UK Department for International Development

IMPACT EVALUATION OF THE SADA MILLENNIUM VILLAGES PROJECT IN NORTHERN GHANA:

ENDLINE SUMMARY REPORT

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Institute of Development Studies

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Results in development

Acknowledgements

This report has been prepared by the team for the impact evaluation of the Millennium Villages Project. The team is composed of staff from Itad, the Institute of Development Studies, the London School of Hygiene and Tropical Medicine, and Participatory Development Associates Ltd (PDA Ghana). The team is fully independent of the Earth Institute, the Millennium Promise and the Savannah Accelerated Development Authority (SADA) who implement the project. The authors of this report are Edoardo Masset, Chris Barnett, Tony Dogbe, Arnab Acharya, Dee Jupp, David Korboe, Kelsy Nelson and Rachel Eager. The report was edited and proofread by Chris Steel, with valuable support from Efi Alamanos.

The findings of this report are the full responsibility of the authors, and any views contained in it do not necessarily represent those of the UK Department for International Development (DFID) or of the people consulted. The team is nonetheless very grateful to all the researchers that have assisted with data collection, the staff at DFID, and everyone else that has provided support, information and comments – including the work of the Earth Institute during the enumeration phase. We are particularly indebted to the support provided by Stephen Adam, Lynne Henderson, Martin Kanyagui, James Bianco and Tom Crowards of DFID Ghana, as well as Seth Ohemeng-Dapaah, Joseph Akolgo, Rafael Flor and Yanis Ben Amor of the Millennium Promise and the Earth Institute. We have also valued comments and technical advice from Patrick Nolen of the University of Essex (and advisor to DFID), plus members of the Evaluation Advisory Group and Peer Review Group.

Open data access

During this evaluation, we have worked closely with the UK Data Archive (UKDA) to make the evaluation datasets available for re-analysis; alongside cooperation from the Earth Institute and the Center for International Earth Science Information Network (CIESIN) at Columbia University.

The UKDA curates the UK's largest collection of digital research data in the social sciences and humanities. It currently hosts all five rounds of household data collected for the impact evaluation of the Millennium Villages in northern Ghana (from 2012 to 2016).

These are available on request from: https://discover.ukdataservice.ac.uk/catalogue/?sn=7734

Contents

List of tables

List of figures

List of boxes

Acronyms

BMI	Body mass index
CEA	Cost-effectiveness analysis
CEW	Community education worker
CF	Far-away control village
CHN	Community health nurse
CHPS	Community-based Health Planning and Services
CHW	Community health worker
CIESIN	Center for International Earth Science Information Network
CN	Nearby control village
CV	Control village
DD	Difference-in-difference
DFID	Department for International Development
DHS	Demographic and health survey
FDR	False discovery rate
GDP	Gross domestic produce
GES	Ghanaian Education Service
GHS	Ghana Health Service
GLSS	Ghana Living Standards Survey
GoG	Government of Ghana
G-PASS	Girls' Participatory Approaches to Student Success
GSS	Ghana Statistical Service
IDD	Initial Design Document
IMF	International Monetary Fund
IMR	Infant mortality rate
IPW	Inverse probability weighting
JHS	Junior high school
LEAP	Livelihood Empowerment Against Poverty
M&E	Monitoring and evaluation
MDG	Millennium Development Goal
METASIP	Medium-term Agriculture Sector Investment Plan
MGCSP	Ministry of Gender, Children and Social Protection
MoFA	Ministry of Food and Agriculture
MoU	Memorandum of Understanding
MPI	Multidimensional Poverty Index

MV	Millennium Village
MVP	Millennium Villages Project
NGO	Non-governmental organisation
NHIS	National Health Insurance Scheme
PAS	Presbyterian Agricultural Services
PDA	Participatory Development Associates
PPP	Purchasing power parity
PRA	Participatory rural appraisal
PTA	Parent–teacher association
PV	Present value
RCA	Reality check approach
SADA	Savannah Accelerated Development Authority
SDG	Sustainable Development Goal
SEND Ghana	Social Enterprise Development Foundation of West Africa
SMC	School management committee
TBA	Traditional birth attendant
U5MR	Under-five mortality rate
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
USAID	United States Agency for International Development
VSLA	Village savings and loans association
WHO	World Health Organization
YEA	Youth Employment Agency

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Executive Summary

Impact Evaluation of the SADA Millennium Villages Project in Northern Ghana

IDS Institute of Development Studies

Participatory Development Associates Ltd. ... everyone matters

The Millennium Villages Project (MVP) aims to demonstrate how the Millennium Development Goals (MDGs) could be achieved locally through an integrated approach to development.

While the MDGs have now been superseded by the Sustainable Development Goals (SDGs, 2016–30), there remains a consistent thread to the MDGs around issues such as eradicating poverty, preventing avoidable deaths and improving education.

Furthermore, the interconnected nature of the SDGs means the MVP model also has relevance for those seeking to address extreme poverty by taking an integrated approach to sustainable development.

This report summarises the findings from what we believe to be the first independent impact evaluation of the MVP approach.

It is hoped that the evidence and analysis will be of relevance to a wide range of actors in international development.

Background to the Millennium Villages project

At a UN Summit in September 2000, world leaders adopted the Millennium Declaration, which committed nations to a new global partnership to reduce extreme poverty and address pressing challenges of hunger, gender inequality, illiteracy and disease.

The MVP aimed to showcase, *'...how effective an integrated strategy for health care, education, agriculture, and small business can be'* Former UN Secretary-General Ban Ki-Moon.

After a decade, around half a million people in 14 different sites across 10 African countries have been part of the global Millennium Villages initiative – an investment totalling in excess of US$300 million.

The MVP can be viewed as an experimental application of the poverty trap theory – where extremely poor countries are 'trapped' in poverty and attempts to increase incomes have very little success. The central thesis of the MVP approach is that undertaking simultaneous investments ('a big push') would lead to a sustained development pathway out of poverty, rather than the more typical approach of smaller investments that are specific to each sector.

The MVP aimed to showcase,
'...how effective an integrated strategy for health care, education, agriculture, and small business can be'
Former UN Secretary-General Ban Ki-Moon.

Typical MVP interventions include:

- Food production
- Nutrition
- Education
- Health services
- Roads
- Energy
- Sanitation
- Enterprise diversification
- Environmental management
- Business development
- Communications
- Water supply

Background to the Millennium Villages project

The MVP was first piloted in Kenya and Ethiopia, and in 2006 was launched at scale. In 2012, the UK Department for International Development (DFID) funded US$11 million into an MVP in Northern Ghana that ran until December 2016.

The project targeted a cluster of communities of up to 26,500 people in the West Mamprusi, Mamprugu Moagduri and Builsa South districts of northern Ghana – an extremely poor area with 80% and 90% of the population living below the national poverty line.

The project was spearheaded by the Earth Institute (Columbia University), with operations overseen by the Millennium Promise and the semi-autonomous Government of Ghana (GoG) agency, Savannah Accelerated Development Authority (SADA).

The project

Timeline
2012 - 2016

Funding
US$11 million

26,500 people
in a cluster of villages

80-90%
of people living below the poverty line

Area of evaluation
Northern Ghana

Northern Region
> West Mamprusi District
> Mamprugu Moagduri District

Upper East Region
> Builsa South District

Rigourous impact evaluation

There have been previous evaluations of MVPs by other researchers. Some have conducted evaluations using data on project and control villages collected by the Earth Institute, although some questions have been raised about the validity of these estimates (Bump et al. 2012). Other studies have exploited data from demographic and health surveys to assess the impact of the MVP (Clemens and Demombynes 2012), or a combination of project data and matched survey data (Wanjala and Muradian 2013).

We believe to date, our evaluation is the most statistically valid, comprehensive and qualitatively informed assessment of impact of the MVP.

Specifically, our evaluation differs from previous ones in four main ways:

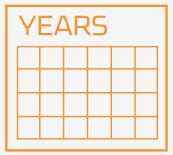
- Data is collected from a sizeable project and matched control groups before and after project implementation.
- Data is collected from repeated interviews with the same households and individuals (panel data).
- Data is collected on a wide range of welfare indicators covering all the MDGs.
- The evaluation is complemented and validated by a concurrent qualitative assessment of the MVP's impact.

At the core of this study, a difference-in-difference (DiD) methodology has been used to estimate impact, based on the difference in the change over time in the average outcomes between the project and in the comparison groups. The study also investigates possible diffusion or displacement effects that may affect the validity of the control groups – that is, where in real world social settings non-governmental organisation or government interventions significantly reduce in the project areas or significantly increase or decrease in control areas. The analysis shows no perverse effects of the MVP on other projects operating in the control areas, and any possible such bias (either way) is likely to be small.

Evaluation key facts

Data collected from sizeable project and control groups

5 survey rounds of households and repeated interviews



5 years duration

Confirmatory and exploratory **analysis**

Data collection on a wide range of welfare indicators

Household surveys in 35 villages within the site and 68 control villages

3 qualitative **impact assesments**

Rigourous impact evaluation

As per the Analysis Plan, the primary aim of the evaluation is to undertake **a confirmatory analysis:** to test whether the project goals and hypotheses are supported by the data, including the achievement of target outcomes (the MDGs), as well as impact heterogeneity, multiple outcomes testing, programme participation and econometric methods.

In addition, the evaluation has undertaken **an exploratory analysis:** testing the theories, enablers and constraints that explain programme success and formulating new hypotheses about how the programme works. This includes analysis of spillover effects, programme impact on non-MDGs outcomes, contributing factors and breaking the poverty trap.

In addition to the DiD analysis of impact, the evaluation deploys a mix of methods. The aim of the qualitative analysis is to help better understand how changes have occurred (or why they have not), unintended effects and how the project affects those who are poorest and most marginalised in the area.

There are three qualitative modules

1. An **institutional assessment** that captures institutional change, particularly at the district and community levels.

2. A **reality check approach** that uses a condensed immersion approach to better understand the realities of households and unintended consequences for them.

3. An '**interpretational lens**' that uses an adapted form of participatory rural appraisal to obtain feedback and insights to help interpret the initial statistical findings, using different well-being groups.

Researchers help with chores creating an informal context for conversations

The aim of the qualitative analysis is to help better understand how changes have occurred (or why they have not), unintended effects and how the project affects those who are poorest and most marginalised in the area.

Impact on poverty and the MDGs

Our approach to assessing poverty is grounded in the official MDG indicators. However, acknowledging the potential measurement issues arising from this approach, we carried out complementary analysis, including use of recognised indicators of income and consumption and the Oxford Multidimensional Poverty Index. Debate on the validity of income versus consumption indicators of poverty highlights the lack of consensus on the superiority of either approach. Our analysis therefore considers both approaches with supporting evidence from the qualitative assessment.

Overall, the project had a statistically significant impact on seven out of the 28 MDG outcome indicators – which, at a headline level, has some consistency with the retrospective evaluation of 10 MVP sites, where one third of its targets were met (Mitchell et al. 2018). In Northern Ghana, the MVP did not however achieve the MDG target to reduce extreme poverty and hunger at the local level (Goal 1), although reducing poverty on this scale is very hard to achieve within a five-year period.

Our exploratory analysis shows that **incomes did increase, but that this did not result in increased consumption. Instead, people appear to have viewed any income rise as a temporary phenomenon, with some saving in the form of liquid assets (e.g. chickens, guinea fowl, goats).**

The qualitative studies further highlight the complexity of the income-expenditure-savings dynamic, particularly given the local context and deeply entrenched behaviours (such as surplus cash earmarked for a backlog of funerals that may be delayed for many years and unlikely to be captured in survey data).

Overall, there is no evidence that people living in the MVP areas have escaped the poverty trap. Incomes have grown at the same rate for all households, leaving inequality unchanged. Income growth has been neither pro-poor nor pro-rich and has increased in a similar fashion for all households. This is supported by qualitative studies, which similarly found little discernible difference, although this was largely because – apart from only very small percentages of inhabitants being classed as 'better off' – there was so little to separate different well-being groups anyway.

In terms of the other MDGs, there was some attributable progress against three other goals. Namely, the project did increase primary enrolment rates (Goal 2); it increased the proportion of births attended by professionals and the number of women said to be using contraceptive methods, although it is not possible to assess the effect on maternal health (Goal 5); and, lastly, it increased access to and use of improved toilets (a target under Goal 7), although there is qualitative evidence that this is unsustainable.

The study also considers spillover effects, and whether project benefits extend to control areas by distance, using a stratification of near and far-away control groups. The overall findings do not, however, support the hypothesis of geographic spillover effects whereby the benefits may have spread from the project to the control areas.

In the last two years of the project more toilets were built but evidence already suggests that people are not using them or they are already in a state of disrepair

There is no evidence that people living in the MVP areas have escaped the poverty trap. Incomes have grown at the same rate for all households, leaving inequality unchanged.

Exploratory findings

Beyond monetary-based measures of poverty, there is evidence that well-being may have improved.

We have considered this in two main ways.

First, an analysis of the Multidimensional Poverty Index (MPI) (multiple deprivations in living standards, health and education) shows that the MVP produced an attributable reduction in multidimensional poverty. We tested the sensitivity of this finding and no single indicator is driving the MPI result, but two indicators together may be (improvements in school attendance and sanitation).

Second, the MPI is generally corroborated by people's own perceptions of improvements in well-being; with life in the MV areas seeming to have got better across a range of dimensions.

As the qualitative studies demonstrate, there has been a noticeable change in the MV areas over the period, with road and electricity improvements, greater access to public provision of services (especially health, but also items such as tractor hire) and growing cash needs (where they could be met). Indeed, people's welfare is likely to be linked to perceptions around access to public health, education and so forth – which have been significant (and tangible) MVP investments in the locality.

As the qualitative studies demonstrate, there has been a noticeable change in the MV areas over the period, with road and electricity improvements.

Greater access to public provision of services (especially health, but also items such as tractor hire)

Health

In terms of health, the MVP has contributed to improvements in health facilities (with increased numbers of patients visiting), plus an increase in home visits by community health workers – though the quality of the latter is not fully understood, with concerns that it was driven more by the project requirements to distribute items. For health outcomes, the most significant impact of the MVP has been the reduction in the prevalence rates of stunting, with mothers consciously increasing the protein content of their children's diets, and children eating more meals overall (as confirmed by our assessment of the dietary indices). This positive impact of the project on stunting is encouraging, as stunting is an indicator of long-term undernutrition and an improvement in height generally lasts longer than improvements in weight.

There has also been an impact in terms of reducing severe malaria, plus increased vaccination of tuberculosis, diphtheria, pertussis (whooping cough), tetanus and measles. The project does not seem to have reduced the most common symptoms of diseases (fever, coughs and diarrhoea) affecting children.

Education

In the education sector, MVP interventions have led to improvements in school facilities, staffing and student/teacher ratios and school attendance. Despite this, there has not been much improvement in the learning outcomes of school children in the MV areas, which suggests a significant gap in the education system between children attending and the quality of their learning.

The qualitative studies highlight several contributory factors to this gap, including poor quality and maintenance of school buildings; perceptions by teachers that their posting to these remote areas is short-term; anecdotal evidence of poor-quality teaching and attendance; and little change in children's motivations to attend school (and motivations to learn).

Agriculture

In terms of agriculture, there has been an impact on agricultural production and reducing food insecurity. This can be explained through input increases (fertilisers, seeds, land, tractor rental and other animals/machinery for hire), as well as the land area dedicated to maize and beans increasing considerably in the MV areas.

As the qualitative studies show, some of this impact has been the result of prior and complementary initiatives in the area, such as the Presbyterian Agricultural Services, the Ministry of Food and Agriculture, Technoserve and the Association of Church Development Programmes. In particular is the shift from millet to maize production (which the MVP was able to build upon and intensify), where the shorter cultivation period for maize has allowed many farmers to grow a second winter crop for the first time (e.g. cowpeas).

Cost-effectiveness of the Millennium Villages Project

The ambition of the MVP was that, by doing everything together, there would be a synergistic effect that would provide greater value for money than would be possible through individual sector-based interventions. The unique nature of the MVP (in terms of the scope of its ambition and the complexity of the interventions) meant that no direct comparison for the overall project was available in the literature. Nevertheless, disaggregating costs and benefits by sector provides a good alternative – that is, if the synergistic effects of the project are significant, then we should expect higher value for money from such sector-based cost-effectiveness analyses (CEAs) compared with more typical single-sector interventions (in health, education, etc.).

The total expenditure on the MVP in Northern Ghana between 2012 and 2016 amounts to US$15.3 million, when discounted to the year 2012 and accounting for the time when goods are used (not just purchased). Health and infrastructure were the largest sectors in terms of project spend, with management and overheads accounting for around a third of the total. The cost per capita was US$360 in 2012 present value terms, or US$88 per capita per annum.

Across the key impact areas of income, health and education, the MVP compares unfavourably with other projects in terms of the cost-effectiveness of service delivery. The returns to investment in education appear to be highest, although it is believed that similar results could have been achieved at significantly lower cost. For health outcomes, these could have been achieved at a much lower cost; and income gains through agricultural productivity are significant, while the contribution that will infrastructure made towards this rise in income is unclear. Nonetheless, it is possible that benefits will continue to arise in the future, and the lack of precise comparators means the difficulties of delivering such a project in Northern Ghana may be underestimated.

Health and infrastructure were the largest sectors in terms of project spend, with management and overheads accounting for around a third of the total. The cost per capita was US$360 in 2012 present value terms, or US$80 per capita per annum.

We have therefore undertaken further analysis and discussed at length the interpretation of the CEA. The management and overhead costs of MVP amount to 31% of all costs, and, if the project were to be replicated, it is possible that these costs could be significantly reduced (e.g. fewer international staff, greater use of local systems of delivery, etc.). Our sensitivity analysis shows that this would improve overall value for money but, even with a 50% cost saving on management costs, the achieved income-generating impact would only just be cost-effective, while health and education would not. While comparing costs to other projects or the GoG per capita spending, while MVP spending is not excessive, we show MVP fell far short of being cost-effective.

Sustainability of the Millennium Villages Project

In the longer run, the MVP may of course produce welfare gains, and ultimately be viewed as cost-effective, yet early indications show that the MVP approach will be difficult to sustain by district institutions and at the community level. Also, there are signs that any gains made under the project are already being undermined (a few months after project closure).

District assemblies in Ghana are often cash-strapped because they are unable to generate revenue of their own and the funds they receive from central level are often three quarters in arrears. Yet the project has created (in effect) a resource-intensive, parallel structure (e.g. with funds not making use of district tender boards, payments directed to the accounts of individual district staff, etc.). District officials also cite the inadequacies of long-term strategic thinking, such as how to sustain the many 'free service' interventions of the MVP (e.g. free ambulance services, the supply of medicines, subsidised tractors, monthly allowances to district officials or top-up salaries to community health workers and community education workers). Undoubtedly, other programmes may pick up some of these, but much is uncertain at the time of project closure.

Early indications show that the MVP approach will be difficult to sustain by district institutions and at the community level.

Some villagers found alternative uses for the mosquito nets provided

Conclusions and lessons

The evaluation findings highlight broader challenges around the ability to achieve sustainable change through large-scale, multi-sectoral programmes - with lessons also for the current vogue of complex programmes aiming to achieve the SDGs.

The CEA suggests that the project has not (so far) yielded sufficiently positive results; it seems to have fallen short of producing a synergistic effect, and what has been achieved could have been attained at a lower cost.

While the high ambitions of the project are admirable, reducing poverty on this scale is very hard to achieve within the lifespan of a programme. It is perhaps unsurprising that the MVP has made such less-than-expected progress against the MDGs, as projects are rarely assessed against impact (or final outcome) indicators such as the MDGs.

Yet there have been some important gains that will benefit people in the area, with improvements in income and people's welfare and reductions in the prevalence of stunting and severe malaria, plus vaccinations against major diseases. In addition, there have been improvements in health and school facilities, with rising school attendance, agricultural production and food security.

The CEA suggests that the project has not (so far) yielded sufficiently positive results; it seems to have fallen short of producing a synergistic effect, and what has been achieved could have been attained at a lower cost. Of course, in the long run, the MVP may produce welfare gains. For example, health care service improvements during the MVP period may improve health later on; or other considerable investments in infrastructure (roads, health and school facilities) may have an impact on future outcomes.

Conclusions and lessons (continued)

Finally, there are a number of lessons for such interventions in the future.

1

While the MVP model recognises the need to address many interrelated challenges, attempting to address all at once appears not to have delivered significant results, nor synergistic effects. Instead, addressing specific sector-based problems (but taking account of the interconnections within the broader system) may still yield better and more cost-effective results.

2

Although many individual interventions and particularly the 'quick wins' have been scientifically tested (e.g. vaccinations, bed nets, fertiliser, etc.), there is a need for considerable experimentation and testing in context – i.e. working with the current political economy of what is possible by district and community institutions, as well as the local cultures and behaviours that change and adapt technologies and know-how.

3

Sustainability is a challenge, and there is a need for early strategic thinking beyond the project lifecycle, particularly for approaches like top-up allowances, community education workers and new health facilities ('super-CHPS'), given their implications for government funding and delivery in the long term. In particular, expenditure in MVP has focused primarily on building infrastructure, supplies and staffing, with insufficient attention to the role of behaviour change in producing a long-lasting impact (such through better agricultural practices, approaches to nutrition, etc).

4

However laudable the aims to assist the poorest, the evaluation comes too late to inform a decade of MVP investments across 10 African countries. Given the significance of the policy and programming decisions around the MDGs, having rigorous evidence programmed in earlier would have helped to better inform investments in the MVP approach.

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All other photographs taken by the Reality Check Approach (RCA) Team.

Chapter 1. Introduction

1. This report presents the endline findings from an impact evaluation of the Millennium Villages Project (MVP) in northern Ghana, as commissioned by the UK Department for International Development (DFID).[1] The Ghana project ran from May 2012 until December 2016,[2] with interventions targeting a cluster of 35 communities with the aim of achieving the Millennium Development Goals (MDGs) – eight globally endorsed targets that address the problems of poverty, health, gender, equality and disease. This is the first Millennium Village (MV) to be accompanied by an independent impact evaluation, and the findings have broader appeal to those seeking to address the root causes of extreme poverty by taking a holistic, community-led approach to sustainable development – such as the Earth Institute's Centre for Sustainable Development, which aims to translate the Sustainable Development Goals (SDGs) into meaningful policies and solutions.

2. The MVP has been designed to demonstrate how an integrated approach to development can translate the international MDGs into results, and sustainably address extreme poverty. MVP was spearheaded by Professor Jeffrey Sachs, while Director of the Earth Institute at Columbia University, working closely with the United Nations Development Programme (UNDP) and a range of donors. MVP has previously been piloted in Kenya and Ethiopia, and in 2006 launched at scale to reach nearly half a million people in 10 countries across sub-Saharan Africa.

3. This final report is based on five survey rounds of household (and other) data collected from 2012 to 2016, as well as three qualitative studies that were undertaken during the baseline (2012), midterm (2014) and in the final years (2016–17). The analysis highlights changes compared with the baseline, and isolates impacts that can be attributed to the MVP through the use of control groups. The evaluation aims to model good practice in transparency and re-analysis, and this report builds on a series of publicly available reports and datasets, including:

   - **The Initial Design Document**,[3] which sets out the detailed evaluation design.
   - **The Baseline Report**[4] and **Midterm Report**,[5] which analyse the full household survey, plus the qualitative research (institutional assessment, reality check, participatory rural appraisal (PRA) assessments).
   - **The Year 2 Report**[6] and **Year 4 Report**,[7] which analyse the 2013 and 2015 household datasets that used a reduced instrument focused on a narrower subset of modules (e.g. demographics, consumption).
   - **The Analysis Plan**,[8] which sets out at least two years in advance how the evaluation team intends to analyse the main quantitative datasets in the final evaluation report.
   - **The 2012, 2013, 2014, 2015 and 2016 household datasets**, which are available for re-analysis (by request from the UK Data Archive).[9]

1 The Terms of Reference for the assignment are included in the IDD (Masset et al. 2013b), Appendix A.
2 The MVP continued to deliver sustainability activities until March 2017. This included handing over projects and activities to the government departments or community level functions responsible for delivering the relevant interventions.
3 http://www.ids.ac.uk/publication/an-impact-evaluation-design-for-the-millennium-village-project-in-northern-ghana
4 http://www.ids.ac.uk/publication/millennium-villages-impact-evaluation-baseline-summary-report
5 http://www.ids.ac.uk/publication/millennium-villages-evaluation-midterm-summary-report
6 http://www.ids.ac.uk/publication/northern-ghana-millennium-villages-impact-evaluation-preliminary-report-on-the-second-round-of-data
7 http://www.ids.ac.uk/publication/northern-ghana-millennium-villages-impact-evaluation-preliminary-report-on-the-fourth-round-of-data
8 http://www.ids.ac.uk/publication/northern-ghana-millennium-villages-impact-evaluation-analysis-plan
9 https://discover.ukdataservice.ac.uk/catalogue/?sn=7734

1.1 Background to the Millennium Villages Project

4. At the UN Millennium Summit in September 2000, world leaders adopted the Millennium Declaration, committing nations to a new global partnership to reduce extreme poverty and address pressing challenges of hunger, gender inequality, illiteracy and disease. Targets were set for the MDGs to be achieved by 2015. In 2002, the Millennium Project was commissioned by the Secretary-General to create a global plan of action to achieve the MDGs. The MVP was created to explicitly demonstrate how the MDGs could be achieved at the local level, using an integrated and scaled-up set of targeted investments based on the recommendations of the UN Millennium Project. The interventions within the MVP cover food production, nutrition, education, health services, roads, energy, communications, water supply, sanitation, enterprise diversification, environmental management and business development. The initiative makes use of community decision making through science-based technologies and techniques, such as agroforestry, insecticide-treated malaria bed nets, antiretroviral drugs, remote sensing and geographic information systems. The MVP model is a 10-year initiative with two 5-year phases.

5. The *first phase* of the MVP approach focuses on achieving quick wins,[10] especially in staple crop production and disease control, and on establishing basic systems for integrated rural development that help communities escape the poverty trap and achieve the MDGs. The interventions are delivered at a cost of approximately US$120 per capita per year, of which the MVP contributes around half to complement funds from the host government, the local community and other partners. The *quick wins* are complemented by infrastructural improvements (buildings, roads, energy, water and sanitation), which are necessary to strengthen the primary health care and education services, and to facilitate development of agricultural markets and business development. The revitalisation and strengthening of community institutions (such as local government and sector-based institutions) and the implementation of strategies to increase women's participation and leadership are also important facets of the MVP approach. The *second phase* focuses more intensively on commercialising the gains in agriculture and continuing to improve local service delivery systems to support the local scale-up.

6. Central to the MVP approach is the value *of integrated community-based investments* in scientifically proven interventions, delivered simultaneously rather than as one-off investments. The premise is that a critical platform of basic needs must be reached before economic development can take off. The interventions are implemented in a multilayered, multisectoral and integrated manner. The rationale underpinning this approach is rooted in the following explanations:

   - To address multiple objectives across a range of areas (health, poverty, disease control, nutrition etc.), a holistic strategy with a range of tools (community-based clinics, diversified local food production, malaria control etc.) is needed.
   - These multiple tools are synergistic, with each supporting a main objective but also contributing to progress on several or all of the goals.

1.1.1 The Millennium Villages and the poverty trap theory[11]

7. The MVP can be viewed as an experimental application of the poverty trap theory presented by Jeffrey Sachs and collaborators in a paper published on the *Brooking Papers on Economic Activity*

10 'Quick wins' are defined as scientifically proven interventions that can achieve wide coverage and lead to dramatic gains in short periods of time. The quick win interventions are: (i) distribution of improved seeds and fertiliser; (ii) distribution of long-lasting insecticide-treated bed nets; (iii) basic immunisations; (iv) vitamin A campaigns; and (v) community wide deworming to reduce levels of intestinal parasitosis. Note: The term 'scientifically proven' is used here to denote interventions where there is strong evidence that they work (e.g. it is known that maize yields significantly increase in response to the application of artificial fertiliser), but which may understate the importance of more contextualised knowledge about what works well under particular sociocultural and political circumstances.

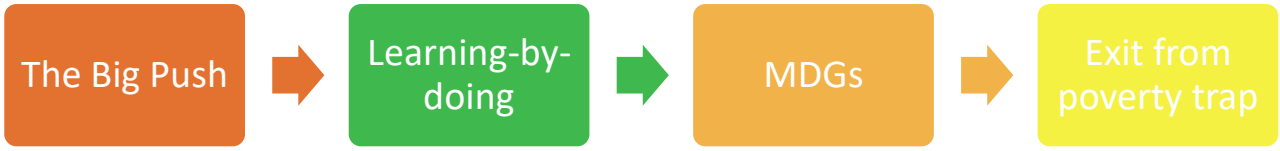
11 For a full discussion of the 'poverty trap', please refer to the IDD (Masset et al. 2013b).

(Sachs et al. 2004). In this paper the authors propose a revival of a classical economic development theory: at very low levels of income the returns to capital investments are not as large as assumed by mainstream economic theory. On the contrary, poor human and physical infrastructure, at low levels of incomes, result in very low returns to investments. As a consequence, extremely poor countries are 'trapped' in poverty as attempts to increase incomes have very little success. The authors then discuss at length the factors that determine poverty traps in African economies. These include: high transport costs; poor agricultural productivity; burden of malaria and poor health; and a history of colonisation and depredation.

8. The implication of the poverty trap model is that small investments in poor countries are unlikely to bring any benefit in the long term. In order to bring countries on a sustained development path, large and simultaneous investments are required (the 'big push'). The authors proceed to delineate the modality of how a big push could be implemented in the African continent. They find that the MDGs are the best indicators for monitoring country progress out of the poverty trap. They suggest a set of interventions that are to be implemented by central governments with the support of donors and local governments, in the following areas: agricultural productivity; health, nutrition and family planning; primary education; urban infrastructure and services; science and technology; gender equity; and regional integration. It is important to note that the authors are firmly convinced that 'we know what works' in achieving the MDGs. This point is forcefully made in the report to the UN Secretary by the Millennium Project 'Investing in Development' (Millennium Project 2005).

9. The theory outlined in the paper and the report quoted above has found a practical application in the MVP. Clusters of villages receive a simultaneous package of interventions including: infrastructure; business development; agriculture; health; and education. Though we know what works in general, it is acknowledged that we do not know with certainty what works in different specific circumstances. Hence, the project requires that a process of learning-by-doing should be put in place in every community in order to select the right mix of development interventions specific to the area. The programme theory is broadly sketched in Figure 1 below.

Figure 1. Simplified programme theory



10. There are a number of assumptions behind this theory, which are explored in more detail in the causal chain analysis presented as part of the main findings (especially Chapters 7, 8 and 9 in relation to health, education and agricultural outcomes).

1.1.2 Northern Ghana Millennium Villages Project

11. As part of its second phase of implementation across Africa, the Millennium Promise Alliance approached DFID to finance a Millennium Village[12] in rural northern Ghana. The proposal was for the design, implementation and monitoring of a five-year set of integrated interventions to accelerate development in a cluster of communities of up to 30,000 people based on the MV model, with potential to be substantially scaled up. The UK provided £11 million between 2012 and 2016 for the implementation of this new MV site in West Mamprusi, Mamprugu Moagduri and Builsa South

12 For simplicity, the project often referred to each MV as a 'village' even though it consisted of a cluster of adjacent villages.

districts of northern Ghana.[13] By supporting a new MV along with this independent and rigorous evaluation, DFID and the semi-autonomous Savannah Accelerated Development Authority (SADA)[14] aimed to provide robust evaluation evidence of the effectiveness of the MV model and integrated rural development approaches as well as how to evaluate them to increase the effectiveness of future development policy and interventions. Previous evaluations have been mostly internal, undertaken by the Earth Institute and the MVP implementation team, and therefore not viewed as independent. Furthermore, they have been criticised for not being rigorous because of their reliance on before-and-after datasets (Millennium Promise 2010), which often show positive trends without a sufficiently robust control group to enable the measurement of the net effect in the MV site.[15]

12. The stated aim of the MVP in northern Ghana was to achieve, '*accelerated progress towards the MDGs*', with the goal to have a regional impact on poverty in the Northern/Upper East regions; with the proportion of the population living below the extreme poverty line reducing from 52.3% (Northern Region) and 70% (Upper East region) to 33% overall by the end of 2016. [16] The target for under-five mortality is that it will fall from 124 deaths per 1,000 (Northern) and 98 deaths per 1,000 (Upper East), to 54 by the end of 2016. Endline progress against the MDG indicators is presented in Chapter 4, based on local level changes recorded in the project (treatment) and control sites.

1.2 Lessons from other integrated rural development programmes

1.2.1 Integrated rural development programmes

13. The MV model builds on the integrated rural development approach, which initially evolved in the 1970s out of earlier large-scale state investment in rural areas and agriculture. This approach shifted priorities towards the social investments needed for rural development, alongside infrastructure and agricultural productivity, including investing in human capital through education and health. Integrated rural development has been seen as a potentially powerful approach to tackling poverty reduction, but has also been subject to substantial criticism,[17] with limited evidence of sustained positive impact from the initial programmes in the 1970s (ODI 2008). On the other hand, it has been argued that balanced approaches to tackling rural poverty have since evolved that build on the earlier thinking around integrated rural development (ODI 2002).

14. The concept of integrated rural development makes some basic assumptions about rural areas in developing countries (Ahmad 1975). To start, it has the expectation that the systems in rural areas will match the market economy; the market economy is seen as the 'natural' state of the economy, and not a system that rural areas need to adapt to. It also expects the local farmers to be eager to adopt new technologies. In addition, for an integrated rural development project to be implemented, the presumption is that the state already has a cohesive rural development strategy at the national level, and that the objectives of development are the same as that posed by integrated rural development. We know from accounts of complexity that this is often complicated by authoritarian governments (Ruttan 1984) and ethnic tensions (Godart 1966). Lastly, integrated rural development approaches typically benefit from the buy-in of diverse financial and institutional authorities. The

13 At the start of the MVP in the SADA area at the beginning of 2012 there were two districts (West Mamprusi and Builsa). In 2012 both districts were split into two, making a total of four districts. The MVP is implemented in the three districts stated above.

14 The SADA Strategy, '*A Sustainable Development Initiative for the Northern Savannah*', emphasises mobilising and coordinating increased investment from public and private sources in order to stimulate private sector-led economic growth, along with careful monitoring and evaluation of development interventions in order to maximise impact.

15 This has been highlighted by several commentators of the MVP approach to evaluation, such as Michael Clemens. See for example 'Impact evaluation in aid, what for, how rigorous?', presentation for the Royal African Society and ODI, Centre for Global Development, 3 July 2012, London, UK.

16 Source: The stated objectives in the Logframe for the Millennium Village in Northern Ghana, DFID.

17 See DFID (2004). This evaluation concludes that 'Farm output did not increase as expected and economic rates of return were therefore substantially reduced. The objectives presented at appraisal were not achieved as planned.' See also, for instance, Ruttan (1975).

state, international development organisations, the private and voluntary sectors together with the influx of foreign aid all come together to create an integrated approach (Ahmad 1975). This synergy and collaboration makes integrated rural development different from a rural relief programme, which is simply aiming at resolving a single issue or providing temporary relief from a crisis.

15. One criticism of integrated rural development projects has been their reliance on setting up substantial project management units to bypass weak domestic agencies. This negatively affects project sustainability since local institutions and communities are then left with minimally improved capacity to continue with operational issues once the temporary management unit is dismantled (USAID Armenia, no date). An external review by ODI (2008) noted that the extent of these parallel administrative arrangements in the MV model is limited in comparison with some of the grander designs of integrated rural development projects. The main finding from a synthesis of experience of large-scale integrated rural development projects in Africa (DFID 2004) is that projects should be less ambitious, more carefully prepared and focused on new technologies offering the best chance of success. A report for United States Agency for International Development (USAID) on the lessons learned from the integrated rural development approach notes that the challenge in achieving sustainability has been to ensure that rural communities establish local organisations to continue to meet their needs, so that local governments and communities can assume greater responsibilities and drive local development.

1.2.2 Evaluations and studies of the Millennium Villages Project

16. There have been evaluations of the MVP by other researchers. Some have conducted evaluations using data on project and control villages collected by the Earth Institute (Remans et al. 2011, Pronyk et al. 2012), though serious doubts were raised about the validity of these estimates (Bump et al. 2012, Clemens and Demombynes 2012). Other studies cleverly exploited data from demographic and health surveys to assess the impact of the MVP (Clemens and Demombynes 2012). Finally, one study used a combination of project data and matched survey data to assess the impact of the MVP in Kenya (Wanjala and Muradian 2013). Most recently, the Earth Institute and Millennium Promise have collaborated with others to produce a retrospective endline evaluation across all 10 MV sites (Mitchell et al. 2018).

17. Wanjala and Muradian (2013) assessed the impact of the MVP in Kenya. While they found significant impacts on agriculture productivity, self-consumption, production margins and total income on target households, they called for revising assumptions about the link between agricultural productivity and cash income relied on by the MVP and other rural development programmes. Pronyk et al. (2012) assessed the impacts of the MVP against MDG-related outcomes three years after implementation in nine countries by comparing changes to reference data. Overall, they found positive results in the MVs, such as a reduction in poverty, food insecurity, stunting and malaria. However, Bump et al. (2012) raised concerns about Pronyk et al.'s methodology in a letter to *The Lancet*. They raised three points of contention with Pronyk's study, including that some of the findings are misleading or even incorrect.[18] Clemens and Demombynes (2012) used the MVP as a case study to make arguments for and against employing rigorous impact evaluations to estimate programme impact. They compared trends in the MVP's intervention sites in Kenya, Ghana and Nigeria with trends in nearby areas to estimate project effects. They concluded that rigorous impact evaluation is an essential methodology for projects like the MVP since before-and-after estimates can be weak indicators of impact.

18. In addition to the evaluations mentioned, the Overseas Development Institute undertook a formative review of the MVP to assess both its scalability and sustainability (Buse et al. 2008). The

18 The three concerns raised in the letter are: (i) the headline finding is not statistically significant and the authors do not display the relevant 95% confidence interval around the estimated on-site decline; (ii) the reported percentage in the decline of child mortality is incorrect; (iii) the nationwide rate of change in mortality is greatly underestimated.

review looked at MVPs in four countries and two sectors to understand how their sustainability could be improved. The research concluded that the MVP model:

- shows that investing heavily in evidence-based, low-cost interventions at the village level can help make progress towards achieving the MDGs
- can provide insights, but not address within its budgetary constraints the complementary upstream investments and institutional reforms needed for the sustainability and scalability of village-level interventions
- when scaling up, the MVP model needs to take on the development priorities of the countries in which it is being implemented.

19. Our evaluation differs from previous impact assessments and studies of the MVP in four ways. First, data are collected from sizeable project and control groups before-and-after project implementation. Second, data are collected from repeated interviews with the same households and individuals (panel data). Third, data are collected on a wide range of welfare indicators covering all the MDGs. Fourth, the evaluation is complemented and validated by a concurrent qualitative assessment of the MVP's impact. We believe that, to date, these elements make our evaluation the most statistically valid, comprehensive and qualitatively informed compared with what has been conducted to date (Masset et al. 2013a).

1.3 Understanding the Millennium Villages Project model

20. The MV model provides an integrated package of interventions that aims to lift rural communities out of poverty. The central hypothesis is that by addressing the most immediate capital deficiencies in communities and households through a form of local 'big push', this provides the necessary conditions for reaching the threshold required to move towards local resilience and self-sustaining economic growth. A key part of the approach is to improve agricultural productivity and market development, enabling people living in rural areas to save and accumulate wealth, stimulating investment and diversification into non-farm work. MV projects have set up comprehensive monitoring and evaluation (M&E) systems, which have been used to assess progress and adapt implementation. This has also enabled the reporting of results within the MV sites (Masset et al. 2013a).

1.3.1 Millennium Village Project key premises

21. Across all MVPs there are key premises and a core set of multisectoral interventions that are implemented holistically. The interventions are expected to deliver a greater impact due to synergistic effects than they would if delivered separately.[19] In the context of rural sub-Saharan Africa, the MVP model posits that increased agricultural production is needed to alleviate extreme poverty. Also, the MDGs should enable the empowerment of communities so that citizens have enhanced capacity in technical, managerial and participatory skills. Finally, interventions should be linked to district, national and global strategies, and lessons from the MVPs should be used to inform national policymaking and decisions about development programming (MVP 2007, Sanchez et al. 2007).

22. Gender equality and environmental sustainability are also a main principle of the MVP approach (Sanchez et al. 2007, MVP 2011). This is most evident in the direct interventions, such as the focus on maternal health, on getting girls into school, and on tackling malaria, which is regarded as a leading cause of mortality and morbidity among pregnant women and among children under five. For instance, to eliminate gender disparity in primary school attendance, separate school latrine facilities are created for girls and learning content is made more relevant to girls. And women of

19 The interventions are implemented in agriculture, education, health, energy, infrastructure (including water and sanitation) and business development.

childbearing age, including non-pregnant women and adolescents, are targeted with micronutrient supplementation.

23. MVP's approach is said to be different from the integrated rural development projects of the 1970s and 1980s because of the way MVP engages with communities and the government, and how interventions are delivered. Within a 'learning-by-doing' framework, the MVP focuses on participatory community decision making to align with the realities in the communities where the project is implemented. The interventions themselves are mutually reinforcing so that they link to community activities and expect to enhance outputs. In terms of inputs, new technologies such as insecticide-treated bed nets, which were not available when the integrated rural development model was implemented in the past, are provided to communities. The MVP is also monitored and evaluated throughout the project lifestyle and has quantifiable and time-bound targets in order to reach the MDGs by 2015. Finally, unlike previous integrated rural development targets, the MVP works to strengthen decentralisation processes (MVP 2011).

1.3.2 Quick wins

24. The MVP's interventions aim to be staggered over the project lifecycle to ensure they are appropriate for the local conditions and priorities. The initial phase of the project lasts between 12 and 18 months and tends to focus on 'quick wins' identified by the UN Millennium Project,[20] and are contextualised for each Millennium Village site. The generic quick wins are as follows (Sanchez et al. 2007, MVP 2011):

- Improving food security through increased food production. This is achieved by subsidising the provision of improved seeds of high-yielding crop varieties or hybrids, and the necessary amounts of mineral and organic fertilisers. In addition, farmers are trained on agronomic practices to eliminate 'hunger months' and to generate crop surpluses.
- Controlling malaria infection by distributing long-lasting insecticide-impregnated bed nets to households. Community health workers (CHWs) train households on how to use the bed nets and monitor their use. In addition, there is increased access to anti-malaria medicines, which helps reduce the disease burden of malaria.
- Improving diet diversity by supporting school meals using locally produced food, drawing from the significant increases in local food production.
- Carrying out immunisation and deworming campaigns.
- Community capacity building processes to empower villagers to manage their own development more effectively and to enhance the sustainability of interventions.

1.3.3 Leveraging

25. The MVP theory hypothesises that a mix of public and private investment (e.g. the cost is shared by the community, government and donors) in science-based and community-led interventions will help create long-term and self-sustaining economic development. In partnership with Millennium Promise, host countries, UN agencies, multilateral partners, individuals, corporations and foundations leverage their expertise, resources and technology to support MVPs in many ways.

26. In host countries, local, regional and national government structures are consulted in the planning and execution of the MVP. They help deliver some of the core interventions such as supporting infrastructure projects or removing barriers to accessing health care by eliminating user fees. The Open Society Foundations has provided financial and leadership support, including US$27.4 million to support core MVP interventions, key staff positions, and financing the project's M&E activities. In

[20] Millennium Villages Project: FAQ: http://millenniumvillages.org/wp-content/uploads/2013/02/MV-FAQ.pdf

addition, the Soros Economic Development Fund committed to provide up to US$20 million in loans to support investment-worthy business projects that arise from the work of the MVP during the second five-year phase. UN partners and other multilateral agencies are leveraged to help with public health initiatives, purchasing crop surplus for regional food aid distribution, providing administrative, operational and technical support (MVP 2011).[21]

1.3.4 Formalising and institutionalising

27. The second goal of the MVP is to create a system for success. 'System' means a clearly defined pathway to achieve the MDGs and a 'toolkit' that can be transferred from the MVs to other parts of rural Africa. These tools include organisational strategies (for example, a detailed system for deploying CHWs), specially designed software, and a real-time information system that documents progress and detects problems in real-time (MVP 2011).

1.3.5 Community mobilisation

28. Local institution building, participation and community empowerment are a key part of the Millennium Village approach, with local committees being established to agree on the use of and responsibility for shared assets. It has been noted that to establish committees is relatively easy, while ensuring that they operate effectively over an extended period, and in ways that prevent social exclusion and elite capture, is more complex (Cabral et al. 2006).

29. The MVP model encourages producers to work cooperatively through farmer-based organisations (FBOs). The FBO model allows producers to collectively store, market and transport crops, giving them access to larger markets from which they would be excluded if producing alone. Other examples of community mobilisation activities include the formation of Water, Sanitation and Hygiene Committees that manage community water points. The MVP also implements community-led total sanitation to encourage households to build their own latrines and stimulate hygienic behaviour change.

1.3.6 Northern Ghana Millennium Villages Project causal chains

30. It is very difficult to pin down the overall theory of change for the northern Ghana MVP. The project itself does not have an overarching theory of change underpinning the programme logic to articulate how the inputs-to-outputs-to-outcomes achievements result in MDG-level impacts. This is partly because of the programme's complexity since multiple interventions are designed to lead to multiple outcomes, but also because the MVP adjusted its interventions each year rather than delivering a fixed package of projects. At the baseline, the evaluation team attempted to reconstruct the theory of change using a series of detailed, generic 'intervention logics' from the Earth Institute.[22] While these intervention logics provide a basic understanding about the causal chains and assumptions in a handful of MVP sub-components, they did not accurately represent the interventions that were actually implemented in northern Ghana. They also lacked sufficient detail about how activities are sequenced and interlinked, such as how vaccines might improve health or increase labour availability in farming. Instead, the evaluation focused on testing the overarching economic theory about the poverty trap, and it is based on theoretical and empirical research that does exist, as outlined in the Initial Design Document (IDD) (Masset et al. 2013b).

31. The evaluation team initially attempted to uncover common findings by sequencing the evaluation's qualitative studies after a preliminary analysis of the quantitative (largely household survey) dataset.

21 http://millenniumvillages.org/about/partners/

22 See the IDD, Appendix B. http://www.ids.ac.uk/publication/an-impact-evaluation-design-for-the-millennium-village-project-in-northern-ghana

This, however, proved difficult because of the logistical challenges of sequencing data collection activities, including the time lag between the studies, variability in the studies' geographical coverage, and each study's different sample size. During the final year of the evaluation, the evaluation team was able to reconstruct causal chains[23] for various parts of the project's implementation using information from project reports, field visits and survey work.[24] The sectoral causal chains were developed and verified with the project staff. These sectoral causal chains were used to guide the evaluations qualitative data collection (mainly the PRA and Institutional Assessments) and framed the subsequent analysis (from both quantitative and qualitative datasets) as presented in Chapter 7 (Health), Chapter 8 (Education), Chapter 9 (Agriculture) and Chapter 10 (Sustainability and Institutional).

1.4 Overview of the evaluation design

32. The evaluation uses a mixed method approach to impact evaluation (Masset et al. 2013a, 2013b). At the core of the methodology is a difference-in-difference (DD) design that compares changes in outcomes in the MVP areas before implementation to post-implementation, with changes in the same outcomes for an explicit control group. DD allows the evaluation to isolate the MVP impact on outcomes (including poverty, child development, undernutrition and child mortality) from effects of other variables changing over time. The overall purpose of the evaluation is to assess the impact of the MV, as outlined in the evaluation Terms of Reference[25] and also assess why and how things work, including investigating the theory and assumptions behind the intervention, and checking for unintended effects (Masset et al. 2013a). The ToR details the following four questions that should be answered through the evaluation:

    1. Does the MV deliver on promises to reach the MDGs within the MV site?
    2. Are the positive impacts of the MV *sustainable* after direct implementation of the MV project has ended?
    3. Is the MV intervention package *cost-effective* in the results it achieves, compared with possible alternatives?
    4. What *externalities or spillover effects* does the MV generate, and do they significantly add to or detract from the positive impacts that might be achieved within the MV site?

33. The evaluation also aims to answer three additional questions that reflect issues raised by key stakeholders about the MVP model. These additional questions are:

    1. Does the MV package empower disadvantaged or marginalised groups (e.g. females, the disabled, or the elderly)?
    2. Does MV achieve additional benefits arising from synergies across implementation of an integrated package of interventions?
    3. Does the MV address common issues relating to agriculture, infrastructure, or social and economic concerns?

34. In preparing the design of this impact evaluation, a number of alternatives were considered. For instance, a randomised trial was, in principle, possible by randomly allocating the interventions to matched village pairs, but this was considered to be infeasible in this particular case. For a more detailed explanation, see Masset et al. (2013a). In the end, the matching of control villages (CV) to project villages (on aggregate characteristics) and further matching of project and control

23 All causal chains were documented in an unpublished paper that was shared with DFID and the MVP. The evaluation team presented the causal chains to the MVP during a validation workshop in Ghana in January 2017. During the workshop, the MVP verified the intervention logic and suggested small revisions to the evaluation's original constructions.
24 As set out in the Analysis Plan (Masset 2015).
25 PO 5603 MV Evaluation Terms of Reference, DFID.

households at the analysis stage (on household characteristics) within a DD approach was considered to be the next best feasible approach after a randomised design. In addition, the evaluation samples two control groups: near and far control groups to assess the potential spillover effects of the MVP on adjacent villages and those much further away.

35. Alongside the quantitative survey data used for the DD analysis, there are a number of supporting qualitative studies that contribute to the evaluation team's understanding of how and why change has occurred – including for the most marginalised in society. There are three qualitative modules that complement the DD analysis: (i) an **institutional assessment** that captures empowerment and institutional change, particularly at the community and district administrative levels; (ii) a **reality check approach** (RCA) that uses a condensed immersion approach to better understand how the MVP affects the realities of people's lives, as well as to capture any unintended consequences; and (iii) an **interpretational lens approach** that in the baseline undertook a poverty and vulnerability assessment, and in subsequent years used a PRA approach to obtain feedback and interpretation from different well-being groups on some of the preliminary statistical findings.

36. As outlined in the IDD (Masset et al. 2013b), the goal of the evaluation is to assess whether the intervention is meeting the MDG targets, as well as whether it is doing so in a sustainable way by breaking poverty trap constraints. In order to achieve these goals, the IDD outlined a data collection plan that sets out to gather detailed information on most MDG targets every two years while data on incomes and expenditure and poverty are collected annually – and this is further elaborated in the Analysis Plan (Masset 2014). The annual data on income and expenditure are used to analyse poverty dynamics over the five years of project operations in order to test the project's ability to break poverty traps at community and household levels.

1.5 Aims and structure of the report

37. The overall purpose of this report is to provide a final assessment of the MVP; to consider its results against the MDG targets alongside changes in other outcome variables and spillover effects; and to consider its likely sustainability. With the completion of MVP interventions in December 2016 and all sustainability activities in March 2017, this final report provides a full impact evaluation of positive and negative changes. The Analysis Plan has been completely implemented, including presenting the impact against the MDG indicators and a full analysis against the poverty trap.

38. This report is a summary of the more detailed data collection, analysis and findings which are contained in annexes to this report. The most substantive of these annexes are four separate reports covering: (i) statistical analysis of the household datasets, blood tests and anthropometric measurements (Annex A); (ii) poverty and well-being assessment based on a qualitative PRA (Annex B); (iii) an RCA drawing on participant observation in a selection of treatment and control communities (Annex C); and (iv) the institutional assessment, which focuses particularly on the district administrative levels (Annex D).

39. This final report is an informed and triangulated summary of the quantitative and qualitative analysis. Chapter 2 summarises important contextual changes in Ghana since the MVP began implementation in 2012. Chapter 3 provides an overview of the evaluation's methodology, including a discussion on the data quality and its suitability for a DD analysis. Chapter 4 describes the MVP's impact on the MDGs after five years of intervention. This is followed by Chapters 5 and 6, which present the impact against a number of core variables: monetary and multidimensional poverty, income and expenditure and perceptions of well-being. Chapters 7 through 9 take an in-depth look at the MVP's impact on the health (Chapter 7), education (Chapter 8) and agriculture (Chapter 9) sectors, followed by Chapter 10 on institutional sustainability. The findings from the cost-effectiveness analysis (CEA) are presented in Chapter 11. Finally, Chapter 12 provides the evaluation's overall findings and conclusions.

40. **Note:** The names of control villages and the identities of particular focus groups have been replaced with identification references to protect the identity of the control communities and the study population. For individuals and households, these identities are not available and the publicly available dataset has been anonymised with appropriate technical safeguards in order to comply with ethical requirements and those of the Institutional Review Board of Columbia University.

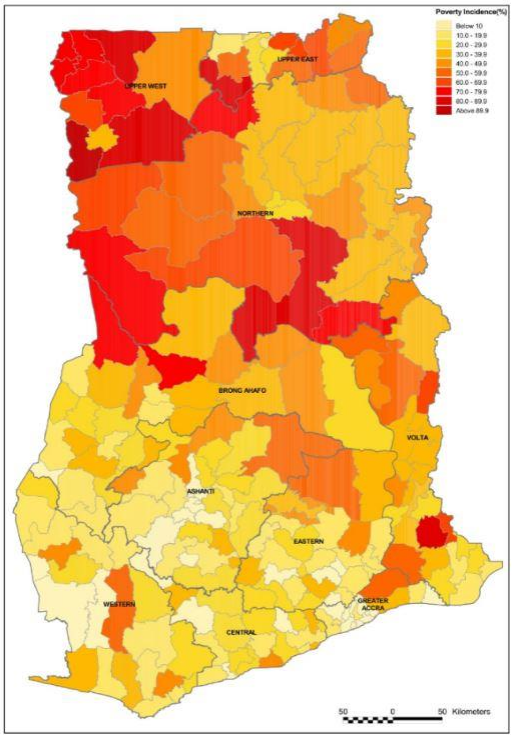
Chapter 2. The context in northern Ghana

41. This chapter sets out the context in which the MVP was implemented in northern Ghana. First, it provides an overview of poverty in the north, including the basis on which the MV sites were selected. The chapter then goes on to discuss the political and administrative changes during the period of project implementation, particularly those around the functioning of the district and regional authorities. The implications of these changes become important later on in this report, when we consider the organisational set-up of the project, its interactions with the administrative structures of government and issues of longer-term ownership and sustainability (Chapter 10). Finally, the chapter considers the complexity of the real-world context in terms of other donor and non-governmental projects operating at the same time. This also sets the scene for further analysis (in section 10.5) on the validity of the control groups, and the extent to which the MVP attracted or displaced additional investment in the area.

2.1 Poverty in northern Ghana

42. Ghana has historically suffered from a north–south divide in terms of wealth distribution and living standards. In the south, rural development and urbanisation has significantly reduced poverty, whereas it has not yielded the same results in the north. Three of Ghana's four poorest regions are in the north, two of which are targeted by the MVP (the Northern and Upper East regions). In 2009, the Ministry of Finance, supported by the World Bank, DFID and the United Nations Children's Fund (UNICEF), led a series of qualitative and quantitative studies to understand poverty and migration in more detail (World Bank 2007). These findings were behind the drive of the GoG commitment to reducing poverty in the north of the country, and among other things to allocate funds from the national budget for the establishment of SADA in 2010.

Figure 2: Map of poverty incidence in Ghana



43. Although Ghana's national level of poverty fell by more than half (from 56.5% to 24.2%) between 1992 and 2013, thus achieving the Goal 1 target, the annual rate of reduction of the poverty level slowed substantially, from an average of 1.8 percentage points per year in the 1990s to a 1.1 percentage point per year reduction since 2006. The level of extreme poverty has also reduced significantly, from 16.5% to 8.4%, but, *'Although the percentage of poor people has declined by a quarter since 2006, the number of people living in poverty has only declined by 10%. This means that poverty reduction is not keeping pace with population growth. Declining from 7m in 2006, Ghana still has almost 6.4m poor people'* (p. 13).[26]

44. Importantly, there are significant regional differences across the country. At the regional level, the Northern, Upper East, and Upper West regions continue to have the highest poverty rates. As Cooke et al. (2016) state, '*Of great concern is the Northern Region which saw its high level of poverty fall only marginally from 55.7% to 50.4%. Since the 1990s overall, the Northern Region has seen the smallest*

26 As the analysis of Ghana Living Standards Survey 7 (GLSS7) was unavailable at the time of writing, this section is based on a report by UNICEF in 2016, which draws largely upon the 2012–13 GLSS6 (Cooke et al. 2016).

progress in poverty reduction. This is a major issue for the country given that *the Northern Region now makes up the largest number of poor people of any of Ghana's ten regions (1.3 million)*' (p.1).

45. Marginalisation of certain groups, including persons with disabilities, widows and ethnic minority groups (such as the Fulanis), can also be seen in communities across the savannah region. This invariably results in higher levels of poverty and/or exclusion. At the same time, however, traditions for helping others out when in need, and a history of cooperation and respectful co-existence, can also be detected, although these mechanisms have frequently been strained to breaking point under the shadow of food insecurity.

2.2 Selection of Millennium Villages Project sites

46. In selecting the project sites in the Northern Region, the following criteria were used in 2011 as outlined in the project document.[27] It was intended that the cluster of intervention villages selected should:

- be located in the Northern Savannah Ecological Zone
- cover communities in at least two of the northern regions (Upper East, Upper West, Northern), where the incidence of poverty is most prominent
- cover communities representative of at least one of three broader systems present in the north: (i) river-based; (ii) agro-forestry; or (iii) growth pole
- include communities that make a cluster with a maximum population of roughly 30,000 people
- be a representative site of a typical rural community in the north
- have strong commitment from local and regional governments.

47. Using these criteria, SADA initially selected three potential sites, although the final decision appeared to be strongly influenced by its 'growth pole' approach, in which areas that show the greatest growth potential are chosen for intervention (abundance of cultivable land and water are among the criteria used to select the poles). As pointed out in the IDD for this independent evaluation, this 'growth pole' approach clashed with the 'poverty trap' approach of the MVP, which invests in the poorest areas rather than those with greater potential. After consultations between SADA, the Earth Institute and DFID, the final site was selected and described in the following way: *'This site includes rural communities located in the Fumbisi valley, Builsa (Upper East) and Kpasenkpe valley, West Mamprusi districts (Northern Region). It is near one of the major markets (Fumbisi) and is representative of two broader systems: river-based and productive zone. Poverty is endemic, infrastructure development is very limited, and basic social services are lacking. The site has potential for agricultural development as it includes two agricultural valleys'* (Masset et al. 2013a, p.26).

48. The choice was also guided by criteria of feasibility (e.g. the complexity of institutional arrangements) and of development conditions in the area. In particular, poverty status at the district level was a criterion used by SADA, even though district-level poverty data were not available and poverty maps had to be drawn up using predictions. The use of these dated (2007) poverty maps was problematic in a number of ways, and the situation was further complicated by the subdivision of districts in June 2012, which resulted in further misleading and conflicting data on poverty incidence.

49. Overall, the analysis of the evaluation team at the outset of this evaluation suggested that (i) the poverty data used to inform the selection of the MVP site were dubious; and (ii) these data should not be further used by the evaluation team to compare poverty levels across districts until the major discrepancies between maps and census data were resolved.

27 The project document was prepared by the Millennium Promise Alliance and the MDG Centre for West and Central Africa.

2.3 Political and administrative changes over the MVP period

50. The MVP operated under the regional authority (SADA) and in cooperation with the districts selected. During the period of implementation, two elections took place, one in December 2012 and one in December 2016. The latter had less effect as it was right at the end of the project.[28] The process leading up to and following national elections is highly disruptive for months or even years either side of the voting day itself, as campaigns are rolled out and politicians jostle. Pre-election promises to voters and campaign supporters, and the need to secure election financing, frequently result in long-term national and district-level development plans being set aside. In the MVP areas, this disrupts financial disbursement against the district assembly's financial plans, with many municipal and district assemblies also uncertain about when the next disbursement of the District Assembly Common Fund will occur.

51. For many districts, the District Assembly Common Fund is their main source of income. Delayed disbursement, often for several consecutive quarters and resulting in a substantial build-up of arrears, continued to undermine planning efforts and increase reliance on external sources of funds such as the MVP during the project period. Indebtedness to contractors (the National Health Insurance Scheme (NHIS) particularly) affected many of the government institutions in the MVP area. Towards the end of 2015, central government paid off many of the arrears, thus in theory a fresh start could be made by the district assemblies. As the Midterm Report summarised, *'Instead of projects like the MVP lending a hand to assist the district assemblies and the departments with what they are doing, they have become lifelines that enable them to perform their most basic functions*' (Masset et al. 2016, p.81).

52. Also, during the period, the number of districts increased in the area. The concept of a district as a sub-regional entity was introduced as part of the new local government system in 1988–89. The 110 districts created then were further subdivided in 2006 to make 138 in total, and in February 2008 this number was increased to 170 districts. During the MVP period, there was the introduction in June 2012 of 46 new districts, bringing the total number of districts to 216. With the creation of each new district comes a new set of organisational arrangements, a sharing-out of already scarce resources (financial, material and human) and at times a realignment of allegiances where traditional, ethnic and sometimes religious lines are crossed. These changes can bring a highly stressed situation in organisational terms, for both citizens and staff, while the new administrative arrangements are established. Because of minimal resources to work with, this can take several years. These changes affected all the districts in the MVP site from the very beginning of the project period, as Builsa district was divided into two (Builsa North and Builsa South) and West Mampruli district was divided into two districts (West Mampruli and Mamprugu Moagduri). In both cases, a new district capital was created from scratch with few facilities or resources, and the old one was retained, though with fewer resources and a smaller area of jurisdiction.

2.4 The Savannah Accelerated Development Authority

53. SADA was established by Act 805 in 2010 as an independent and statutory corporation after a series of concerted efforts by both main political parties to address the gross inequalities faced by Ghana's northern citizens. SADA's purpose is to '*provide a framework for the comprehensive and long-term development of the Northern Savannah Ecological Zone*', with a focus on boosting the economies of the northern communities through agricultural production in particular.

28 President John Atta Mills (National Democratic Congress) died on 24 July 2012 and was replaced by his then Vice President John Mahama, who then stood at the election in December that year. He assumed power the following January but the opposition party, the New Patriotic Party, contested the result in court, and it was eight months before the election result was upheld. This delay affected operations at district level, especially as the district chief executives, the political heads of the districts, could not be appointed. As the MVP worked through the district structures, the delay in the appointment of district chief executives would have affected approval of certain activities and to some extent, operational momentum generally.

54. Unfortunately, during the early years of the project, SADA was bedevilled by a corruption scandal. Its 2013 audit report revealed large-scale misappropriation of funds, related to a number of contracts including those intended for large-scale tree-planting and the rearing of guinea fowl. This received a persistent and high level of media attention, with subsequent calls for criminal prosecution and reimbursement of the embezzled funds. Tagging SADA onto the MVP's name at the outset, so the project became known as 'SADA–MVP', did not help the MVP's reputation. It also confused citizens and increased the tendency to misattribute interventions, while fuelling the already widespread perception that projects and initiatives like SADA and the MVP were patronage avenues for the ruling class and the ruling party.

55. It is widely acknowledged that a change in leadership in early 2014 turned the organisation around. SADA continued to enjoy support from a number of international development partners and in 2014–15 it embarked on fairly extensive consultative processes to develop a series of master plans for the cities of Tamale and Buipe, and a land management system for Tamale city. These were intended to begin the process of providing a broad framework for northern development, with long-term plans for their implementation. It is intended that these will draw consistent support from across the party political spectrum and complement the local government and sector plans of successive elected governments.

56. Apart from SADA, the GoG has introduced other policies and programmes to alleviate poverty. These include the Ghana School Feeding Programme, the National Health Insurance Scheme and the Livelihood Empowerment Against Poverty (LEAP) social cash transfer programme. LEAP provides cash and health insurance to extremely poor households across Ghana to alleviate short-term poverty and encourage long-term human capital development. It began with a trial phase in March 2008 and then expanded gradually in 2009 and 2010. The number of beneficiary households[29] increased from 1,645 in 2008 to 146,074 (185 districts) as at 31 December 2015. The LEAP Secretariat expected coverage to increase to 200,000 in 216 districts by 31 December 2016, and to 300,000 households by early 2018.[30] The new Ministry of Gender, Children and Social Protection (MGCSP)[31] is also developing the Ghana National Household Registry, a single registry database on extremely poor and poor households to be used for beneficiary selection by all social protection interventions. This is likely to be able to direct resources towards the poorest households in a more comprehensive and nuanced way, so the differences within regions and districts can be better understood and identified households can benefit from the combined and proven synergistic benefits of several social protection programmes.

2.5 Non-governmental organisations and other operations in the MVP area

57. Over the project duration, many NGOs and other programmes operated in the Northern and Upper East regions. This included several international NGOs with a longstanding presence, such as ActionAid and World Vision, as well as other smaller, local NGOs like the Foundation for Integrated and Strategic Development and Regional Advisory Information and Network Systems. Other examples of organisations delivering projects included church affiliations (e.g. the Presbyterian Church of Ghana) and private companies (e.g. Ghana Cocoa Board).

58. Over the five years, it was a significant challenge to produce a systematic record of all interventions operating within the MVs and CVs. This is for a number of reasons: (i) there is no single register of operations, either by an umbrella body or by local government; (ii) while general information is available on organisations operating in the area, this is not usually specified by locations that can be

29 LEAP eligibility is based on poverty and having a household member in at least one of three demographic categories: households with an orphan or vulnerable child, elderly poor or person with extreme disability unable to work.
30 http://leap.gov.gh/
31 The MGCSP was created in January 2013 as a successor to the Ministry of Women and Children's Affairs. Its social protection policies include the Ghana National Social Protection Policy, the National Gender Policy, the National Ageing Policy 'Ageing with Security and Dignity', the Child and Family Welfare Policy and the Justice for Children Policy.

easily linked to the MV and CV sites (even within an organisation's own record keeping); and (iii) some attempts to contact organisations have been met with tactics of avoidance (postponed meetings etc.), which may be partly because of the political nature of SADA–MVP in the region.

59. In order to understand the level of activity of government, NGOs and other philanthropic bodies in MV and CV sites during the course of the programme, we have used the PRA datasets to gather detailed information on 20 villages. This has been updated and reviewed to identify organisations, projects and interventions reported as being implemented in the area and their timescales. Since PRA datasets were used for this analysis, data were available from seven MVs in which the MVP had intervened and 13 quasi-identical control communities – seven nearby control villages (CNs) and another six far-away control villages (CFs). Where possible, gaps in the data were completed in consultation with community contact points and by interviewing implementing organisations.

60. Specific organisations and projects implemented were documented. Project descriptions were used to identify discreet interventions such as farmer training or provision of teaching resources. Interventions were then categorised by sector, where possible using MV causal chains. Table 1 shows the number of individual organisations or consortia working in each area between 2010 and 2017. Organisations include government departments, NGOs, religious groups or churches, private sector companies and philanthropic individuals. These data show that a similar number of organisations were operational in CNs, CFs and MVs during the course of the MVP.

Table 1. Number of organisations in MVP area, 2010–17, as reported in PRA studies

Area	Organisations
Control Far	29
Control Near	27
Millennium Villages	30

Table 2. Number of interventions in MVP area by sector, 2010–17

Area	Control Far	Control Near	Millennium Villages	Total
Education	33	26	35	94
Agriculture	18	18	20	56
Health	20	12	19	51
WASH	9	9	5	23
Infrastructure	4	2	10	16
Other	4	7	4	15
Total	88	74	93	255

61. Further analysis investigated the number of discreet interventions implemented by these organisations and in which sector these fell. As Table 2 shows, the MVs received a slightly greater number of interventions between 2010 and 2017 compared with CFs and CNs, although the difference is small. It should be noted that intensity or scale of intervention is not estimated here and ranged quite significantly (i.e., from the construction of classrooms to the provision of solar lamps). Investments were focused on the education, agriculture and health sectors.

62. These data demonstrate that the scope and scale of government and non-government development interventions occurring in MVs and CVs was similar throughout the MVP. There is no strong evidence for crowding-in of investment in MV areas, with only a limited increase in the number of interventions in MVs. There is similarly no evidence to support the theory that the project may increase government and non-government spending in control areas. This conclusion is supported by further analysis in Chapter 10 (based on a survey of all MV and CV sites), as well as in Chapter 12 (CEA and assessment of health and education facilities, drawn from the Facility Survey data).

63. The validity of the control group selection is further explained in the methodology chapter that follows.

Chapter 3. Methodology

64. This chapter summarises the evaluation's methodology, with further details provided in the IDD (Masset et al. 2013b) and the Analysis Plan (Masset 2014). Plus, methodological updates for the final round of surveys and the qualitative studies are presented in the respective annexes to this report.[32] The purpose and key questions were derived from discussions between DFID and other key stakeholders before commissioning the evaluation. The central tenet of the evaluation is to consider impact, both in terms of progress towards the MDG targets as well as a broader set of outcomes. Indeed, it is perhaps reasonable to expect some progress towards the MDGs given the level of investment in a relatively small area (£11.5 million in 35 communities from DFID alone). As such, the evaluation is tasked with looking further, including: measuring the extent to which these impact/outcome variables can be attributed to the MVP rather than other factors; whether these impacts are sustainable beyond the life of the project; and whether the intervention is cost-effective compared with other possible policy options.

65. These concerns underpin the core questions for the evaluation, which can be summarised as:

1. Does the MVP deliver on promises to reach the MDGs within the MV site?
2. What externalities or spillover effects does the MV generate, and do they significantly add to or detract from the positive impacts that might be achieved within the MV site?
3. Are the positive impacts of the MV sustainable after direct implementation of the MVP has ended?
4. Is the MV intervention package cost-effective in the results it achieves compared with possible alternatives?
5. Does the MV package empower disadvantaged or marginalised groups (e.g. women, people with disabilities, or the elderly)?
6. Does the MV achieve additional benefits arising from synergies across implementation of an integrated package of interventions?

3.1 Evaluation design

66. As mentioned earlier, the evaluation design uses a DD approach for the estimation of the project impact. In a DD framework, observations in the project group are compared with observations in a control group. In the simplest set-up, none of the groups are exposed to the intervention (i.e. the MVP) in the first period while the project group is exposed to the treatment in the second period but the control group is not. Given a number of assumptions and qualifications discussed below, this approach removes the biases produced by changes over time and by differences between the groups as well as providing an estimate of project effects.

67. Our sample consists of 35 project villages and 68 control villages. The selection of project villages was undertaken before the evaluation was commissioned and is summarised in Chapter 2.

68. The control villages were selected within the three districts where the project is implemented using a one-to-one matching method based on a set of village-level variables from the 2010 census, supplemented by village-level observations collected in the field. Each project village was paired to a control village from two strata. One stratum was composed of potential controls in the vicinity of

32 These are Annex A (statistical analysis); Annex B (PRA study), Annex C (RCA study) and Annex D (institutional assessment). Geographical vicinity was assumed by sampling from area councils (sub-district administrative divisions) adjacent to the MV area councils. See section 2.2. of the technical Appendix for a detailed description of the stratification by distance adopted at the design stage of the evaluation.

the project and the other stratum was composed of potential controls far from the project.[33] Hence, there are 34 control communities in the vicinity of the intervention area, and 34 control communities far-away from the intervention area but within the district boundaries. The oversampling of the control communities was conducted with the goal of providing an estimation of project spillover effects to neighbouring communities and of allowing the use of matching methods at the analysis stage (see section 6.1 of the Analysis Plan).

69. The table below lists the quantitative data collected during the 2016 (Y5/endline) survey round in both the MV and CV locations.

Table 3. Quantitative instruments used during 2016

Survey instrument	Description
Household (full)	Modules are mostly focused on questions regarding achievement of the MDGs (education, malaria, water, sanitation, time use in the home etc.), plus others on income, expenditure, in/out migration and social networks. At baseline, a separate survey to test people's expectations of survival, income and educational returns was conducted, and later incorporated into the main survey instrument.
Adult	Developed from internationally accepted standards for demographic and health surveys (DHS) used to calculate child mortality etc.
Facility	A tool on characteristics, staffing and usage of main health and education facilities (clinics, primary schools and junior secondary schools).
Community	Designed by the impact evaluation team to capture village-level data on land area, distance to facilities, economic activities, market prices, shocks and development projects.
Anthropometry	Heights and weights of all children under 5 are taken.
Blood tests	Haemoglobin of children under 5 and malaria infection testing obtained by finger-pricking.
Cognitive and learning tests	Observe the MVP's impact on learning outcomes, which are not otherwise captured by the household questionnaire (i.e. which focuses on attendance rates, and highest grade achieved). They include Raven's matrices, backward and forward digit span, short and advanced mathematics and English language tests.

70. In addition to the quantitative instruments outlined above, the evaluation design includes a number of qualitative modules that were conducted at the base, mid and endline. These are: (i) a poverty and vulnerability assessment at baseline, used to identify local views of wealth, well-being and marginalisation. A subsequent 'interpretational lens' was used at midline and endline using a PRA;[34] (ii) a RCA study that uses an immersion approach with households; and (iii) an institutional assessment focusing on the effects of the MVP on district government arrangements and longer-term sustainability. Each of these approaches is detailed later in this chapter.

71. The qualitative research components mostly focus on providing a deeper understanding of 'how' and 'why' change happened including changes in knowledge and behaviour, positive and negative differences, spillover changes in other communities etc. They also provide local perspectives, gathering evidence that a quantitative dataset cannot be reasonably expected to capture (such as how programme interventions have been linked together or otherwise; how relationships have

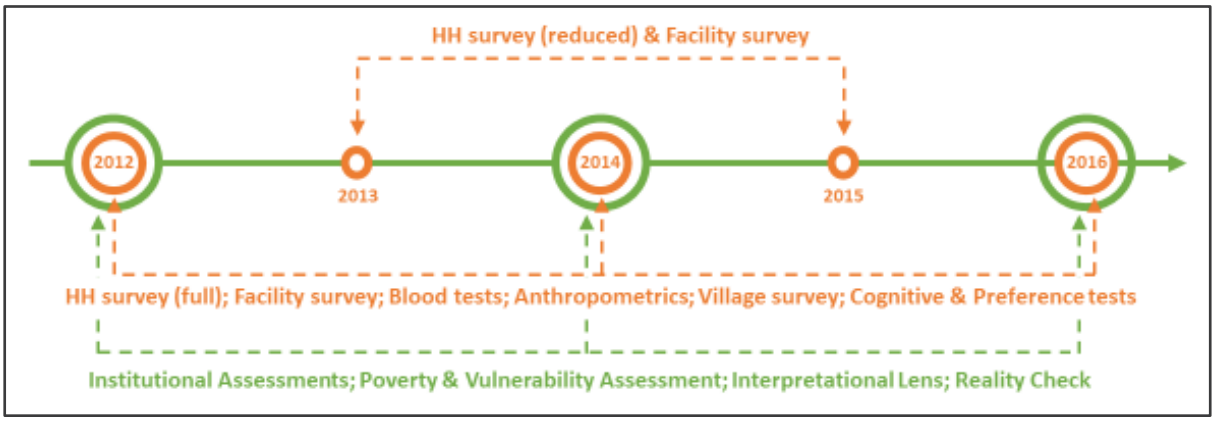
33 Geographical vicinity was assumed by sampling from area councils (sub-district administrative divisions) adjacent to the MV area councils. See section 2.2 of the Technical Appendix for a detailed description of the stratification by distance adopted at the design stage of the evaluation.

34 It should be noted that the interpretational lens in effect repeats the PRA work from the baseline and midline. The main difference is that the interpretational lens does not repeat the well-being categorisation but revisits these same groups with a greater focus on change (and explaining and interpreting change). The midterm was the first use of this approach, but because of delays in gaining access to the quantitative data, the evaluation team used a shortlist of preliminary issues to guide the qualitative follow-up. The endline study was able to use a more systematic process, drawing on a preliminary analysis of the household data to identify emerging statistical findings for the interpretational lens research to follow up and better understand how the change affected different social strata and how it could be explained.

changed at the household, community, district and regional levels; how institutional arrangements have altered; and people's views, perspectives, opinions and reasoning).

72. All the qualitative modules, plus the full household survey and the other quantitative instruments (as set out in Table 3) were conducted at the base, mid and endline. During the in-between years (2013 and 2015) only a reduced household survey was used, mainly to provide an annual dataset for modules on income, consumption.

Figure 3. Summary of data collection by year



Source: Itad.

73. Additionally, in the final year of the project the evaluation team constructed sectoral causal chains to inform the sequencing of the qualitative studies, help with the analysis of anomalous quantitative results and also texture and deepen understanding of key findings. At the endline the sectoral causal chains help frame the analysis, test programme theory, attempt to understand how and why changes did or did not occur, and impact on the MDGs. These are presented in Chapter 7 (Health), Chapter 8 (Education), Chapter 9 (Agriculture) and Chapter 10 (Sustainability and Institutional).

3.2 Methodology for estimating difference-in-difference analysis

74. Project impact is estimated using a DD analysis: the difference in the change over time in the average outcomes between the project and in the comparison groups. In the simple standard two-period and two-group set-up, the DD effect is:

$$\delta = \left(\bar{y}_{P,1} - \bar{y}_{P,0}\right) - \left(\bar{y}_{C,1} - \bar{y}_{C,0}\right)$$

where δ is the DD effect, y is the average outcome either in the project group (P) or in the comparison group (C) observed in the first period (0) and in the second period (1).

75. We calculate DD effect using regression analysis. We use different regression models depending on whether panel data are available. When panel data are available we employ fixed-effect and lagged dependent variable models or ANCOVA (analysis of covariance). In a number of instances panel data are not available. For example, children who were under five at the baseline are no longer under five after five years and cannot be tracked to analyse nutrition or mortality. Similarly, many, if not all, children who were tested at the baseline are no longer eligible for testing after five years. In all these cases we employ a cross-sectional model.

76. The cross-sectional regression (t=0,1) is also the simplest:

$$y_i = a + bT_i + cP_i + dP_iT_i + \sum_{j=1}^{n} g_j X_{ji0} + e_i$$

where *y* is the outcome observed for the observation *i*, *T* is a dummy variable equal to 0 for period 1 and equal to 1 for period 2, *P* is a dummy variable equal to 1 if the observation is in the project group and equal to 0 if the observation is in the control group, the interaction of the project and the time variable (*PT*) is equal to 1 if the observation is both in the project group and observed in the second period. The equation estimates the following: *a* is the average outcome in the control group in period 1; *b* is the difference in the outcomes between period 2 and period 1 in the control group (the time trend); *c* is the difference between project group and control group in period 1; finally, *d* is the required DD effect of the project. The X_i are (*j=1,…,n*) covariates that improve the balance between the project and comparison group samples, as these were not randomly obtained from an experiment, and increase precision of the estimates by reducing the standard error of the coefficients (g_i).[35]

77. When panel data are available we use a fixed effects model to remove the impact of fixed effects: time-invariant unobservable determinants of the outcomes such as, for example, farmers' motivation or children's abilities. The fixed-effect model is:

$$y_{it} = a_i + bT_{it} + dP_iT_i + \sum_{j=1}^{n} g_jX_{itj} + e_{it}$$

The covariates in this case are time-varying variables that are not affected by the project such as the occurrence of drought or other shocks and household composition.

78. With panel data we also employ the lagged dependent variable model (Imbens and Wooldridge 2009) also known as the analysis of covariance (ANCOVA) model:

$$y_{i1} = a + by_{i0} + dP_i + \sum_{j=1}^{n} g_jX_{ji0} + e_i$$

which is simply a regression of the dependent variable in period 2 on the dependent variable in period 1 and a project dummy in addition to the usual baseline covariates.

79. These models can be expanded to include multiple time periods, and for completeness we report below the model specifications employing five time periods. For each of the three models above we report the specification estimating the average project effect over the five-year period and the specifications estimating four-year specific project effects.

80. Five period cross-sectional models (t=0,1,2,3,4):

$$y_i = a + \sum_{t=1}^{4} b_tT_{it} + cP_i + dP_iT_i + \sum_{j=1}^{n} g_jX_{ji0} + e_i$$

$$y_i = a + \sum_{t=1}^{4} b_tT_{it} + cP_i + \sum_{t=1}^{4} d_tP_iT_{it} + \sum_{j=1}^{n} g_jX_{ji0} + e_i$$

81. Five period **fixed effects** models (t=0,1,2,3,4):

$$y_{it} = a_i + \sum_{t=1}^{4} b_tT_{it} + dP_iT_{it} + \sum_{j=1}^{n} g_jX_{jit} + e_{it}$$

$$y_{it} = a_i + \sum_{t=1}^{4} b_tT_{it} + \sum_{t=1}^{4} d_tP_iT_{it} + \sum_{j=1}^{n} g_jX_{jit} + e_{it}$$

[35] One potential problem with the use of covariates in the estimation of project effects is that most covariates are affected by the project or are themselves objectives of the intervention. Think, for example, of a DD regression of height-for-age including changes in total household expenditure. The inclusion of variables affected by the programme will 'absorb' some of the project effects that would otherwise be captured by project dummies. Hence, in order to capture the programme impact with a project dummy interaction, the covariates can only include baseline characteristics or variables that are not affected by the programme (Rosenbaum 1984).

82. Five period lagged model (t=1,2,3,4):

$$y_{it} = a + by_{i0} + \sum_{t=2}^{4} c_t T_{it} + dP_i T_{it} + \sum_{j=1}^{n} g_j X_{ji0} + e_i$$

$$y_{it} = a + by_{i0} + \sum_{t=2}^{4} c_t T_{it} + \sum_{t=1}^{4} d_t T_{it} + \sum_{j=1}^{n} g_j X_{ji0} + e_i$$

83. The comparator villages surveyed at the baseline were identified by matching district villages to project villages using a propensity score built using village-level characteristics obtained from census data and from field visits. In order to remove remaining baseline differences in characteristics between the project and the control group we further employ matching methods at the household and individual level in the estimation of the project effects. In doing so we follow matching on sub-classification of the propensity score as recommended and outlined by Imbens and Rubin (2015). The sub-classification procedure employs the regression models outlined above to estimate project effects within groups of similar project and comparison observations built using the propensity score. In some cases, because of modelling complexity (for example, in the estimation of infant mortality), the sub-classification method cannot be employed and we use inverse probability weighting (IPW). In this method, all observations in the regression models above are weighted by the propensity score. All charts presented in the paper also weight observations by the propensity score using IPW. The details, justification and sensitivity analysis of the matching procedure adopted are illustrated in Annex A.

3.3 Data collection and sample characteristics

84. This section describes the characteristics of the sample and its suitability for assessing project impact. The validity of a DD approach rests on the assumption that project and comparison groups are similar. Differential trends in the outcomes and covariate shocks were discussed in the previous second round analysis reports and were not found to be major threats. Here, we focus on changes in the composition of the project and comparison groups produced by attrition and migration.

85. The baseline survey targeted a sample of 755 households in the MV villages and 1,496 households in the CV villages. These sample sizes were identified to detect impacts of an acceptable size through power calculations. The size of the comparison group is twice the size of the project group for the reasons outlined above: to stratify the impact of the intervention by distance thus identifying spill over effects, and to be able to perform matching of observations at the household level to further improve the comparability of the two samples. In every survey round, the same households were targeted for the interview, though at each round not all targeted households were found. As a result, the samples vary at each survey round while the sample of panel households decreases over time. We decided to follow this approach, rather than only following panel households over time, because a number of impacts such as mortality, nutrition and education tests are estimated over cross-sections and therefore benefit from larger samples.

3.3.1 Sample characteristics

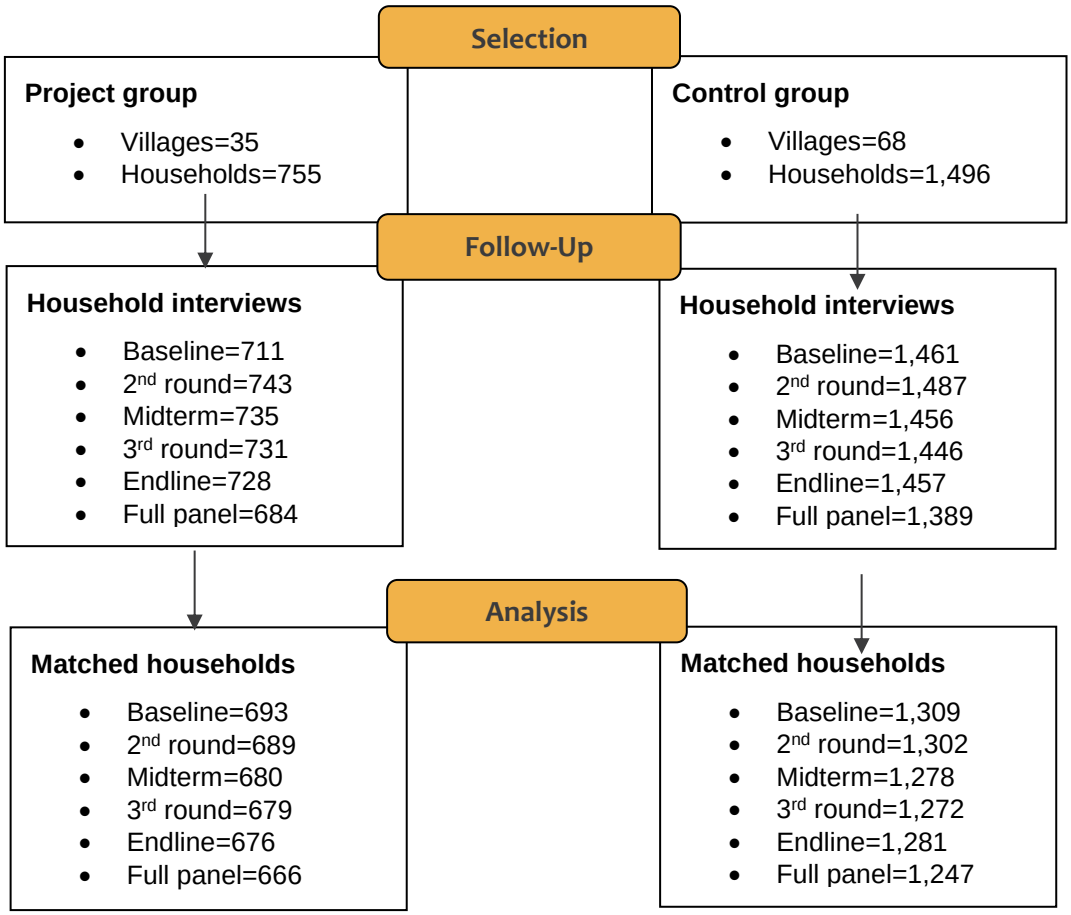
86. The number of interviews conducted in project and comparison villages in all rounds is shown in Table 4. The largest number of interviews was conducted in the second round, while the smallest was conducted during the baseline. There is no obvious pattern in these numbers. There are no differences in the percentage of households interviewed in MV and CV areas suggesting that the absence of project benefits did not act as a deterrent to responding at the interviews in the CV areas. On the contrary, these numbers suggest that a proportionally larger number of households was interviewed in CV areas than in MV areas.

Table 4. Completed household interviews in MV and CV areas

Sample	Target	2012	2013	2014	2015	2016
MV interviews	755	711	743	735	731	728
%	100	94	98	97	97	96
CV interviews	1,496	1,461	1,487	1,456	1,446	1,457
%	100	97	99	97	97	97
All interviews	2,251	2,172	2,230	2,191	2,177	2,185
%	100	96	99	97	97	97

87. The number of households interviewed across rounds is reported in the flow diagram, Figure 4. The diagram follows the style of CONSORT diagrams[36] used in reporting the results of randomised control trials and also includes the number of households included at the analysis stage. This number is restricted to households interviewed (and matched) at baseline that were interviewed again in the following rounds.

Figure 4. Flow diagram of MV and CV households included in the study



88. For completeness we also report a flow diagram for comparison households from the 'near' (CN) and 'far' (CF) comparison groups, because by design they represent two separate samples. The two samples are very similar though it appears that fewer households were followed up in the 'far' comparison areas. A smaller number of 'far' comparison households is also included in the final analysis because trimming of the sample following matching removed a larger number of households that are distant from the MV area.

[36] A CONSORT diagram (CONsolidated Standards Of Reporting Trials) is a flow diagram that displays the progress of all participants through a trial, such as a randomised control trial.

Figure 5. Flow diagram of 'near' and 'far' comparison households included in the study

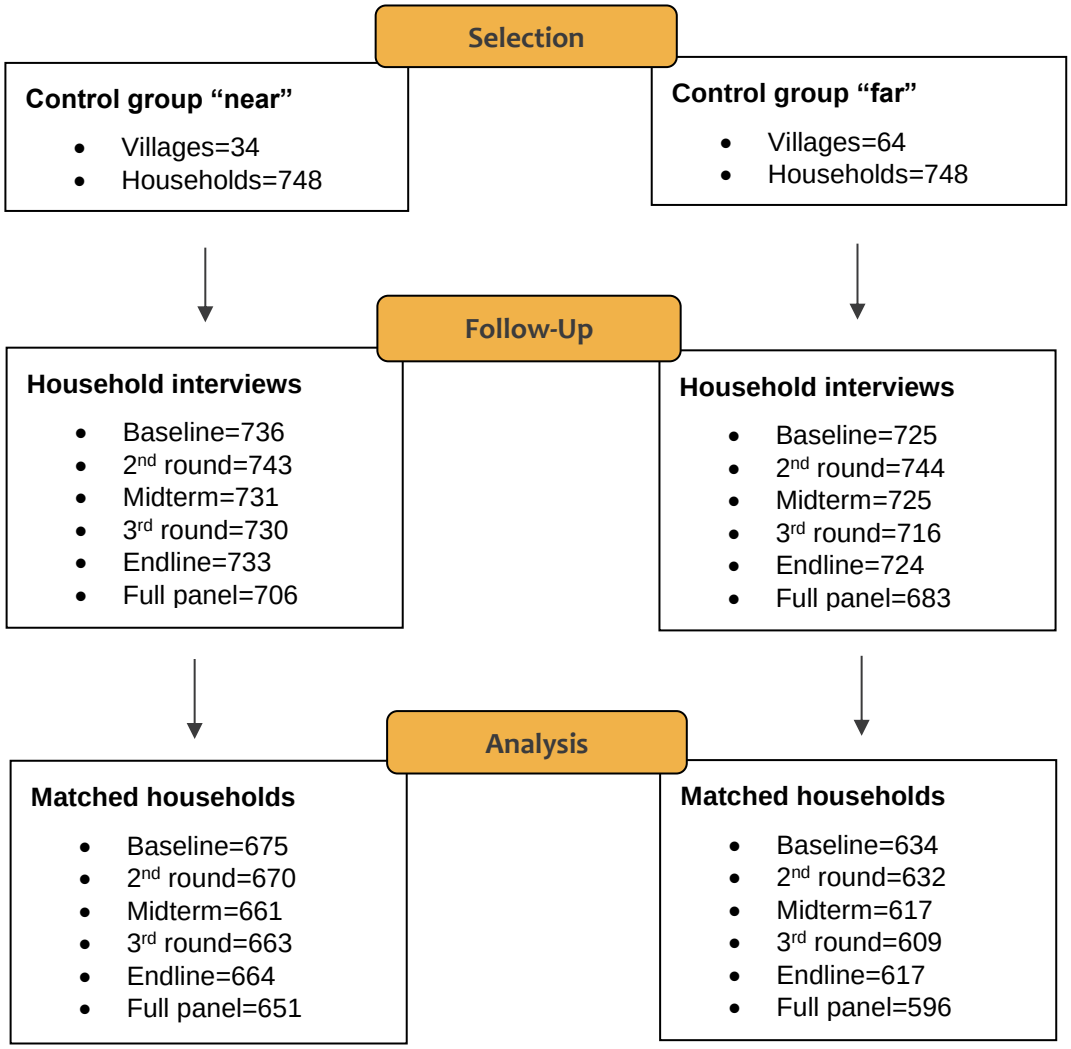


Table 5. Panel households in MV and CV areas

Sample	Target	2012	2013	2014	2015	2016
MV panel interviews	755	711	707	697	689	684
%		94.2	93.6	92.3	91.3	90.6
CV panel interviews	1,496	1,461	1,454	1,424	1,391	1,389
%		97.7	97.2	95.2	93.0	92.8
All panel interviews	2,251	2,172	2,161	2,121	2,080	2,073
%		96.5	96.0	94.2	92.4	92.1

3.3.2 Attrition rates

89. Attrition rates in the study area were very low. Less than 8% of the original target sample was lost over time. Note, however, that the baseline did not interview all target households. The attrition rate for the households interviewed at baseline is only 4.6% for the whole sample ((2073–2172)/2172). More importantly, the attrition rates in MV and CV areas are very similar, being 3.8% and 4.9% respectively.

Table 6. Panel of individuals in MV and CV areas

Sample	2012	2013	2014	2015	2016
MV individuals	5,231	5,576	5,854	6,021	6,338
MV panel		4,930	4,654	4,550	4,474
%		94.2	89.0	87.0	85.5
CV individuals	10,337	10,649	11,023	11,255	11,750
CV panel		9,869	9,378	9,072	8,875
%		95.5	90.7	87.8	85.9
All individuals	15,568	16,225	16,877	17,276	18,088
All panels		14,799	14,032	13,622	13,349
%		95.1	90.1	87.5	85.7

90. Attrition rates were relatively small also for individual household members (see Table 6). More than 85% of the original target individuals were enumerated in the last survey round. The reduction in the sample is more the result of changes in household composition and errors in reporting household membership than of actual dropping out of the study.

Table 7. Reasons for not completing the interviews

Reason	2012	2013	2014	2015	2016
No competent household member at home	21	1	8	13	12
Entire household absent	22		11	20	14
Interview postponed	10				
Interview refused	1				
Partly completed					
Dwelling vacant or destroyed		4	2	20	18
Dwelling not found	19	9	13	5	22
Household has relocated		6	15	8	
Household dissolved or deceased		1	6		
Other	6		4	7	
All	79	21	59	73	66

91. The number of households lost at each round and the reason for not completing the interview at each round are reported in Table 7. These numbers are very small and do not allow us to investigate whether the 'attriters' are different from the rest of the sample, much less if there are differences in characteristics between MV and CV attriters. The reasons for not completing the interviews vary over time, but the absence of a competent household member at the time of the visit, absence of the entire household or the inability to find the dwelling were the predominant reasons.

92. Enumerators were instructed to enquire about the whereabouts of the households from neighbours in cases when it was assumed that the household had relocated. Few households appeared to have relocated and, oddly, not a single household had reportedly relocated in the year before the last survey round. Favourite locations for relocation appear to be Kumasi and surrounding areas and Accra (see Table 8). Overall these data suggest that, despite some challenges, the survey teams were able to enumerate households with the accuracy expected by similar surveys in the same settings and that there are no large differences between MV and CV areas driven by natural population change, movements in and out of households or reporting errors.

Table 8. Whereabouts of households reported as 'relocated'

Location	2013	2014	2015	2016
Kumasi, Kumasi, Ashanti	1	2	4	
Jagsi, Kumasi, Ashanti			1	
Delaasa, Kumasi, Ashanti			1	
Ejisu, Ejisu-Juaben, Ashanti			1	
Sariba, Northern, West Mamprusi	1			
Obuasi, Obuasi, Ashanti	2			
Luisa, Builsa, Upper East	1			
Accra, Greater Accra		7		
Kentasi, Ashanti		1		
Presetia	1			
Eastern Region			1	
Missing	0	5	0	
All	6	15	8	

93. As discussed in Annex A, attrition rates were also relatively small among individual household members. More than 85% of the individuals originally selected for the interview were enumerated in the last survey round. Attrition among individuals was mostly the result of errors in reporting household membership and, to a much lower extent, of changes in household composition. Changes in household composition are a potential threat to the validity of the comparison of outcomes in MV and CV areas. For example, comparisons could be biased if a considerable portion of the control population were to migrate to MV areas to access project benefits. The project and control groups could have changed in two ways: by a natural increase (the difference between births and deaths) or by movements of individuals in and out of households. We tested the impact of the intervention on household size and per adult equivalent and we found none. This result is important because it ensures that per capita and per adult equivalent figures in the project and control group are comparable. As for migration, the project did not have an impact on 'permanent' movements outside the Northern Region and reduced 'temporary' seasonal migration. The latter result being only temporary, however, does not lead to a change in the composition of the household.

3.3.3 Seasonal bias

94. The potential seasonal bias resulting from conducting the household surveys at different times at baseline, was thoroughly investigated and the results can be found in Appendix H of the Baseline report. Our analysis of the seasonality of the project outcome variables using secondary data showed that seasonality would not affect the estimation of impact on most variables and the large similarity of the same variables at baseline in project and control areas seems to confirm this position. We stress however that the use of mosquito bed nets and malaria incidence in particular could be affected. We also concluded that any seasonal bias could not be either 'estimated' or 'adjusted'. Nonetheless, the direction of bias is known and can be used in the interpretation of results. Of the two outcomes that could be affected by the bias: malaria prevalence and use of bed nets, only use of bed nets shows baseline values in project and control areas that are clearly different and could suggest the presence of bias. The bias would underestimate impact on malaria prevalence in MV areas and overestimate the impact on bed net use in MV areas.

3.4 Institutional assessment

95. The institutional assessment was undertaken by the endline institutional team comprising four researchers. The assessment took place in April 2017 in the three districts. Six focus group discussions were held (two in each of the three districts). One was held with the district administrative team, and the other with the heads or representatives of the district technical departments and agencies.

96. On a few occasions the study team used simple scoring to provide an idea of participant emphasis or weighting. Using a scale of one (low) to ten (high), the focus group discussion participants were asked to discuss and then give a score about an issue or projects. However, the main reason the scoring methodology was used was to initiate a debate and explore the reasons and explanations people gave for their scores rather than the scores themselves.

97. Analysis of the focus group discussions with the district administrative team in each district revealed very similar issues. The same was true for focus groups with the district technical departments. For this reason, instead of producing separate reports for each district, as was done at the baseline, there is only one report for the endline institutional study, incorporating the perspectives of the district administrators and those of the technical personnel. Where deemed necessary, the views of the MVP team have also been incorporated. The report has focused on what the district officials and the MVP team had to say.

3.5 Participatory rural appraisal

98. The PRA study was undertaken between March and April 2017 over 36 days. The research team comprised 20 research assistants supported by a research trainer/coordinator and a lead writer. To the extent possible, the study worked with the same research assistants who had been recruited for the baseline and midline rounds. Where this was not possible, new recruits were identified. A three-day workshop complemented by a one-day hands-on trial of the research protocol at CF3 (far-away control village 3) served as training for the newer researchers while providing an opportunity for the older researchers to refresh their skills. Following some screening, the 20 researchers selected were constituted into four teams and assigned to the sampled sites based largely on their familiarity with the respective languages.

99. Each of the four teams conducted three sets of interviews in their assigned communities. The interviews comprised:

- Focus group discussions with the different well-being categories established at the baseline.
- Focus group discussions on similar issues with the following stakeholders: community leaders, children from households representing the different well-being categories, parents, parent–teacher associations (PTAs), district education officials, teachers; some children from Primary 6 were also selected randomly to test their reading of the Primary 6 reader.
- Key informant interviews with some individuals who had fallen into or exited poverty, teachers who have been in the community the longest, traditional leaders, parent–teacher association (PTA) members, community health nurses and volunteers, traditional birth attendants (TBAs), bonesetters, drug store keepers, agricultural extension workers and prominent farmers.

100. In all, the research team visited 20 field sites. These comprised seven Millennium Villages in which the MVP had intervened and 13 quasi-identical control communities – seven nearby control villages (CNs) and another six far-away control villages (CFs).[37]

101. The categorisation of the focus groups was informed by a prior well-being ranking exercise conducted at the baseline in which community representatives compiled locally relevant descriptors of well-being for their community and matched those descriptors with well-being strata. In addition to the four recurring categories of rich, moderately rich, poor and very poor households, a small minority of communities also identified either a *super-rich* or *destitute* stratum. To enhance the tracking of qualitative changes and promote local learning from the evaluation process, the composition of the focus groups interviewed at the baseline was maintained throughout the evaluation.

37 The village sample is short by one because one far away control village visited at the baseline was found to have been included in MVP's database in error.

102. The study built on the areas of conversation outlined for the earlier baseline. These were refined and augmented by specific areas of interest flagged by the quantitative strand of the research for deeper enquiry. Additional key informant interviews were conducted with children in and out of school, teachers, some lead farmers/opinion leaders and individuals who the focus group discussions identified as having peculiar or informative experiences.

103. Much of the data analysis took place in tandem with the fieldwork. Throughout the period of interviewing, the teams tried to make time in the evenings to reflect on the information they were receiving and to identify apparent conflicts in the data. Gaps and findings that required further investigation were then flagged and strategies devised for further investigation during the remaining fieldwork period. The strategies typically comprised additional observation, limited repeat interviews to drill deeper, and targeting appropriate key informants to interview.

104. At the end of the fieldwork period, an intensive five-day debriefing-cum-analysis workshop was held between selected research assistants and team leaders, the research coordinator and the lead writer. The workshop critically interrogated the provisional findings and began to distil the similarities and differences between MVs and CVs, between well-being cohorts, and between sexes. It also flagged up apparent inconsistencies and gaps as well as errors for further attention. The respective teams followed up on these areas with the communities and/or relevant institutions. Two meetings were also held between the study leaders and the MVP transitional team in Bolgatanga to seek further clarifications.

3.6 Reality check approach

105. The RCA is a qualitative research approach involving trained and experienced researchers staying in people's homes for several days and nights, joining in their everyday lives and chatting informally with all members of the family, their neighbours and others they come into contact with. This relaxed approach ensures that power distances between researchers and study participants are diminished and allow researchers to build genuine trust with study participants in a relatively short time, which provides the enabling conditions for people to share their own views, stories and perspectives. By building iteratively on conversations, having multiple conversations with different people, together or individually, as well as having opportunities for direct experience and observation, researchers are able to triangulate insights gathered from when they are in the field during post-field processes and analysis. These multilayered triangulation processes strengthen confidence in the findings. The RCA[38] has gained international recognition and uptake as an efficient and effective means to gather the insights and perspectives of participants of social change processes. The approach builds on and extends the tradition of listening studies (see Salmen 1998, Anderson et al. 2012) and beneficiary assessments (see Shutt and Ruedin 2013) by combining elements of these approaches with researchers actually living with people whose views are being sought; usually those who are directly experiencing the issue under study.

106. The six RCA study villages were those which were used in the baseline and midline studies (February 2013 and May 2015 respectively). These were selected in consultation with the MVP M&E expert after the pilot in 2013 as well as the research team undertaking the PRA study so that the two studies would not overlap.[39] Two of these six villages were selected from the long list of 'comparisons'; one was designated as *'near' (*i.e. close to MVP locations and where spill over effects might have been anticipated) and the other was *'far from'.* The selection of villages used the same ratio of Mamprusi to Builsa communities as the MVP itself. Researchers mostly stayed in the same houses as they had done at baseline and midline. These 18 households had been selected together with the community to fulfil the following criteria: (i) poorer households; (ii) households with different generations living in the house including, where possible, school-age children; (iii) households in each village which

38 Originally developed in 2007 in Bangladesh with the Embassy of Sweden.

39 One location partially overlaps in that the RCA selected a sub-community of a larger community selected by the PRA study. This may provide useful opportunities for triangulation in the two further phases of the evaluation.

were at least 10 minutes' walk from each other; (iv) households located at the centre of the village as well as the periphery; and (v) households with a number of close neighbours (to enable interaction with them as well). In addition to the 18 households where the researchers actually stayed and had intense interactions, the team had extensive conversations with a further 543 people (268 women and girls and 275 men and boys) including teachers, health providers, traders and village leaders in the communities.

107. The RCA study was conducted in two parts with two teams in the field from 30 June to 5 July, and from 6 July to 11 July 2017. The focus of this final RCA study, like the midline, was on 'change' and what people felt had changed for better or worse or had stayed the same since the midline. However, conversations were guided to take a longer view of change from before the baseline to understand how people viewed change, what was significant change and to assess the pace of change. Using photographs taken at baseline and midline as prompts, picking up on conversations recalled from the baseline and midline and sometimes our own observations of change (e.g. the installation of toilets, increased transport options), we were able to have open and frank conversations about how people felt about these changes, what were good and less good changes and the perceived drivers of those changes both in their family and community spheres.

108. Each subteam of three to four researchers spent a full day for collaborative analysis with the team leader after each immersion, sharing all their conversations, observations and experiences related to the areas for conversation. Each debrief started with discussing what people felt were the most significant changes since we last stayed with them. The collaborative analyses were recorded in detail in written notes combined with other important archived material (photos, drawings, maps of the village and charts) providing detail on households, villages and case studies. A final whole team workshop was undertaken for two days to reflect on the findings and identify commonalities and differences across villages and households. The team leader used established framework analysis procedures based on: (i) familiarisation (immersion in the findings); (ii) identification of themes; (iii) charting (finding emerging connections) in order to structure the findings from an emic perspective.

3.7 Analysis and synthesis

109. The process of analysis and synthesis has been incremental, with the evaluation team developing emerging themes and areas of enquiry over the five-year period of the evaluation. During the baseline and midline reporting periods, each study area (statistical analysis of the household survey; interpretational lens through PRA; the RCA; institutional assessment; and CEA) produced preliminary summary reports. The findings of each study were presented and evidence discussed during team workshops, with a focus on drawing out: (i) areas where the qualitative research corroborated the emerging statistical DD analysis of impact; (ii) areas where the qualitative research challenged the statistical findings, and further analysis was required to better understand the phenomenon; and (iii) areas where the different findings did not match, and were flagged for further enquiry during subsequent rounds. For example, during the baseline, the Engels Curve analysis initially showed an unusual food curve that increased with per capita expenditure, suggesting that any additional income is spent on food, and at odds with more usual Engel Curves.[40] Likewise, during the midterm analysis, there emerged a puzzling relationship between increasing incomes and little effect on expenditure, especially where the PRA and RCA in particular observed that households had no savings to explain this finding. This fed into subsequent rounds, with more qualitative enquiry and statistical analysis undertaken for the Year 4 and final reports.

110. For this final report, the process of analysis and synthesis was undertaken much earlier, and included deliberate sequencing of the statistical analysis, PRA and RCA studies. First, the evaluation team used earlier findings and project documentation and visits to develop a set of causal chains that better explained the anticipated connections between MVP activities and potential impacts. While the

[40] For a fuller discussion see pages 33–34 of the Baseline Report, and its Appendix I (Engel Curves). This can be found at: http://www.ids.ac.uk/publication/millennium-villages-impact-evaluation-baseline-summary-report

statistical analysis of the household survey data mostly focused on the impact side (net effect) of these causal chains, the rest of the chain provided a useful framework to guide more qualitative enquiry. Second, a preliminary set of emergent findings (based on the Year 4 analysis) and then subsequent statistical analysis of some of the final household data collected in 2016 were used to develop a shortlist of enquiry areas. The PRA (interpretation lens) and RCA studies followed on from this analysis, allowing a direct link between preliminary findings on impact and the subsequent fieldwork on better understanding how (and for whom) these effects occurred. Third, the evaluation team once again wrote up a preliminary analysis which was shared and discussed during a team workshop – drawing out areas of commonality and difference – and identifying areas for additional analysis. This process continued through the report writing process, with the team engaged in further discussions as well as the writing of all chapters to ensure findings are accurately represented. The chapters that follow present this analysis.

Chapter 4. The impact on the Millennium Development Goals

111. In this chapter, we illustrate the impact of the project on the Millennium Development Goals (MDGs). Countries have recently adopted a new and more comprehensive set of development goals known as the Sustainable Development Goals (SDGs). However, we first investigate the impact of the intervention on the MDGs rather than on the SDGs for the following reasons: (i) the achievement of the MDGs is the original project goal and the project activities were chosen and designed to this aim. It seems natural that the impact of an intervention should be first measured against the ultimate goals it set out to achieve. These goals have been clearly communicated by MVP and understood that the success of the project should be judged by these indicators.[41] This was further communicated to the evaluation team at the start of the study, and set out in the programme's logframe and reporting; (ii) based on this, the Analysis Plan of the evaluation formulated in 2013 clearly stated the objective of testing the impact of the intervention on the MDGs, so a deviation from the Analysis Plan at this stage would be problematic for the credibility of any results shown; (iii) the quantitative survey instruments were largely designed to assess changes in MDGs rather than SDGs or other indicators; (iv) the quantitative impact of the project on the MDGs provides a first approximation of overall project effectiveness; and (v) finally there is substantial overlap between the two sets of indicators as many MDGs were included again in the SDGs. We discuss the limitations of the assessment of the MDGs at the end of this section and the remainder of the report is largely dedicated to assessing the impact of MV on several other welfare dimensions in an exploratory way.

112. The quantitative analysis of the impact of MVP follows the analysis plan (Masset 2014), and the evaluation was registered with the Register for International Development Impact Evaluations hosted by 3ie (Masset 2015). In the analysis plan we distinguished a *confirmatory* analysis directed to assess the impact of MVP on the MDGs from an exploratory analysis directed at assessing the impact of MVP on non-MDG outcomes and the causes of impact or of lack of impact. In order to avoid selective reporting, cherry-picking of results and p-hacking, the MDG indicators were clearly spelled out in the analysis plan, and all impacts on MDGs, whether positive, null or negative, are reported here.

113. The MDG indicators were developed following the UN instructions on the measurement of MDGs.[42] Because of the characteristics of our survey instruments, in some cases our indicators differ slightly from the official UN definitions but great care was taken in reproducing the official methodology. Table 9 details how we built each indicator and what the indicator measures represent.

Table 9. Description of the MDGs indicators

MDG	Obs.	Panel	Indicator
Goal 1: To eradicate extreme poverty and hunger			
1.1 Proportion of population below US$1 (PPP) per day	5	Yes	The proportion of the population below the international *poverty line* of US$1.25 a day at purchasing power parity, thus adjusting for cheaper cost of living in Ghana. The UN recommendations are indifferent regarding the use of income or consumption for this indicator. We decided to use household income to introduce more information to the information already provided by the poverty headcount and the food poverty headcount that are based on household expenditure.
1.2 Proportion of population below the national poverty line	5	Yes	The proportion population living below the official Ghanaian *national poverty line* allowing the purchase of a minimum basket of food and non-food items.

41 This was detailed as part of the UN Millennium Project. Formerly available at: http://www.unmillenniumproject.org.
42 See http://mdgs.un.org/unsd/mi/wiki/MainPage.ashx

MDG	Obs.	Panel	Indicator
1.3 Poverty gap ratio	5	Yes	The mean shortfall of population from the national *poverty line*. It measures the depth of poverty by calculating how far from the poverty line the poor are.
1.4 Share of poorest quintile in national consumption	5	Yes	The share of total expenditure in the study area that goes to the poorest 20% of the population. This is a measure of inequality in the population.
1.5 Employment to population ratio	5	No	The percentage of individuals older than 15 who did any work, paid or unpaid, over the previous year not including domestic work.
1.6 Proportion of employed people living below US$1.25 income (PPP) per day	5	No	The percentage of the employed (as defined above) who are income poor. This indicator was developed to provide a measure of the lack of decent work in a country.
1.7 Proportion of own account and contributing family workers in total employment	5	No	The proportion of the employed population (as defined above), engaged in farming, animal husbandry, fishery or any other self-employment without being remunerated.
1.8 Percentage of underweight children under-5	3	No	The percentage of children aged 0–59 months, whose weight is below the WHO international benchmark. It is a composite indicator of acute (wasting) and chronic (stunting) undernutrition.
1.9 Proportion of population below minimum level of dietary energy consumption	5	Yes	The proportion of individuals below the Ghanaian official food poverty line which allows the purchase of a minimum basket of food items.
Goal 2: To achieve universal primary education			
2.1 Net enrolment ratio in primary education	5	No	The proportion of children of official primary school age (6–11) that are reported having attended primary school at any time during the previous year.
2.2 Proportion of pupils starting grade 1 who reach last grade of primary	5	No	The proportion of children age 11–14 who completed primary among those who ever attended primary school.
2.3 Literacy rate of 15 to 24-year-olds, women and men	3	No	The proportion of adults age 15–24 who were able to read correctly two English sentences ('The child is playing with the ball'; 'Farming is hard work') and to do some arithmetic (9+4 and 4x5).
Goal 3: To promote gender equality and empower women			
3.1 Ratio of girls to boys in primary education	5	No	The ratio of the net attendance rate in primary school of boys and girls age 6–11. A ratio below one implies fewer girls are attending primary than boys.
3.2 Share of women in wage employment in the non-agricultural sector	5	No	The proportion of women above 15 in overall employment in the non-agricultural sector. The indicator measures to what extent women have equal access to jobs outside agriculture.
Goal 4: To reduce child mortality			
4.1 Under-5 mortality rate	2	No	It is the child's probability of dying before 5 years of age, calculated per thousand of population over the 5 years preceding the interview using the DHS method.
4.2 Infant mortality rate	2	No	It is the child's probability of dying before 12 months of age, calculated per thousand of population over the 5 years preceding the interview using the DHS method.
4.3 Proportion of 1-year-old children immunised against measles	3	No	The proportion of children aged 0 or 1 whose vaccination card reports a measles vaccination or whose mother recall the child being given an injection in the upper arm to prevent measles.
Goal 5: To improve maternal health			
5.2 Proportion of births attended by skilled health personnel	3	No	The proportion of deliveries among women age 15–49 assisted either by doctor, clinical officer, or nurse for all children of age 0–2 at the time of the interview.
5.3 Contraceptive prevalence rate	3	No	The proportion of women aged 15–49 using any contraceptive method at the time of the interview (sterilisation, pill, IUD,

MDG	Obs.	Panel	Indicator
			injections, implants, condoms, rhythm, abstinence and withdrawal).
5.4 Adolescent birth rate	2	No	The proportion of women aged 15–19 that gave birth during the previous 5 years.
5.5 Antenatal care coverage	3	No	The percentage of women aged 15–49 who received at least one antenatal visit (doctor, clinical officer, nurse, midwife, CHW) for children who are aged 0–2 years at the time of the interview.
Goal 6: To combat HIV/AIDS, malaria and other diseases			
6.3 Proportion of population aged 15–24 with comprehensive correct knowledge about HIV	3	No	The proportion of population aged 15–49 that answered correctly 8 (yes/no) questions about obvious causes of HIV infection transmission.
6.6 Malaria prevalence among children under 5	3	No	The proportion of children with malaria based on microscopic analysis of parasite count in the blood.
6.7 Proportion of children under-5 sleeping under insecticide-treated bed nets	3	No	The proportion of children aged 0–59 months who slept under an *insecticide-treated mosquito net* the night before the interview.
6.8 Proportion of children under 5 with fever who are treated with anti-malarial drugs	3	No	The proportion of children aged 0-59 months with fever in the last 2 weeks who received anti-malarial drugs.
Goal 7: To ensure environmental sustainability			
7.8 Proportion of the population using an improved drinking water source	3	Yes	The percentage of households whose main source of drinking water is: piped into welling, yard or plot; public tap; tube well and borehole; protected dug well; protected spring; bottles; sachet water.
7.9 Proportion of the population using an improved sanitation facility	3	Yes	The percentage of households that normally uses toilets: flush to piped sewer system; flush to septic tank; flush to pit (latrine); ventilated improved pit latrine; pit latrine with slab.
Goal 8: To develop a global partnership for development[43]			
8.14 Fixed telephone subscriptions for 100 inhabitants	3	Yes	Percentage of households reporting having a landline in the home.
8.15 Mobile cellular subscriptions for 100 inhabitants	3	Yes	Percentage of adults aged 15–49 reporting a personal use of a mobile phone during some or all the year before the interview.

114. First, we compare the baseline MV and CV indicators with the MDG indicators for the rest of the country (Table 10). The MDG indicators for the whole of Ghana are those reported by the latest DHS report (GSS et al. 2015), with the exception of the poverty data that are those reported by the latest poverty data available from the Ghana Living Standards Survey 6 (GSS 2014). Some interesting observations can be made by comparing the MDG indicators in the study area to the whole country: First, the area is much poorer than Ghana in terms of monetary poverty. The difference in monetary poverty is large, although the percentage of malnourished children is not much higher. Second, primary school attendance rates are comparable to those prevailing in Ghana, although literacy rates among young adults (15–24 years of age) are lower than the rest of the country. Third, there is little disparity in school attendance in Ghana between boys and girls, while in the study areas girls are more likely to attend school than boys and the difference increases at higher school levels. Fourth, child mortality rates are much higher in the study areas than the rest of Ghana, and although nearly half of children are immunised against measles, this is also worse than the country overall. Fifth, there are some large differences in maternal and child health. The proportion of mothers receiving antenatal care is similar, and a larger number of children sleep under treated bed nets. The proportion of births attended by skilled professionals is, however, much lower than the rest of the country, and similarly the use of contraceptives and knowledge of HIV. Finally, households in the

43 A subset of this MDG focused on 'in co-operation with the private sector, make available the benefits of new technologies, especially information and communications'.

study area have better access to improved water sources than the rest of the country but much less access to toilet facilities. In summary, these data suggest that the study area is much poorer in monetary terms, that child mortality rates are higher, that maternal health and health services are poorer, and that access to toilet facilities is limited, while rates of school attendance, access to water facilities and undernourishment are similar.

115. Since we are testing multiple hypotheses at the same time, we use critical values for the rejection of the null hypotheses that are more conservative than the usual 5% and 10%. When testing multiple outcomes at the same time there is a chance of finding effects when there are none. For example, with 84 different hypotheses and a statistical significance threshold of 5% we would expect at least four 'significant' results even if there was no impact at all. To overcome this problem, we assess the significance of the results using the false discovery ratio (FDR) (Efron and Hastie 2016). In order to do so, we order the p-values in ascending order and index them by i=1,..,n and we reject all the null hypotheses whose p-value is less than (q/N)*I, where q is the statistical significance level of choice (in our application we use 0.05 and 0.10 as is common in empirical practice). All estimations reported in the report testing more than 10 hypotheses at the same time include the FDR adjustment of critical values and statistical significance.

Table 10. Baseline MDGs in MV, CV areas and Ghana

MDG	Baseline CV	Baseline diff. MV	Ghana
Proportion of population below US$1 (PPP) per day	83.52	0.13 (0.515)	
Proportion of population below the national poverty line	88.08	–0.47 (0.836)	24.2
Poverty gap ratio	48.72	0.96 (0.699)	7.8
Share of poorest quintile in national consumption	7.24	–0.59 (0.777)	
Employment to population ratio	79.49	–3.19 (0.217)	
Proportion of employed people living below US$1 (PPP) per day	52.75	8.04 (0.488)	
Proportion of own account and contributing family workers in total employment	95.86	–3.56 (0.080)	
Percentage of underweight children under-5	16.43	–1.78 (0.345)	11.0
Proportion of population below minimum level of dietary energy consumption	66.48	0.94 (0.798)	8.4
Net attendance ratio in primary education	69.56	–9.30 (0.056)	70.6
Proportion of pupils starting grade 1 who reach last grade of primary	74.54	2.86 (0.602)	
Literacy rate of 15 to 24-year-olds, women and men	32.93	–2.52 (0.505)	85.1
Ratio of girls to boys in primary education	1.04	**0.24**** (0.006)	1.0
Share of women in wage employment in the non-agricultural sector	52.75	8.04 (0.488)	
Under-5 mortality rate	103.57	**–34.66*** (0.030)	60
Infant mortality rate	69.94	–25.67 (0.097)	41
Proportion of 1-year-old children immunised against measles	50.89	10.44 (0.015)	89.3
Proportion of births attended by skilled health personnel	29.95	–0.69	73.7

MDG	Baseline CV	Baseline diff. MV	Ghana
		(0.902)	
Contraceptive prevalence rate	9.77	–0.31	26.7
		(0.884)	
Antenatal care coverage	79.63	5.76*	97.0
		(0.074)	
Proportion of population aged 15–24 with comprehensive correct knowledge about HIV	12.75	0.20	23.6
		(0.920)	
Proportion of children under-5 sleeping under insecticide-treated bed nets	54.64	**–23.76*** **	46.6
		(0.000)	
Proportion of the population using an improved drinking water source	72.54	–0.037	64.2
		(0.946)	
Proportion of the population using an improved sanitation facility	8.93	0.32	15.0
		(0.923)	
Fixed telephone subscriptions for 100 inhabitants	0.19	–0.19	
		(0.194)	
Mobile cellular subscriptions for 100 inhabitants	45.73	3.18	
		(0.419)	

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

116. The data reported in Table 10 also allows for comparing baseline indicators in MV and CV areas. Comparisons are made after matching households and trimming the sample to remove households in either group that are too different from the comparator sample. Rates of poverty, malnourishment and other distributional indicators of poverty are very similar in the MV and CV areas. Fewer children in MV are attending primary school areas at the baseline though the difference is not statistically significant. Many more girls are attending primary school in the MV area and the difference is statistically significant. Child and infant mortality rates are much smaller in MV area though the difference is not statistically significant. Antenatal coverage is higher in MV areas while the proportion of children sleeping under bed nets is much smaller, though this latter result is likely to be the result of seasonal factors related to the implementation of the baseline survey at different times of the year. Access to basic infrastructure such as water, toilets and mobile communication is very similar.

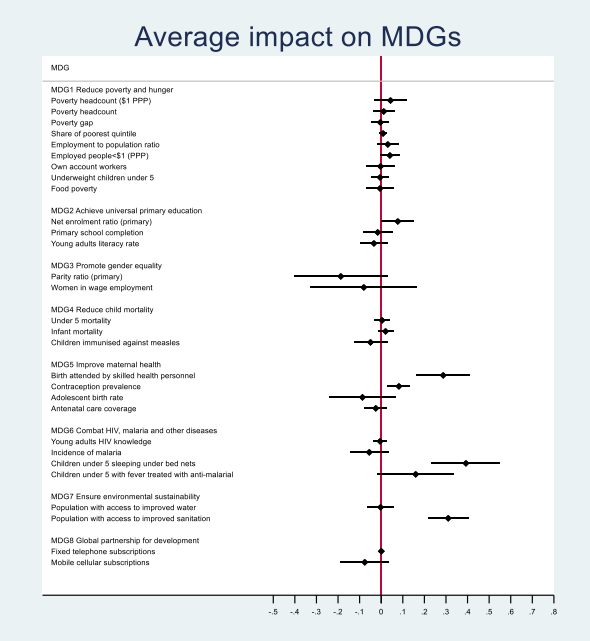
117. The average impact of the intervention on the MDGs is presented in Figure 6. All MDGs indicators are binary – being reported as ratios, shares, proportions or rates – and the difference-in-difference impacts have a simple interpretation as percent points differences between the project and the control group. In some cases, a positive impact of the intervention is a reduction in the MDG indicator (for example poverty or malaria incidence), while in other cases a positive impact is an increase (for example, births attended by skilled professionals or mobile phones usage). To simplify the reading of the chart we changed the sign of the changes in such a way that positive impacts are all on the right-hand-side of the chart. The vertical line represents no impact, a confidence interval entirely to the right of the vertical line is a positive impact and a confidence interval to the left is a perverse negative impact. The confidence intervals were adjusted to correct for testing multiple hypotheses using the false discovery ratio. They are wider and more conservative than usual 5% confidence intervals and reject a larger number of hypotheses that is normally the case in order to avoid the discovery of effects resulting from chance alone.

118. It is immediately apparent from the chart that MVP had few large impacts, some small impacts, many null impacts and no negative impacts. It could be argued that the sample size of the study was too small and that the study was not sufficiently powered to detect impacts. If this was true, the inability to observe impact would not imply the absence of impact. This however is unlikely to be true. The project expected to achieve large impacts on the MDGs. Power calculations were conducted with caution and based on conservative expectations about effect sizes (Masset et al., 2013). In addition,

we can measure our degree of confidence in the results by looking at the confidence intervals of the point estimates. If confidence intervals of null effects are tight around the lack of impact, one can be confident that the data are supporting the no impact hypothesis. Some confidence intervals are indeed wide and would have surely benefited from larger samples, like for example parity ratios, teenage pregnancies and malaria incidence. However, these wide confidence intervals have all uncontroversial point estimates that are well to the right or to the left of the vertical line of no impact. Confidence intervals of effects close to the zero line of no impact – including poverty, undernourishment and child mortality – are tight around zero suggesting that for them the true effect of the project is indeed likely to be zero. A discussion of small effect sizes is therefore not necessary because: (a) the project set out to achieve large impact and our study was sufficiently powered to detect such impacts; and (b) small impacts have confidence intervals that are tight around the null hypothesis of no impact and can therefore be confidently considered as zero impacts. Hence, in what follows we will mainly focus on effects that are statistically different from zero and we will mostly discuss the effects qualitatively as being large (>10% difference) or small (<10% difference) rather than discussing point estimates.

119. We assess the impact of MVP on the MDGs irrespective of targets because these were either undefined or too generic. To our knowledge MVP did not specify specific targets in Ghana in relation to the MDG indicators. On the other hand, the United Nations set generic targets for the MDGs and for some indicators no target was ever defined. For example, target 1b states the goal of 'achieve full and productive employment', target 6.c states the goal of 'halting and reversing the incidence of malaria'. It is not clear how these goals translate into numerical targets for the percentage of vulnerable employment or malaria prevalence in the population. For some indicators there are no targets at all. For example, target 5.a states the goal of reducing maternal mortality by three quarters but does not say what should be the target percentage of births attended by skilled professionals or the target rate of contraception. Target 4.a states the goal of reducing mortality by two thirds, but does not state the desired level of measles immunisation rates. An additional complication is that targets, when defined, were expressed in relation to a 1990 baseline, but we have no data on the status of MDG indicators for the MV sites in 1990 and therefore we would only be able to provide rough approximation of the stated goals. Finally, our evaluation found a positive impact of the intervention for just seven MDG indicators. Hence, we will discuss the progress on targets with respect to these seven indicators assuming that the goal of the intervention was universal, for example, 100% enrolment in primary schools and of births attended by skilled professionals.

Figure 6. Average impact of MVP on the MDGs



120. The year-specific impacts of the intervention on the MDGs are shown in Table 11 by survey year and on average (shown in last column). Impacts are expressed as difference-in-difference (DD): before-and-after changes in the outcomes in the MV areas minus the same changes in the comparator group. They represent the impact of the intervention after removing changes produced by other factors unrelated to the project such as government spending, historical trends or natural disasters. All outcomes are reported as ratios, shares, proportions or rates. Since all MDG indicators are binary outcomes, all the impacts are interpreted as differences in ratios or per cent differences. P-values assessing the statistical significance of the observed effects are reported in parentheses under each DD effect. Statistically significant coefficients are in bold.

Table 11. Impact of MV on MDGs outcomes

MDG	DD impact 2013	DD impact 2014	DD impact 2015	DD impact 2016	DD average impact
Proportion of population below US$1.25 (PPP) per day	**–1.17** (0.001)	**–9.84** (0.013)	**–3.95** (0.294)	**–9.05** (0.015)	**–8.65** (0.002)
Proportion of population below the national poverty line	–0.72 (0.793)	–1.09 (0.745)	0.83 (0.826)	5.567 (0.133)	1.17 (0.676)
Poverty gap ratio	–0.68 (0.804)	–5.89 (0.054)	3.24 (0.218)	1.90 (0.573)	–0.38 (0.869)
Share of poorest quintile in national consumption	1.17 (0.352)	1.49 (0.300)	0.99 (0.392)	–0.01 (0.990)	0.87 (0.321)
Employment to population ratio	2.14 (0.450)	5.22 (0.075)	4.31 (0.083)	0.80 (0.800)	3.06 (0.204)
Proportion of employed people living below US$1 (PPP) per day	**–13.59** (0.001)	**–13.63** (0.001)	–6.60 (0.106)	**–10.01** (0.007)	**–11.04** (0.000)
Proportion of own account and contributing family workers in total employment	3.89 (0.042)	3.90 (0.046)	4.28 (0.030)	4.04 (0.049)	4.02 (0.037)
Percentage of underweight children under-5		1.03 (0.727)		–2.14 (0.435)	–0.51 (0.821)
Proportion of population below minimum level of dietary energy consumption	–0.84 (0.847)	–9.50 (0.078)	8.81 (0.067)	–0.42 (0.933)	–0.55 (0.885)
Net attendance ratio in primary education	**9.56** (0.007)	4.35 (0.252)	3.54 (0.325)	**13.48** (0.000)	**7.69** (0.015)
Proportion of pupils starting grade 1 who reach last grade of primary	0.90 (0.837)	–1.43 (0.725)	–1.40 (0.741)	–4.12 (0.300)	–1.62 (0.670)
Literacy rate of 15 to 24-year-olds, women and men		–3.36 (0.113)		–0.19 (0.961)	–3.36 (0.313)
Ratio of girls to boys in primary education	**–0.29** (0.011)	–0.09 (0.413)	–0.10 (0.420)	**–0.26** (0.021)	–0.19 (0.058)
Share of women in wage employment in the non-agricultural sector	–10.97 (0.531)	0.96 (0.960)	–6.92 (0.664)	–14.54 (0.387)	–8.06 (0.545)
Under-5 mortality rate		–20.86 (0.389)			4.12 (0.842)
Infant mortality rate		–8.67 (0.711)			20.22 (0.285)
Proportion of 1-year-old children immunised against measles		–6.45 (0.160)		–3.10 (0.545)	–4.95 (0.182)
Proportion of births attended by skilled health personnel		**16.57** (0.001)		**39.08** (0.000)	**27.00** (0.000)
Contraceptive prevalence rate		**5.73** (0.018)		**11.48** (0.000)	**8.50** (0.000)
Adolescent birth rate					–8.67 (0.269)
Antenatal care coverage		–7.43 (0.129)		2.36 (0.538)	–2.94 (0.468)
Proportion of population aged 15-24 with comprehensive correct knowledge about HIV		0.056 (0.832)		2.41 (0.249)	1.47 (0.474)
Malaria incidence		–4.50 (0.333)		–4.47 (0.345)	–5.53) (0.196)
Proportion of children under-5 sleeping under insecticide-treated bed nets		**42.88** (0.000)		**34.60** (0.000)	**39.24** (0.000)
Children under 5 with fever treated with anti-malarial drugs		11.13 (0.240)		**23.70** (0.023)	15.99 (0.041)
Proportion of the population using an improved drinking water source		–5.89 (0.174)		5.50 (0.129)	–0.27 (0.940)
Proportion of the population using an improved sanitation facility		1.61 (0.444)		**61.36** (0.000)	**31.04** (0.000)
Fixed telephone subscriptions for 100 inhabitants		0.01 (0.707)		0.01 (0.698)	0.01 (0.675)
Mobile cellular subscriptions for 100 inhabitants		–5.40 (0.374)		–9.96 (0.059)	–7.60 (0.146)

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio

121. Here we discuss the impacts of the intervention on each MDG. The project did not have an impact on the indicators of Goal 1 (eradicating extreme poverty and hunger), with the exception of reducing poverty measured using household income data and adjusted by purchasing power parity. With respect to the goal of halving poverty, this represent a contribution of 21% to the goal over and above what was achieved in control areas. On all other indicators, the project did not reduce poverty whether measured by the national poverty line or the national food poverty line. The difference of impact on income and expenditure is further discussed in section 5.2. The project did not reduce inequality or improve the distribution of expenditure among the poor since no impact is found on the consumption share of the bottom quintile and on the poverty gap. Finally, there is no impact on the percentage of undernourished children. The project had a positive impact on employment as both the employment to population ratio and the percentage of family workers on own account increased, though none of these effects are statistically significant. Following the reduction in income poverty, there was a reduction in the proportion of the employed that are income poor.

122. Goal 2 is achieving universal primary education. Primary school attendance was below 70% at baseline and the project increased attendance by 7.7 percentage points, an effect driven by higher attendance in the second and in the last year of the intervention. With respect to the goal of achieving universal primary education, this effect represents 27% of the goal over and above what was achieved in the control areas. The project did not improve completion rates or adult literacy. The latter, it should be noted, was not a goal of the intervention and no specific activity was designed to improve literacy of adults.

123. Goal 3 is improving gender equality and empowering women, which is assessed by gender parity in school and by the share of women in wage employment. The project decreased the parity ratio though the effect is not statistically significant. It should be noted that more girls than boys attend school in the study area, particularly in the MVs. The project appears to increase boys' school attendance relatively more than girls, thus redressing the existing gender imbalance. We found no impact of the intervention on the percentage of women engaged in wage employment in the non-agricultural sector. Note, however, that a very small fraction of employment is salaried as most individuals are self-employed in agriculture or in non-farm activities.

124. Goal 4 is reducing child mortality, measured by child (under five) and infant (under one) mortality and by the rate of measles immunisation. The project does not have a positive impact on any of these indicators. The charts show a clear reduction in mortality rates between baseline and midterm, but further improvements between midterm and endline are small and, more importantly, even larger improvements are occurring in the comparison areas so that the final DD effect suggests an increase in mortality rates. There was no improvement in the percentage of children immunised against measles. The rate of measles immunisations appears to have decreased in the MV areas against a stable or increasing trend in the control areas. The net outcome is negative in MV areas, though not statistically significant.[44]

125. Goal 5 is improving maternal health, which cannot be measured directly in a small sample and is approximated by a number of intermediate outcomes, namely the proportion of births attended by a skilled professional, the contraceptive rate and antenatal coverage. The project has a large impact on some of these intermediate indicators. The proportion of births attended by professionals increased dramatically, while the increase in the proportion of women using contraceptive methods increased substantially. The project did not have an impact on antenatal visits.

44 Note that the impact on measles immunisation for children under two (MDG) is different from the positive impact on a sample of under five children. The MDG indicator requires a sample of children under two, whereas the project appears to have increased immunisation rates when a sample of children under five is considered.

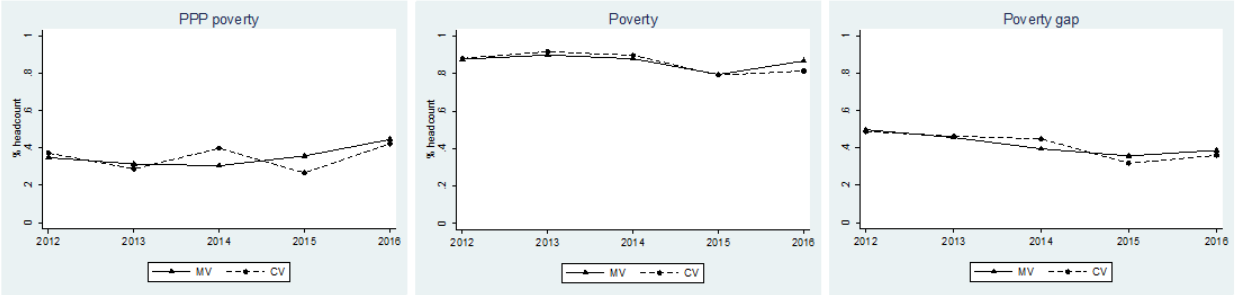
126. Goal 6 focuses on combating HIV/AIDS, malaria and other diseases. There was a dramatic effect on the proportion of children using mosquito bed nets; and some effect on children under five treated with anti-malarial drugs. With respect to the goal of achieving universal use of anti-malarial drugs, MVP achieved 25% of the goal over and above what was achieved in the control areas. The project did not however have an impact on HIV knowledge, nor the general incidence of malaria. It must be noted that impacts on malaria prevalence and use of mosquito bed nets can be biased because of different timing of data collection in the project and control groups at the baseline. Though the size of the bias cannot be estimated or adjusted, its direction is known. With respect to the goal of achieving a universal use of bed nets, the project achieved about 87% over and above what was achieved in control areas. This impact on the use of mosquito bed nets might be overestimated, while the impact on malaria incidence might be underestimated. This is more likely to be the case for bed nets, whose baseline values in project and control areas are clearly different, suggesting a bias is present.

127. Goal 7 is to ensure environmental sustainability, assessed by households' access to improved sources of drinking water and use of improved sanitation facilities. The project did not have an impact on sources of drinking water (although as mentioned earlier, this was relatively high at the outset, compared with the rest of the country). There was a dramatic impact on the use of improved toilets towards the end of project implementation. With respect to the goal of halving the percentage of the population without access to improved sanitation, this represented achieving 67% of the goal over and above what was achieved in control areas.

128. Goal 8 is developing a global partnership for development that at the household level is assessed by access to telephone technology. The project did not have an impact on the use of landlines, which remained non-existent over the study period in both MV and CV areas. Perhaps a bit surprisingly, given the considerable efforts made by the project in this direction, we found no impact on the use of mobile phones.

129. The trends in the MDG indicators in MV and CV areas are displayed in the charts of Figures 6 to 13.

Figure 7. Goal 1 Eradicate extreme poverty and hunger



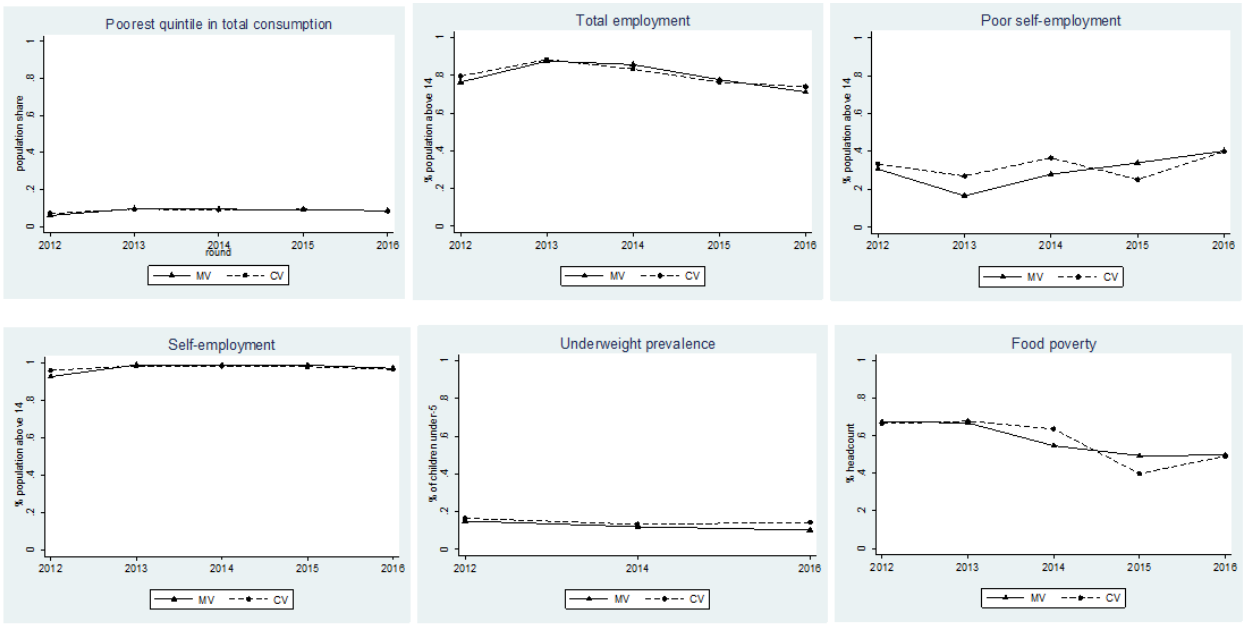


Figure 8. Goal 2 Achieve universal primary education

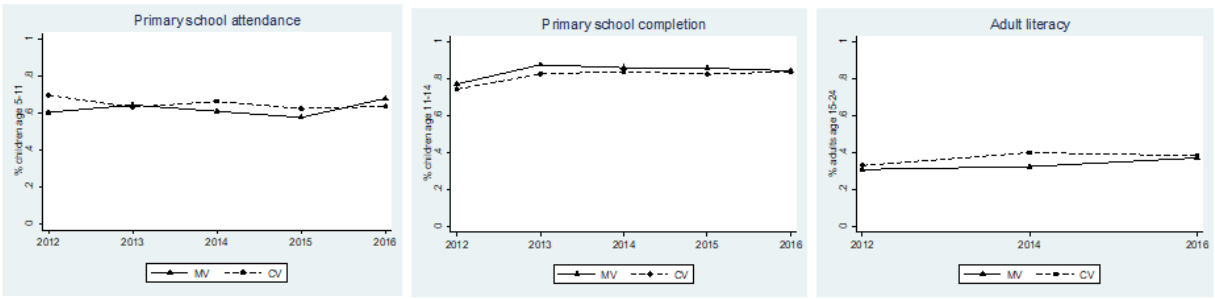


Figure 9. Goal 3 Promote gender equality and empower women

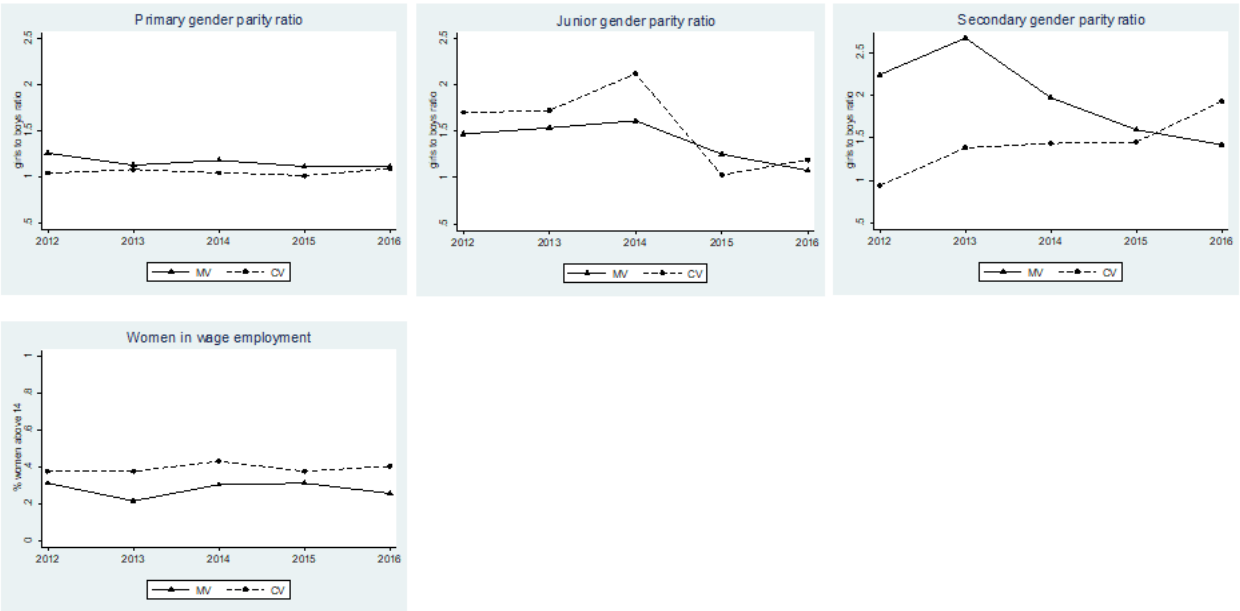


Figure 10. Goal 4 Reduce child mortality

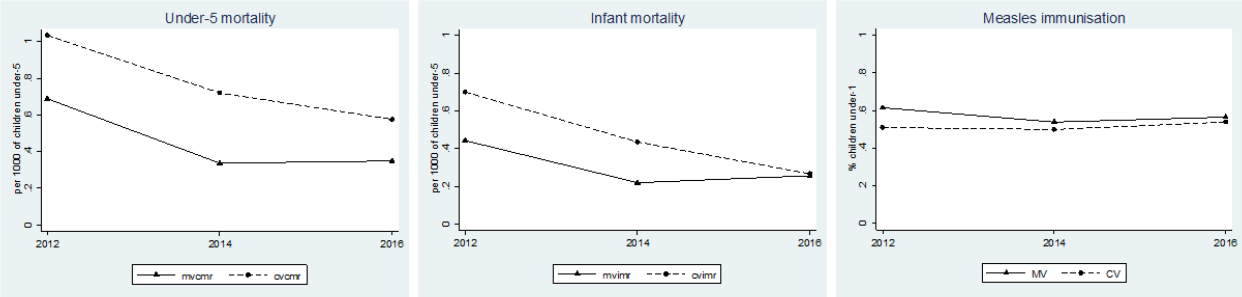
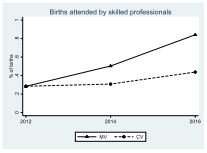
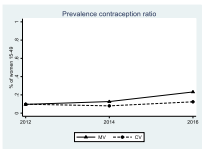
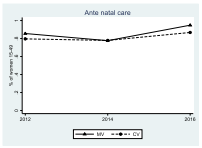


Figure 11. Goal 5 Improve maternal health







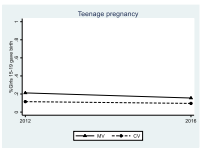
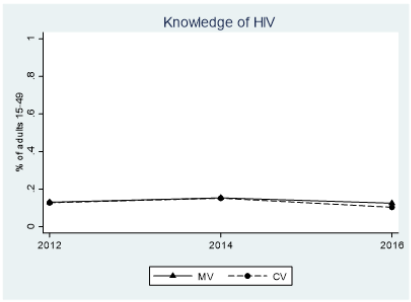
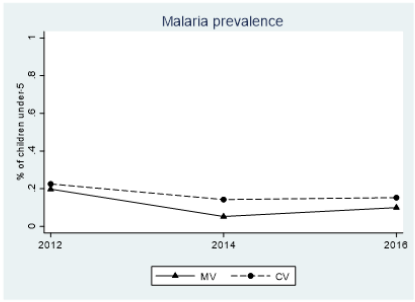
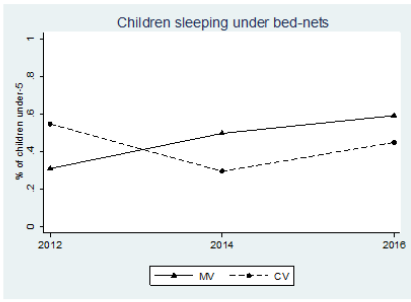


Figure 12. Goal 6 Combat HIV, malaria and other diseases







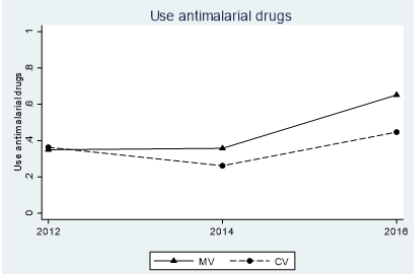


Figure 13. Goal 7 Ensure environmental sustainability

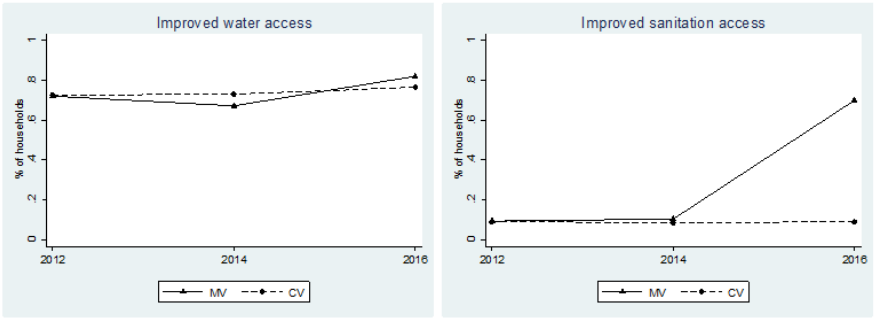
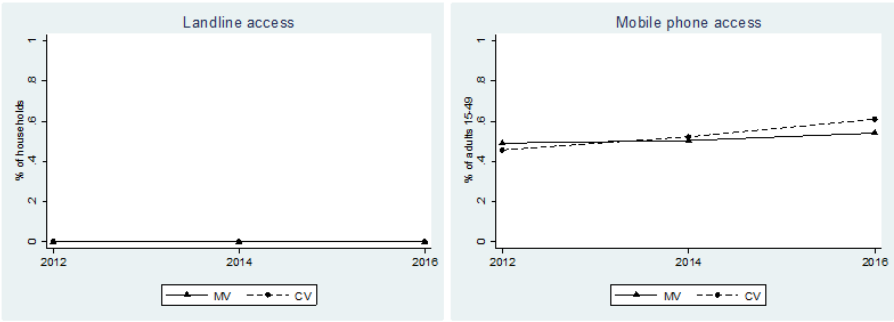


Figure 14. Goal 8 Develop a global partnership for development



130. Overall, the project did not achieve its stated goals of achieving the MDGs by 2016. At endline, there was no observed impact of the MV on the official MDG poverty or hunger indicators. Far from breaking the 'poverty trap' the project does not appear to have reduced poverty and hunger at all. There are, however, some encouraging impacts of the intervention in education and health. The 7.7% effect on primary enrolment is considerable and the dramatic improvement on some intermediate health indicators (births attended by skilled professionals, contraception rates and children sleeping under mosquito bed nets) predicts a future improvement in maternal and child outcomes that could only be observed in future surveys or using larger samples. It is perhaps a bit surprising that the project did not improve some of the outcomes that were explicitly targeted by the intervention such as: child mortality, immunisation rates, antenatal care, access to drinking water and usage of mobile phones. There is, however, a very large impact on the use of improved toilet facilities that emerges towards the end of the intervention.

131. The analysis of the impact on MDGs has a number of limitations that will be further investigated and analysed in the following section of the report:

- Projects are rarely assessed on impacts on final outcome indicators such as the MDGs. For many of the indicators, it could be argued that the size and the time frame of the intervention was not able to produce dramatic changes in the short period of time under study. Also, some of the standard MDG indicators, such as knowledge of HIV or adult literacy rates, were not explicitly targeted by project activities.
- Some outcome indicators are calculated using small samples, like for example literacy and knowledge of HIV among young adults. For the majority of outcomes, however, it cannot be argued that the sample size was too small and that the study was not sufficiently powered to detect impacts. The project expected to achieve large impacts on the MDGs, but power calculations were conducted with caution and based on much more conservative expectations (Masset et al. 2013b). In addition, we can measure our degree of confidence in the results by looking at the 'confidence' intervals. If confidence intervals of null effects are tight around the lack of impact, one can be confident that the data are supporting the no impact hypothesis. Some

outcomes would have surely benefited from larger samples, like for example gender parity ratios and adolescents' birth rates, but the intervals of many null effects, including poverty, undernourishment and child mortality, are tightly clustered around zero suggesting that for them the true effect of the project is likely to be zero.

- All MDGs outcomes are measured as ratios, shares and percentages, sometimes relying on somewhat arbitrary cut-off points (poverty and undernutrition). This type of analysis precludes observing impacts outside the cut-off points and is blind to distributional effects. There are only three MDG indicators that are not binary: income poverty, expenditure poverty and child undernourishment. The distributional impacts of the project on expenditure poverty is assessed by the food poverty indicator, by the poverty gap measure and by the share of the poorest quintile in total consumption. Changes in these indicators show that project did not have any positive impact on the very poor. On the other hand, the absence of impact on child undernourishment could be a result of the particular cut-off chosen and extremely undernourished children might have benefited from the intervention. This is discussed in section 7.4.2. The distributional impact of the intervention on household incomes are analysed in section 5.2.3.
- The official MDG indicators are unable to fully detect the impact of the project on living standards. For example, employment-related indicators have little relevance in a place where most individuals do some work at any time. On the other hand, relevant indicators of well-being such as prevalence of anaemia and malaria or cognitive skills and maths test scores are missing.
- Observed impacts may be dampened by spillover effects. If benefits extend to control areas, the comparison sites are contaminated and the effects underestimated. For example, mothers and children from CV areas might have accessed the health services provided by the intervention thus resulting in large 'project' impacts in CV areas, which nullify the comparisons between MV and CV.
- Absence of DD impact does not necessarily mean that the project did not have an impact. If similar interventions were conducted in other areas, it may simply mean that the project is as effective as these other interventions.

4.1 Impact heterogeneity and spillover effects

132. In this section we assess the impact of the interventions across two subgroups (district and sex) and by distance from the MV areas using the stratification of the control group in near and far communities that was imposed by design. Sex refers to sex of the individual for individual level outcomes (such as mortality or school enrolment) or to the sex of the head of the household for household-level outcomes (such as poverty or access to drinking water). For district subgroups we use the original district subdivision that existed at the time of the baseline because the stratification of the sample was based on the two districts of Builsa and West Mamprusi. Spillover effects are investigated by looking at the impact of the intervention in communities geographically located at a (relatively) short distance from MV communities. The exercise is conducted separately for the districts of Builsa and West Mamprusi because localities in West Mamprusi are more distant from each other and therefore geographic spillover effects are less likely to occur than in Builsa. The exercise is conducted for all MDGs outcomes and the statistical significance of the p-values is calculated at the thresholds of 5% and 10% using the false discovery ratio.

133. None of the sex differences are statistically significant. Similarly, none of the differences in effects between the districts of Builsa and West Mamprusi are statistically significant. Apparently, the project did not affect girls and female-headed households differently or the population of the two districts. Few of the differences observed in the near communities in comparison with the far-away communities are statistically significant. It is, however, difficult to interpret these differences as spillover effects: the results point to a reduction in poverty in control communities near MV areas, but since the intervention did not have an impact on poverty in MV areas in the first place, this is

more likely the result of other factors rather than spillovers originating in the project area. When looking at spillover effects by district we find, as expected, some statistically significant differences in Builsa but not in West Mamprusi. Again, some of these differences are hard to interpret as spillover effects: several differences refer to changes in poverty, which the project was unable to produce in the MV areas in the first place. Other impacts are not in the expected direction, such as a negative impact on the use of bed nets or access to drinking water. The only effect that could be possibly interpreted as a positive spillover effect is an increase in the proportion of births attended by a skilled professional.

Table 12. Subgroup and spillover analysis of impact of MV on the MDGs

MDG	DD sex (female)	DD district (Builsa)	DD near	DD near in Builsa	DD near in West Mamprusi
Proportion of population below US$1 (PPP) per day	0.073 (0.434)	0.053 (0.409)	–0.065 (0.044)	–0.062 (0.235)	–0.085 (0.033)
Proportion of population below the national poverty line	0.105 (0.309)	0.038 (0.389)	**–0.063*** (0.005)	–0.062 (0.055)	–0.066 (0.031)
Poverty gap ratio	0.112 (0.059)	–0.027 (0.417)	**–0.066**** (0.000)	**–0.080**** (0.001)	–0.053 (0.053)
Share of poorest quintile in national consumption	0.033 (0.227)	–0.004 (0.826)	–0.022 (0.016)	**–0.050*** (0.003)	–0.010 (0.255)
Employment to population ratio	0.030 (0.221)	0.062 (0.258)	0.007 (0.782)	0.012 (0.721)	–0.004 (0.929)
Proportion of employed people living below US$1 (PPP) per day	–0.017 (0.419)	0.160 (0.026)	0.015 (0.813)	0.051 (0.492)	0.011 (0.862)
Proportion of own account and contributing family workers in total employment	0.026 (0.075)	0.039 (0.357)	0.050 (0.015)	0.059 (0.094)	0.046 (0.048)
Percentage of underweight children under-5	0.009 (0.845)	–0.077 (0.076)	0.022 (0.567)	–0.022 (0.525)	0.032 (0.508)
Proportion of population below minimum level of dietary energy consumption	0.169 (0.140)	0.083 (0.154)	**–0.124**** (0.000)	**–0.141*** (0.002)	**–0.122*** (0.004)
Net enrolment ratio in primary education	–0.054 (0.213)	–0.051 (0.460)	0.054 (0.117)	0.028 (0.565)	0.070 (0.125)
Proportion of pupils starting grade 1 who reach last grade of primary	0.025 (0.713)	0.153 (0.087)	0.076 (0.049)	0.103 (0.042)	0.058 (0.310)
Literacy rate of 15 to 24-year-olds, women and men	0.029 (0.710)	0.070 (0.268)	–0.061 (0.151)	–0.102* (0.072)	–0.011 (0.872)
Ratio of girls to boys in primary education	–0.102 (0.830)	–0.162 (0.409)	–0.090 (0.278)	–0.075 (0.560)	–0.102 (0.364)
Ratio of girls to boys in secondary education	1.528 (0.754)	1.072 (0.617)	–0.439 (0.722)	–2.599 (0.544)	0.826 (0.222)
Ratio of girls to boys in tertiary education	NA	–2.793 (0.641)	0.241 (0.830)	2.457 (0.703)	0.078 (0.957)
Share of women in wage employment in the non-agricultural sector	0.448 (0.337)	0.310 (0.142)	–0.001 (0.995)	–0.305 (0.342)	–0.035 (0.799)
Under-5 mortality rate	–0.099 (0.010)	–0.040 (0.318)	0.005 (0.851)	0.021 (0.571)	–0.005 (0.893)
Infant mortality rate	–0.060 (0.083)	–0.028 (0.447)	0.002 (0.908)	0.004 (0.904)	0.001 (0.973)
Proportion of 1-year-old children immunised against measles	–0.113 (0.116)	0.111 (0.150)	0.121 (0.052)	0.121 (0.152)	0.123 (0.134)
Proportion of births attended by skilled health personnel	0.022 (0.775)	–0.067 (0.536)	0.128 (0.033)	**0.275*** (0.002)	–0.009 (0.855)

MDG	DD sex (female)	DD district (Builsa)	DD near	DD near in Builsa	DD near in West Mamprusi
Contraceptive prevalence rate	–0.041 (0.645)	0.068* (0.056)	0.023 (0.220)	0.000 (0.993)	0.030 (0.117)
Antenatal care coverage	0.022 (0.722)	0.056 (0.246)	–0.012 (0.706)	–0.009 (0.828)	–0.015 (0.731)
Proportion of population aged 15–24 with comprehensive correct knowledge about HIV	–0.037 (0.402)	0.021 (0.565)	0.049 (0.044)	0.078 (0.122)	0.027 (0.165)
Proportion of children under-5 sleeping under insecticide-treated bed nets	0.114 (0.067)	–0.198 (0.075)	–0.063 (0.413)	**–0.232*** (0.004)	0.003 (0.973)
Proportion of the population using an improved drinking water source	–0.100 (0.141)	–0.068 (0.169)	–0.055 (0.038)	**–0.109*** (0.007)	–0.005 (0.896)
Proportion of the population using an improved sanitation facility	–0.046 (0.391)	–0.033 (0.335)	–0.022 (0.271)	–0.062 (0.019)	0.022 (0.450)
Fixed telephone subscriptions for 100 inhabitants	–0.001 (0.544)	0.002 (0.608)	–0.001 (0.634)	–0.003 (0.620)	NA
Mobile cellular subscriptions for 100 inhabitants	0.026 (0.596)	–0.118 (0.170)	–0.068 (0.153)	–0.137 (0.065)	–0.017 (0.767)

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio

Chapter 5. Breaking the poverty trap

134. One of the ultimate aims of the MVP is to break the poverty trap,[45] for which the achievement of the MDGs is instrumental. In Chapter 4, we demonstrated that the project had hardly any attributable impact on the MDG indicators: there was no impact on Goal 1 (eradicating extreme poverty and hunger); and the project did not reduce poverty when measured using the national poverty line or the national food poverty line. We also noted that the MDGs rely on somewhat arbitrary cut-off points, ratios and percentages, and that this can sometimes preclude observing impacts outside of these cut-off points, especially as they ignore any distributional effects. For example, the project might have reduced extreme poverty but because this impact occurs below the official poverty line it does not result in an overall reduction in poverty.

135. In this chapter, we start our exploratory analysis that goes beyond the MDG indicators to consider whether the MVP reduced poverty in other ways, including on other measures of poverty, distributional effects, and the relationship between income and savings. The analysis in this chapter covers:

- the impact on household monetary poverty
- patterns of household income and consumption
- explaining investment and savings dynamics
- breaking the poverty trap.

136. Overall, we find that monetary poverty at the household level (however measured) did not decrease as a result of the MVP. The survey data, however, suggest[46] that household incomes are actually increasing because of the project, yet with no corresponding increase in expenditure and an unclear change in savings, this presents a puzzle that we explore in more detail. The chapter concludes that although there are some noticeable improvements in income, they are insufficient to break the poverty trap.

5.1 Impact on household monetary poverty

137. In considering monetary poverty, we employ three commonly used poverty indices: the poverty headcount, the poverty gap, and the squared poverty gap (as defined in Appendix 3 of this report). Trends of the three poverty indices in the MV and CV areas over time are shown in Figure 15, while the actual rates are reported in Tables 13 and 14 for the general poverty line and for the food poverty line respectively. These poverty rates are extremely high for the project areas, being between 80% and 90% in any given year. Indeed, nearly all of the population is poor, and more than 50% of the population is extremely poor for most of the period considered. As a matter of comparison, poverty and food poverty were 24.2% and 7.8% respectively in Ghana in 2012–13, and 50.4% and 19.3% respectively in the Northern Region (GSS 2014). The high rates observed in the study area in comparison with the rest of Ghana and when compared with the Northern Region are not surprising given that our sample is entirely rural (poverty is much higher in rural areas in Ghana) and that the project explicitly selected an extremely poor area (as per the project selection criteria described in

45 Poverty trap models try to explain why poverty and inequality persist among countries, generations and individuals. The implication of the poverty trap model is that small investments in poor countries are unlikely to bring any benefit in the long term. In order to bring countries on a sustained development path, large and simultaneous investments are required (the 'big push'). The MVP invests considerable resources, including government and community resources, on a wide range of activities. Together, these provide an implicit test of a 'big push' theory aimed at breaking the poverty trap.

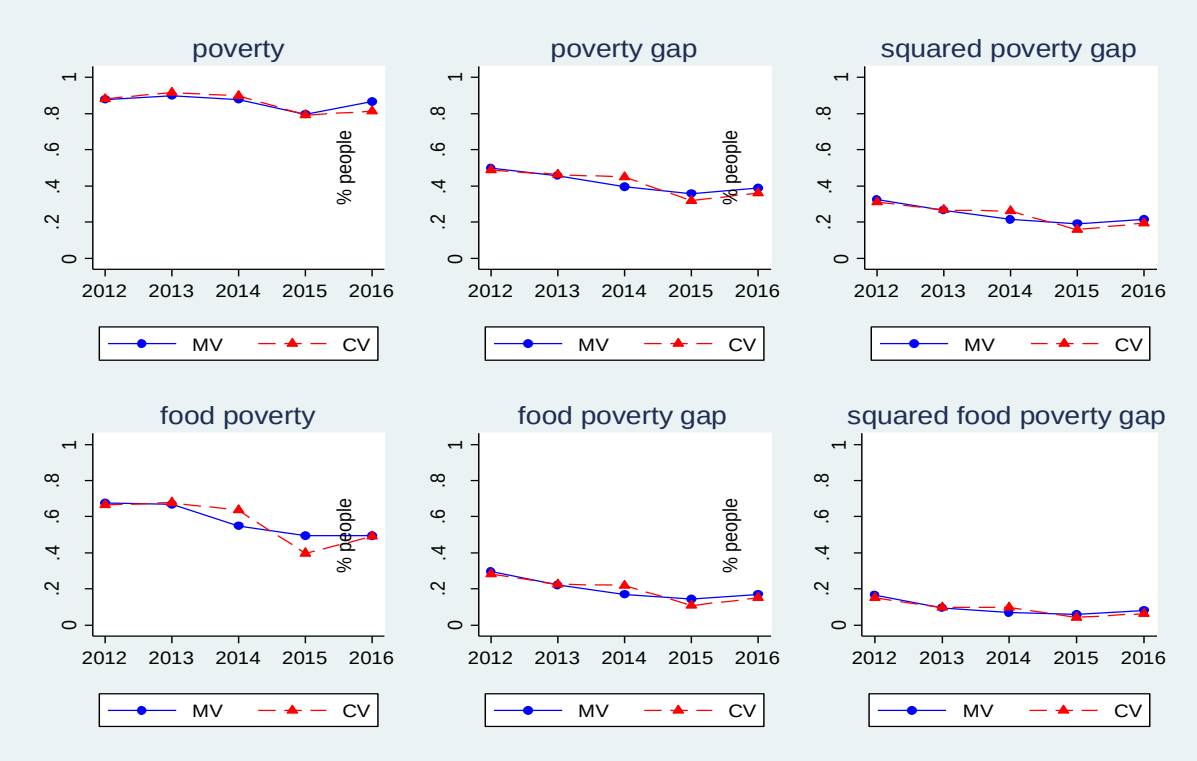
46 The survey data show an income increase attributable to the project, but this probably includes some measurement error (as discussed later on in this chapter).

Chapter 2).[47] There is no doubt that the population in our study is extremely poor by the standards set by the Ghanaian authorities, and are to some extent trapped in poverty.

138. All poverty rates were nearly identical in MV and CV areas at the baseline and no statistically significant difference was found. Overall poverty has remained relatively stable in the MVs over the period and has not decreased more rapidly in comparison with the CVs. The MV poverty headcount tracks the CV poverty headcount very closely throughout project implementation, with the exception of the endline when the last round of data collection actually found an increase in poverty in MVs compared with CVs (though this difference is not statistically significant). The poverty gap has decreased in the MV areas as well as in the CV areas. This is represented visually in Figure 15.

139. The distribution of poverty among the poor has improved, which means that it has become less unequal. This has not, however, occurred more quickly in MV areas than in CV areas with the exception of the observation at the midterm. The squared poverty gap also decreased in both MV and CV areas pointing to a reduction in the severity of poverty. The reduction in inequality among the poor went to the advantage of the poorest. Again, however, there are no large differences between MV and CV areas. The squared poverty gap is lower in MV areas than in CV areas at the midterm but is larger again at the fourth round. Both poverty gap and squared poverty gaps are nearly identical at the endline.

Figure 15. Poverty indices over time in MV and CV areas



Note: Percentages are those that are below the poverty line.

47 Note that for poverty gap rates, these are not comparable at different levels of poverty headcount as they are a function of poverty. The Upper West region, however, reported a poverty rate similar to the one observed in our sample of 89.1% in 2005/2006, and also reported a poverty gap ratio of 50.7%. This is well aligned with the figure observed in our study area.

Table 13. Poverty indices (overall poverty)

	Baseline		2nd round		Midterm		4th round		Endline	
	CV	MV	CV	MV	CV	MV	CV	MV	CV	MV
Poverty headcount	88.1	87.6	91.7	89.9	89.8	87.9	79.2	79.6	81.4	86.8
		(0.836)		(0.355)		(0.422)		(0.993)		(0.125)
Poverty gap	48.7	49.7	46.3	45.6	44.9	39.5*	31.8	35.8	36.1	38.8
		(0.699)		(0.717)		(0.066)		(0.122)		(0.438)
Squared poverty gap	31.0	32.3	26.7	26.2	26.0	21.4**	15.7	19.0*	19.4	21.4
		(0.585)		(0.773)		(0.049)		(0.061)		(0.515)

P-values in parentheses. Three stars (***) represent statistical significance at 1%, two stars (**) is 5% and one star (*) is 10%.

140. Unlike overall poverty, food poverty has substantially decreased in the study area over the period considered. This reduction was, however, not attributable to the project and was not faster or larger in MV areas in comparison with CV areas. While at the midterm, food poverty was considerably lower in MV areas, it was again larger in the following round of data collection. The poverty gap and the squared poverty gap follow a similar, and smoother, pattern.

141. We explored the distributional impact of the intervention on household expenditure using 'individual growth incidence curves', which average household consumption growth against initial levels of consumption, which is done for increasing levels of consumption (Fields et al. 2003, Bourguignon 2011). These curves are designed to assess whether growth has been pro-poor, pro-rich or distributional neutral. We plot average growth against predicted values of expenditure and baseline wealth rather than on baseline expenditure to remove measurement error and regression to the mean. The charts so obtained (Figure 16) suggest the MV is equally ineffective in increasing household expenditure across the expenditure distribution. MVP does not have any particular impact on the very poor.

Figure 16. Individual growth incidence curves (expenditure)

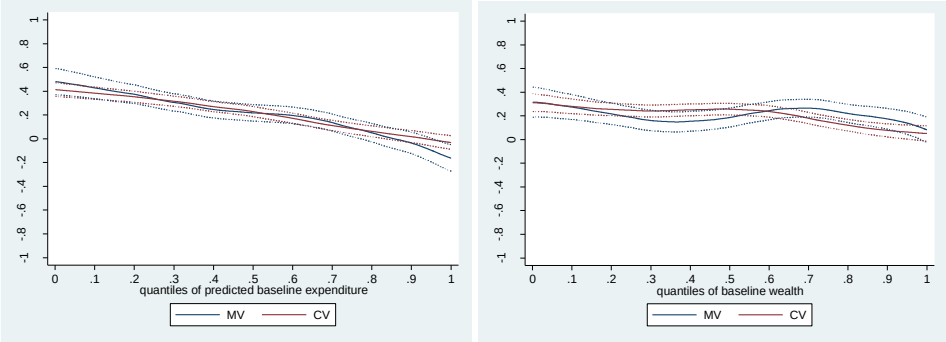


Table 14. Poverty indices (food poverty)

	Baseline		2nd round		Midterm		4th round		Endline	
	CV	MV	CV	MV	CV	MV	CV	MV	CV	MV
Poverty headcount	66.5	67.5	67.8	66.8	63.5	54.7*	39.7	49.4	49.1	49.6
		(0.798)		(0.790)		(0.091)		(0.044)		(0.931)
Poverty gap	28.2	29.7	22.5	22.1	22.0	16.8**	10.8	14.3**	15.1	16.7
		(0.572)		(0.846)		(0.045)		(0.048)		(0.633)
Squared poverty gap	15.0	16.5	9.8	9.4	9.9	7.0*	4.2	5.9*	6.3	7.9
		(0.436)		(0.712)		(0.064)		(0.062)		(0.424)

P-values in parentheses. Three stars (***) represent statistical significance at 1%, two stars (**) is 5% and one star (*) is 10%.

142. Indeed, with regards to food poverty, both the PRA and RCA studies confirm that people talked across the MV and CV areas about experiencing shorter hungry seasons in recent years (typically

towards the end of the dry season when stocks from the previous year have run out and the new crop is not yet planted). This is discussed further in Chapter 9 on Agriculture. People explained that despite longer and more unpredictable dry seasons, the duration that families reduce their food intake is shorter, which they attributed to changes in cultivation practice. Double cropping and growing legumes – especially cowpeas during the dry season that are used for earning cash – enables families to buy basic food items. By staying with poorer households for several days and nights, the RCA team also experienced changes in diets and eating behaviour over the years. The team observed a slight improvement in the availability of cooked food each day in homes and more willingness to serve beans with '*tuo zaafi*' (or TZ) in 2017 than previous years, but otherwise there was no change in diet diversity. Family members often do not eat at the same time since they eat when feeling hungry or when convenient to fit it around their activities. Thus, the concept of a fixed number of meals per day and potentially increasing this as a sign of development does not resonate with their lived reality. The RCA noted across most families and their neighbours that surplus cash would more likely be spent on livestock, recreational assets (e.g. TV, DVD, sound systems), electricity, toiletries, occasional sweets and snack food, and over-the-counter medicines rather than on diversifying their diet or eating more food.

143. In summary, the project did not reduce poverty or extreme poverty as measured by Ghanaian official standards. This type of poverty assessment, however, has some limitations. The project might have substantially improved the conditions of the very poor without changing the overall proportion of poor people because the improvement was not large enough to lift them above the poverty line. A different (lower) poverty line would be able to observe this impact. In other words, if an intervention affects poverty in different ways along the poverty distribution, for example by helping the extremely poor to a greater extent, it may appear effective or ineffective depending on which poverty line is used. This is the reason for looking at two different poverty lines as in Tables 13 and 14. In this way we show that there are no differences in poverty whether we use a high or low poverty line. This approach can also be taken further by computing poverty differences at all possible poverty lines, rather than just using two lines. We can therefore assess the extent to which poverty differences (or the lack of) are sensitive to the choice of a particular poverty line. This type of analysis is available in Annex A of this report. It shows that there is no poverty line for which the project can be shown to have a positive impact on either the poverty headcount, the poverty gap or the squared poverty gap. We can conclude that the project did not reduce poverty.

5.2 Household income and expenditure

144. Despite no evidence that the MVP reduced poverty, there is some indication that the dynamics between income, expenditure and savings have changed over the periods. The poverty figures above are based on expenditure and suggest that expenditures did not increase in MV areas after the intervention, but this is not necessarily the same for income. Before doing so, it is necessary to explain the different definitions used, and how these are calculated. Consumption and income figures were calculated using standard procedures adopted by the Ghana Statistical Service (GSS 2014) in order to obtain poverty figures that can be compared with national figures reported in government statistics. When following the same procedure was not possible because of differences in data availability, we adopted best practices available in the literature (Deaton and Zaidi 2002). The details of these calculations are provided in Annex A.

145. Household income and expenditure figures were then divided by the number of 'adult equivalents' in the households rather than by household size (see Appendix 3 for definitions). It is believed that per capita figures tend to overstate the extent of poverty and do not allow meaningful comparisons between households of different demographic composition (White and Masset 2003). This is because children's consumption needs are normally lower than adults, at least in deprived areas, and because some household goods can be shared among household members so economies of scale are generated in consumption. Methods for adjusting expenditure by the demographic composition of the household vary from simple rules (e.g. the square root of household size used by

the OECD) to sophisticated econometric techniques (e.g. the estimation of Engel's and Rothbart's equivalence scales). Whatever method is used, there is a consensus that however arbitrary, an adjustment of expenditure and income figures by demographic composition is better than no adjustment at all (Deaton 1991). In our application, we use the equivalence scale adopted by the GSS, which adjusts people's expenditures in proportion to their nutritional requirements for a given age and sex, in such a way that children weigh less and count only as a fraction of an 'equivalent adult'. Thus, for example, a couple with a two-year-old child will have adult equivalent size 2.24. A couple with an infant, a child aged four and another child aged 10 will have adult equivalent size 3.36.

146. Although there is much debate about the superiority of income versus expenditure measures of poverty (see Box 1), they each assess very different concepts of welfare. Income is concerned with *opportunities*: what can people do with available resources? Whereas expenditure is concerned with the *realisations* of these opportunities: what are people's actual living standards? From our perspective both approaches are equally relevant and welfare comparisons on both indicators are important as long as they are not biased.

Box 1. Differing views on expenditure and income measures of poverty

Much of the tradition in the measurement of welfare and poverty has relied on expenditure (consumption) estimates rather than income. This has however been based more on practical issues of measurement and inertia in empirical practice than on a superiority of expenditure over income as a welfare indicator. The opinions of economists are divided between supporters of expenditure ('*There is a strong case for preferring consumption over income in measuring welfare*', Ravallion 2016) and supporters of income ('*The multifaceted nature of consumption, and the differing concerns that it evokes, mean that a consumer spending measure is not demonstrably superior to income as an indicator*', Atkinson 2015). Both expenditure and income rely on imputations, long (and incomplete) questionnaires, and recall and seasonal bias. Some authors believe that practical problems of data collection are more serious for consumption than for income (Deaton 2002). Expenditure measurements are nevertheless also susceptible to severe errors and our Benford's analysis of income and expenditure (see Annex A) seems to show that approximation or fabrication of quantities is more common in reporting expenditure than in reporting income. Theoretical arguments in favour of expenditure over income are also rather weak. An argument is often made of consumption being smoother than income and therefore more representative of 'lifetime' or 'permanent' income based on the Modigliani-Freedman permanent income hypothesis. The permanent income theory, however, has found little empirical evidence for its validity and the hypothetical long-term income construct which is the focus of this theory is not necessarily what we are interested in for practical and policy applications.

147. While consumption (expenditure) did not increase in MV areas more than in CV areas, incomes increased substantially. The patterns of per adult equivalent consumption and income are displayed in Figure 17 and show that these are not the same as the earlier analysis of poverty based on expenditure: per adult equivalent expenditure and incomes were nearly identical in MV and CV areas at baseline. Yet, while per adult equivalent expenditure was nearly 10% larger in MV areas than CV at the midterm, it was then 10% lower than CV in the last two rounds of data collection. The statistical tests in Table 15 show that these latter differences were barely statistically significant (note that expenditure is measured in logarithms and therefore coefficients can be interpreted as percentage differences). In other words, the MV did not have a positive impact on expenditure and there is some evidence that MV areas performed more poorly than CV areas in the last two years of the intervention. Conversely, incomes after the baseline were much larger in MV areas in every single year and these differences are consistently statistically significant. Incomes doubled in MV areas in comparison to the baseline, while they increased only by some 50% in the CV areas. The coefficient estimates suggest a DD impact between 40% and 50% depending on the model specification (the dependent variable is measured in units of baseline standard deviations to account for negative values, the coefficients therefore measure changes in standard deviations of income).

Figure 17. Expenditure and income per adult equivalent (Cedis per year)

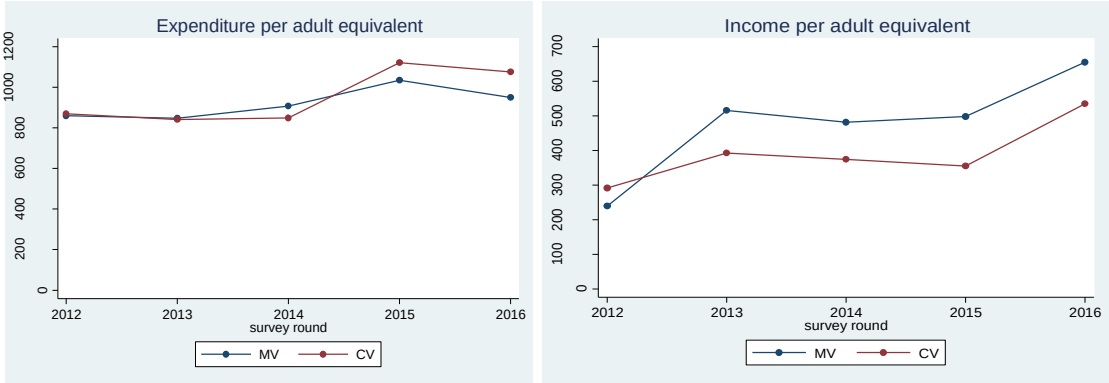


Table 15. Impact on total consumption per adult equivalent

	Cross-section	Fixed effects	Lagged model
Average DD effect	–0.017	–0.022	–0.033
	(0.766)	(0.702)	(0.278)
DD effect 2nd year	0.015	0.003	0.001
	(0.835)	(0.970)	(0.987)
DD effect 3rd year	0.090	0.086	0.074
	(0.182)	(0.203)	(0.160)
DD effect 4th year	–0.084	–0.099	–0.101**
	(0.188)	(0.121)	(0.029)
DD effect 5th year	–0.093	–0.084	–0.110**
	(0.225)	(0.279)	(0.043)
Sample size	9,859	9,859	7,857

P–values in parentheses based on cluster–adjusted standard errors. *** is statistical significance at 1%, ** is 5% significance and * is 10% significance. Standard errors are calculated using 500 bootstrap replications.

Table 16. Impact on income per adult equivalents

	Cross–section	Fixed effects	Lagged model
Average DD effect	0.26**	0.26**	0.205**
	(0.013)	(0.011)	(0.003)
DD effect 2nd year	0.27*	0.27**	0.212*
	(0.036)	(0.036)	(0.039)
DD effect 3rd year	0.22	0.22	0.165
	(0.138)	(0.139)	(0.229)
DD effect 4th year	0.28*	0.29**	0.223*
	(0.051)	(0.044)	(0.039)
DD effect 5th year	0.28**	0.29**	0.222*
	(0.037)	(0.032)	(0.034)
Sample size	9,859	9,859	7,857

P-values in parentheses based on cluster-adjusted standard errors. *** is statistical significance at 1%, ** is 5% significance and * is 10% significance. Standard errors are calculated using 500 bootstrap replications.

148. These figures suggest the MV had a positive and large impact on household incomes, as explored further in Chapter 9 (on agricultural production and livestock). The chapter (section 9.6) also considers income by income source and shows that much of the income growth occurred in agriculture – farming in particular.

149. The increase incomes raises two important questions: (1) How can the impact be so large given the absence of an impact on consumption? and (2) more generally, How can income increase as consumption does not change? These are explored in more depth in the following discussions on

measurement issues (below), and an additional investigation of the savings behaviour of households (section 5.2.1).

150. The differential impact of the intervention on incomes (rather than expenditure) is likely to be at least in part, the result of the underestimation of income figures.[48] This is not something specific to our study and is well-documented in the literature (e.g. Deaton 1997). It is often largely dependent on the level of detail employed in questionnaires. The charts on income and expenditure in Figure 17 are reported on different scales and therefore hide the fact that income is much lower than expenditure every single year. Since poverty levels are extremely high, it is unlikely that the difference between income and consumption in the study area is the result of an overestimation of expenditure and is more likely to be the result of an underestimation of incomes.

151. While we cannot trust the size of the impact of MV on incomes, we can be more certain that the MVP did at least have an effect on incomes. From a welfare perspective this represents an improvement in people's opportunities.

152. Nonetheless, the fact that incomes increase while expenditure remains unchanged is counterintuitive and deserves some additional explanation. We would expect an extremely deprived population to increase their consumption as their income increases, but this is not what is observed from the survey data. One hypothesis is that the households in our study appear to have perceived the increase in incomes brought about by the intervention as temporary and have not adjusted their consumption upward – this is explored further below in terms of savings behaviour. Another explanation is about how we interpret the expenditure findings. We need to distinguish between two types of expenditure: (i) consumption of current goods, which is employed in official poverty statistics, which is not increasing in this case; and, (ii) the purchase of durable goods and extraordinary expenditure, which is not included in official poverty statistics, which is increasing since we a– as supported by evidence from both the statistical analysis and the qualitative studies. Indeed, the RCA and PRA studies suggest that some people are spending more (e.g. marriages are bigger with larger sound systems, funerals are bigger with more gifts for guests etc.), more alcohol consumption, more eating out, and more expenditure on TVs, renting DVDs, more motorbikes and fuel costs. It is therefore possible that while households in the study perceive the increased incomes resulting from the MVP as temporary, they are altering their consumption patterns in ways that are not fully captured by the survey instrument (e.g. gifts at funerals, which can be sizeable in the local culture). See Box 2.

Box 2. Funerals: A significant but underestimated expenditure?

Despite the MVP reportedly having made efforts to educate citizens on the impoverishing impact of a backlog of funerals and the need to control such expenditures, there has been little obvious impact on this deeply entrenched behaviour. As highlighted in earlier reports, people shared that surplus cash is often earmarked for funerals, which may be delayed for years if there are insufficient resources to *'honour the dead properly*'. This can create a significant backlog, effectively acting as a debt on households. Arguably though, funerals can also be viewed as an investment both to ensure the dead join the spirits of the ancestors and concomitantly can provide guidance and protection of the living as typified by this quote (from a PRA focus group discussion): '*if these funerals are not performed, households will not progress and their ancestors will [cease to] help them in their farming and other endeavours*'. Both the RCA and PRA studies find that people say that funerals take up significant shares of surpluses in most households. During the midline RCA, people helped to construct the

[48] A comparison with income figures reported by the GSS for similar geographic areas of Ghana show that incomes from employment and small enterprises are likely to have been underestimated by our survey. Since much of the impact on income occurred in agriculture, which is overrepresented in the total income figures, the proportionate impact on total income is artificially magnified. In other words, the observed *proportionate* impact on total incomes, and on agricultural incomes in particular, is large and real but is also overestimated by an amount which is difficult to quantify.

average cost for the two parts of the funeral ceremony (*Kumka* and *Juka*) and calculated a figure of around GHS1,200.

The PRA study found that especially in the Bul'k (Builsa) project area, funerals threaten to reverse much of the gains from improved agricultural productivity. The overwhelming majority of those interviewed felt that funeral expenditures are still rising. Large quantities of millet and maize are used to feed the throngs of mourners who congregate from near and far, but also in brewing the alcoholic beverages served for refreshment. Livestock expenditures are equally high, with households yielding to longstanding cultural prescriptions obliging them to make animal sacrifices to their ancestors.[49] Furthermore, both the PRA and RCA studies find that funeral spending has increased as contemporary expectations have increased. The RCA and PRA researchers experienced over the years a trend to play modern music on (hired) hi-fi systems and to serve guests with bottled beverages rather than the traditional *pito* (a local beer brewed from millet and served lukewarm). A ban by the Bul'k paramountcy on serving (cheap) local gin at funerals (because many people end up intoxicated) has contributed to the shift to (more expensive) bottled beverages. Increasingly, the actual food served also comes in takeaway packs, which is considered a mark of sophistication. A participant at MV4 noted: '*we are now integrating the Ashanti culture into ours*.'[50] Others expressed the opinion that the rich have set new standards which they feel '*obliged to meet, to avoid disgrace*'.

5.2.1 Investigating the savings behaviour of households

153. Furthermore, it is worth investigating whether people are saving any increases in income in a precautionary way to protect against future incidents (e.g. school fees, social obligations etc.) or invested in productive assets to increase income-generating capacity and therefore future incomes. Data on savings were not directly collected[51] and savings cannot be derived by subtracting consumption from income because of the underestimation of income problem described above. We therefore adopt a broad definition of savings and look at different ways of storing wealth: cash holdings, assets and livestock. In our study area, savings are not limited to cash holdings and include household assets and livestock, which are often accumulated with the purpose of storing wealth or as investments.

154. Figure 18 shows that much of wealth is held in the form of livestock and assets, while monetary savings are of limited size (the way these figures are estimated is explained in Box 3). Unlike assets, livestock is highly liquid as it can be easily traded for cash, particularly small animals, and is an ideal form of saving. All the wealth components considered increased in the MV area after the intervention particularly at the midterm. Purchases of durables, livestock and assets seem to follow an increasing pattern until the midterm and then a decreasing or plateauing pattern up to the endline. These charts give some credence to the hypothesis that income gains were spent on durable goods, saved in cash, or invested in livestock and assets, at least during the first phase of the project. The figures also show that households did not tend to invest income gains in agricultural assets, except livestock, and that wealth was possibly stored for precautionary reasons.

Box 3. Explaining home repairs, durable goods, monetary savings and animal stock

Home repairs and the purchase of durable goods do not normally enter consumption figures because they involve substantial resources and provide their welfare services over a long period of time. We constructed an expenditure category consisting of home repairs and purchases of the following items: computers, mobile phones, furniture, appliances, agricultural equipment, motor and non-motor vehicles, in the 12 months before the survey. We calculated the value of cash holdings with bank and *susu* accounts. We calculated the values of all livestock holdings, including large livestock such as cows, donkeys and sheep, and small animals such as guinea fowls, chickens and ducks. Finally, we looked at the value of all asset holdings either for agricultural production (like threshers, hoes and tractors) or for domestic use (like radios, bicycles and furniture). We do

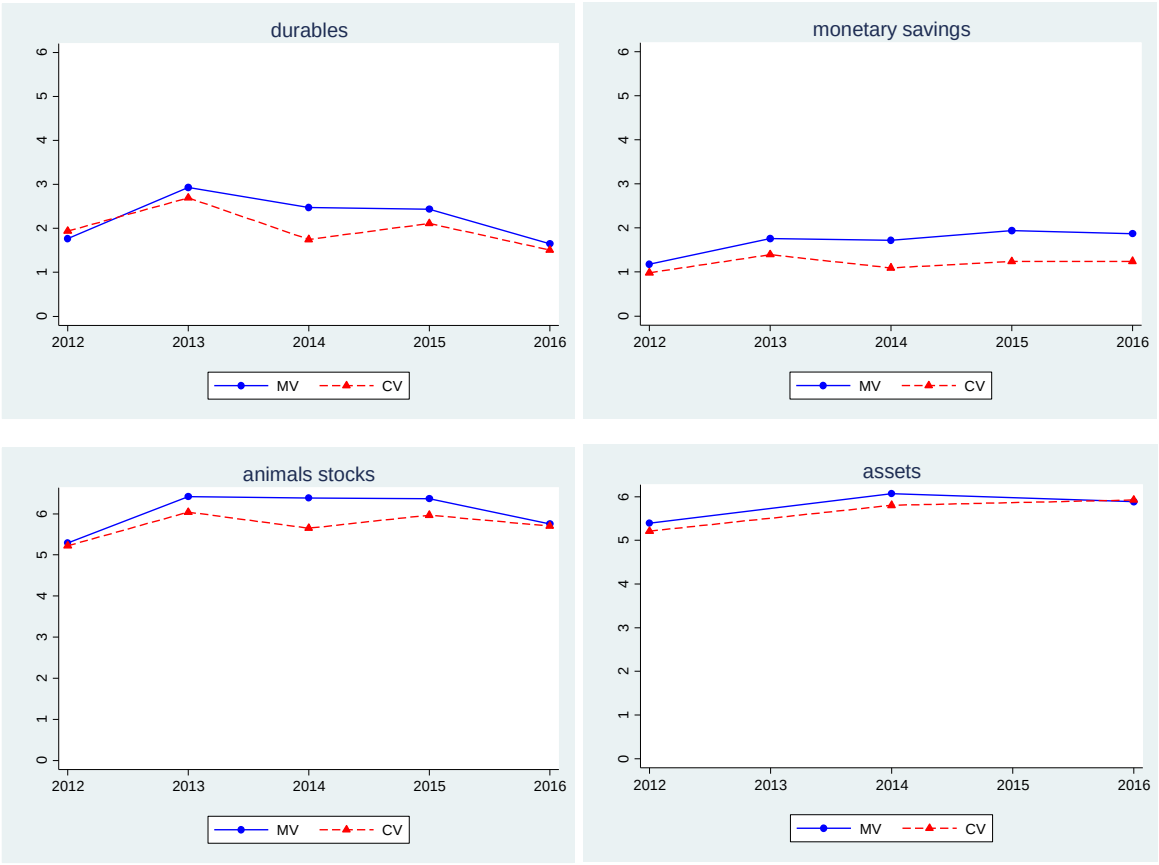
49 Fire festivals too entail slaughtering animals to placate ancestral gods.

50 Across Ghana, Ashanti funerals are perceived to be the most ostentatious and most expressive.

51 Data were not directly collected on the amount of savings, but rather on aspects such as the membership of *susu* savings groups etc., as well as the accumulation of livestock assets etc.

not attempt to combine these quantities in a single 'savings' or 'wealth' figure. Durables are measured as a flow while all the other quantities are stocks. Assets were measured only at baseline, midterm and endline. Finally, we believe there is a value at looking at these figures separately as the quantities in the figures are in logarithms so that the difference can be interpreted approximately as proportionate differences.

Figure 18. Patterns of durables purchases, and stocks of monetary savings, animals and assets



Note: All figures show log transformation of the monetary value of per adult equivalent durables, cash savings, animal holdings and household assets.

Table 17. Impact of MV on household assets and savings

	DD impact 2013	DD impact 2014	DD impact 2015	DD impact 2016	Average DD impact
Durables	0.231*	0.704***	0.291***	0.112	0.334***
	(0.050)	(0.000)	(0.001)	(0.322)	(0.000)
Cash savings	0.341*	0.603***	0.685***	0.574***	0.549***
	(0.045)	(0.000)	(0.000)	(0.001)	(0.000)
Assets		0.212**		–0.081	0.070
		(0.011)		(0.508)	(0.460)
Livestock	0.366**	0.677***	0.386*	0.022	0.364**
	(0.023)	(0.000)	(0.066)	(0.901)	(0.005)

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

155. Both the PRA and RCA provide further insights into the issue of savings and how households choose to save and invest. The RCA has consistently shown over the years that people like to put surplus money into 'easily liquefiable assets', with a preference for home-based crop stores and keeping

fowl and small livestock, such as sheep and goats.[52] It is not just the unfamiliarity with banks and the distance to access banks, but also a distrust combined with the difficulty of accessing cash quickly (whereas a small animal or bird can be quickly sold for cash whenever needed). There is also a preference to invest in livestock that 'takes care of itself', for example, the smaller ruminants and fowl which roam free in the communities without tying up too much capital or incurring too much risk if lost.

156. In the PRA study, many participants in the focus group said they sell their surplus cereals (owing to the threat of insect infestation) to buy livestock at a time when livestock diseases and deaths have been increasing. In some communities, wealthier men noted that they feel somewhat compelled to hold on to surplus harvests and livestock (rather than dispose of them) because of the prestige associated with having visible surpluses. Both the PRA and RCA found that better-off households are more likely to be able to retain their stocks for sale when prices rise, while the poor sell regularly and in small amounts to finance discrete household needs as they arise.

157. The PRA found that men are more likely than women to save with banks. In some communities where Bucobank staff take their mobile services to the villages (rather than expecting citizens to carry their money to the bank)[53] more people now have bank accounts. Richer men generally cited GHS1,500–2,000 as the size of annual surplus that would influence them to save in the bank, whereas poorer men quoted GHS500–1,000. Women (except the richest) mostly continue to save at home through their own stashes of crops (which are often hidden) and small livestock.

158. The MVP was one of several programmes assisting women (in particular) with Village Savings and Loans Associations (VSLAs). These are a more formalised version of *susu* groups that have been operating for generations in Ghana, and VSLA is usually referred to as *susu* by people in the village. The RCA found that women often noted their membership of *susu* groups as a key change for them in the last few years. For example, a woman shared how it was invaluable as she was able to save about GHS620 towards fees for her son to go to senior high school and hopes to borrow the rest without interest. Another VSLA member explained that it is '*very helpful because you can borrow money when you need it and we share the money out at the end of the year'.* Others said this is particularly important for a backlog of funeral costs. The PRA study notes in several MVs that VSLAs assist women with raising capital to expand their farms and micro-enterprises such as *pito* brewing or small-scale trading.

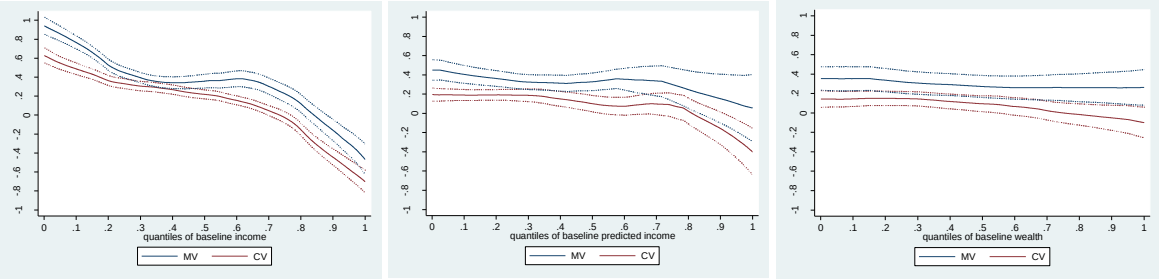
5.3 Breaking the poverty trap and distributional effects

159. A final issue to address in the discussion on poverty are distributional effects and whether the MV is breaking the poverty trap within the study area, by which we mean countering any tendency in the study area to favour accumulation of wealth among the rich. This analysis is detailed in Annex A. One popular way to look at whether economic growth is pro-poor consists of using 'growth incidence curves', which plot average growth for ordered percentiles of the income or consumption distribution (Ravallion 2016). One drawback of growth incidence curves is that they can compare different distributions but do not say how growth differs for different groups of people. The latter analysis requires 'individual growth incidence curves', whereby average growth in income is plotted against the ordered percentiles of the same households (Fields et al. 2003, and also Bourguignon 2011). In other words, we order the population of households by increasing levels of baseline income on the horizontal axis and plot the average income growth in the following periods for the same households. This is what is shown in the left chart in Figure 19 and indeed shows a negative slope, but unfortunately individual growth incidence curves are affected by measurement error and are

52 Pigs in non-Muslim villages.
53 For example, MV7 and CF7.

normally negatively sloped (Fields 2000). To overcome this problem we adopt two strategies,[54] and the results of these two strategies are shown in the middle and right charts.

Figure 19. Individual income growth incidence curves



160. After adjusting for measurement error, the individual incidence curves become flat across the distribution of income (or wealth), which implies that there is no poverty trap in the area. Incomes grow at the same rate for all households, presumably leaving inequality unchanged. This implies that the project did not have a differential impact across the distribution. Income growth was neither pro-poor nor pro-rich and increased in a similar fashion for all households. The PRA and RCA studies note that villages are mostly poor and the well-being ranking conducted in PRA areas to identify the different focus groups found that only very small percentages of inhabitants were classified as 'better off'. The studies suggest that there is no discernible difference in the rate that incomes grow for the poor and 'better off' because there is actually little to separate them anyway.

5.4 Summary

161. Overall, there is no discernible impact of the MVP on monetary poverty, where poverty is measured using expenditure as a proxy. An analysis of incomes by contrast shows that there is a substantial income increase that can be attributed to MVP, and yet with no increase in consumption, which suggests that either there is a measurement error or households are saving. By adopting a broader definition of savings as wealth (cash holdings, assets and livestock), we show that much of a household's wealth is held in the form of assets and livestock, with the latter being highly liquid as it can be easily traded for cash, particularly small animals (chickens, guinea fowl, goats). The PRA and RCA studies further highlight the complexity of this income-expenditure-savings dynamic (e.g. funeral expenses), and why this may have been underestimated in the household survey and insufficiently addressed by the project. In summary, while incomes have increased (probably temporarily) in the MV areas, there is no evidence that this is breaking the 'poverty trap' as the project has not improved the income of any specific group.

54 The first plots average income growth against predicted baseline income. Income is regressed against main determinants and therefore the impact of shocks is, at least, partially removed. The second strategy plots average income growth against an estimate of baseline household wealth directly, rather than income.

Chapter 6. Multidimensional poverty

162. While the preceding chapter focused on monetary measures of poverty and the dynamics between income, expenditure and savings, this chapter focuses on a broader perspective of poverty. Although monetary poverty at the household level is a useful proxy (and relates closely to achieving MDG Goal 1), there are many other aspects to poverty (from access to health and educational services, to the insecurity and marginalisation of an individual, as well as household and community perspectives). Therefore, while the MVP has not had an impact on monetary measures of poverty, it is still possible that it has led to changes on other dimensions of deprivation. Indeed, this multidimensional perspective is important given the project's aim to address all the MDGs through activities undertaken across all sectors. In this chapter, we explore a broader perspective in two ways: first, through a quantitative analysis of the multiple dimensions of poverty (using the Oxford Multidimensional Poverty Index, or MPI); and, second, by considering people's own perceptions of well-being and how these may have changed because of the project. The chapter ends by concluding that there is evidence that the MVP has contributed to decreasing multidimensional poverty (beyond monetary measures).

6.1 Impact on multidimensional poverty

163. The project aims at improving lives across several dimensions and the use of a metric that captures overall welfare progress is highly relevant. As such, there are a number of advantages in using a multidimensional index, and the Oxford MPI in particular, to evaluate the intervention:

- First, the index is theoretically grounded in the capability approach to poverty (Sen 1992), whereby poverty is the failure to function in a number of welfare dimensions, to some extent independently of opportunities offered by income.
- Second, income and expenditure measures fail to account for access to public health and education services that may account for much of people's welfare (Bourguignon and Chakravarty 2003). Not all health and education services are provided through the market (therefore not captured by income and expenditure figures), and certainly not the services provided by MV.
- Third, indices such as the MPI have the conceptual advantage of measuring deprivation across several dimensions at the same time. Multidimensional deprivation indices are designed to capture when people are failing to meet basic aspects; poverty across several dimensions *at the same time*.
- Fourth, the index has been adopted by UNDP since 2010 in the Human Development report series and MPI measurements are available for most countries. This means that it is possible to compare multidimensional poverty and changes in the study area with poverty and changes in other countries.
- Finally, from an empirical point of view, the use of an index reduces all welfare dimensions to just one, thereby overcoming the statistical multiple testing problem.

164. The MPI index has various criticisms: for example, the index implicitly makes undesirable trade-offs before welfare dimensions (Ravallion 2012); and its construction may provide misleading results in the evaluation of welfare policies (Duclos and Tiberti 2016). These issues will be discussed later on in the limitations section, particularly focusing on the extent to which these limitations affect the validity of the impact comparison between MV and CV areas.

Box 4. How the MPI is constructed

The index was built to represent deprivation along three fundamental dimensions of welfare that were already employed in the Human Development Index: health, education and living standards. These three dimensions are given equal importance and indicators are obtained for each dimension. In particular, a household is deprived in any indicator if (index weight in parenthesis):

- No household member has completed five years of schooling (1/6)
- Any school-age child is not attending school in years 1 to 8 (1/6)
- Any child has died in the family (1/6)
- Any adult or child for which there is information is malnourished (1/6)
- The household has no electricity (1/18)
- The household sanitation facility is not improved based on MDG definition (1/18)
- The household does not have access to improved drinking water based on MDG definition (1/18)
- The household has dirt, sand or dung floor (1/18)
- The household cooks with dung, wood or carbon (1/18)
- The household does not own one of the following assets: radio, TV, telephone, bicycle, motorbike, refrigerator, car and truck (1/18)

165. Our survey questionnaires are modelled on the DHS questionnaire, which in turn were used to build the original MPI. We were, therefore, able to calculate the index in the same way as the official MPI. There are, however, two exceptions. First, our malnourishment deprivation index is based on child undernutrition only, as our surveys did not measure the nutritional status of mothers (BMI) as is standard in DHS surveys. Second, we restricted the time period for calculating child mortality to five years before the survey in order to be able to measure more accurately any changes produced by the intervention. Since not all households have children under five or children of school age, some of the indicators are censored. We follow the same procedure adopted by the MPI (Alkire and Santos 2014) of considering as not deprived those households for which no information is available to assess their deprivation status. Alternatively, we could remove from the sample the households censored on one dimension but we would end up with a smaller and less representative sample. Our goal here is not to calculate the index with great accuracy but to assess differences between the MV and CV groups and there is no reason to believe this choice should introduce a bias in the comparison, while it benefits the analysis by granting the use of a larger sample.

166. The Multidimensional Poverty Index (MPI) can be used to assess the level of poverty in the population. Following the official MPI we define as poor all those households that are simultaneously deprived on one third of all dimensions considered. We define the proportion of poor people in the sample as the poverty incidence. In addition, we also calculate an indicator of poverty intensity. This is the average of the index among poor households only, and it measures the average number of deprivations simultaneously faced by poor households.

167. Our analysis shows that MVP produced a considerable reduction in the MPI, and by implication, on multidimensional poverty. While the index and the related poverty measures were nearly identical at the baseline in MV and CV areas, all figures decreased in both areas but at a faster rate in the MV areas (Figure 20). We tested the differences observed in these charts and found that they are all highly statistically significant (Table 18). These tests are based on estimations using the lagged model but they were conducted using repeated cross-section and fixed effects models as well and obtaining very similar results.

Figure 20. Multidimensional poverty index, incidence and intensity

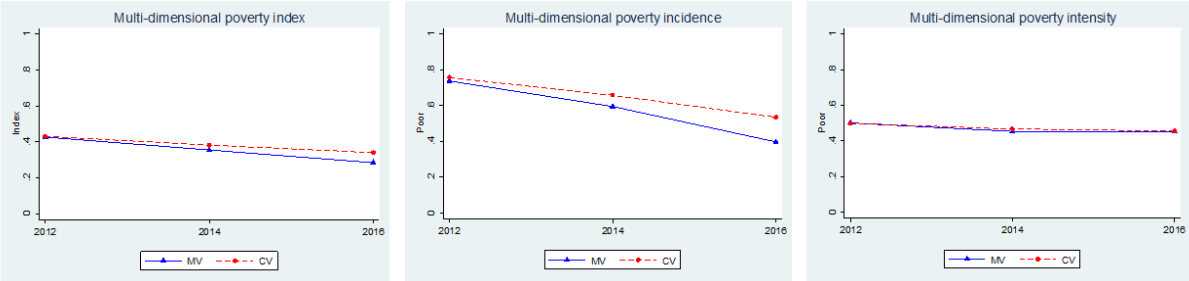


Table 18. Impact of MV on multidimensional poverty

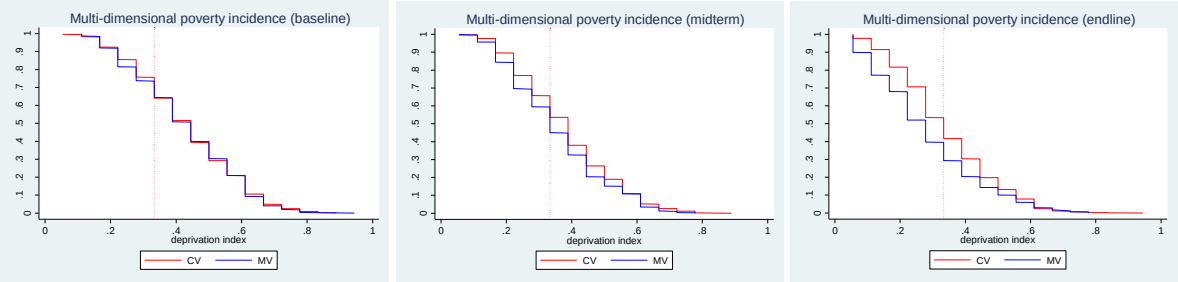
	Baseline in CV areas	Baseline difference in MV	DD impact 2014	DD impact 2016	Average DD impact
Multidimensional poverty index	0.431	–0.004 (0.839)	–0.025* (0.064)	–0.059*** (0.000)	–0.042*** (0.001)
Multidimensional poverty incidence	0.757	–0.019 (0.679)	–0.058 (0.119)	–0.143*** (0.001)	–0.101** (0.007)
Multidimensional poverty intensity	0.498	0.003 (0.842)	–0.013 (0.245)	–0.009 (0.379)	–0.012 (0.125)

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

168. The MPI is a composite index of deprivations along 10 dimensions, and it is useful to see what are the dimensions in which most of the improvement was made. We first look at the contributions of each deprivation indicator to the overall MPI. The dimension-specific deprivation indices are the censored deprivation indices multiplied by the weight assigned to the dimension and divided by the size of the adjusted MPI. The percentage contributions are interesting because they tell us what the main components of overall deprivation in the area are. Nearly 40% of total deprivation is caused by failure in education, and lack of electricity and sanitation makes another 20%. In other words, concerted investments in electricity, sanitation and education would bring about a large reduction in multidimensional poverty in the area. We then look at impacts of MV on each specific deprivation index and we find significant impacts on school attendance and sanitation. Impacts on other dimensions are smaller and not statistically significant. This analysis suggests that improvements on a few indicators of the index may be driving the results.

169. We assessed the robustness of these results in two ways. First, we looked at the sensitivity of the results to different specifications of the poverty line. The charts in Figure 21 plot the incidence of poverty for all possible multidimensional poverty lines for the three survey rounds. When the poverty line is 0, everybody is poor and poverty decreases as we increase the average share of multiple deprivations. The dashed line shows the poverty cut-off used for calculating poverty incidence in Table 19. The charts show that multidimensional poverty at the midterm and endline is unequivocally lower in MV areas compared with CV areas for different levels of the poverty line, from which we conclude that the observed impact of MV on multidimensional poverty is totally independent of the cut-off used to measure poverty incidence.

Figure 21. Cumulative distributions of multidimensional poverty by survey round



170. Second, we looked at the sensitivity of the results to the items included in the index and the weights used, leaving one and two components out of the index at a time. We recalculated the index and poverty incidence after leaving out one of the index components at a time (practically really setting to 0 the weight of one component at a time). The variety of poverty indices and poverty incidence produced under these different specifications of the index are shown in the chart below. Leaving one component out does produce swings in the size of poverty but the difference between MV and CV remains unchanged. The positive impact of MVP on multidimensional poverty is not the result of the positive impact of the intervention on any single component of the multidimensional index. We then tested the impact on the index of leaving out two dimensions at a time (practically setting the weights of two dimensions to zero). There are 43 possible combinations of this type (excluding combinations that would remove a dimension such as health, education and living standard altogether). Ten configurations turned out not to be statistically significant at 10%. Non-significant configuration always excluded either school attendance or sanitation from the index (the other excluded component being either nutrition, mortality, electricity, assets or cooking fuel). This confirms the results of our analysis of dimensional contributions to deprivation and of changes in single deprivations. Much of the impact on the index is driven by improvements in school attendance and sanitation. In summary, no single indicator is driving the MPI findings but two indicators might be.

Figure 22. Sensitivity of the Multidimensional Poverty Index to a specific component

Note: The red lines are the indices calculated after leaving out one of the index components at a time for the MV areas. Blue lines do the same for the CV areas.

6.2 Perceptions of well-being

171. The concept of well-being was explored in both the PRA and RCA studies with the intention of extending the view of development beyond household income and consumption to those enshrined in multidimensional measures. The RCA study found that people's sense of well-being was, however, strongly associated with their sense of economic well-being and, in particular, having cash to spend. Earlier RCA studies noted that over the period of the project the need for cash has increased significantly. So, for example in 2015, we noted that cash was needed:

to purchase seasonings, cooking oil, batteries, phone credit, health insurance, pay school 'levies', agricultural inputs, milling services, electricity installation and for social obligations such as funerals and naming ceremonies and to meet increasing consumer tastes for snacks, alcohol, cosmetics, skin and hair products, phone downloads and fashion clothes (RCA Report 2015, p. 4).

172. These cash needs have been added to in the last two years by the cost of electricity consumption since connections have been made, the cost of fuel for motorbikes, which are more widely owned, the cost of hiring tractors and the costs of agrochemicals (more widely used, especially to grow cowpeas). There also seems to be some evidence of increased expenditure to buy medicines. Because of these increased cash needs, families only felt their well-being had improved when they could meet these demands for cash, and half of the families the RCA researchers stayed with did not therefore feel better off.

173. Nevertheless, families in the RCA study often indicated that if they themselves were not better off, certain changes in the village meant that as a community they felt less deprived or more developed. In other words, they felt that aspects of public poverty had been addressed and recognised the benefits even if it had not made very much difference to them as a family. The most significant factor here is the provision of electricity but also increased mobility and connectivity through mobile phones as well as public service provision, especially health services. People noted in particular being able to access painkillers and medicines for common ailments as a key element of well-being. Political patronage was noted as important and those communities with strong family connections to particular Members of Parliament felt well-placed for attention and future development programmes.

174. The RCA villages were also ranked according to the following indicators: the state and accessibility of roads, provision of electricity (especially to households), accessibility and vibrancy of markets, access to all levels of basic education, access to health services, agricultural production and profits, other livelihoods (diversity of opportunities and potential to earn) and political connectedness. Both MVs and CVs in the RCA study made significant improvements with regard to public poverty but exhibited different rates of change. The MVs generally improved quicker and then plateaued or in one case, declined; while one CV in the study started slower and started to close the gap.

175. The PRA study suggests some similarity to the findings on multidimensional poverty with both the RCA and the survey. All seven MVs included in the PRA study perceived well-being to have improved *overall* since the baseline.[55] By contrast, significant declines were reported in 4 of the 13 control villages visited (CN1, CN4, CN6 and CF6). The dip in well-being at CN1 resulted mainly from the river overflowing its banks. This caused some previously rich households to lose their crops and/or fishing gear. Respondents noted how the floods had attracted crocodiles which had destroyed their fishing nets. At CN4, CN6 and CF6, livestock losses (through death and theft) and erratic rains were the main adversities that had dragged households down. The loss of youth labour (through migration) was a further barrier cited at CF6. While the adverse climate did affect both MVs and CVs, households in the MVs were generally more resilient because of the improvements in agricultural productivity.

176. Net well-being was perceived to have improved for children as well in all seven MVs in the PRA sample, but also in many CVs. Several small but important changes were noted in cultural practices and attitudes towards children. Several of the focus groups said that children's diets are now somewhat richer in protein. While hardly any changes were reported in the very low levels of animal protein consumed, children in MVs (but excluding MV7) are increasingly being fed eggs and eating more meals overall. The RCA noted a little more consumption of eggs by both young children and elderly. According to participants in the PRA sessions, disparities between children from rich and poor households in the MVs are also perceived to have narrowed since the baseline.

55 As noted in the baseline report, food security was by far the dominant factor in participants' construct of well-being in the PRA study.

6.3 Summary

177. In Chapters 5 and 6, it is clear that the project did not have an impact on monetary measures of poverty, although incomes did rise. Yet taking a multidimensional perspective, the evidence shows that poverty has declined more quickly in the project areas, whether measured statistically through the MPI, or from people's own perceptions of their well-being. Using MPI as a measure, the analysis shows that the MVP produced an attributable reduction in multidimensional poverty, with no single welfare outcome dominating this result. The PRA and RCA studies corroborate this finding, with people's realities of well-being having improved – taking account of road and electricity improvements, greater access to public provision of services (especially health, but also items such as tractor hire), and growing cash needs (where they could be met). We therefore conclude that while monetary poverty *at the household level* has not decreased due to the MVP, public dimensions of poverty have improved with the showering of benefits in the form of health, education, roads, electricity, tractor services and so forth. The following chapters explore each of these in greater depth; so, using education as an example, whereas the MPI considers only attendance and completion of schooling as proxy indicators, the exploratory analysis that follows considers the other aspects of the causal chain that leads to improved learning outcomes.

Chapter 7. Health outcomes

178. Moving beyond the poverty analysis of the two previous chapters, the next three chapters consider the sectoral focus of the project starting with the interventions in health. One of the aims of the MVP was to achieve '*enhanced access to health services provided by skilled personnel and trained community health workers (CHWs) in the Millennium Villages site*'.[56] By improving access to health services, the project expected to '*reduce common causes of morbidity and mortality*'.[57] This includes reducing death rates, malaria, tuberculosis and other diseases, reducing the mortality rate of children under five, and improving nutrition and maternal health.[58] This chapter explores this causal chain from interventions in the health sector through to changes in child mortality, nutrition and incidence and prevention of diseases – as well as changes in service provision, and knowledge of health and hygiene practices.

179. The chapter finds that the main impact of the project has been on child nutrition (rates of stunting, improved diets) and severe malaria, with no discernible impact on child mortality or common symptoms of diseases (fever, coughs and diarrhoea).

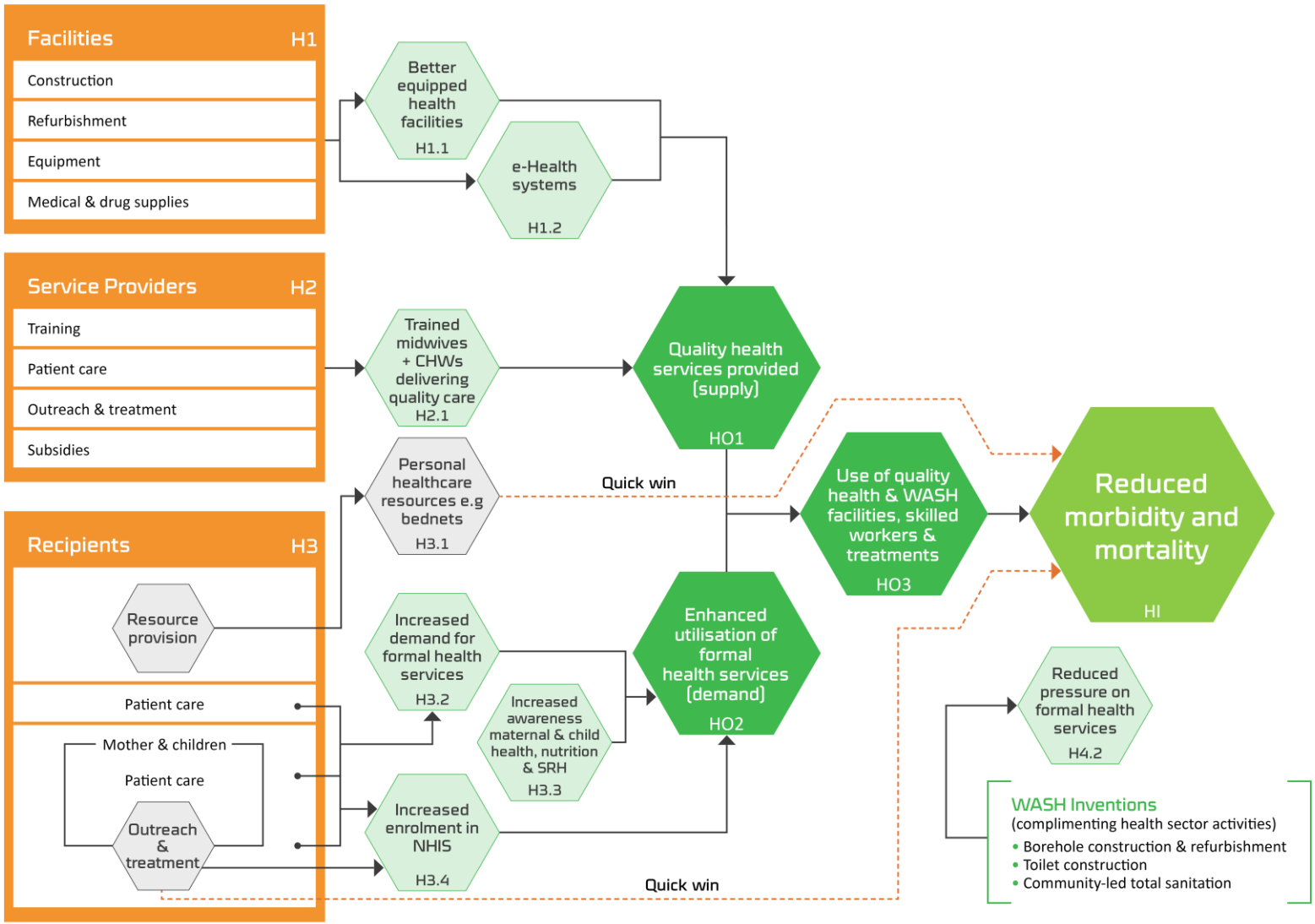
7.1 Health causal chain

180. The MVP identified the following health-related problems in northern Ghana: high incidence of maternal mortality, lack of availability of free health care at the point of delivery, and a lack of skilled health workers.[59] The MVP anticipated that several changes would result from activities to improve health services in the MVs. By implementing multiple interventions which generate impacts at various levels, it was expected that there would be a range of outputs, such as: skilled staff delivering improved basic services (e.g. increasing the proportion of births attended by skilled health workers); and women, men and children facing fewer barriers to accessing services (e.g. increasing contraceptive prevalence, early detection and treatment of malaria).[60] As a result of these outputs, several results were expected to be achieved around the increased use of facilities, drug treatments and care by trained skilled health workers. These outcomes were expected to improve health, which was anticipated to have a positive impact on reducing morbidity and mortality in the MVs.[61]

181. The causal chain presented in Figure 23 is a reconstruction of the theory as understood by the evaluation team and validated by the MVP team. To tackle the health problems faced in the MVs, the MVP set out to employ a multi-pronged set of activities involving 'quick wins' (immunisation, deworming campaigns,[62] and distributing bed nets); as well as longer-term improvements (e.g. constructing and renovating health facilities; recruiting staff and providing training; and subsidising salaries for CHWs, community health nurses (CHNs), medical assistants, clinical staff (such as state registered nurses) and midwives);[63] and supporting behaviour change programmes (hygiene and sanitation, breast feeding etc.).

56 Logframe for the Millennium Villages Accountable Grant Programme, DFID, 2016.
57 2012 Annual Report on the Millennium Villages Project in Northern Ghana, p. 5.
58 Ibid.
59 Business Case: Millennium Village in Northern Ghana, DFID, 2011.
60 Ibid.
61 2012 Annual Report on the Millennium Village Project in Northern Ghana.
62 Deworming campaigns take place at both schools (for children in schools) and at the household level (for children who are not yet old enough to attend school).
63 There is a written understanding between MVP and District Health Management Team specifying clear roles of the different actors and based on which allowances are paid.

Figure 23. Causal chain for the MVP's anticipated health impacts



182. Much focus was placed on community-based health planning and services (CHPS), with activities designed to result in functional clinics at the village level[64] staffed by government and community-based workers to provide basic clinical services for infectious diseases, nutritional deficiencies, antenatal care and institution-based births; expanded health services, family planning, micronutrient supplementation for vulnerable groups, treatment and TB.[65] The investments by the MVP fall into four main areas:

- **Facilities:** In the project's first year, the MVP procured critical drugs and supplies, including laboratory equipment, nutritional supplements, contraceptives, vaccinations and HIV tests. The MVP developed an e-Health system called CommCare, which enabled real-time patient tracking and referrals through Android phones, thereby improving point of care service through decision-making guidance and collecting regular data that can easily be accessed. In order to get this system off the ground, the MVP hired an e-Health manager, procured phones and trained staff.[66] The MVP also constructed and refurbished CHPS compounds, health centres, maternity wards and staff quarters.[67]
- **Service providers:** During the first year, the MVP recruited key clinical staff such as health nurses, physicians' assistants, midwives, laboratory technicians and other specialists. As part of this, the project supported CHWs. The community health volunteer system is a GoG programme and had already been in place for many years with between four to six volunteers in each village, each providing health outreach to approximately 100–200 households including a mandate to make home visits at least every 90 days. They have a range of responsibilities including conducting rapid diagnostic tests (RDTs) to detect malaria, referring patients, administering or recommending treatments, vaccinating children, and so on.[68] The project provided stipends to the CHWs for the first time as well as resources such as bicycles, medical kits and training to boost their outreach effectiveness. CHNs support the work of CHWs.[69]
- **Recipients:** The MVP conducted several outreach initiatives to disseminate information about health issues such as information sessions on infectious diseases, nutrition, exclusive breastfeeding and sanitation. CHWs distributed bed nets to households and provided them with information about malaria prevention.[70] Outreach efforts also included informing residents about their rights to the NHIS and helping to register children under five and adults.[71]
- **Maternal health care:** A key aim for the MVP was to improve maternal health by ensuring that more women give birth at clinics with skilled birth attendants rather than at home using traditional birth attendants.[72] CHWs were supposed to monitor pregnant women every six weeks and monitor and advise on care of newborns until they reach five years of age. Comprehensive antenatal care services were provided that included pregnancy monitoring, tetanus toxoid immunisation and micronutrient supplementation.[73] The MVP also funded community-based mother support groups to provide nutrition and water, sanitation and hygiene education to women of reproductive age.[74]

64 The term 'super-CHPS' compounds has been coined for MVP-supported CHPS, although this does not align with the GoG policy.
65 2012 Annual Report on the Millennium Village Project in Northern Ghana.
66 Ibid.
67 2014 Annual Report on the Millennium Village Project in Northern Ghana.
68 2012 Annual Report on the Millennium Village Project in Northern Ghana.
69 2014 Annual Report on the Millennium Villages Project in Northern Ghana.
70 2012 Annual Report on the Millennium Village Project in Northern Ghana.
71 2014 Annual Report on the Millennium Village Project in Northern Ghana.
72 2012 Annual Report on the Millennium Village Project in Northern Ghana.
73 2014 Annual Report on the Millennium Village Project in Northern Ghana.
74 2015 Annual Report on the Millennium Village Project in Northern Ghana.

7.2 Project implementation

183. A summary of the MVP's known health activities and achievements is outlined in Table 19, with the quantification of MVP inputs and activities based on SADA Annual Reports (2015–17). It should be noted that not all the activities may fit within the allocated categorisation since each output may contribute to multiple health results. Despite the complexities in specifying which outputs lead to various outcomes within the intervention logic, Table 19 attempts to group activities together according to where they are most relevant. Then, the remainder of this chapter sets out the main impacts of the MVP on health outputs and outcomes.

Table 19. Summary of MVP's health activities[75]

Facilities	Service providers	Recipients	Maternal health and under 5s
Constructing and refurbishing CHPS compounds, medical laboratories, incinerators, and staff quarters, equipping maternity units	Subsidising and topping up salaries for CHWs and CHNs[76] (53 CHWs employed)	Outreach visits, including identification and support of vulnerable individuals	Antenatal and postnatal care
Drug storage	Training (midwives etc.) (8 students trained in midwifery; 66 CHWs, 98 cluster staff and 26 referral staff trained in Telemedicine)	Funding NHIS membership during first year	Outreach and education sessions (e.g. breastfeeding, child nutrition)
e-health systems (i.e. CommCare) tracking patient health, identifying mothers and children at risk of HIV transmission	Home visits and tests (RDTs for malaria)	Resource distribution (e.g. contraception, bed nets, vitamin A, deworming tablets, basic medication, anti-malarial, immunisations, paracetamol, food supplements)	Awareness of skilled birth attendants
Provision of ambulances and 'motor kings' (2 ambulances)	Skilled birth attendants (employment of retired midwives) (12 midwives stationed at 9 facilities)	Awareness raising (e.g. contraception, NHIS) (1,500 children under-5 and 300 mothers registered with NHIS; 185 citizens participated in focus groups on malnutrition)	

7.3 Impact on service provision

184. This first section considers changes to service provision as a consequence of the MVP, covering health facilities, CHWs and the provision of antenatal and postnatal care.

7.3.1 Health facilities

185. The MVP sought to construct and refurbish health facilities, recruit additional CHWs and promote health initiatives in communities. Table 20 compares health infrastructure in the two areas. In 2012, there were more health facilities within the CV areas in comparison to MV areas. In 2012, the two districts, where the MVP was placed, subsequently split and this may have affected access to health care in the CV areas where there were already some health facilities. By 2016, there were 11 health facilities in the MV areas. We also find there are more health care workers in the MV areas. Among the new cadre of workers in 2016 that were not listed in 2012 are CHWs, and there are more CHWs

75 Numbers in brackets are the indicative number of achievements over the course of the project documented in the 2016 SADA Mid-Year Report, 2017 Project Completion Report and 2015 SADA Annual Report.
76 Note: CHWs and CHNs were previously voluntary and unpaid before MVP introduced salaries/top-ups.

in MV areas than in CV areas in 2016. The MV areas also saw an improvement in cold chains or the vaccine storage system, as part of improving vaccination rates. There is, however, insufficient data to confirm the presence of electricity in the health posts, and neither is it possible to identify any health post buildings that were considered of poor quality in the MV areas.

Table 20. Indicators of facilities changes, 2012 and 2016

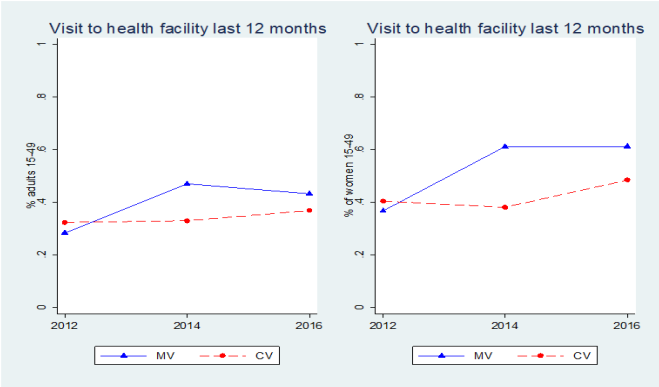
Indicators, Item	2012, Indicators			2016, Indicators			Variance		
Categories	MV	CN	CF	MV	CN	CF	MV	CN	CF
Health posts	1	1	2	0	0	0	–1	–1	–2
Health clinics	0	4	5	0	0	0	0	–4	–5
Mobile clinic	0	1	1	0	0	0	0	–1	–1
Dispensary	0	0	0	0	0	0	0	0	0
Hospital	0	0	2	0	0	0	0	0	–2
Other type facilities, basic and primary health centres	2	1	3	11	7	5	9	6	2
Doctors	0	3	4	0	0	0	0	–3	–4
No. of physician assistants posted	2	0	2	2	0	1	0	0	–1
No. of midwives posted	1	5	13	11	2	7	10	–3	–6
No. of staff registered nurses	1	4	8	15	4	4	14	0	–4
No. enrolled nurses/clinical health assistants				23	7	10	23	7	10
No. of community health nurses				24	12	13	24	12	13
No. of lab technicians				2	0	1	2	0	1
No. of pharma technicians				1	0	0	1	0	0
No. of records officers				6	0	2	6	0	2
No. of health promotion assistants				1	0	0	1	0	0
No. of health extension workers/ward aids				4	1	1	4	1	1
No. of CHWs				21	4	0	21	4	0
Cold Chains, operative, Vaccine storage power	1	1	8	10	3	2	9	2	–6
Condition of the building:									
No. of new				7	1	3	7	1	3
No. of poor				0	5	2	0	5	2
No. of dilapidated				0	1	0	0	1	0
Number with transport vehicle(s)				11	2	0	11	2	0
Total number of patients on the day visited, column				368	70	100	368	70	100
Health centres with transportation to referral				11	2	0	11	2	0
No. of health centres reporting staff quarters				10	5	5	10	5	5

186. In addition to the changes cited above, the health posts in the MV areas were better equipped in 2016 and the number of people visiting health posts on the day that the survey took place is far higher in the MV areas. Health centres are equipped with the means to transport patients for referral in the MV areas, and some of the health centres charge user fees, although some do not across both areas. In general, more procedures, including emergency delivery, take place in the MV areas. Staff quarters are available in all areas to nearly the same level as before, once the number of health facilities are taken into account.

187. The household survey data confirms the large observed increase in the number of adults and their children visiting health facilities in the MVs. More than 40% of adults reported visiting a health facility during the previous 12 months, while 60% of mothers reported a visit in the previous 12 months. The increased attendance of health facilities by mothers is an obvious result of the higher demand and provision of maternity services by the project (see section 7.3.3 for further discussion). According to the household survey, attendance at health facilities has not changed much since the midline (Figure

24), which may be due to the perceived adequacy of treatments administered by CHWs during home visits thus reducing the need for facility-based care (see section 7.3.1).

Figure 24. Visits to health facilities



188. The increase in visits to health facilities is much larger in MV areas than in CV areas and the differences are always statistically significant (Table 21). The PRA found that there appears to be growing confidence in the diagnostic ability of the formal health care system. Across study sites, more villagers now claim to prefer orthodox medicine.[77] This is occurring in both MVs and many CVs that benefited from the GoG's investments between 2013 and 2016 in CHPS facilities across the north (with members of the executive even giving up 10% of their salaries to finance the construction of additional CHPS compounds).[78] As a result, several CVs got CHPS facilities over the period. The fact that these facilities are typically accredited by the National Health Insurance Authority also makes them more accessible to poor households with active NHIS subscriptions.

Table 21. Changes in visits to health facilities and visits by CHW in MV and CV areas

	Baseline CV	Baseline differential MV	DD impact 2013	DD impact 2015	DD average impact
Visited a health facility during last 12 months (all adults)	40.42	–4.92	26.37***	17.84***	22.23***
		(0.200)	(0.000)	(0.000)	(0.000)
Visited a health facility during last 12 months (women)	32.37	–3.99	17.92***	10.63**	14.40***
		(0.144)	(0.000)	(0.002)	(0.000)

189. The PRA found that where CHPS is provided in the MVs there appears to be greater emphasis on delivering *curative* services than in non-MV sites, where the nature of service delivery maintains the original, basic concept of primary health care and disease prevention (Awoonor-Williams et al. 2013). Across the board, participants reported relying less on indigenous health care options[79] such as TBAs, herbalists, diviners, prayer camps and drug peddlers. In one CV, participants observed that soothsayers are now only consulted when formal health care has failed. A poor man noted wryly, '*even the soothsayers now attend hospital when they are sick … so why would we go to them?*' TBAs too are increasingly referring expectant mums to formal health care facilities, though many women

77 However, some (but by no means all) focus groups of poor participants reported being poorly received at the Fumbisi Health Centre and the Builsa District Hospital at Sandema. Health staff of these facilities were described in words such as '*arrogant*', '*unfriendly*' and '*disrespectful towards illiterate villagers and patients in tattered clothing*'.

78 (http://www.myjoyonline.com/news/2013/November–19th/govt-announces-10-pay-cut-for-president-mahamaveep-and-ministers.php).

79 Also supported by the findings of the RCA study, which noted a significant increase in the use of health facilities since the baseline, and a perception that traditional remedies and spiritual healings are used less often.

still find it reassuring to be accompanied there by their TBAs. Focus group participants did, however, decry the lack and relatively high cost of accessing orthodox medicines (Box 5).

190. It is important to note that interviews with staff of the Ghana Health Service considered the MVP's version of CHPS misinterprets the philosophy underpinning the concept and does not have a place in their hierarchy of facilities. The project upgraded standard CHPS facility specifications by creating a hybrid model in which CHPS function as a quasi-sub-district health centre with more curative services. The aim was to extend service delivery to a larger population, although this does not align with the Ghana Health Service's conceptualisation of CHPS. The MVP's CHPS do not qualify as a Level A (CHPS) or a Level B (health centre) facility in the Ghanaian health sector framework[80] and furthermore the superior levels of service in these 'super CHPS' cost more than the government can support. As a result, the higher expenditure on better quality service provision (e.g. wages for more nurses/higher-grade personnel, maintenance of more sophisticated equipment, higher utility bills etc.) in the MVP's variant of CHPS will be difficult to fund by the government.

Box 5. Perceived value of health facilities and NHIS subscriptions

When the MVP funded NHIS subscription fees for MV residents, few households in the MVs opted out of the NHIS. Once it stopped subsiding the fees, the RCA study found that households began to hedge over renewing their subscriptions. A household's decision making on whether to enrol in the NHIS (or renew expiring subscriptions) was influenced by perceptions of the costs and benefits of enrolment. People complained that they had to travel long distances at relatively high cost to reach the centralised renewal centres. Once there, they also encountered long queues. Others felt that, at around GHS25, the cost of subscription outweighs the benefits. Some said they did not use the health facilities during the period when they were enrolled, or others were deterred by the fact that their CHPS compounds hardly ever had medications beyond the most basic ones like paracetamol. Participants spoke of being told to make additional payments for their prescriptions (often at private drugstores), even when their subscriptions were active. A minority reported being put off by humiliating behaviours meted out by frontline staff in some referral facilities, notably Builsa District Hospital and Fumbisi Health Centre. Such experiences combined to discourage households from renewing their expired subscriptions.

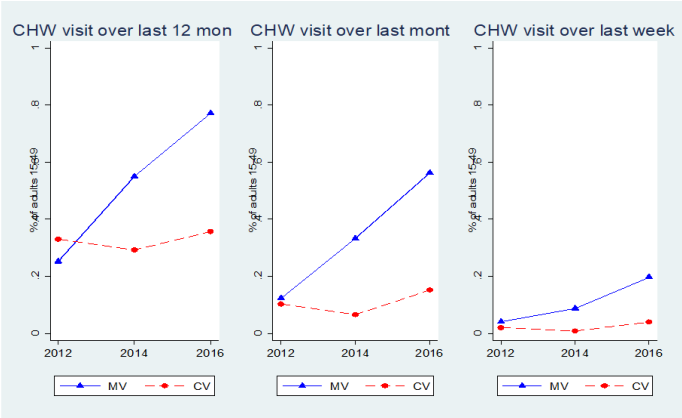
Sources: RCA and PRA studies.

7.3.2 Community health workers

191. Nearly 80% of male and female adults reported a visit from a CHW in the previous 12 months in MV areas during individual interviews, which points to widespread, though not universal, reach of the intervention. Nearly 60% of adults reported a visit in the previous month and about 20% in the previous week, thus pointing to the relatively high frequency of visits carried out (Figure 25).

80 See para 3 of the draft new CHPS Policy document.

Figure 25. Visits by CHWs



192. The increase in visits by CHWs is much larger in MV areas than CVs and the differences are always statistically significant (see Table 22). The PRA showed that virtually all the MV households in the study were covered by CHW visits by the end of 2016.

193. The MVP CHW model modified the pre-existing 'community health volunteer' approach, adding extra responsibilities and including a monthly allowance to reflect the increased time commitment required. However, district officials, in particular the Ghana Health Service, expressed concern that this approach weakened the sense of community responsibility and may not be financially viable in the future. These issues are explored more thoroughly in Chapter 10.

Table 22. Changes in visits by CHW in MV and CV areas

	Baseline CV	Baseline diff. MV	DD Impact 2013	DD Impact 2015	DD average impact
Visited by a CHW during the last 12 months	33.06	–7.94*	33.02***	49.48***	40.93***
		(0.042)	(0.000)	(0.000)	(0.000)
Visited by a CHW during the last month	10.45	1.91	24.22***	39.08***	31.36***
		(0.548)	(0.000)	(0.000)	(0.000)
Visited by a CHW during the last week	2.31	2.01	6.05**	13.78***	9.76***
		(0.201)	(0.023)	(0.000)	(0.000)

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

Box 6. Understanding the quality and nature of CHW visits

The term 'visit' is used by the household survey as a generic term to mean being seen by a nurse or CHW *whether in the home, clinic or another place* (e.g. in the community). While this means the data are open to interpretation, the same question was asked in MV and CV sites, so the dramatic statistical difference points to an increase that is attributable to MVP. The RCA study (which focuses on some of the poorest households in the area) found that CHWs did not actually make regular (monthly) monitoring and education visits, and that interactions with CHWs only took place during special programmes such as antenatal care or postnatal care sessions, bed net distribution etc. The study suggests that while 'visits' by CHWs increased during the project period in MV areas, there is concern that these may be overly driven by project requirements to distribute items or meet targets rather than 'home visits' that provide regular home-based monitoring and care. One example of this was from 2016 when the RCA found that there was a massive effort to meet the MVP's latrine construction targets, and CHWs were required to visit homes to instruct families to construct toilets. During these visits people said they were threatened with withholding of future benefits if they did not comply.

7.3.3 Provision of antenatal and postnatal care

194. There was some increase in the provision of antenatal and postnatal care. The proportion of pregnant women called to a session who visited before delivery did not increase, but it was extremely large at the baseline. There was an increase in antenatal visits carried out by CHWs and nurses. No increase was observed in the provision of iron, malaria treatments and HIV testing before delivery. There was a large increase in deliveries in health facilities though a large number of deliveries still occur in homes. There was no change in postnatal visits in facilities after birth but note that the number of such visits was already nearly universal at baseline. On the other hand, the number of mothers visited after leaving the facility increased considerably. See earlier for a discussion on the interpretation of 'visits' by CHWs (Box 5).

Table 23. Antenatal care services

	Baseline CV	Baseline diff. MV	DD endline 2016
Any antenatal care visit	93.0	5.2***	1.7
		(0.001)	(0.119)
Antenatal care visit by CHW	7.0	-1.5	8.8**
		(0.537)	(0.010)
Antenatal care visit by nurse	87.9	3.3	3.2
		(0.162)	(0.057)
Iron taken during pregnancy	73.9	-10.2	-5.9
		(0.189)	(0.069)
Anti-malaria medication taken during pregnancy	79.9	10.4**	1.3
		(0.002)	(0.466)
HIV test during pregnancy	66.6	6.8	-0.7
		(0.035)	(0.814)
Delivery assisted by doctor or nurse	2.6	-0.2	4.4
		(0.917)	(0.280)
Delivery either at hospital, health centre, health clinic	23.3	0.2	22.7***
		(0.964)	(0.000)
Any postnatal visit in facility	92.6	-6.2	-0.6
		(0.127)	(0.462)
Any postnatal visit after leaving facility	32.1	-13.6**	33.8***
		(0.012)	(0.000)

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

7.3.4 Vaccination of children

195. The project increased the prevalence of vaccinations among children for three major vaccines (BCG, DPT and measles), though did not change polio vaccination rates. The project did not appear to increase children's intake of vitamin A and deworming tablets.

Table 24. Children vaccinations and other supplements

	Baseline CV	Baseline diff. MV	DD impact midterm 2014	DD impact endline 2016	Average DD impact
Vaccination card	65.7	12.1*** (0.001)	10.0*** (0.000)	7.8*** (0.000)	9.2*** (0.000)
BCG	81.8	3.2 (0.236)	5.1** (0.004)	2.7 (0.054)	4.0** (0.004)
POLIO	43.3	–2.6 (0.553)	–2.8 (0.451)	–4.4 (0.354)	–3.4 (0.365)
DPT	66.5	5.5 (0.244)	8.1** (0.008)	5.8** (0.017)	7.1** (0.003)
Measles	69.9	1.1 (0.722)	4.9 (0.051)	5.0* (0.027)	5.1** (0.010)
Vitamin A	69.5	–0.4 (0.939)	–9.5** (0.014)	–2.7 (0.531)	–6.4 (0.068)
Deworming	38.5	1.7 (0.726)	–2.7 (0.554)	8.2 (0.135)	2.7 (0.493)

Note: vaccination rates were calculated for children under-5. Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

7.3.5 Distribution of bed nets

196. The project distributed a large number of mosquito bed nets and promoted their use. The earlier chapter on the impact of MV on the MDGs already showed a dramatic increase in the proportion of children reported to sleep under mosquito nets. Here we look at three additional indicators of malaria prevention: whether walls were sprayed with insecticides, whether the household has any mosquito nets (observed, not reported) and the number of functioning nets.[81] The project did not promote spraying of walls, and the prevalence of spraying followed similar patterns in MV and CV areas led by other organisations or the government.

197. The number of households with mosquito nets and the overall number of functioning nets increased. But, so did the same indicators in the CV areas. A reduction in the availability of bed nets, however, was observed in CV areas at the midterm, which did not occur in MV areas. This resulted in the estimation of a large DD impact on the proportion of households with bed nets. It should also be noted that at the baseline, household data on use of bed nets were collected over August–September in the control group while they were collected over June–July in the project group. This likely resulted in an artificial difference in the use of bed nets at baseline. The analysis of secondary data showed that use of bed nets is more common in August–September in comparison to June–July. Unfortunately, the size of this seasonal bias at baseline cannot be estimated or adjusted. However, the direction of the bias is clear and easily interpreted. The use of bed nets reported at baseline in the control group was higher than what it should have been, which resulted in an artificial dip in the use of bed nets in the control group at midterm and in an overestimation of the impact of MV on the use of bed nets in the project group. Among the households in the RCA study it was found that having bed nets and using them were very different issues. The main reasons given for not using them were that they were too hot to sleep under and too difficult to secure, especially when people sleep outside. The need to use bed nets was also diminished when indoor residual spraying programmes are routinely carried out.

81 The household survey instructed the enumerators to classify as functioning nets with 'no major damage or large holes'.

Figure 26. Impact of the MVP on malaria prevention initiatives and practices

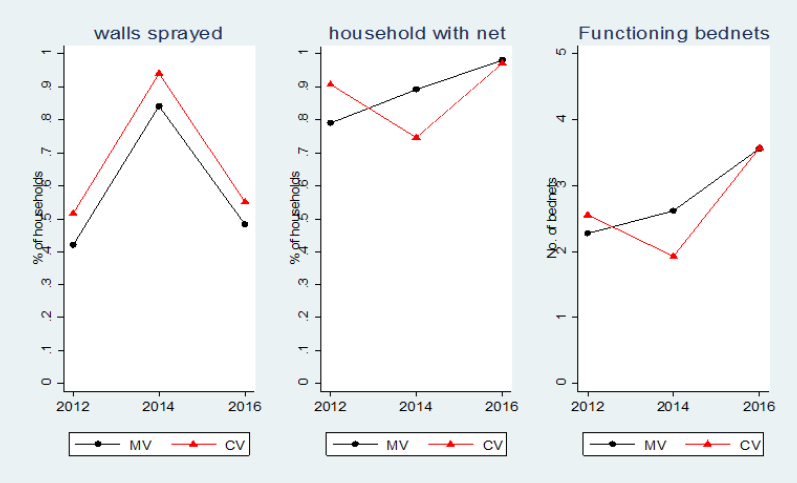


Table 25. Impact on malaria prevention initiatives and practices

	Baseline CV	Baseline diff. MV	DD Impact 2013	DD Impact 2015	DD average impact
Walls sprayed in the last 12 months	51.60	–9.12*	–1.46	3.17	0.87
		(0.044)	(0.880)	(0.503)	(0.878)
Household has any mosquito nets	90.74	–11.74***	26.49***	12.51***	19.51***
		(0.003)	(0.000)	(0.000)	(0.000)
Number of functioning nets	2.56	–0.28	0.96***	0.26	0.61***
		(0.129)	(0.000)	(0.269)	(0.001)

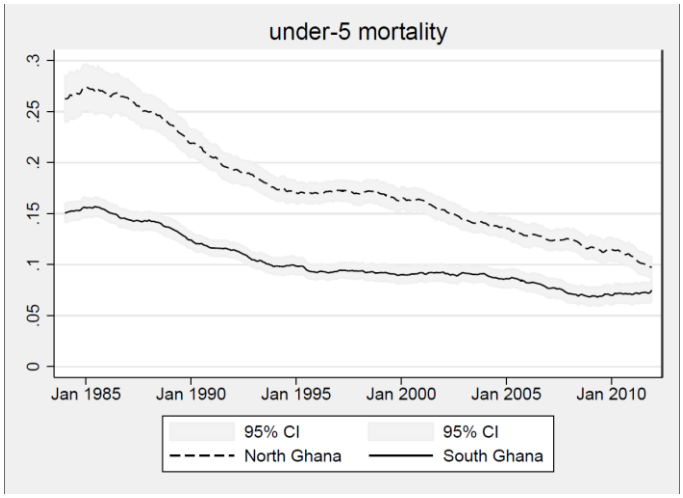
Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

7.4 Impact on child health outcomes

7.4.1 Child mortality

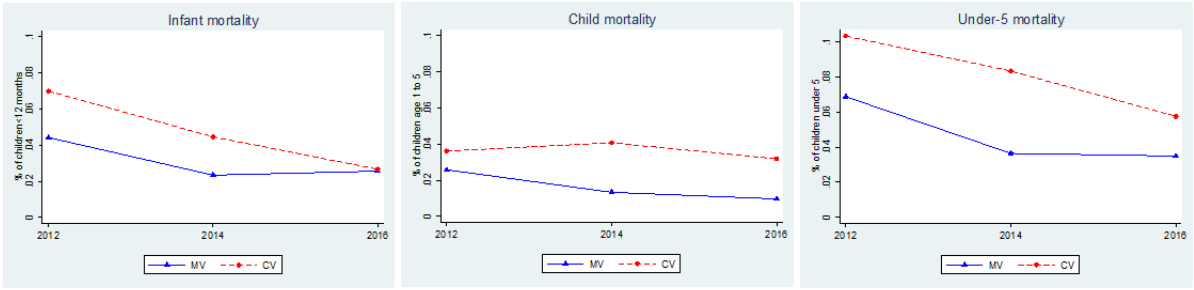
198. Mortality rates have been decreasing in Ghana over the last 30 years and they decreased at a much faster rate in the north than in the south of the country. See Figure 27 that plots mortality trends in northern and southern Ghana for under-five-year-olds using data from six different DHS surveys (1988, 1993, 1998, 2003, 2008, 2011). In 1985, one in four children would die before their fifth birthday in northern Ghana. In 2011 the same probability was one in ten, which is not too different from the probability in southern Ghana.

Figure 27. Under-5 mortality rates in northern and southern Ghana 1985–2011



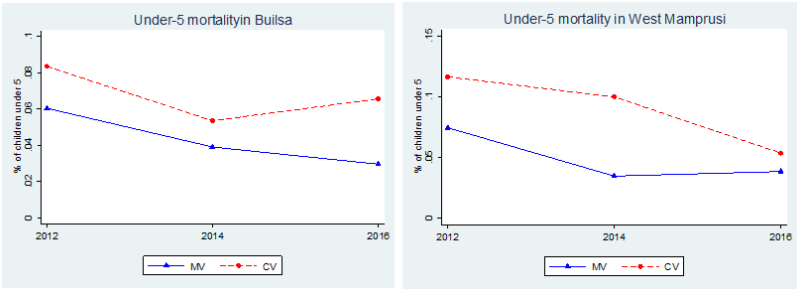
199. Baseline mortality rates in the CV areas are similar to those observed in northern Ghana by the DHS, but MV mortality rates are smaller, which was observed and discussed in the previous reports without finding a conclusive explanation. Here, we focus on the comparative changes over time and first observe that child mortality decreased in MV areas, but also decreased in CV areas and the net DD effect is small and not statistically significant.

Figure 28. Infant, child and under-5 mortality in MV and CV areas



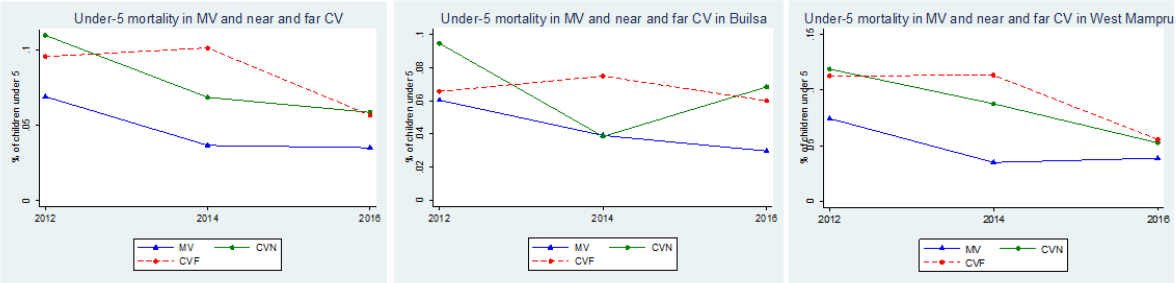
200. Patterns of change have been slightly different in the districts of Builsa and West Mamprusi. While more progress in mortality reduction was made in the MV communities in Builsa, the opposite is true for the control group communities that saw more progress in mortality reduction in West Mamprusi.

Figure 29. Under-5 mortality in MV and CV areas in Builsa and West Mamprusi



201. Decreases in mortality rates were very similar in MV and near CV areas, but the disaggregation of the same patterns by district does not suggest that this could be the result of spillover effects. In Builsa, mortality rates of near communities were very similar to those of MV areas at the midterm, but much higher at the endline, while in West Mamprusi the improvement in mortality rates in near communities was even larger than the improvement observed in the MV communities.

Figure 30. Under-5 mortality in MV and near and far CV areas



202. The presence of a functional CHPS compound with resident nurses was perceived as a major contributor to the decline in child mortality (see discussion in section 7.3.2). Another reason given for the reduction in child mortality was that the frequent community health nurse outreach/CHW visits made it possible for illnesses to be spotted early before they escalated beyond control.[82]

203. However, mortality rates were already fairly low in the area, and it is thought that this is because of a range of health sector pilots and interventions that had preceded the MVP and which have contributed to the continuous improvements observed not only in MVs but also across the wider project area. These include:

- Substantial area-wide investments in health education/primary health care and antenatal and postnatal care by Catholic missionaries (commonly referred to as '*the white man*') stationed at Wiaga, in what was then known as Builsa District[83]
- UNICEF invested in a sustained pilot on child immunisations, vitamin A and D supplementation, and bed nets in the Kassena Nankana District and other parts of the savannah, in partnership with the Navrongo Health Research Centre
- In many of the community visits, groups described how Radio Builsa (a licensed community radio station in Sandema) and the Foundation for Integrated and Strategic Development had been untiring in educating citizens on health, hygiene and family planning. In recent years, this public service reportedly received some funding support from the MVP.

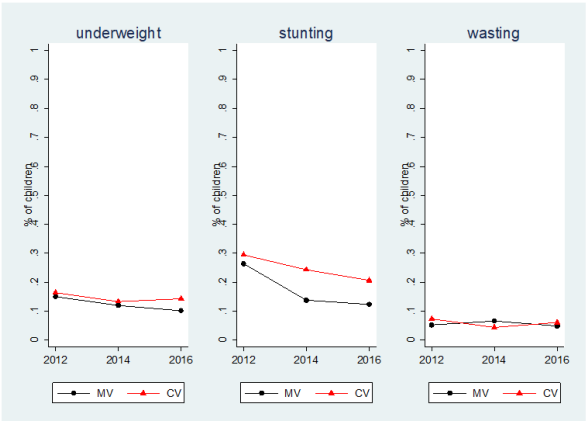
7.4.2 Child nutrition

204. The MVP implemented a number of interventions to improve the nutritional status of children. These included providing vitamin A, deworming tablets, nutrition monitoring by CHWs, and a wider package of health interventions. The MVP also promoted food production, food security and aimed to improve access to safe water sources and sanitation facilities, hence acting on most determinants of undernutrition in the dimensions of food availability, access to health facilities and caring practices.

205. The programme had some impact on the nutritional status of children under five (Figure 31). The prevalence of underweight and stunting decreased at a faster rate in MV areas compared with CV areas. The size of the impact on underweight was not sufficiently large to reach statistical significance, but the reduction in the prevalence rates of stunting was large and statistically significant. Finally, wasting increased in MV areas in comparison to CV areas, but this is not a negative effect of MV but rather a consequence of children's height improving at a faster rate than weight. The positive impact of the MVP on stunting is encouraging, as stunting is an indicator of long-term undernutrition and an improvement in height generally lasts longer than improvement in weight. Taken together, this reflects a more general improvement in health.

82 CHW visits reportedly covered virtually all households by the time the project closed at the end of 2016.
83 This was before the district was broken up into Builsa North and Builsa South.

Figure 31. Undernutrition prevalence rates in MV and CV areas



206. We also calculated three indices recommended by the World Health Organization (WHO) to assess the quality of the diet of children under 24 months of age. Children are expected to consume at least four different types of food from a defined list of food categories, with a given frequency and in different combinations with fluids depending on whether they are breastfed or not.[84] The project improved all dietary indicators between baseline and midterm but the difference between the MV and CV areas decreased again at the endline. The DD effect is positive, and large, only for minimum dietary diversity. This is likely to be related to the widespread introduction of maize and various legumes in the family diet resulting from increased production of these specific crops, which have increased in both MV and CV areas.

Figure 32. WHO diet indices for children aged 6–23 months in MV and CV areas

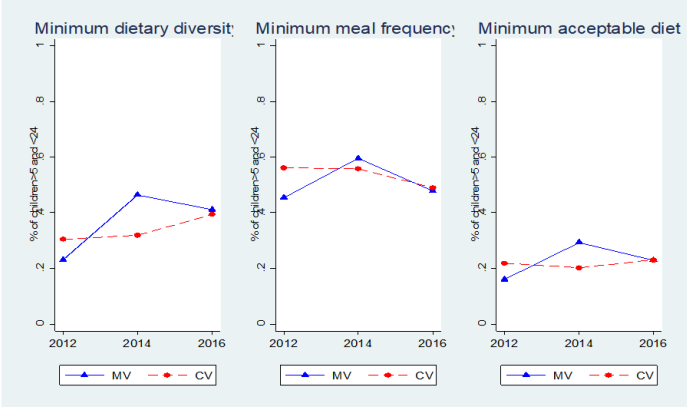


Table 26. Impact of MV on diet indicators of children aged 6–23 months

	Baseline CV	Baseline diff. MV	DD impact midterm 2014	DD impact endline 2016	Average DD impact
Minimum dietary diversity	30.51	–7.71 (0.147)	23.13* (0.006)	8.36 (0.391)	17.08 (0.038)
Minimum meal frequency	56.12	–9.98 (0.091)	10.60 (0.193)	4.94 (0.622)	8.42 (0.268)
Minimum acceptable diet	21.88	–5.95 (0.154)	–3.76 (0.520)	1.61 (0.833)	1.12 (0.833)

84 The diet diversity indices are: (i) the minimum dietary diversity (proportion of children between 6 and 23 months who eat food from at least four different categories); (ii) minimum meal frequency (the proportion of children between 6 and 23 months of age who consume solid foods and fluids a minimum number of times a day); and (iii) minimum acceptable diet (the proportion of children who receive minimum diversity of diet with minimum frequency).

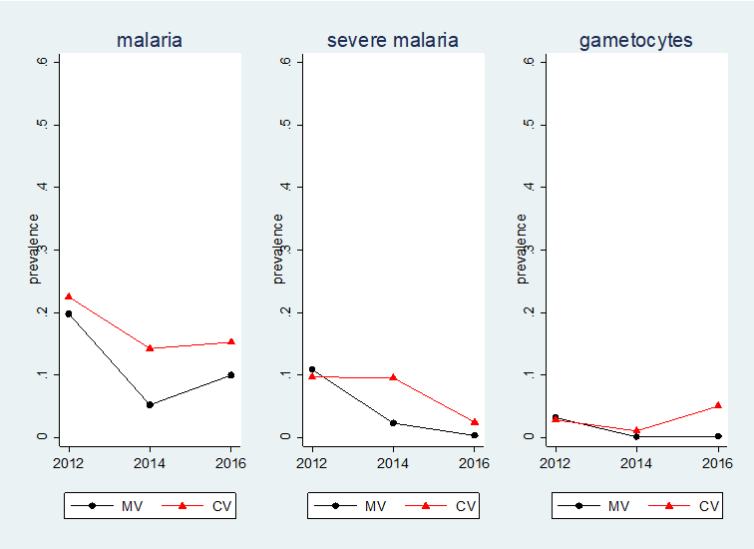
Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

207. The PRA study found that mothers are consciously increasing the protein content of their children's diets. This has mostly been in the form of beans and eggs, but not meat and has occurred because of the education which mothers receive at the CHPS compounds and in their outreach programmes. Similar changes reported by the non-poor in some CVs were attributed to a combination of health education and rising prosperity. The higher consumption of beans is also influenced by the increasing cultivation of cowpea and demonstrations by the MVP on diverse culinary uses of soybean.[85] Traditionally, children are not forbidden from eating eggs, although animal proteins are widely considered as delicacies reserved for adults. The PRA focus group participants also suggest that children are eating more meals overall, especially in the MVs, but also in several CVs. Similarly, the RCA study notes that people perceive the overall 'hungry season' to be shorter across all villages and people attribute this to substituting traditional millet crop with maize which, by virtue of its faster growing cycle, enables double cropping. The rapid introduction of cowpea as the crop of choice to follow on from maize has also contributed to the shortening of the hungry season, as well as providing a cash crop in the worst months.

7.4.3 Child malaria and other diseases

208. The MVP had some impact on the incidence of malaria. We defined malaria incidence as the percentage of children infected by the malaria parasite, and we defined severe incidence as the proportion of children with parasitic infection above the baseline median parasitic infection. The distinction does not have a clinical basis. However, there is high heterogeneity in the size of blood parasitic infection and we wanted to separate cases that are more likely to develop into malaria from those that are less likely to develop on account of the size of the parasitic infection. The density of gametocytes is an indicator of how easily the subject can transfer the malaria to mosquitos, which can then transfer it to other humans, and it is therefore a predictor of risk of malaria contagion.

Figure 33. Malaria prevalence in MV and CV areas



209. The intervention had an impact on the overall reduction of malaria incidence, though the size of the effect does not reach statistical significance. The impact, however, is larger and statistically significant on the incidence of severe malaria. The project also had an impact on reducing the

85 The MVP promotes the cultivation and utilisation of soya bean, but farmers and women are adapting the knowledge and skills acquired to cultivate cowpea, a preferred legume.

number of gametocytes. Gametocytes are responsible for the transmission of the infection from one subject to another, so that a reduction in their number suggests a potential lower spread of the disease in the population. It is worth noting that there is a possibility of seasonal bias (see paragraph 197). The bias cannot be estimated or adjusted but its direction can be easily interpreted. Baseline malaria incidence in the control group might have been lower than reported by our data, though there is no large difference in malaria incidence at baseline to suggest that this was the case. If malaria was lower in the control group at baseline, then progress in malaria reduction in the control group was also lower than reported, and as a result the estimated impact of MV on malaria is underestimated.

Table 27. Impact on malaria parasite infection (cross-section)

	Baseline CV	Baseline diff. MV	DD Impact 2013	DD Impact 2015	DD average impact
Malaria incidence	22.51	–2.88	–4.50	–4.47	–5.53
		(0.471)	(0.333)	(0.345)	(0.196)
Severe malaria incidence	9.69	0.97	–7.46	–3.50	–5.71*
		(0.704)	(0.026)	(0.196)	(0.050)
Presence of gametocytes	2.82	0.40	–0.70	–5.78*	–3.70*
		(0.760)	(0.575)	(0.009)	(0.012)

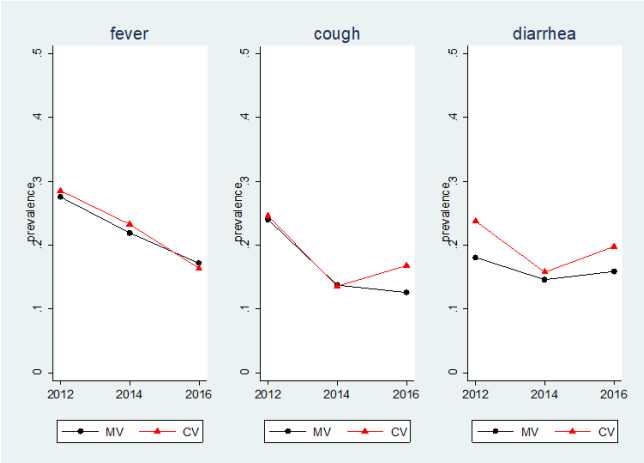
Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

210. While malaria incidence has declined in both MVs and CVs, the drivers behind this change are less clear. RCA households noted the efficacy of the indoor residual spraying programmes which all the study communities benefited from either through the President's Initiative for Malaria control (funded by United States Agency for International Development) or the AngloGold Ashanti Malaria Control Ltd (*AGA Mal)* programme (funded by Global Fund). Study households in both MV and CV all had bed nets, but bed net use was observed as rather low although when the spraying programmes had been delayed, more people used nets.

7.4.4 Prevalence of common symptoms for children

211. Mothers reported the occurrence of episodes of fever, cough and diarrhoea for all children under five in the household. Trends in prevalence rates are fairly similar across MV and CV areas (Figure 34), with the possible exception of cough in the last survey round.

Figure 34. Prevalence of fever, cough and diarrhoea among children under-5



212. All prevalence rates are decreasing in MV areas but not at a faster rate than in CV areas (except cough at endline) and average impacts are not statistically significant. The project does not appear to have reduced the incidence of most common symptoms of diseases affecting children.

Table 28. Project impact on fever, cough and diarrhoea on children under-5 (cross-section)

	Baseline CV	Baseline diff. MV	DD impact 2013	DD impact 2015	DD average impact
Fever during the last 2 weeks	28.52	–1.24	–0.35	2.21	0.96
		(0.674)	(0.935)	(0.567)	(0.789)
Illness with cough during the last 2 weeks	24.58	–0.52	0.64	–3.41	–1.42
		(0.870)	(0.878)	(0.375)	(0.695)
Diarrhoea during the last 2 weeks	23.76	–5.70	4.31	1.98	3.30
		(0.028)	(0.202)	(0.636)	(0.314)

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

7.5 The cost and effectiveness of MVP health interventions

213. A precise mapping of costs to results within the health sector is difficult to achieve, limiting the precision of an overall cost-effectiveness analysis. For instance, in the case of malaria prevention, money spent on bed nets was supplemented by routine visits by health workers – yet investment in health workers can also be associated with other health outcomes, making it difficult to arrive at an exact cost associated with malaria prevention for the purpose of comparison with other programmes. Moreover, the benefits generated by health expenditure were further supplemented by, for example, increases in agricultural production and improved access to health centres thanks to improved road connections. Suffice it to say, that if the MVP 'big push' hypothesis holds true, the synergies involved should generate health outcomes at a lower cost than would be the case if multiple individual programmes targeted the same outcomes. The CEA chapter provides full details of the analysis summarised here.

214. While the health process indicators suggest that the MVP achieved improvements in health care access and positive behavioural change, unit costs from the literature suggest that comparable achievements in health worker contacts, malaria reduction and vaccinations could have been delivered at under US$270,000 – just 7% of the total health budget of MVP. However, the lack of closely comparable projects in the literature leaves questions as to whether or not the observed results could truly have been delivered at such low costs given the limited pre-existing health infrastructure and systems in the project area.

215. While no cost estimates from other programmes were available relating to stunting, the estimated potential benefits from reduced stunting are substantial. These expected benefits from reduced stunting, however, would only cover 10% to 28% of the total health costs.

216. The above analysis, combined with a lack of evidence of attributable improvements in infant and under-five mortality rates (IMR and U5MR), suggest that the total health costs of US$4 million by mid-2016 are difficult to justify on cost-effectiveness grounds.

7.6 Summary

217. In summary, the project has resulted in an improvement in health facilities (with increased numbers visiting) and also in the reported visits by CHWs due to the MVP – though the quality of health care provided and the nature of visits is not fully understood. There are also some concerns emerging that CHW visits have been driven primarily by the project requirements to meet targets and distribute items. The loss of the MVP stipends for CHWs and deviance from the previous volunteer approach

may have implications for number of CHWs active in the area. Coupled with issues of government's ability to finance the 'super CHPS' delivered by MV and issues with their integration into the current management structure, there is potential that the benefits brought about by the MVP may not be sustained at the same rate in the longer term.

218. In terms of health outcomes, child mortality is decreasing in both MV and CV areas (although this effect is not attributable to MVP). The most significant impact of MVP in health has been the reduction in the prevalence rates of stunting, with mothers consciously increasing the protein content of their children's diets, and children eating more meals overall (as confirmed by our assessment of the dietary indices). It is worth noting that the reduction in stunting was not associated with a parallel reduction percentage in underweight children – an indicator more readily related to short-term malnutrition and food intake. This suggests that improvements in long-term nutritional status are likely to have resulted to a large extent from health interventions such as malaria control, and from changes in caring practices, such as breastfeeding and growth monitoring.

219. The MVP has also had an attributable impact on severe malaria and reducing gametocytes. Though malaria incidence has declined, this is not statistically significant. But the project has not reduced the most common symptoms of diseases (fever, coughs and diarrhoea) affecting children, despite its focus on quick wins and investments in CHPS and CHWs. The project has also increased the prevalence of vaccinations among children for the three major vaccines (BCG, DPT, measles).

Chapter 8. Education

220. This chapter explores the MVP interventions in education, which aimed to achieve '*enhanced access to quality primary education*'.[86] The interventions (from new and refurbished classrooms, to hiring teachers, and providing salary top-ups) were planned to result in changes in school attendance and learning outcomes, as well as improvements in parents' views of the benefits of education and wage expectations. By improving access to primary education, the project expected to reach intermediate outcomes that '*ensure universal primary education, increase the quality of education overall and increase access to secondary education, especially for girls*'.[87] With the emphasis on quality education, it is assumed that the project will have a positive impact on the learning outcomes for children.

221. This chapter first considers the education causal chain, and the activities implemented by the MVP. It then goes on to present findings of the impact of MVP on school facilities, and the impact on staffing, school attendance, and finally on learning by pupils. The chapter finds that overall there have been some sizeable improvements in school facilities and staffing especially in the MV areas, plus a positive impact on school attendance. But overall, there has been no effect on the learning outcomes of children.

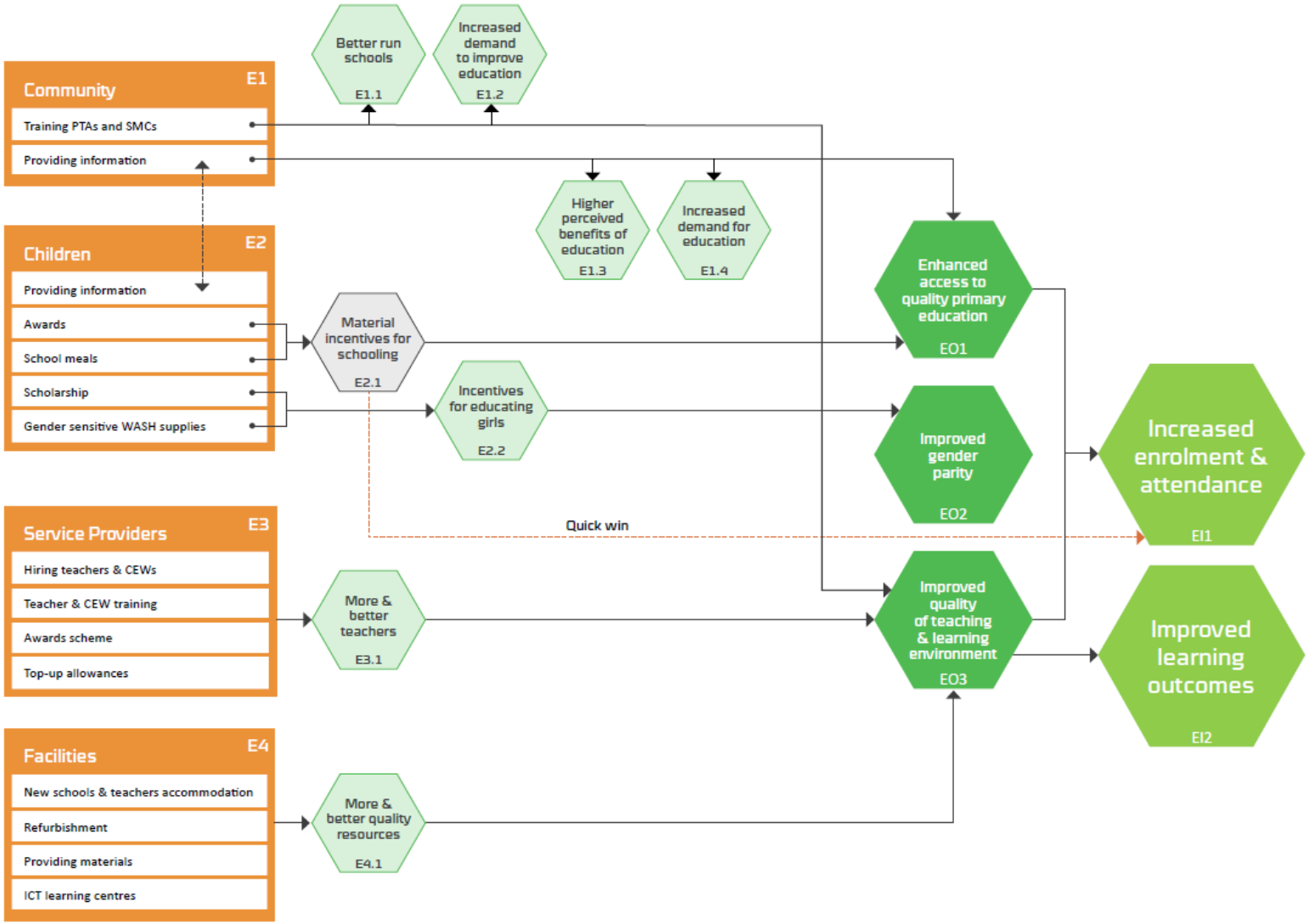
8.1 Education sector causal chain

222. The causal chain presented in Figure 35 is a reconstruction of the theory as understood by the evaluation team and validated by the MVP team.[88] By implementing multiple interventions generating impacts at various levels, it was expected that there would be a range of *outputs*, such as: greater demand for education by both children and parents; schools managed more effectively; additional and better quality resources to facilitate learning; and parents having greater incentives to send children to school, particularly girls. It was anticipated that achieving these outputs would improve children's access to formal education, as well as motivate parents to educate their daughters. At the same time, the education that children access would be of better quality both in terms of teaching and the learning environment. Taken together, these results were expected to increase both enrolment and classroom attendance, with a positive impact on improving learning outcomes in the MVs, and therefore the achievement of the MDGs.

223. In the first year of operation, project staff conducted several needs assessments with the communities, PTAs, school management committees (SMCs), and district education directorates. These assessments revealed the scale and variety of problems faced by the education system in the north: inadequate buildings and teaching materials, teacher absenteeism, poorly qualified teachers, high teacher turnover, language barriers to learning, and economic and social constraints to school attendance such as long distances to school, absence of toilets for girls and the value parents place on schooling.[89] The project then devised an overall strategy to tackle these problems with the main goal of increasing school attendance. The strategy is based on delivering *activities* within three main pillars: (i) improving school quality; (ii) sensitising communities and parents; and (iii) enrolling more girls in school. Additional interventions aimed at bringing more children to school were attempted, but on a much smaller scale.[90]

86 2014 Annual Report on the Millennium Villages Project in Northern Ghana, p. 17.
87 Logframe for the Millennium Villages Accountable Grant Programme, DFID, 2016.
88 In reconstructing this causal chain, the evaluation team also drew on the latest literature on education interventions in low and middle income countries (Snilstveit et al. 2015).
89 Preliminary Report on the Fourth Round of Data: Northern Ghana Millennium Village Project, 2017.
90 Ibid.

Figure 35. Causal chain for the MVP's anticipated education impacts



The detail of each of these three pillars is presented in Annex F (Causal Chain Analysis), and summarised below:

- **Improving schooling quality:** It was thought that one of the main factors behind low school attendance was the poor quality of instruction. This in turn was the result of poor school infrastructure and poor teaching (including the intimidation of children). Hence, the project invested heavily in the construction and rehabilitation of classrooms, school toilets and playgrounds, and refurbished schools with sports equipment, teaching materials, books and computers. In order to increase the *quality of teaching*, the project constructed and rehabilitated teacher quarters and provided other incentives for teachers to live in the communities. The project trained teachers on teaching methods and provided salary top-ups to staff of the Ghana Education Service (GES) to supervise teachers' work.[91] Monitoring of children's/student's numeracy and literacy, pupil attendance, teacher attendance and water, sanitation and hygiene (WASH) conditions was carried out in all project schools.
- **Sensitising communities and parents:** The aim of the community sensitisation work was to strengthen the communities' understanding of the role they can play in advancing children's education (e.g. by ensuring children get to school on time; holding schools, head teachers and teachers accountable for children's performance; the school holding the community members accountable for their responsibilities to children). The project hired and trained community education workers (CEWs) with the intention that they would hold meetings and workshops with the communities, PTAs and SMCs to sensitise parents about the benefits of education. In addition, CEWs were expected to visit families of children not attending school and families of children who dropped out of school to get more children in school.[92]
- **Gender parity:** In order to boost girls' school attendance, the project put in place a varied set of initiatives, including: school toilets for girls, delivery of sanitary pads to prevent absence from school during menstruation, community and parents' sensitisation[93] on the benefits of girls' schooling and scholarships for girls attending senior secondary schools.[94]

224. In addition to these broad packages of initiatives, the project also tried to increase school attendance by supporting the provision of school meals and establishing a real-time monitoring system in schools to improve learning. Real-time monitoring was undertaken by CEWs using mobile technology and involved assessing children's reading skills on a regular basis in order to inform project staff and education authorities about progress made and to establish areas in which remedial education was needed.

8.2 Project implementation

225. This section summarises the activities actually undertaken by the MVP in northern Ghana (see Table 29). Where records by SADA or Earth Institute permit, these are quantified based on the Annual SADA Reports (from 2015 to 2017). It should be noted that not all the activities fit neatly within the allocated categorisation since each output may contribute to multiple educational outcomes, and so the groupings are according to where they are most relevant.

91 Ibid.
92 Ibid.
93 Community sensitisation activities took place at community meetings, mother-to-mother support groups, and VSLAs.
94 Ibid.

Table 29. Summary of MVP's education activities[95]

Community	Children		Service providers	Facilities	
Community sensitisation	**Gender parity**	**Resource provision**	**Teaching quality**	**Infrastructure**	**Resource provision**
Training PTAs and SMCs	Gender-based violence awareness and Gender clubs in schools (482 school girls trained on sexual and reproductive health)	School meals programmes supported	Teacher training (120 teachers trained in Jolly Phonics;[96] 174 teachers trained in numeracy, literacy etc.)	Provision of school furniture and equipment	Providing school supplies (10,000 exercise books supplied; 3,000 pens and pencils; 16,800 text books)
Radio programmes	CEWs sensitised on girl education	CEW visit out of school children	Awards scheme for teachers and students	School construction (8 school buildings, 4 refurbished)	Student scholarships
Funding CEWs	Provision of sanitary pads for girls (3,200 sanitary pads in 20 MV schools)		CEWs trained as teachers (45 CEWs teach in primary schools)	Classroom construction and refurbishment (174 classrooms constructed in 20 cluster schools)	Provision of sports materials
	Running mentor girls camps		Lobbying GES for investment in teachers	Playground construction	Learning materials distributed
	Gender sensitive WASH facilities		Solar lamps	Construction of early child development centres	ICT learning centres
	Gender-specific safety programmes		CEWs provided with solar lamps	Lobbying district assemblies for school repairs	
	Creation or identification of scholarships for girls		Curriculum printed	Building teacher accommodation (4 teachers' quarters constructed, 12 teachers' quarters updated)	
			Top-up allowances (10 GES staff)		
			Curriculum training for head teachers, circuit supervisors, gender facilitators, and district supervisors		

226. In practice, however, the education directorates in the respective districts lacked the ability to hire new teachers due to conditionalities in Ghana's IMF package and indeed struggled with maintaining the existing teaching stock as teachers retired or deceased. As a result, the MVP employed the CEWs as teachers to supplement the deficit of government teachers. This, however, reduced the CEWs' sensitisation work considerably and resources had to be invested in training CEWs in addition to teachers.[97]

95 Numbers in brackets are the indicative number of achievements over the course of the project documented in the 2016 SADA Mid-Year Report, 2017 Project Completion Report and 2015 SADA Annual Report.
96 Jolly Phonics is a fun and child-centred approach to teaching literacy through synthetic phonics.
97 2017 Preliminary Report on the Fourth Round of Data: Northern Ghana Millennium Village Project.

227. Attempts to bring more girls than boys to school were limited in scope and misguided. Early data collected at baseline revealed that far more girls attend schools than boys. While bringing more girls to school can only be beneficial, gender parity in education is not a core issue in the area as more girls are attending school in primary, junior high school and secondary school. In addition, the MVP interventions were very limited in scope and magnitude. For example, only about 30 scholarships were given to girls attending secondary school through the externally funded 'Connect to Learn' project, and sanitary pads were distributed to only a fraction of the female school population.[98]

228. In the end, the project relied heavily on improving physical resources. It constructed and rehabilitated a large number of classrooms and provided modest quantities of teaching and learning materials. In several cases, teaching was conducted by newly trained CEWs.

8.3 Impact on school facilities

229. The MVP sought to improve school buildings, hire more teachers and promote community outreach by educationists. Studies have shown that smaller ratios for pupil to classroom and teachers have been crucial in improving educational achievements, while other school materials are thought to have an impact. Table 30 compares 2016 facility data with 2012, for both MV and CV.

Table 30. Indicators of facilities changes, 2012 and 2016

	2012			2016			Variance		
Facility/Infrastructure Productive Input	**MV**	**CV-Near**	**CV-Far**	**MV**	**CV-Near**	**CV-Far**	**MV**	**CV-Near**	**CV-Far**
No. of primary schools	21	17	17	19	13	15	–2	–4	–2
No. of junior high schools	16	6	9	12	10	8	–4	4	–1
No. of students	6756	3835	5841	7873	5158	5430	1117	1323	-411
No. of classrooms in good conditions	103	105	102	149	80	72	46	–25	–30
Student–classroom ratio	65.6	36.5	57.5	52.82	64.75	75.41	–12.78	28.25	17.91
No. of buildings needing repair: Minor repair Major repair				 23 1	 6 8	 10 6			
Average funding per school	-	-	-	1707	1507	1209			
No. of students travelling more than 3 km	687	512	329	1371	991	553	684	479	224
No. of students receiving meals	0	1071	2127	1758	1070	1006	1758	–1	–1121

Source: Facilities survey conducted by the Earth Institute (2012, 2016)

230. In general, there are some improvements in education in the MV areas. In particular, the MVP facilitated improvements in the number of classrooms in good condition, as well as the number of qualified teachers (discussed in the next section, and Table 31). Generally, the buildings are in better condition in MV areas. For example, more schools in MV areas have toilets, and all schools with toilets have toilets for girls. The provision of electricity is inadequate, but that is the case in all regions of Ghana. Schools are better funded in the MVs and there are more meals served in MV schools than CVs. It is possible that MV area schools had no meal programmes in 2012, as shown in Table 30. We have not been able to confirm whether this is missing data or not.

231. There are several unclear findings in the above table. There has been an increase in the number of children travelling more than three kilometres to school, while the number of school buildings are decreasing (between 2012 and 2016). As there are fewer schools in all areas, this may be a particular concern in MV areas. The MV areas have more students than other regions in 2016. It is hard to explain why CV-far areas has fewer students in 2016 though it could be because of the divisions of

98 Ibid.

the district which took place between 2012 and 2016. As this data is from facilities, the school areas served by the CV schools may have changed. Increases in school attendance as reported in the household survey is far larger for MV areas than it was for CV areas.

232. Further support for schools in both MV and CV areas came from a range of other projects, including G-PASS[99] (distributed by Camfed[100] and the Girls' Education Unit of GES) and Pumping is Life Ghana[101] (a water-sector NGO). Camfed provided additional sanitary pads, teaching and learning materials and scholarships for girls; the Girls' Education Unit supplied uniforms to selected needy girls; G-PASS also provided sanitary pads, teaching and learning materials and grants to cover mock exams and other school-based levies; and Pumping is Life Ghana co-financed a concrete water cistern for the school.

233. There are also emerging concerns about improvements to school facilities in the MVP area. The RCA study found that construction, rehabilitation and equipping of MV schools had, according to teachers, been based on a needs assessment at the beginning of the project conducted by '*project people with checklists'.* The teacher's reaction to this can be summed up by the words of a school principal in 2013 who was at the time compiling a list of needs for the MVP to address '*they don't ask us what we want, they give us what they have'.* While substantial development of school premises was witnessed by the RCA teams and very much appreciated by communities, observations over the subsequent years revealed poor workmanship (leaking roofs, pitted cement floors, poorly constructed window and door frames, cracked walls) and very poor maintenance (new furniture which has already broken, non-functional ceiling fans, broken hinges on doors, windows and gates, non-functioning pumps) as well as some provisions that were never finished (such as the installation of water tanks for teachers in one MV which were never connected; there is still no electricity connection in another MV school despite electricity in the village). The RCA study noted a pervasive expectation for either donors to fix problems or for the government to repair buildings and equipment (an issue not just for MVP interventions, of course). In one of the RCA CV locations, however, this trend is being bucked, with high levels of community pro-action to solve problems[102] including undertaking repairs and maintenance without waiting on others (Box 7). It is interesting to note that the MVP adopted a more community-labour approach towards construction towards the end of its construction work, partly, as we understand, because funds were limited. This may lead to stronger feelings of ownership and concomitant responsibility for repair and maintenance as suggested by the CV positive deviance example, below.

Box 7. An example of positive deviance from a control village[103]

Most remarkable was that this CV community had started its own primary school in 2010, first 'under a tree' with three volunteer teachers because the nearest alternative was 'too far for young children to walk' (about 45 minutes). They had subsequently constructed their own school with the support of the youth group when they failed to get government support for the teachers. RCA researchers noted that parents in this community demonstrated strong motivation compared with other study villages to send their children to school as epitomised by the quote from a father in the 2013 RCA report: 'even if I have to sell my last goods I will make sure my child goes to school' and we noted a very high level of school attendance. This was not only better than other villages but was also achieved without a school feeding programme or distribution of free school uniforms. It was also clear that they had an active PTA, which among other things had taken the initiative to put in place speed bumps on the road to increase safety near the school. By 2015, the school had three classes (Kindergarten and Primary classes 1 and 2) in a community-built mud building with zinc roof with an enrolment of about 70, with three government-trained teachers. The local Member of Parliament had provided 100 bags of cement to support the further construction of the school. RCA researchers remarked at the time how different this school felt compared with others with children happily going off to school in the

99 Girls' Participatory Approaches to Student Success.
100 Campaign for Female Education.
101 https://www.cordaid.org/en/partners/pumping-is-life-ghana/
102 A full description and discussion of this remarkable 'positive deviance' CV can be found in the RCA Endline Report (2017) under Case study: 'Control village' moving forward by itself.
103 https://www.cordaid.org/en/partners/pumping-is-life-ghana/

mornings, punctual starting (even though the teachers came in from outside the community each day) and a 'fun and interactive curriculum' and noted that children they met outside school were 'keen to share what they did in school with us'. Maintenance issues are managed by the community as they arise, and they often collect money from house-to-house to cover the repairs, for example of boreholes and electricity connections.

234. While MV schools had focused and concentrated construction and refurbishment support, many CVs benefited from school construction too, often as a result of the actions of electoral candidates. These initiatives suffered from periods of delay in the construction process, presumably when funds were short or reflecting periods when it was less expedient for candidates to invest. Often, construction was much slower than for MVs and led to frustration among parents, teachers and students.

8.4 Impact on staffing

235. There are also changes in human resources with student and qualified teacher ratios improving in MV areas. There are fewer teachers teaching more than one class in the MV area, and fewer teachers receiving up-to-date training in the MV area at the time of survey in 2016. In addition, student–classroom ratios improved only in MV areas and even with lower number students in the CV-far region there is significant deterioration of this ratio over time. The MV areas made many more teacher hires than the CV areas during this time period. It is possible that these teachers were already trained and experienced. Anecdotal evidence[104] suggests that some teachers may have been hired from CV areas for MV areas.

Table 31. Indicators of staffing changes, 2012 and 2016

	2012			2016			Variance		
Facility/Infrastructure Productive Input	**MV**	**CV-Near**	**CV-Far**	**MV**	**CV-Near**	**CV-Far**	**MV**	**CV-Near**	**CV-Far**
Total no. of qualified teachers	61	51	89	178	95	85	117	44	–4
Student/qualified teacher ratio	110.0	75.2	65.6	44.2	54.3	63.8	–65.8	–20.9	–1.8
No. of teachers average day				214	113	120			
No. of teachers previous day				198	89	98			
No. of newly trained teachers				22	53	51			
No. of teachers teaching more than one class				10	16	13			

Source: Facilities survey conducted by the Earth Institute (2012, 2016)

236. Similarly, both the PRA and RCA studies confirm that MVs had higher endowments of teaching staff, but this came at a cost to non-MV schools. Schools across the rural savannah routinely experience serious staffing challenges, especially with a shortage of *trained* teachers. However, in response to active lobbying by the MVP, GES allocated an increased number of trained teachers to the project's schools. As the trained teacher resource is a relatively fixed stock,[105] the preferential treatment given to project schools deprived other schools of potential improvements in their trained teacher resources.

237. The superior teacher situation in MV schools is also the result of the project's recruitment of CEWs (a paid position) to help fill teacher deficits and to assist with other activities such as enrolment and retention drives. Preparedness to live in the community was an explicit condition for recruitment of CEWs, and the RCA study found many were recruited directly from the community. Their allowances have been stopped since the project closed and they were encouraged to seek continued

104 Informal conversations by the team with a District teaching officer in West Mamprusi.
105 GES is actively increasing posting of newly trained teachers to rural areas, so the RCA study noted substantially increased numbers of teachers in both MV and CV, albeit higher numbers in MV.

employment under other schemes (e.g. the Youth Employment Agency, YEA). The RCA found several CEWs were not able to do this and that overall numbers of former CEWs working as teachers in MV schools has fallen as a result.

238. There is also evidence that increased staffing numbers in schools (whether teachers posted to MV areas or the recruitment of CEWs) will not alone lead to improved teaching. Talking with teachers in the RCA study, we found many of the newly posted teachers did not intend to stay long in the community. Some had been posted far from their own home towns, could not speak local languages and told us they did not feel integrated into the community. Most shared that they saw these postings as short-term first postings hoping to secure positions nearer home or in towns within two to three years. This was less of a concern among teachers who worked in schools where they could still reside in town and commute daily to school rather than live in the teacher accommodation. Where schools were located beyond easily commutable distances from towns, the MVP provision of accommodation with electricity was felt to be an important motivation for teachers to stay, albeit for short tenures, and the RCA researchers found these had become their own micro-communities (often including newly posted health staff too), which provided mutual support and recreation possibilities when otherwise they were quite marginalised from the rest of the community.

239. Both the PRA ad RCA studies found that the project's investment in teacher accommodation (new-builds and renovations) has had a major effect on retaining teachers. The improvement can be illustrated by insights from the RCA study which found teachers in an MV saying that they thought having electricity was essential as they can '*have fridges, satellite TV and computers'*. In another MV, teachers said that having electricity in the teachers' quarters '*made all the difference'*, especially as '*social life in the village is difficult*'. The PTA in yet another MV said that the main reason health workers and teachers do not stay in the village is the lack of electricity as echoed in a CV where teacher accommodation is very poor and there is no electricity. People say, *'teachers go home to their families and a whole week can pass without them returning'*.

240. At the baseline it was common for teachers to commute from distant towns, arriving at school late (often after 9 a.m.), a situation that is still common in the CVs. Although the PRA study indicated that parents in CVs criticised teachers for poor attendance, the RCA study found that teacher attendance in MVs was not always that good either. On normal[106] school days, RCA researchers observed very short contact times in both MV and CV, with schools starting late and finishing early but also punctuated by several very long breaks of more than 30 minutes each throughout the day. In one MV where teachers eschew staying in the accommodation provided because it does not have electricity and the village is commutable from a main town, teachers are frequently late and absent when it rains. In another MV none of the teachers live in the village because of its proximity to a main town. Children said, '*teachers do not come to school; sometimes we only play and come back'* and others told us that when the teachers do come they usually leave early, and often '*just take the register and go back to town by 9.30am*' where people say they run their own businesses including shops. This suggests that provision of accommodation alone is not sufficient and people in PRA focus group discussions noted the absence of good supervision, too.

8.5 Impact on school attendance

241. Impact on school attendance is assessed by calculating net attendance ratios. The attendance ratio calculates the proportion of children of a specific age who report having ever attended school at any time[107] over the previous year in the appropriate school for their age. For example, the net attendance rate in primary schools consists of the proportion of children aged 6–11 who attended primary school in the year preceding the interview. Net attendance rates for junior high school and senior high school are calculated in a similar way. Since late entrants (children starting school at an

106 Fridays across MV and CV are atypical days, characterised by very short school days, missing teachers and generally more relaxed approach.

107 This measures attendance at any time over the previous year, not regular attendance, but acts as a proxy.

older age than six) and returning pupils (children returning to school after long breaks out of school) are common, we also calculate an attendance rate for primary for all children aged 5 to 18, and an attendance rate of any school level for the same age group.

242. The charts show a modest progress in attendance ratios in primary school. The project focused a lot of effort on increasing attendance in primary schools, but completion of primary increases the probability of attending junior high school and senior high school and therefore we would expect also attendance of higher grades to increase over time. A small increase in junior high school is apparent but there is no change in senior high school, which is currently attended by a small fraction of the student population.

Figure 36. Net attendance ratios in primary,[108] junior high school and senior high school

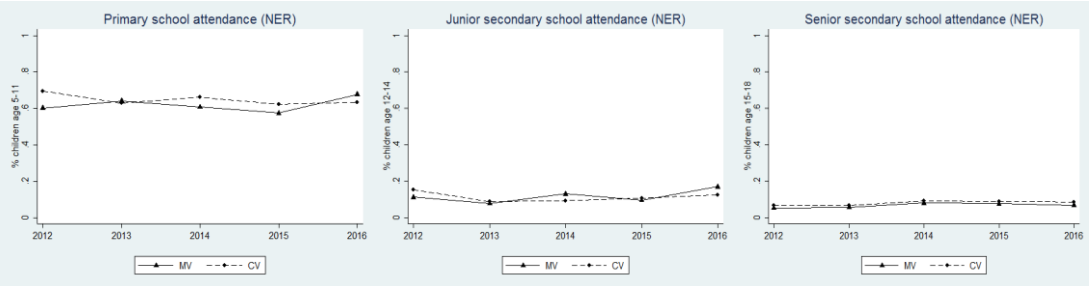
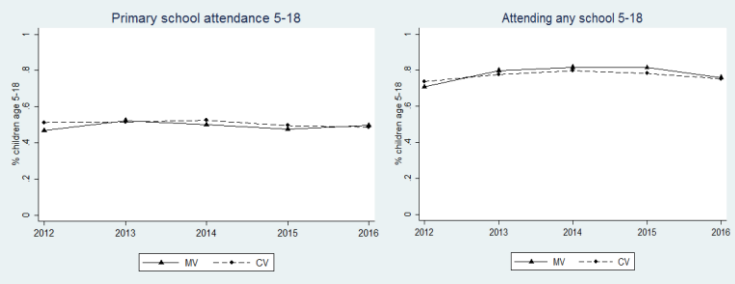


Figure 37. School attendance of any grade (children aged 5 to 18)



243. These impacts are more visible when calculated as numerical DD (see Table 32). The project had a positive impact on all attendance indicators except senior high schools. The impact on primary attendance was of nearly 8% on average and was largest in the first and the last year of intervention. The impact on attendance of junior high school is nearly 6% and fails to achieve statistical significance. Attendance of any school by all children aged 5 to 18 also increases by 5% reflecting a larger attendance of school by children outside the school-specific age range.

108 This is consistent with international definitions and refers to 'having ever attended in the previous year'.

Table 32. Impact on net school attendance

	Baseline CV	Baseline diff. MV	DD impact 2013	DD impact 2014	DD impact 2015	DD impact 2016	Average DD impact	Sample size
Primary education	0.696	-0.093	0.096*	0.043	0.035	0.135***	0.077*	13994
		(0.056)	(0.008)	(0.265)	(0.338)	(0.000)	(0.017)	
Junior secondary school	0.154	-0.038	0.027	0.081	0.028	0.089	0.057	5671
		(0.171)	(0.408)	(0.060)	(0.459)	(0.087)	(0.119)	
Senior secondary school	0.069	–0.016	0.002	0.001	0.005	–0.004	0.001	7147
		(0.387)	(0.913)	(0.979)	(0.824)	(0.865)	(0.969)	
Primary attendance (Children 5–18)	0.513	–0.045	0.047	0.017	0.020	0.054	0.035	29346
		(0.175)	(0.052)	(0.474)	(0.411)	(0.059)	(0.105)	
Attendance of any school (Children 5–18)	0.708	–0.030	0.057*	0.055*	0.061*	0.040	0.053*	29346
		(0.481)	(0.017)	(0.020)	(0.010)	(0.131)	(0.016)	

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

Table 33. Activities promoting education in MV areas

	Baseline CV	Baseline diff. MV	DD 2013	DD 2014	DD 2015	DD 2016	Average DD change
Parent–teacher association			20.5***	5.9	20.2***	23.4***	17.5***
			(0.000)	(0.218)	(0.000)	(0.000)	(0.000)
School management committee				0.1	1.2**	0.6	0.6
				(0.781)	(0.015)	(0.250)	(0.081)
Child had a school meal on previous day	20.1	8.9 (0.218)	12.0 (0.114)	16.3* (0.027)	11.1 (0.176)	12.1 (0.135)	12.9 (0.059)
Children received a bursary			0.4	0.5	0.1	0.2	0.3
			(0.142)	(0.104)	(0.869)	(0.535)	(0.170)
Children received stationery, uniform etc.			8.2	4.1	12.7***	18.3***	10.8***
			(0.053)	(0.356)	(0.000)	(0.000)	(0.001)
Child given a sanitary pad			1.2	2.7**	10.9***	5.4***	5.0***
			(0.073)	(0.006)	(0.000)	(0.003)	(0.000)

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

8.6 Motivations for schooling

244. Our survey asked parents and children about wage expectations.[109] In education economics, it is assumed people make schooling decisions based on, among other things, the expected wage for different schooling levels. As such, an increase in expected wages should determine an increase in schooling. Respondents were thus asked to estimate the wages they thought would be paid to a person who had completed primary schooling and to one who had completed secondary schooling.

245. At baseline, parents and children's expectations were very similar, though children's perception of wages, on average, were higher. The project did not change children's wage expectations. However, parents' expectations increased substantially both for completion of primary and secondary school. It remains to be explained whether this change in perspective is the result of a better understanding of the benefits of schooling, produced by the project or is the result of a true increase in wages in the area. From an economics perspective, however, we interpret changes in parents' wage expectations for children with some degree of education as incentives to sending children to school.

109 Adults and children were asked separately about wage expectations. Adults were typically the head of the household, and 80% were male. Children are those taking the test in the age range of 5–19 years.

Table 34. Parents' and children's wage expectations

	Baseline CV	Baseline diff. MV	DD impact midterm	DD Impact endline	Average DD impact
Children's wage expectations (primary school)	7.89	–3.44*** (0.000)	1.96 (0.332)	–12.30 (0.270)	–6.20 (0.334)
Children's wage expectations (secondary school)	17.06	–10.80*** (0.000)	11.99* (0.037)	–5.44 (0.740)	1.98 (0.826)
Parents' wage expectations (primary school)	7.07	–2.20*** (0.000)	1.60** (0.018)	1.85** (0.012)	1.73** (0.006)
Parents' wage expectations (secondary school)	13.99	–7.22*** (0.000)	7.98*** (0.000)	5.53*** (0.001)	6.75*** (0.000)

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

246. Although the RCA found for the first time at the endline that families were expressing more ambivalence about education,[110] there was generally more willingness to send children to school. The RCA also found that presence of nurses and teachers living in the community as a result of MV provision of accommodation provided role models that encourage school attendance. It could also be argued that as a result of more interaction with teachers and nurses, MV parents now have greater access to information about wage expectations for secondary-educated persons. Both the PRA and RCA studies noted that, because of increased maize and cowpea cultivation, cash incomes for many families had improved and they were more willing to encourage their more academically able children to continue school. In particular, both studies revealed that parents are more willing to send their children to school when they are confident teachers are routinely present, which is probably the main driver of increased attendance. The 'before MVP' situation in MVs is epitomised by continuing problems plaguing CVs and can be illustrated by comments shared in one CV: '*there are no teachers in school so what is the point of the children going?*' and '*teachers are never there, never encourage the kids so it is time wasting – we may as well come to the field*'.

247. The household survey found an increase in distributing sanitary pads for adolescent girls in MV area and the PRA study noted that this was mentioned as a contributing factor for improved attendance. The survey data found an increase in supply of stationery and school uniforms in MVs but the bursary programme for girls attending junior secondary school appears to have been too small to produce any impact (see Table 32 above). The PRA study found that in both MVs and CVs more children are reportedly attending school because of the supplies of stationery, uniforms and other logistics distributed under a range of other interventions, notably by GoG – with some under the Ghana Partnerships for Education Grant as well as G-PASS. However, the RCA midline noted a very high degree of duplication and most of these incentive programmes were stopped in 2015.

248. At baseline both the RCA and PRA studies noted that actual corporal punishment and fear of it were key reasons children avoided school. At the baseline, RCA children themselves indicated that the main reasons for non-attendance were that they did not understand the lessons or were frightened of corporal punishment, of which the researchers observed much evidence. The PRA study found incidence of corporal punishment has largely declined (though is still present) in MV schools. In the PRA study people shared that offences that still attract corporal punishment include taking a mobile phone to school, recurrent lateness and viewing pornography. The RCA findings differ from the PRA in that observations in schools and conversations with children suggest there is still a lot of corporal punishment in both MV and CV schools. For example, in one MV children told us that teachers frequently *'beat us … and they don't teach us'* and, tellingly, a daughter (9) in one of the homes we

110 While before, people saw a future in getting at least one child well educated and employed, some parents now shared that they felt they had wasted their money on education or that there were better opportunities to earn in the village (without education) than there had been before, especially in villages experiencing good cowpea production.

stayed in wants *'to be a teacher so I can cane students'*. Teachers in another MV told us that they '*have to cane'* the children to maintain discipline. In yet another MV we happened to visit the combined primary and junior high school (JHS) as JHS prefects were being briefed by the principal on how to use the cane to keep discipline among their fellow JHS and primary school students. In this MV school, all the teachers, which included young fresh graduates, carried sticks and one new graduate teacher from Kumasi shared *'we have to carry canes as these children do not know how to behave – they get nothing from home'*.

8.7 Impact on learning

249. And finally, our study measured effective learning in school by administering a set of tests at the households and administered to children regardless of school attendance. All children were administered three cognitive tests: Raven's matrices, and forward and backward digit span. The selected cognitive tests measure different dimensions of 'intelligence' and capture genetic as well as acquired skills. Children who are physically and intellectually stimulated at a young age tend to perform better at these tests. Simple eight-question maths and English tests were administered to children aged 6 to 11 who ever attended primary, and advanced (much longer) maths and English tests were administered to children older than 11 who ever attended junior secondary school.

250. According to the tests, the project did not improve children's cognitive skills. Oddly, it appears to have had a negative impact on the backward digit span test. The negative effect is consistent across the midterm and the endline assessment and of similar size. In a digit span test, the subject is requested to repeat a sequence of random numbers. The backward digit span test is more challenging as it requires the subject to repeat the series of numbers in reverse. The test measures the efficacy of short-term memory, which can be affected by learning practice (for example, practising music increases short-term memory) or by factors related to attention, such as a proper diet and micronutrient intake (malnourished and anaemic children tend to perform more poorly).

Table 35. Impact of MV on cognitive skills and test scores

	Baseline CV	Baseline diff. MV	DD impact midterm	DD impact endline	Average DD impact	Sample size
Raven's matrices test	0.010	–0.007	0.236	–0.197	–0.002	10,602
		(0.956)	(0.080)	(0.321)	(0.991)	
Forward digit span	0.015	–0.036	–0.156	–0.027	–0.086	10,508
		(0.681)	(0.130)	(0.818)	(0.380)	
Backward digit span	-0.007	0.078	–0.230	–0.263	–0.248	10,503
		(0.403)	(0.099)	(0.040)	(0.033)	
Easy maths	0.003	0.009	0.099	–0.330	–0.147	5,956
		(0.911)	(0.403)	(0.021)	(0.219)	
Easy English	0.053	–0.100	0.066	–0.386**	–0.190	5,581
		(0.297)	(0.542)	(0.002)	(0.055)	
Advanced Maths	0.029	–0.099	0.342	–0.479**	–0.158	1,674
		(0.448)	(0.067)	(0.005)	(0.290)	
Advanced English	0.038	–0.122	0.567**	–0.299	0.035	1,683
		(0.279)	(0.002)	(0.127)	(0.827)	

Note: Coefficients are reported as standard deviations of the baseline average combined in the project and control groups. Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

251. The impact on test scores is negative with the exception of the advanced English test.[111] All negative effects on test scores are large and statistically significant at the endline assessment. Since easy English and Maths tests were administered to children who ever attended primary school, while advanced English and Maths tests were administered to children that ever attended junior secondary, negative scores may result from an increase in school attendance in MV areas by children of poorer backgrounds and with no previous education. Indirect evidence of this was obtained by looking at the impact of the project on a panel of children who were tested both at the baseline and the endline and whose test scores did not change or improve, though the change was never statistically significant. Alternative explanations might include overcrowding in classrooms (high attendance) or the employment of less qualified teachers (CEWs) by the project.

252. Indeed, it is hard to be conclusive on learning outcomes, and evidence shows contradictory changes due to the MVP. The PRA study in fact found that although comprehension remains poor, there is an improvement in reading ability across MVs as a whole (note that this is based on a small set of random tests with Primary 6 children by the PRA researchers). While many P6 children from MVs could read short passages given to them, some of their counterparts in the CVs were unable to read two-letter words like *it* and *of*. The passages read were in English and the enhanced competence could be attributed to the fact that MV schools have more teachers who can only teach using English as they have no knowledge of local languages. The RCA study where researchers stayed with families noted generally poor learning outcomes among primary students. For example, a nine-year-old who has been attending school for four years is still in Primary 1 in an MV school and cannot yet write simple numbers. Another 11-year-old in Primary 4 in another MV can only say *'my name is…'* in English. The RCA study confirms the reasons given for the decline in learning outcomes suggested from analysis of the survey data that more mixed ability children attend MV schools (increased attendance) whereas parents and teachers prioritise more academically able children in less well-resourced schools and that there is in fact no real sense that teaching is better in MVs. For example, not a single school (MV or CV) visited during the RCA study had pictures on the wall or other visual aids. Computer laboratories were not used as much as intended, either because teachers found it difficult to manage few resources among the large numbers in their classes, because computers were not working or because there were no teachers available with the skills to teach computer classes. Children mostly said they very rarely used the computers and that these classes were not particularly fun and consisted of identifying parts of a computer and drawing pictures of computers.

8.8 Cost and effectiveness of educational activities

253. The aim of the MVP's educational expenditure is to improve the quality of education and enable children to continually attend schools, thus the cost of gaining one year of schooling is one of the more important measures of cost-effectiveness. The MVP generated over 2,000 additional years of schooling, the estimated benefits of which in terms of potential future income stand at US$3.1 million to US$4.3 million – significantly outweighing the US$1.6 million spent on education under MVP.[112] These figures are derived through Mincerian[113] returns to additional year of education; given the measure simply uses years of schooling it is not clear if the return is based on cognitive improvements which were not observed through MVP implementation. A further caveat is that while we may suggest a significantly positive return on investment, there are numerous examples in the literature of additional years of schooling being generated at much lower costs than the US$770 per year achieved by MVP, which suggests poor value for money.

111 The slightly elevated English test scores among JHS students might be accounted for by the increased use of English in schools (for all subjects) due to new postings of teachers without local language skills – an effect which would be more apparent in MV than CV.
112 Cost calculations are explained in more detail in the cost-effectiveness chapter.
113 The Mincerian function is a single-equation model that explains wage income as a function of schooling and experience.

254. The MVP showed very little improvement in cognitive skills, an important indicator of educational quality, although it is likely too early to judge these results. Most of the interventions by the MVP were aimed at building up the educational system as a whole, which makes it harder to compare achievements of the MVP with achievements in other programmes, since most impact evaluations of other interventions report on small steps towards mostly marginal improvements to increase the capacity of an educational system.[114]

8.9 Summary

255. In summary, the MVP interventions led to improvements in school facilities, staffing and student/teacher ratios and school attendance, but without much substantive improvement in the learning outcomes of school children in the MV areas. There is emerging evidence that a range of factors in the assumed causal chain have not been addressed. First, despite the construction and rehabilitation of school buildings, evidence already suggests that this is deteriorating due to poor workmanship, lack of maintenance or unfinished work.

256. Second, the posting of teachers to these remote locations is viewed by many as short-term meaning they have little motivation to stay for any period of time – and many of the recruited CEWs (who are taking on teaching responsibilities) are not eligible for allowances beyond the project. For schools near to towns, teachers often commute in, and attendance can be low or irregular. Evidence suggests a relatively static pool of teachers within the area, with positioning of teaching staff within MV schools being at the detriment of non-MV schools.

257. Third, and while we have no robust assessment of teaching quality, there is anecdotal evidence that it is generally poor.[115]

258. Fourth, the motivations of children to attend school (and by implication to learn) have not changed in the MV localities, though there is evidence that parents' wage expectations as a result of schooling have increased. There are also several factors that affect parent motivations, although more often than not, parents seem more willing to send children to school if they are confident teachers are routinely present in the classrooms (even if this may not actually be the case).

114 It is possible that achievements from the other MVP sectors complemented the achievements of the educational sector. For example, the health interventions may impact a population to reduce the number of sick days both for pupils and teachers, and better roads make schools more accessible, especially for seasonal disruptions.

115 The RCA researchers, for example, observed teachers relying on chalk and talk lessons, with students simply copying sentences into their books and with no use of teaching aids. Plus, punctuality and contact hours were limited, with teachers sitting around gossiping with each other for a lot of the time.

Chapter 9. Agriculture

259. This chapter explores the MVP interventions in agriculture, which aimed to achieve '*improved food and nutrition security and development of the agricultural value chain*',[116] and by improving food production, the project expected to '*increase incomes … of farming households in the MVP cluster*'.[117] It investigates the extent to which this was successfully achieved. The chapter first considers the agricultural causal chain and sets out the activities implemented by the MVP. Evidence is then presented of farmers' involvement in the project (e.g. through farmers groups, receiving agricultural training and inputs like seeds and fertiliser). This is followed by an analysis of which farming inputs and other services (such as tractor hire) most significantly contributed to increases in agricultural production. And finally, the chapter finishes by presenting the project's impact on agricultural incomes, food security and land use.

260. Overall, the chapter shows that the MVP had an impact on agricultural production, with fertiliser, seeds, land and tractor provision contributing to this improvement. In particular, the land area given over to maize and beans in project areas has increased considerably, although there has been a more widespread adoption of cowpeas in the area (unrelated to the project). There has also been an impact on food security.

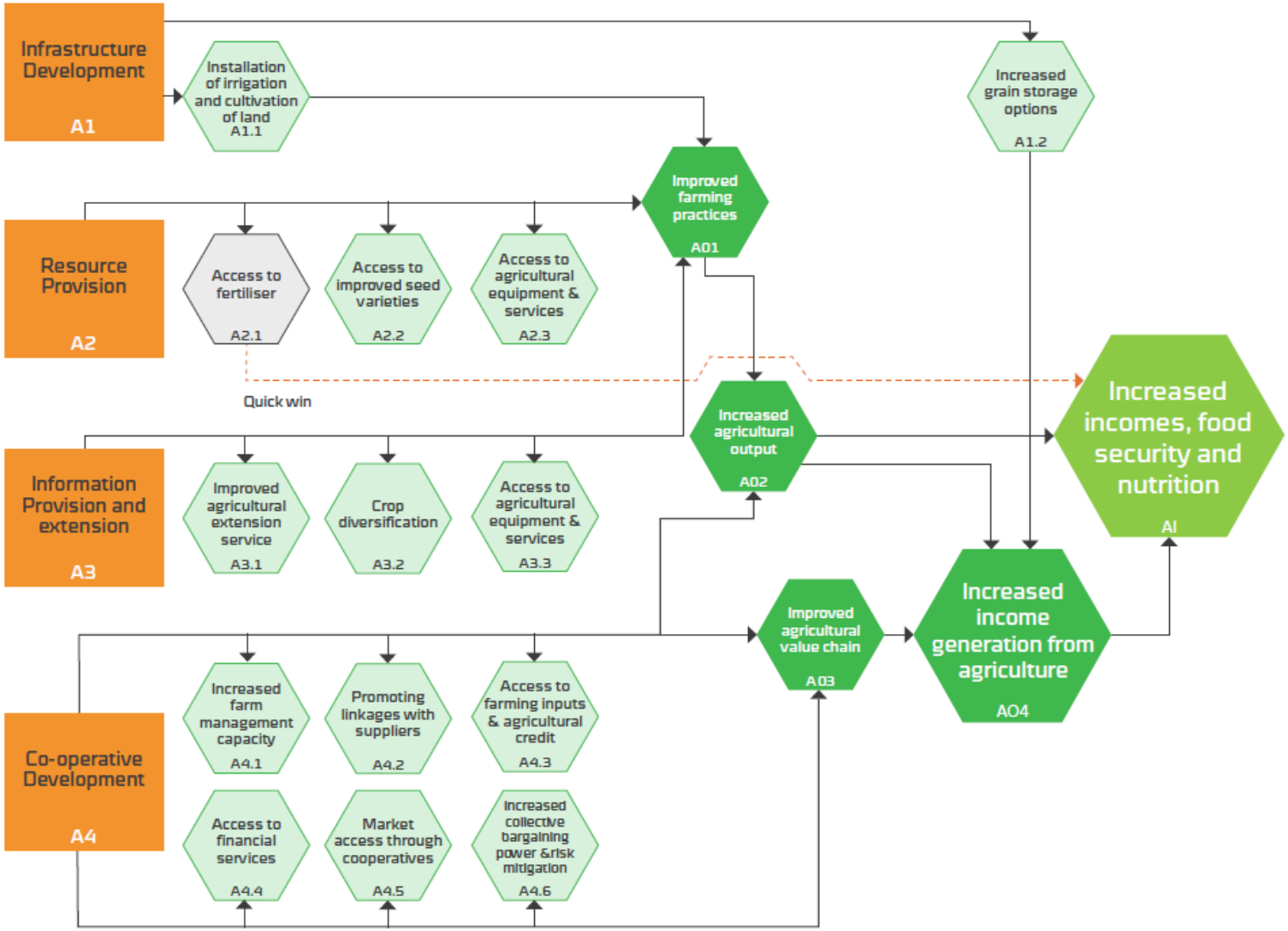
9.1 Agriculture causal chain

261. The following agricultural problems were identified in the northern Ghana: crop yields, prices and market access are subject to uncertainty and seasonal variability; low agricultural productivity; poor access to markets; farmers are unable to increase their income through agricultural inputs because they lack finance of their own and it is not possible to access credit from commercial lenders; and lack of inputs leading to soil nutrients becoming depleted after repeated cropping (environmental degradation).[118]

262. The causal chain presented in Figure 38 is a reconstruction of the theory as understood by the evaluation team and validated by the MVP team. By implementing multiple interventions, the MVP anticipated generating impacts at various levels, and a range of *outputs* were planned, including: dams and irrigation for the dry season, providing agricultural extension services, increasing access to farming inputs, strengthening market linkages, reducing pre- and post-harvest losses, building strong farmer-based groups, and ensuring access to financial services. As a result of these outputs, it was expected that this would improve crop production, develop markets for agricultural products, and build capacity of agro-dealers, storage facility owners and civil society organisations to provide reliable products and services to all actors in the agricultural value chain. These, in turn, were expected to increase agricultural productivity and improve the value chains, with an expected positive impact on food security and increasing incomes in the MVs. These agricultural interventions, integrated with activities delivered across other sectors were expected to generate synergies that would enable people in rural areas to save and accumulate wealth, stimulating investment and diversification into non-farm work.[119]

116 Logframe for the Millennium Villages Accountable Grant Programme, DFID, 2016.
117 2015 Mid-Year Report on the Millennium Villages Project in Northern Ghana, p. 7.
118 Business Case: Millennium Village in Northern Ghana, DFID, 2011.
119 Ibid.

Figure 38. Causal chain for the MVP's anticipated agricultural impacts



263. To tackle the agricultural problems faced in northern Ghana, the MVP started with a set of activities aimed at achieving 'quick wins' by delivering inputs (e.g. artificial fertilisers), subsidising improved seeds of high-yielding crop varieties or hybrids, training farmers on agronomic practices to eliminate 'hunger months', forming cooperatives, and developing food storage options and markets.[120, 121] As mentioned earlier, over time it was anticipated that crop surpluses would lead to income rises and reinvestment, and with a maturing of the agricultural value chain then there would be a shift from 'quick wins' towards farmers gaining greater access to services in support (e.g. credit for farming inputs, markets etc.). The overall strategy was implemented across four pillars:

- **Resource provision:** The MVP provided farmers with agricultural inputs such as seeds, fertiliser, tractor services and land preparation (e.g. clearance for rice cultivation). In particular, the project provided improved seeds (such as for the production of maize) as well as artificial fertiliser. Seeds and fertiliser were either donated or provided through loans[122] made on concessional terms or with very low repayment rates. Farmers were also able to rent small tractors at below market rates. Studies were conducted for micro-irrigation projects but never implemented because they were made redundant by proposed government plans to build a new dam on the White Volta River.[123] The MVP also provided motorbikes and fuel allowances to enable agricultural extension agents (AEAs) to visit the rural communities they serve.[124]
- **Information provision and extension:** The MVP helped hire eight new AEAs, adding to the 14 that were already employed by the government. In addition, AEAs were given training and basic tools. AEAs were supposed to work through more than 150 'lead farmers', who were selected in each community based on skills and motivation and were in charge of organising farmer groups of 15–20 members. Lead farmers were equipped with tools, some inputs and training and charged with the task of training their farmers group. Training relied mostly on farm visits and demonstration plots and included sessions on land preparation, planting, weed control, integrated soil fertility management, harvesting and post-harvest management. The MVP expected training to increase profits by increasing farm productivity through increased production.[125]
- **Cooperative development:** The MVP conducted a number of studies on agricultural systems and value chains to inform the selection of promising new crops and improve market access. Large buyers (so-called aggregators) for farmers' produce were identified and farmers received training on market quality standards and requirements. Mango, maize, millet and acacia were identified as promising new crops for which farmers were given saplings and/or seeds and the training to grow them. Market development initiatives were planned to improve profits by giving farmers access to better prices and promoting the production of higher value crops. The project has paid attention to organising farmers through the formation and capacity building of 'cooperatives'. See Box 8 on local distinctions between cooperatives and farmers groups.
- **Infrastructure development:** The project intended to help minimise post-harvest losses. Some of the losses were to be resolved by training farmers on proper harvest times. The project also rehabilitated warehouses or constructed new storage facilities, as losses are often the result of improper storage methods or the absence of storage facilities. Improved storage was intended to have an immediate impact on quantities of output sold, as losses during storage are reduced (e.g. due to theft, deterioration of quality, pests etc.), but is also intended to enable farmers to sell their produce when prices are more favourable.[126]

120 Business Case: Millennium Village in Northern Ghana, DFID, 2011.
121 Preliminary Report on the Fourth Round of Data: Northern Ghana Millennium Village Project, 2017.
122 Loans refer to regular cash credits, usually from rural banks.
123 Ibid.
124 2014 Annual Report on the Millennium Villages Project in Northern Ghana.
125 Preliminary Report on the Fourth Round of Data: Northern Ghana Millennium Village Project, 2017.
126 Ibid.

9.2 Project implementation

264. A summary of the MVP's known agricultural activities and achievements are detailed in Table 36. MVP inputs or activities have been quantified (in orange text) where possible, based on MVP's self-reported figures in the 2015–17 Annual Reports.[127] Not all the activities fit easily within allocated groupings since each output may contribute to multiple agricultural outcomes. Table 36 groups activities together according to where they are most relevant.

Table 36. Summary of MVP's agricultural activities[128]

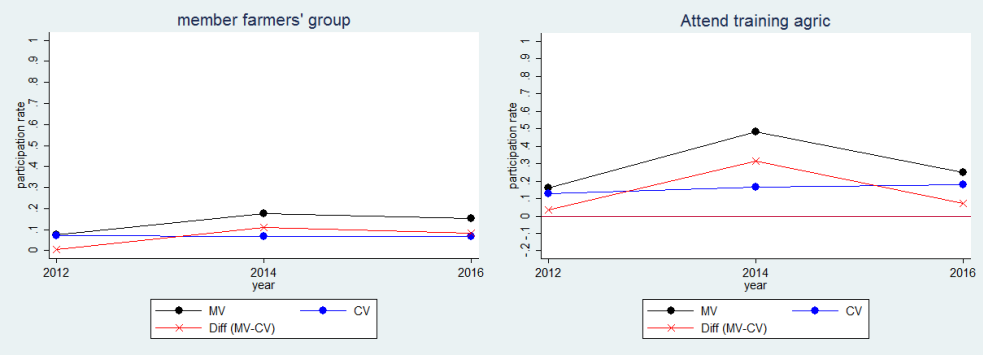
Infrastructure	Resource provision	Information provision	Cooperative development
Demonstration plots (400)	Seeds/saplings (9,000 mango, 3,000 acacia)	Outreach services (8 additional AEAs appointed, plus 14 existing AEAs)	Cooperatives for farmer groups
Construction or rehabilitation of grain storage and warehouses	Fertilisers (112 tonnes donated by Mosaic)	Training (e.g. conservation, using improved seeds, good agronomic practices, land preparation) (400 trainings of lead farmers)	Training (e.g. on market quality standards) (10 community entrepreneurs trained)
Land irrigation	Tractors (10 available to rent with drivers)	MoUs signed with Ministry of Agriculture to provide services	Setting up Village Savings and Loan Associations (50 groups with membership of 1,425)
Land cultivation (230-hectare paddy rice cultivated)	Motorbikes and fuel allowances for AEAs		

9.3 Farmers' involvement in the project

265. The MVP offered farmers a package of interventions, and farmers were involved to varying degrees. Some of these interventions were piloted and then soon abandoned because they proved to be unfeasible, such as the construction of micro-irrigation structures or market development. Other interventions were implemented throughout the project but were only partially successful, such as the formation of agricultural cooperatives or storage facilities. It is possible that this unintentionally undermined the integrated approach of the project.

266. We focus here on those programme interventions that were implemented more successfully and were adopted by farmers, namely: (i) the provision and promotion of agricultural inputs (such as fertiliser, seeds, herbicides and tractor services); (ii) the provision of agricultural training for the promotion of specific crops (maize and soybeans) and for improving farming practices.

Figure 39. Membership of farmers groups and attendance of agricultural training



127 Project Completion Report on the Millennium Village Project in Northern Ghana (January 2012–March 2017).
128 Numbers in brackets are the indicative number of achievements over the course of the project and documented in the 2016 SADA Mid-Year Report and 2017 Project Completion Report.

267. The charts in Figure 39 show that the project produced a moderate increase in membership of farmers groups and a considerable increase in attendance of agricultural training. Involvement in both activities reached a peak at the midterm. We analysed the characteristics of participants of farmers groups and agricultural training and found that age, sex and marital status are the strongest determinant of participation in both MV and CV areas. Members of farmers groups and those attending agricultural training at midline were predominantly older, married males. We found no evidence that the programme targeted particular groups or that particular sectors of the population obtained a preferential access to its services.

Table 37. Farmers' involvement in the intervention

	Baseline CV	Baseline diff. MV	DD impact midterm 2014	DD impact endline 2016	Average DD impact
Member of farmer group	7.1	0.5	11.1***	8.5***	9.8***
		(0.720)	(0.000)	(0.000)	(0.000)
Training in agriculture	12.7	3.3	31.4***	7.1**	19.7***
		(0.204)	(0.000)	(0.024)	(0.000)

268. The use of agricultural inputs shows a similar pattern (Figure 40 and Table 38). The second and third year of intervention[129] witnessed a large increase in the use of agricultural loans and chemical fertiliser in MV areas in comparison with CV areas. After the midterm, agricultural loans returned to pre-intervention levels while rates of fertiliser use remained higher than in CV areas.

Figure 40. Agriculture-related activities

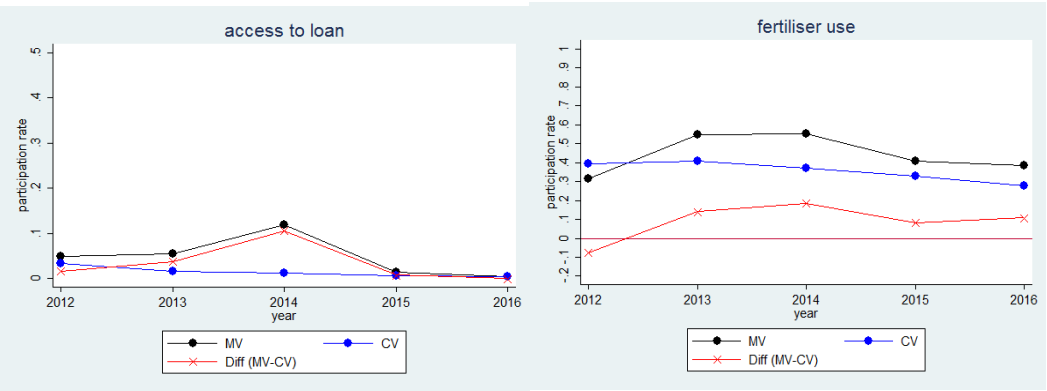


Table 38. Household participation in agriculture-related activities

	Baseline CV	Baseline diff. MV	Diff-in-diff 2013	Diff-in-diff 2014	Diff-in-diff 2015	Diff-in-diff 2016	Average Diff-in-diff
Any household member received a loan	3.3	1.6	3.8***	10.6***	0.7	-0.1	3.8***
		(0.260)	(0.004)	(0.000)	(0.190)	(0.885)	(0.000)
Used any fertiliser	39.4	-7.7	14.1***	18.1***	8.3	10.8*	12.9***
		(0.132)	(0.002)	(0.000)	(0.072)	(0.045)	(0.002)

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

129 The survey is conducted during July to September each year and asks about the preceding year. The patterns observed in the data may therefore be for the preceding year, with the peak occurring in 2012 and 2013.

269. The PRA study highlights, with a few exceptions, that the farmer groups formed in the MVs did not graduate into true cooperatives,[130] an observation confirmed by the MVP transition team.[131] See Box 8 for further details. The cooperative is what the MVP ultimately sought to facilitate, but it did not always happen. In fact, according to the PRA study, the groups mostly never 'matured' into formal cooperatives. Farmers simply formed loose groups because they were told the MVP (and other external actors) would not work with individuals. Typically, though, they did not complete the process of registering as fully fledged cooperatives and so could only access some elements of the package of MVP interventions.

Box 8. Cooperatives and farmer-based organisations

Farmer groups are generally considered to be small numbers of farmers joining together for a specific purpose, which is usually to access agricultural credit or other inputs. By contrast, cooperatives are larger, more formalised, with clear written procedures and structures, and registered by the Department of Cooperatives. Importantly, farmers make a distinction between 'groups formed by command' (i.e., for the sole reason as to be eligible for external inputs) and cooperatives that help share risks, collective bargaining and joint marketing. This means that 'farmer groups' can be temporary, existing only for the purpose of receiving inputs such as from external development projects, and then dissipating thereafter.

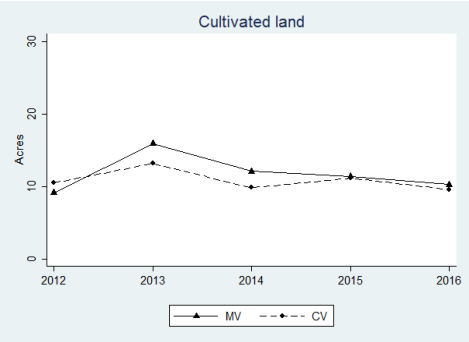
270. Both the PRA and RCA found that a seemingly growing disillusionment with farmers groups has arisen from a long history in savannah communities of implementing agencies (government, non-government and private) forming groups 'by command' or using lists of former groups as a means to deliver services, but without sufficient thought to the composition, group dynamics or the need for building trust. The RCA noted in 2013 that some of the discontent about farmer groups was actually fomented by what farmers referred to as the mismanagement of the maize inputs programme by the MVP. These inputs came far too late and the harvests were very poor so households did not have surplus to pay back the loans as intended. The project was accused of bullying tactics in an attempt to recover loans over the following seasons and in some villages, farmers fled for some months to avoid police action. PRA focus group discussion participants indicated likewise that the poor were more likely to have either misinterpreted or missed out entirely on the details of the MVP's input credit arrangement. The poorer focus group participants said they simply had not appreciated that the fertilisers they were given in 2013 were anything but a handout and also shared that, following threats of police action, several poor farmers fled their communities until the perceived harassment had died down.

9.4 Changes in land use and cropping patterns

271. The size of cultivated land increased considerably in MV areas in comparison with CV areas, particularly in the second year and at the midterm (Figure 41). The project encouraged farmers to cultivate larger plots of land or cultivate more intensively. According to the household survey, the average cultivated land at baseline was relatively large (above 10 acres per household) and the main cultivated crops were maize, beans, rice, millet, sorghum and groundnut. Caution, however, needs to be taken when interpreting these figures as the land area data are self-reported. For example, some farmers in the RCA study said that before the project they tended to reduce the size of the land they reported, as they thought this would make them priority for support (and conversely it is possible that farmers in the CVs were underreporting throughout the five-year period).

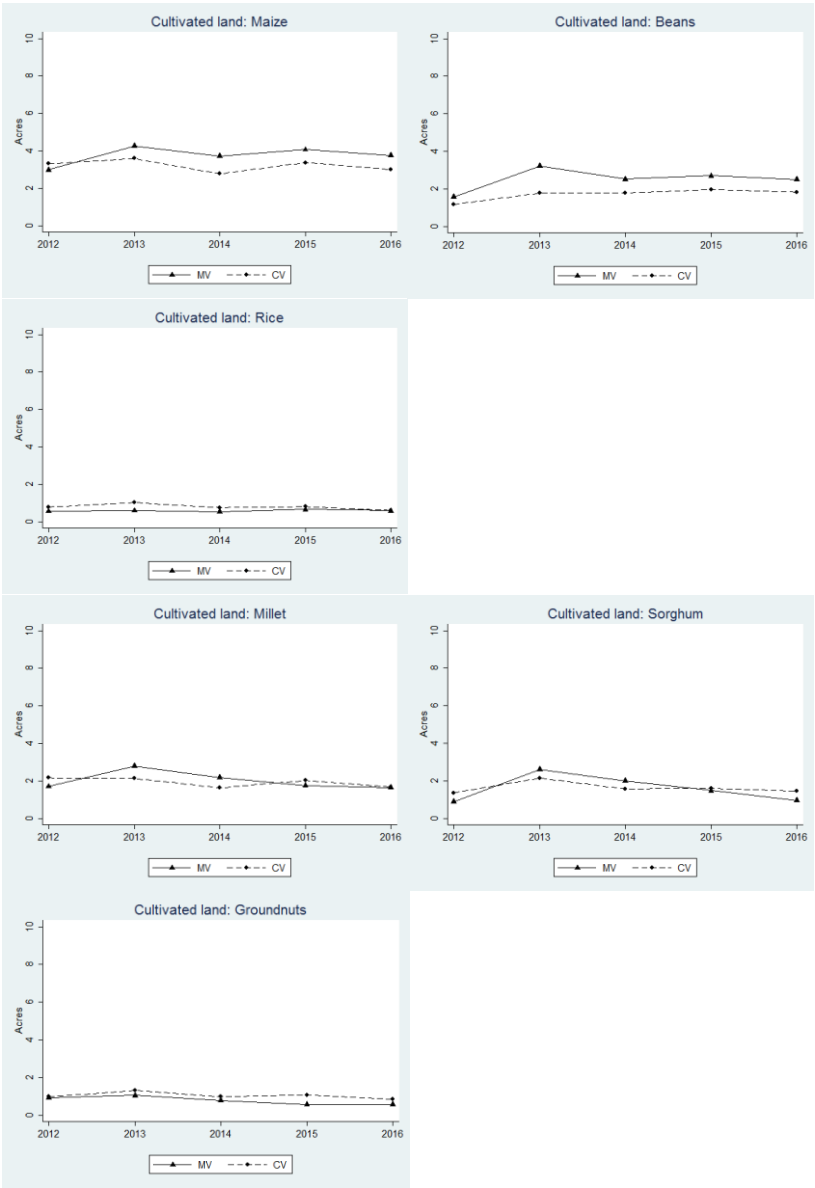
130 The household survey (question 411) does not distinguish between farmer groups and cooperatives.
131 Meeting between representatives of independent evaluator's PRA team and MVP transition team, 5 June 2017.

Figure 41. Impact of MV on cultivated land



272. In terms of changes in cultivation patterns of the main crops in MV areas, the land area dedicated to maize and beans has increased. The agricultural area devoted to more traditional crops like millet, sorghum and rice did not change, while the area cultivated to groundnut decreased (see charts in Figure 42 and Table 39).

Figure 42. Impact of MV on land cultivated to different crops[132]



132 Note: Beans includes soybeans and cowpeas.

Table 39. Impact of MV on land cultivated to different crops

	Baseline CV	Baseline diff. MV	DD impact 2013	DD impact 2014	DD impact 2015	DD impact 2016	Average DD impact
Cultivated area (acres)	10.50	-1.36	0.23***	0.21***	0.07	0.07	0.15***
		(0.048)	(0.000)	(0.000)	(0.159)	(0.310)	(0.001)
Maize	3.31	-0.45	0.20***	0.24***	0.22***	0.20***	0.22***
		(0.175)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)
Beans	1.18	0.40	0.48***	0.26**	0.27**	0.21	0.31***
		(0.062)	(0.000)	(0.010)	(0.009)	(0.068)	(0.002)
Millet	2.16	-0.30	0.20	0.14	-0.03	0.02	0.08
		(0.453)	(0.068)	(0.094)	(0.722)	(0.878)	(0.369)
Rice	0.70	-0.22	-0.09	-0.04	0.00	-0.01	-0.04
		(0.431)	(0.173)	(0.460)	(0.964)	(0.864)	(0.523)
Sorghum	1.37	-0.47	0.12	0.08	-0.01	-0.16	0.01
		(0.068)	(0.304)	(0.329)	(0.875)	(0.053)	(0.927)
Groundnut	0.98	-0.06	-0.05	-0.07	-0.18***	-0.10**	-0.10**
		(0.563)	(0.300)	(0.128)	(0.000)	(0.009)	(0.008)

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

273. There are a number of reasons that could explain this increase in maize and bean production in the MV areas. The PRA study suggests that it has been aided not only by the improvement in access to physical inputs but also by the adoption of the row planting method, which utilises land more intensively and makes investments in tractor services and weed control more cost-effective. Similarly, the RCA study found that MVP was active in promoting maize (but not cowpeas), with improved inputs and cultivation techniques (tractor ploughs being better than hand-hoeing or the bullock plough), as well as row planting which many mentioned as learning directly from agriculture extension agents or indirectly from other farmers.

274. Taken together, this has also provided the right conditions for experimenting with other dry season crops, especially cowpeas, which has recently become an important contributor to household incomes. As one man observed during a focus group discussion: '*with one bag of [cowpeas], I can buy three to four bags of maize*'. Box 9 explains some of the drivers behind the recent rise in cowpea production in both MV and CV areas, where farmers have learned from the MVP, migration to other areas, and farmer-to-farmer knowledge exchange. For example, farmers in PRA focus groups indicated that MV farmers transferred skills they were taught about soybean cultivation to farming the higher-return cowpea crop. In contrast, farmers in those CVs where cowpea has become a key crop often said they had picked up the requisite know-how during their migration stints to the fertile so-called '*overseas*' areas and along the White Volta, where they often hired themselves out as farm labourers on cowpea farms.[133] Observing that the return on cowpea farming was considerably higher than for the traditional crops they had been farming, several such migrants decided to divert their incomes and energies to that crop on returning to their home villages.

Box 9. The extraordinary rise of cowpea cultivation[134]

Intrigued by so many people telling us how key cowpea cultivation had become in their lives and how many described a change in their outlook since they started to grow it, we tried to establish the drivers of this phenomenal uptake. Five years ago, cowpea was grown in riverine areas (e.g. Builsa north) but generally for consumption only because yields were not particularly good (less than three bags per acre) and no insecticides or weed killers were used. People told us they began to hear about a private farmer in Yagba who was '*getting*

133 Farmers in some MVs too mentioned this route of skill acquisition.

134 Based on discussions in RCA sense-making workshop, but similarly confirmed by the PRA study.

15 bags from an acre' and wanted to find out how he did this. He achieved these yields by using chemicals bought from a single supplier in Bolga. Dealers quickly saw demand for these chemicals was increasing and opened a number of outlets, permanent and at weekly markets, especially in Fumbisi. People copied the practice during 2012–14 seasons and were excited by the yields they got and the fact that it filled an otherwise relatively unproductive farming period (October–December). Soon buyers were sending trucks from Kumasi, Tamale and Techiman, and farmers shared with us that there is a '*big demand down south*'. Large landowners also became interested in cultivating cowpea, providing sharecropping opportunities too. People described the market as commercial and competitive and shared the advantages of storage if they could afford to do this. For example, the 2016 harvest sold at around GHS300/bag in December/January but rose to GHS400/bag at the time we were staying in the villages (July 2017) with some people speculating it would increase further to GHS420 as it '*becomes scarce'*. Farmers told us they do not consume the cowpeas themselves '*as they have too much chemicals in them'* and grow small amounts among their maize closer to home where they do not intensively use chemicals.

9.5 Impact on agricultural productivity

275. In this section we unpack the impact of the MVP on agricultural productivity. Some of the input services provided by the project are directly observable and were reported in the surveys, for example, the use of tractors and fertiliser. Other inputs are observable but not directly reported in the survey, such as farming practices. Other contributors to higher productivity are not observable like those resulting from improved market access or easier access to roads. In order to shed light on the determinants of the DD observed, we use decomposition methods to attribute changes in agricultural productivity to (i) changes in inputs; (ii) changes in productivities of inputs; and (iii) other unexplained differences.

276. The estimated DD impact of the MVP on farm productivity is estimated at roughly 38% and is highly significant (in statistical terms).[135] The results of the estimations[136] are reported in Table 40. The first column shows the impact of the intervention on agricultural output without including any control variables and estimates an average impact of the project using a first difference estimator. The second and the third column of Table 40 estimate a production function (relating farm production to farm inputs) for the MV areas and the CV areas separately. The results of these regressions are the basis for performing the decomposition of effects, which are presented in the fourth and fifth columns. The fifth column shows the changes in agricultural output that are explained by changes in input use. These effects represent how much the output in CV areas would increase if in CV areas input use had to increase in the same way as in MV areas.

135 We find an average impact of 0.38 of the intervention. Since the dependent variable is in logarithms, this is roughly equivalent to a 38% increase in agricultural productivity.

136 We identify the determinants components of this change in the following way: We first explain changes in MV and CV areas separately using changes in input use as determinants. We then use these difference in differences as counterfactuals to assess the proportion of change in productivity determined by changes in inputs, changes in factor productivity and other factors.

Table 40. Decomposition of the impact of MV interventions on agricultural productivity

	DD effect without control variables	Production function in MV areas	Production function in CV areas	Changes in factor productivities	Changes in factors
MV total difference	0.381***				
	(0.000)				
T2	–0.196***	–0.097	–0.246***	0.037	
	(0.000)	(0.170)	(0.000)	(0.199)	
T3	–0.174***	–0.107	–0.050	–0.014	
	(0.000)	(0.131)	(0.312)	(0.541)	
T4	–0.249***	0.049	–0.119**	0.042	
	(0.000)	(0.493)	(0.015)	(0.152)	
Fertiliser		0.004	0.011***	–0.012	0.028**
		(0.241)	(0.000)	(0.503)	(0.007)
Seeds		0.096***	0.159***	0.000	0.078**
		(0.000)	(0.000)	(0.999)	(0.033)
Herbicides		0.007	–0.003	0.029	–0.004
		(0.228)	(0.368)	(0.544)	(0.579)
Pesticides		0.033***	0.048***	–0.019	0.021
		(0.000)	(0.000)	(0.508)	(0.245)
Labour		0.284***	0.221***	0.010	0.025
		(0.000)	(0.000)	(0.572)	(0.141)
Land		0.106***	0.134***	–0.024	0.083**
		(0.000)	(0.000)	(0.666)	(0.037)
Capital		0.023**	0.014***	0.019	0.007
		(0.003)	(0.006)	(0.644)	(0.203)
Tractor		0.042***	0.030***	0.013	0.013*
		(0.000)	(0.000)	(0.650)	(0.056)
Other rents		0.023**	0.030***	–0.008	0.031**
		(0.029)	(0.000)	(0.784)	(0.006)
Component of difference				0.098	0.283***
				(0.237)	(0.000)
R-square	0,018	0.359	0.369		
Observations	7,652	2,644	4,988		

277. The majority of input coefficients are statistically significant and the input increases together explain 74% of the change in productivity. This analysis suggests that much if not all of the observed improvement in agricultural output observed in MV areas is the result of an increase in input use, in particular of fertiliser, seeds, land and tractors. On the other hand, we do not observe an impact of the project on productivities of fertiliser, labour, land and capital (column 5). It seems that the increase in value production was obtained by putting more land under cultivation and using more capital and labour rather through an increase in the productivities of production factors. Finally, there is a residual unexplained positive effect of the project on agricultural output that is not embodied in changes in inputs. These are changes attributable to other MV interventions, such as roads. The effect, however, is not statistically significant and not very large.

278. As discussed in the pre-analysis plan (Masset, 2015), this analysis is exploratory and does not intend to provide a causal model of agricultural productivity. The goal of this exercise is to generate hypotheses about how the project worked, not to explain the observed facts[137].

279. In terms of farmer perspectives of key determinants, the PRA study found that women and poorer groups in the MVs quite consistently noted improvements in their ability to access tractor services, which also links to the finding on increased use of land. At the baseline, the story was that the subsidised tractors facilitated by the project were relatively few and the poor were losing out in the competition for access.[138] Because ploughing is a time-sensitive activity, and with the rich typically having greater economic influence and much larger farms, the poor simply could not have their farms ploughed on time. During the endline interviews, however, MV participants (including their poor and women's focus groups) observed a marked improvement in numbers of available tractors. They explained that the rise in demand for tractor services had led some rich men in the area to invest in the enterprise of hiring out tractors. The investment was facilitated through an arrangement whereby the previous government of the National Democratic Congress party (2009–16) made available subsidised tractors for sale across the country.[139] An outcome was that farmers in the MVs now feel less pressured to queue for subsidised tractor services as the price differential between subsidised and unsubsidised tractor services has reportedly narrowed under the influence of market forces.[140] There are, however, some concerns about the sustainability going forward. For example, in one RCA study village:

Some farmers have had to revert to using bullock ploughs recently, which are less efficient and often entail young boys taking time off school to plough.

> *'My' father and his neighbours were worried about the shortage of tractors this year. Some said it was because of the change in government and others because 'SADA is gone'. It is July and nobody in this area has sown their maize yet. They say they have never sown this late before. 'My' father said he did not know that 'SADA tractors would not be here this year' and said that he had liked them and that they were 'trusted'. He spent each day I was with him trying to find a tractor at the market centre. There are very few bullocks in this village which can plough for them so he said he was 'really worried'.*

280. Beyond tractors and greater land use, the PRA study found that MV farmers generally perceived the partnership with the MVP to have improved their access to agricultural know-how, fertiliser, tractor services and quality seed, although the situation is varied, and a few farmers in RCA MV areas (some of the poorest households) shared that they had picked up advice on planting in rows and that this had made a difference. In the PRA study, MV farmers suggest that improved know-how on planting

137 This is a descriptive exercise, which breaks down the impact of MV on agricultural production in three components: increases in input use (such as fertiliser and improved seeds), increases in input productivity (such as labour productivity) and any other unobserved factor (such as access to markets and other synergistic project effects). The exercise is credible if we assume that project and control areas are affected by the same non-project related unobserved factors (such as weather) and that farmers in the two areas respond to these factors in a similar way. This, however, is not necessarily true as project and control areas can be affected by unobservable factors in different ways. For example, a positive weather shock in project areas would increase the unexplained component of the model that we would erroneously attribute to unobserved project effects. Also, if factor use interacts in different ways with unobservable factors in project and control areas the estimation of returns to factors will be biased. The analysis therefore rests on some key assumptions that cannot ever be tested.

138 The subsidy level was in the region of 30%, with the SADA tractors charging GHS40 per acre while services procured from the private sector were around GHS60.

139 As with many other items that were rationed, there were widespread rumours of allocations being influenced by patronage politics and graft.

140 For example, in one CV access to tractor services improved significantly, with nominal prices even lower than at the baseline.

in rows and the correct plant spacing are important contributing factors, as are the visits by agriculture extension agents that are said to have become more regular in several MVs.

9.6 Impact on agricultural incomes

281. This section looks at the consequential impact (or otherwise) of improved agriculture production on household incomes. Farming and livestock rearing are the predominant economic activities in the area. According to the household survey, more than 80% of income is generated in the agricultural sector. Income generated by micro-enterprises ranges roughly between 10% and 20% depending on the year, while incomes from wage employment and transfers are negligible.

282. Much of the positive impact of MV on households' incomes (noted in Chapter 5) was generated in the agricultural sector and particularly in farming (Figure 43). The impact on livestock income was smaller in size. According to many farmers in the midterm RCA, harvests had not been particularly good in the early years because of drought, late rains and consequent delayed planting while others had experienced exceptional flooding. The subsequent harvests in 2015 and cowpea harvests in early 2016 (Box 9) were slightly better. The biggest change that people noted, however, is that of growing maize instead of millet as a crop (for which MVP can take some credit). This has enabled farmers to plant a second crop, comprising cowpeas, in the dry season.

283. The impact on incomes from micro-enterprises varied from year to year and it is large and statistically significant only in the second year of implementation. The RCA study noted that people indicated that micro-enterprise incomes may have experienced an increase in the early years[141] of the MVP largely because of the influx of workers (road and facilities construction, installation of electricity poles and mobile phone masts). Families were opportunistic in setting up small roadside stalls selling cooked food, snacks, mobile credit, cigarettes and alcohol. The more recent increase, people tell us in some areas is now to service road construction workers but may also reflect investment of surplus income from cowpea profits and to service the increasing consumer tastes of the general population as well as the influx of teachers and nurses who now reside in communities, especially some of the MV communities.

284. There is also a large impact on income from transfers, but transfers are a negligible component of overall income and therefore contribute very little to the overall impact. Finally, the impact on income from wage employment was negative in all years, except 2015, but the difference is very small and never statistically significant.

141 The project commenced in May 2012, and because the household survey for the 2013 dataset was conducted in mid-2013, the responses may correspond with the peak of MV activities in the first year.

285.

Figure 43. Impact of MV on different income sources

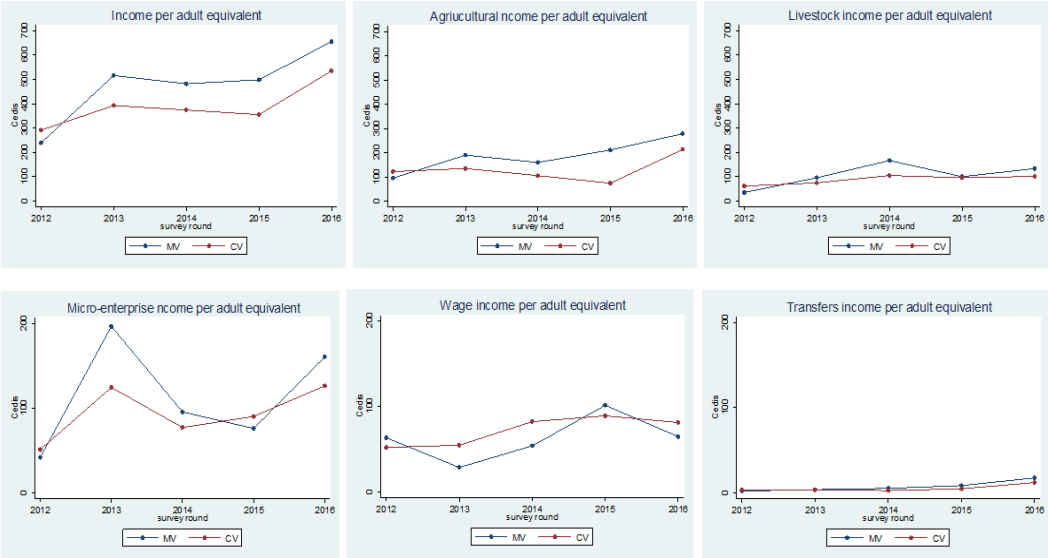


Table 41. Impact of MV on income sources per adult equivalents (lagged model)

	Farming	Livestock	Micro-enterprise	Wages	Transfers
Average DD effect	0.44**	0.08	0.11	-0.03	0.25***
	(0.001)	(0.049)	(0.313)	(0.519)	(0.000)
DD effect 2nd year	0.34**	0.06	0.32	–0.06	0.03
	(0.001)	(0.467)	(0.070)	(0.179)	(0.781)
DD effect 3rd year	0.31**	0.18**	0.04	–0.06	0.22*
	(0.013)	(0.004)	(0.893)	(0.248)	(0.027)
DD effect 4th year	0.73**	0.00	–0.10	0.04	0.31**
	(0.001)	(0.966)	(0.505)	(0.477)	(0.008)
DD effect 5th year	0.37	0.10	0.17	–0.02	0.48
	(0.068)	(0.195)	(0.422)	(0.703)	(0.057)
Sample size	7,857	7,857	7,857	7,857	7,857

Note: Standard errors calculated using 500 bootstrap replications at cluster level. P-values in parentheses based on cluster standard errors. Stars represent statistical significance levels, whereby * is 10%, ** is 5% and *** is 1% against critical values calculated using false discovery ratio.

9.7 Impact on food security

286. Food security is an ambiguous concept and refers to household ability to access food on a stable basis over seasons and years. In the MV survey food security is gauged through two questions: whether the household did have enough food during the previous 12 months, and the number of days the household was without food in the previous month. As such, there needs to be caution with interpreting these findings.[142]

287. According to the household survey, the MVP had a large impact on households reporting not having enough food in the previous 12 months. The fraction of households reporting food insecurity decreased substantially in MV areas, particularly at midterm (Table 42). The MVP also reduced the

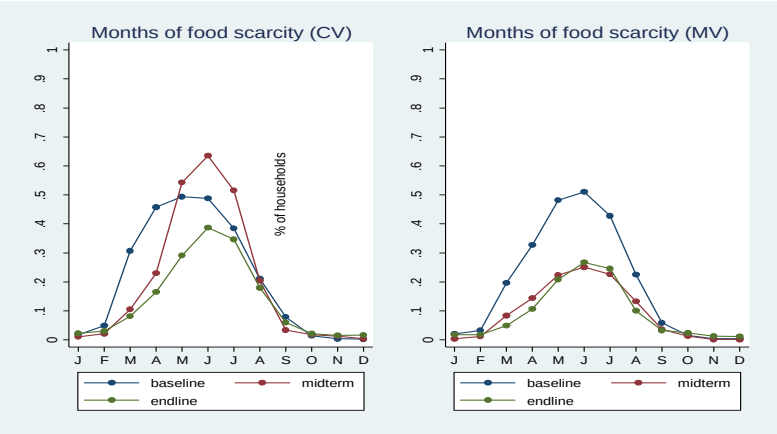
142 Although according to the RCA immersions, several CV families found it strange that people had come every year to ask them the same questions (meaning the annual MVP surveys) and *'yet we still have not got anything'*. Some of them shared that they must have appeared too well-off to the project to qualify for benefits, and from the midterm onwards they understated their condition. So, for example, some said they ate less frequently than before and some overstated their hungry period.

reported number of days without food in the previous month although the impact is not statistically significant. Households also reported the months of the year in which they were most food insecure (Figure 43). Seasonal stress is highest for food in the months between May and August. Seasonal food insecurity is very similar in MV and CV areas at the baseline. MV areas, however, show much lower levels of food insecurity at midterm and endline, consistent with evidence of an increase in food availability at the household level.

Table 42. Impact of MV on food security

	Baseline CV	Baseline diff. MV	DD impact 2013	DD impact 2015	DD average impact
Not enough food in the last 12 months	82.24	1.36	–32.29***	–18.51***	–25.42***
		(0.663)	(0.000)	(0.000)	(0.000)
Days without food in the last month	10.60	–0.79	–1.64	1.08	–0.27
		(0.545)	(0.244)	(0.406)	(0.840)

Figure 44. Seasonal food insecurity



288. Households continue to exploit a wide array of strategies to tide them over the *hungry season*. In the MVs, however, fall-back measures were generally less drastic than they had been at the baseline. During the PRA study, a participant in a focus group of rich men from a MV observed, '*we have kicked out hunger from here*'. An executive member of the farmer cooperative in the same community said, '*we [no longer] have to sell our animals to buy food for our families; animals are [now] sold to pay senior high school fees and hospital bills.*' Not only are maize yields considerably higher than they are for millet (its main competitor crop), but, because of its shorter cultivation period, it is also more drought resistant. But the key issue is, according to farmers in the RCA study, the fact that the short cultivation period for maize enables them to grow a second winter crop on the same land for the first time. Generally, cowpeas are grown at a time that it can be turned into cash to buy food when the maize stock is depleted.

289. The Presbyterian Agricultural Services (PAS) and the Ministry of Food and Agriculture (MoFA) should also share credit for the shift from millet to maize production (which the MVP built on and intensified with its vastly superior funding) due to their earlier efforts at promoting maize cultivation and good agricultural practices. Others in MVs and CVs identified the five-year Millennium Development Authority's effort that preceded the MVP and closed at the beginning of 2012, as well as Technoserve and Association of Church Development Programmes interventions as the sources of the agronomic know-how that influenced improvements in their farming practices.

290. Other efforts to improve food security such as providing storage facilities and training in better home storage techniques do not seem to have been successful. The RCA study found that none of the farming families, which are some of the poorest in the area, used improved warehouse facilities and

they shared that they prefer to keep their crops at home. This is because they do not trust collective storage and worry that their crops will be taken or adulterated. It is also because they prefer to be able to dip into their own home stored stocks when needed, sometimes in small amounts, for emergencies, obligatory contributions to social events (e.g. weddings, funerals), their own consumption and feeding relatives who visit and prefer the convenience of anytime access (see Chapter 5).

9.8 Cost and effectiveness of agricultural interventions

291. Overall, the impact on agriculture in the MVP region cannot be attributed to agricultural activities alone, as the MVP also sought to improve infrastructure and community engagement. These are likely to improve market access and perhaps community coordination on market days and perhaps even achieve some economies of scale on production of marketable agricultural goods.

292. Income gains as stated above amount to US$141 per adult equivalent for the five years, versus a total cost of US$160 per capita on the combined package of agriculture, infrastructure and community development (see the CEA chapter for full details). The extreme assumption is that all infrastructure and community development aimed to improve income. It was also meant to have an immediate impact on income. Using such an assumption suggests a negative rate of return to the combined package of investments – including agriculture – which were targeting income generation under the MVP. Given that the project is multidimensional, one could also claim that improved health should contribute to income as well. The lower bound costs – coming only from the agricultural effort – suggests a positive return.

9.9 Summary

293. Overall, the MVP had an impact on agricultural productivity, with an approximately 38% rise over the period of implementation. This can be mostly explained through input increases (fertilisers, seeds, land, tractor rents and other animals/machinery for hire), with 74% of the productivity increase explained in this way. The land area dedicated to maize and beans increased considerably in the MV areas, as the project enabled farmers to open up more land to cultivation either through double cropping or increasing the area of farmed land – although since the project has ended, the transfer of MVP tractors to mostly private owners may threaten sustainability.

294. There have also been important changes in incomes and food security as a result of the project. Most of the positive impact of MV on households' incomes (see Chapter 5) was generated in the agricultural sector and particularly in farming, and to a much lesser extent, livestock. It is problematic to isolate agricultural interventions from other aspects of the project (especially infrastructure), but nevertheless our costing study finds, when taking agriculture costs alone, a benefit-to-cost ratio of 2 (double the benefit to costs). If all of infrastructure were devoted to income-generating activities, then the benefit-to-cost ratio would be 1, meaning that the costs and benefits are equal.

295. In addition, the MVP had a large impact on food security, with a reduction in the number of households reporting not having enough food in the previous 12 months.

Chapter 10. Sustainability and institutional impact

296. This chapter is an early exploration of how the interventions and outcomes made under the MVP are being sustained beyond the project. It also looks at how the project has had an impact on local institutions. It is based primarily on the institutional assessment interviews with district officials of the three partner districts (see Annex D: Institutional assessment). Findings related to community-level institutions and views on sustainability are from the field or site reports of the participatory rural appraisal (PRA) in the seven study communities and the reality check approach (RCA) in four study communities in the MVP cluster. It is important to note that the endline institutional assessment and the PRA and RCA studies were conducted only five or seven months after the closure of MVP. Sustainability and institutional impact of MVP should ideally be in evidence at least a couple of years after project closure, because as noted earlier, to establish local committees and structures is relatively easy, while ensuring that they operate effectively over an extended period, and in ways that prevent social exclusion and elite capture, is more complex (Cabral et al. 2006). As with preceding chapters, it begins with the sectoral causal chain on local institutions.

10.1 Institutional causal chain

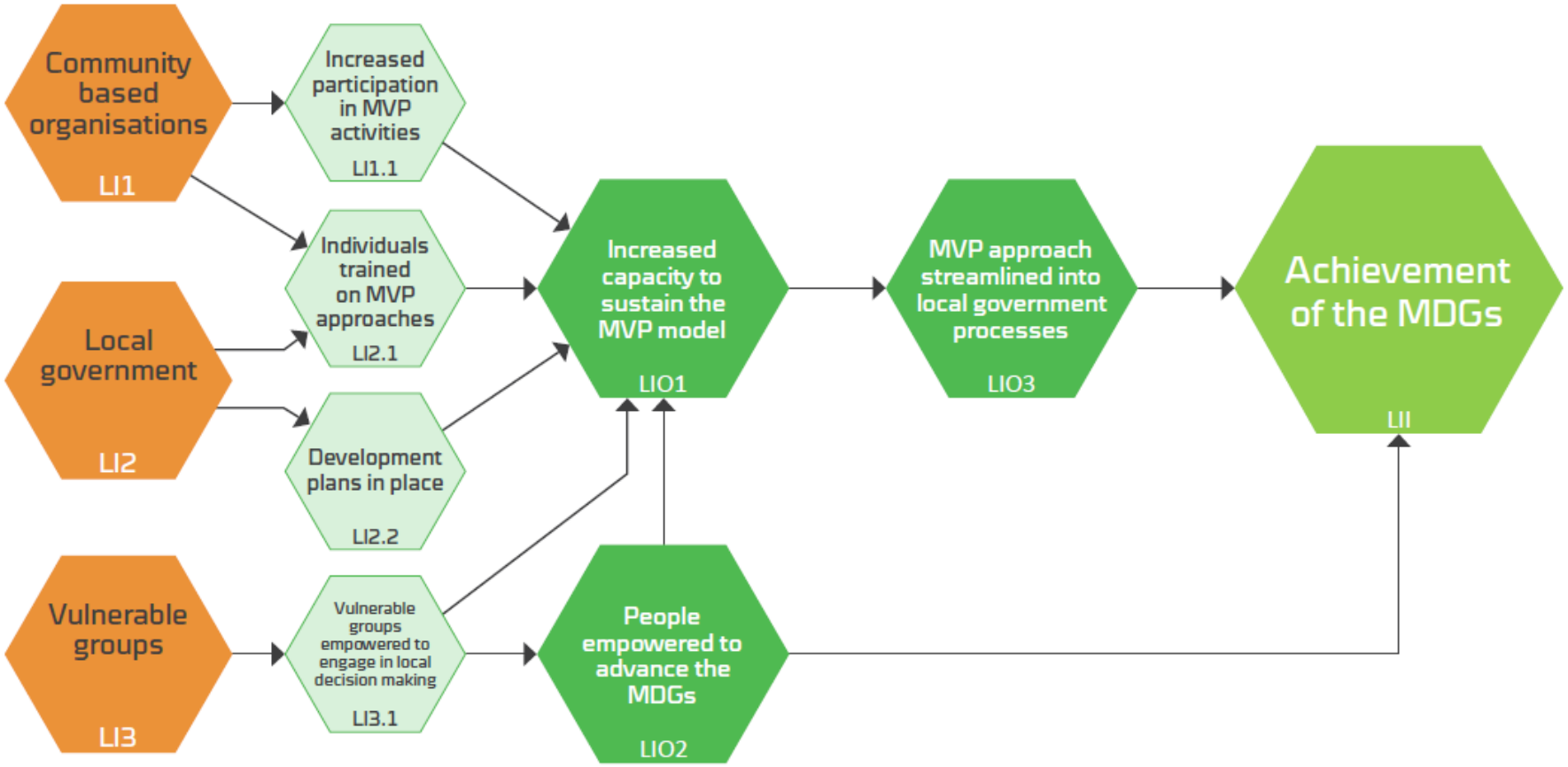
297. The sectoral causal chain (Barnett et al. 2017) on local institutions provided the framework for the endline institutional study report. As noted in the local institutions causal chain, the fifth output of the MVP aimed to achieve '*strengthened local institutions and community capacity to secure sustainability of MV gains*'. By strengthening local institutions across the MVs, the project hoped to '*empower people to advance the MDGs within their own communities, increase the participation of vulnerable and minority groups in decision making and governance, and build the capacity of local government to sustain project gains in the long term'.*

298. The causal chain presented in Figure 45 is a reconstruction of the theory as understood by the evaluation team and verified with the project. The MVP anticipated several changes would result from the activities to strengthen local institutions in the MVs. By implementing multiple interventions generating impacts at various levels, it is expected that there will be a range of outputs, such as:

- increased involvement and commitment by the local community and officials, and help to secure sustainability of the impacts
- building capacity of local government through technical assistance to regional and district officials, by including them within implementation teams, and by involving them in assessments including the initial needs assessment exercise
- expanded links with government and other development partners, including steering groups that coordinate local and district-level activities, planning, and cost sharing.

299. As a result of these outputs, several results are expected to be achieved around increased participation in project activities. These outcomes are anticipated to have a positive impact on institution building and community empowerment.

Figure 45. Causal chain for the MVP's anticipated local institutions impacts[143]



143 The evaluation team's interpretation of the MVP interventions on local institutions are about sustaining the achievement of the MDGs beyond the project.

300. The MVP employed a generic set of activities aimed at achieving 'quick wins' through community capacity building processes to empower villagers to manage their own development more effectively and to enhance the sustainability of interventions. The interventions implemented are not connected to each other in a causal chain form.

- **Community-based organisations:** The MVP team attended community meetings (*durbars*) whenever possible to discuss the project objectives, progress and challenges, and to better define the roles of all stakeholders. The Community Development team at MVP had mapped and profiled existing community institutions and governance structures and set strategies for how to engage them in project activities. Community meetings were also organised to review and take stock of the project implementation in each community, so that the community may collectively agree on how to improve upon its role in the project implementation and engagement.[144]
- **Vulnerable groups:** The MVP identified vulnerable groups in the cluster and worked with each sector coordinator to ensure that interventions reached these groups. The MVP made a concerted effort to recruit and train female interns with an aim to provide support to technical leads and coordinators, acting as a backup for staff, and create a pool of advocates for the MVP concept and its integrated approach to achieving the MDGs.[145]
- **Local government:** To develop a clear framework for partnership and sustainability, the MVP Community and Governance team secured the signing of the Memoranda of Understanding (MoU) with the three district assemblies where the project was implemented. These clearly state the roles and responsibilities of the assemblies and MVP in terms of project implementation and outlined how MVP would contribute to the assemblies' medium-term development plans. The MVP published and shared lessons learned via annual reports and articles. The project held a training on leadership, planning and advocacy for local government staff including district chief executives, coordinating directors, planning and budget officers drawn from the project implementing districts.[146]

301. A summary of the MVP's known institutional activities and achievements are detailed in Table 43. Despite the complexities in specifying which outputs lead to various outcomes within the intervention logic, Table 43 attempts to group activities together according to where they are most relevant.

Table 43. Summary of MVP's institutional activities to date147

Community-based organisations	Vulnerable groups	Local government
Meetings (409 community members attended citizen engagement sessions)	Sector coordination	Capacity building
Workshops		MoUs
Press coverage		Inputting into planning sessions
Advocacy strategy plans		Publishing reports
Community centre		Training (35 officials of district assemblies trained in Project Management and Environmental Impact Assessments)
Training (60 community-based organisations trained in advocacy)		MVP documentary (1)

144 2015 Annual Report on the Millennium Villages Project in Northern Ghana.
145 Ibid.
146 Ibid.
147 Numbers in brackets are the indicative number of achievements over the course of the project documented in the 2016 SADA Mid-Year Report and 2015 SADA Annual Report. These numbers need to be verified with MVP.

302. The following sections set out the main impacts of the MVP on institutional outcomes and sustainability.

10.2 Increased capacity of local stakeholders to sustain the MVP model

303. For this outcome to be attained, the MVP was expected to achieve the following outputs:

- increased participation of local stakeholders in the MVP activities and decision making
- individuals trained on MVP approaches
- development plans in place.

304. Achievement of these outputs was to lead to the MVP's approach being streamlined into local government processes. This, together with the outcome of empowering people to advance the MDGs, was to contribute to the sustainable achievement of the MDGs.

10.2.1 Increased participation in MVP activities and decision making

305. At the local government level (subsequently referred to as the district assembly), 8 out of 14 technical staff of the partner districts interviewed were unhappy with their level of participation in MVP activities and decision making. The type and level of participation in MVP activities and decision making varied from one district institution (i.e. district administration or technical departments) to the other. This was due to a number of factors, the key ones being:

- **A district institution having an MoU with the MVP that stated what was expected of both sides.** When they agreed expectations, roles and responsibilities were clearer, which enabled active participation of the district institution in the MVP interventions. The MoU also provided the formal framework for the MVP to work with a district administration or technical department. These spelled out the institutional, financial and governance arrangements between them in broad terms and were mostly complemented by annual action plans. According to the institutional assessment (Annex D), all the districts seemed generally happy with the MoU as a vehicle for expressing the nature of the relationship with the MVP as they provided a useful vehicle for administrative continuity amid the considerable changes in personnel. They also said that the MoU signed between the MVP and the districts had, to a large extent, been adhered to as planned and helped them know what was agreed and expected.
- **The status and existing relationship of a technical (sectoral) department within the decentralised local government system.** The district administration (i.e. the administrative arm of the district assembly comprising administration, finance, planning, and budget units) has varying levels of authority over different technical departments. Some departments like health, education and agriculture command bigger operations and budgets than others. As a result, they have more influence and autonomy in the district.

306. The depth of participation in MVP activities largely reflected the current and varying status of a district institution within Ghana's decentralisation system as a whole, with some technical departments being more devolved than others. Technical departments such as the Environmental Health Department, Department of Social Welfare and Community Development and the Works Department fall directly under the authority of the district administration. They often lack the requisite personnel and resources to do their work. Decisions and their implementation were often done through the administration. Others such as the Ghana Health Service, GES and the Department of Agriculture are semi-autonomous at district level and better resourced. They are also more subject to directives from their regional and national offices. For instance, the MoU between the MVP and the Ghana Health Service was signed at the regional level, not at the district level. Similarly, certain decisions were taken between the MVP and the regional offices. In West Mamprusi, it was the Regional Department of Agriculture, not the District, which was involved in the interviews conducted

to select extra agricultural extension staff employed by the MVP. In Builsa South District, the representative of the District Health Directorate at the focus group discussion, was of the view that most decisions in the department in relation to the MVP were to be taken at the regional level. He gave two instances to illustrate his point. First, the decision to bring in retired midwives as a temporary measure while steps were taken to train, re-engage and 'bond' (i.e. commit to work for a number of years in the district) new midwifes was done in consultation with the regional health directorate. Second, the current district office of the District Health Directorate was constructed by the MVP in agreement with the regional directorate.

307. Some departments, notably the Ghana Health Service, GES, the Department of Agriculture and the Department of Cooperatives, were regarded by the MVP as being key to implementing project activities and therefore tended to work with them directly.

308. Since the MVP's approach used district field staff to implement activities and district-level staff to monitor, the three technical departments of agriculture, health and education became pivotal in its work. The staff of the Department of Cooperatives also featured prominently because they had the mandate for forming, registering and regulating cooperatives for which reason the MVP had to involve them in the formation of the farmer cooperatives. On the other hand, others like the Department of Community Development and Social Welfare[148] said they were marginalised throughout the five years and did not have a role in MVP activities. The department only participated in the frequent stakeholders' consultative meetings and workshops organised by the MVP which, in the view of one representative, were just to showcase progress of their work. Considering the importance of community participation and ownership, it is surprising that the staff of the Department of Community Development and Social Welfare were marginalised in the MVP's community-level activities.

309. There was variable capacity (and interest) among individual district leaders to be able to manage in a way that facilitates participation of other district officials and stakeholders. Expectations differed among district officials and they tended to mainly participate in: (i) stakeholder meetings; (ii) quarterly and annual review meetings; and (iii) trainings and workshops. It was at the meetings that they made inputs into planned MVP activities. While some personnel in Builsa South District were content with being kept informed of activities by the MVP team, others in West Mamprusi District expected and were ready to be fully consulted and involved in the design and decision making at all stages of the project. The level of expectation or interest affected the way in which actors at all levels engaged with MVP activities and their sense of ownership for what happened during and after the project. The MVP personnel affirmed that the attitude, interest and commitment of the leadership of a district department or district administration also affected the outcomes. Some heads of departments were proactive and took initiative to pay monitoring visits to schools, health facilities and communities to see what was going on and to carry out activities agreed upon.

310. From the quantitative data, the project increased the percentage of people who joined efforts to solve community problems in the 12 months before the interview.[149] This was affirmed by community members from across different well-being categories in the PRA study. They reported an increase in the number of community-wide meetings as well as group meetings at which community members participated in decision making. The change was attributed primarily to the MVP, but also to the activities of some other government institutions.[150]

148 At the national level, the Department of Social Welfare and Community Development, which used to be two separate departments but merged into one, is known as Department of Social Development and at the regional level it is Department of Social Protection. However, at the metropolitan and district levels it is called Department of Social Welfare and Community Development while at the municipal level it is also called Department of Social Protection. These differences in the naming of the same department, according to focus group participants at West Mamprusi, are as a result of errors in the gazetting of the Act that instituted the merged entity.

149 Annex A, page 26.

150 Community level findings are from the Field/Site reports from the seven PRA study communities. Four well-being categories were used.

311. The increase in meetings and participation in decision making was seen as a departure from baseline when decisions were made by the community or group leaders alone. In some communities, this change was attributed to community sensitisation by the MVP and the training they provided for community and group leaders. It was also attributed to the increased number of community-based groups like farmer cooperatives, VSLA, and women and youth groups the project set-up. The formation of these groups meant these stakeholders had spaces where their voices could be heard. In addition to the MVP, some communities also attributed change to increased engagement from assembly members and government staff like the GES, Ghana Health Service and the Department of Agriculture. In Naadema, women also attributed the change to sensitisation programmes they heard on Radio Builsa. In many communities, they reported increased participation of women and the poor and vulnerable in decision making. In one community, women reported that because of this improvement in participation, when they are called to the chief's palace, it is no longer because they have been accused of doing something wrong.

312. Despite reported increased participation in decision making, especially of women, it is still the voices of the men and traditional leaders that are heard. Many communities reported that the traditional hierarchical structure whereby community members have to channel their views through their family heads, the '*magazia*' (women leader) and assembly member to their sub-chiefs for onward transmission to their chiefs is still in place.

10.2.2 Individuals trained in the Millennium Villages Project approaches

313. From the institutional causal chain, one of the outputs was for individuals in the district and the communities to have been trained in MVP approaches, which would have gone towards increasing the capacity of the districts and communities to sustain the MVP model. At the district level, in the view of district actors, this was not achieved in any depth because the MVP used a stand-alone or parallel structure to manage its projects. The institutional arrangement they described below, corroborated by the MVP staff, affirms this assertion.

314. The MVP was headed by a team leader and had coordinators for each component of the project: education, health, agriculture, community participation and M&E. The MVP team operated from Bolgatanga, which is the capital of the Upper East region. According to the district staff, this was different from the practice by other agencies or projects like UNICEF, the FAO-funded Northern Regional Poverty Reduction Programme, Community-Based Rural Development Programme, and Ghana Social Opportunities Project, which have coordinators based in the districts and work directly with the district assemblies. Funds for project activities are channelled through bank accounts opened by the district assemblies for that purpose. This was not the case with the MVP. The project team controlled 80–90% of the project funds because much of the project funding went to infrastructure projects handled directly by the project. Although the districts do have tender committees, the MVP did not use them for procurement of goods and services of contractors who worked on the infrastructure projects or suppliers of stationery or furniture. The remaining 10–20% of the project funds were related to capacity building activities of the district staff, monitoring and review activities, top-up allowances for Ghana Health Service and GES staff/workers, fuel for ambulances and motorbikes etc. While some of these funds were paid directly to the district institutions to carry out project activities, the top-up allowances were paid directly to the individual staff/workers, which bypassed the district institutions for which they worked.

315. A similar finding was made in 2008 in a formative review of the MVP in Bonsaaso Cluster, in the Ashanti Region of Ghana. The report states that:

> *The parallel system adopted by the MVP, in the health arena at least, undermines sustainability at district level. The health sector report notes that the MVP may be viewed as an 'island of success' in Ghana's 'sea of health system dysfunction'. Administratively, the MVP office is a 'high-tech' zone, with computers and laptops, printers and Internet connectivity; the project has assembled highly trained personnel, such as a PhD-level statistician, to implement, monitor and*

evaluate project activities in a district that would not ordinarily attract high calibre personnel (Nyonator and Dovlo 2005). The contrast between the MVP's resources and that of the District Health Directorate is stark" (Adjei et al. 2008: 45).

316. At the community level, there was no formal institutional agreement between the MVP and the individual communities through their representatives like the chief, assembly person, sub-chief or the unit committee. According to community members, the MVP undertook capacity building activities for community leaders and for specific committees such as the PTA, health committee, farmer cooperatives and VSLA, in order to strengthen their ability to carry out activities or supervise activities within their domain. They mentioned that the PTA was trained to manage their finances, record keeping, management of conflicts in the school setting, guidance and counselling, and resource management.

317. The output relating to development plans being in place is discussed in the section 10.6 on Exit strategy and sustainability.

10.3 People empowered to advance the Millennium Development Goals

318. The institutional causal chain shows that increased capacity of local institutions was expected to go together with a people empowered to advance the MVP model. One way to look at this is in terms of the contribution of districts and communities to MVP interventions or initiatives.

10.3.1 Contribution of districts and communities to MVP interventions or initiatives

319. One of the core principles of the MVP is cost sharing with government, donors and the local community.[151] For the government and local community, this must be to boost their stake in the project or their ownership of it and the chances of sustaining it when the MVP came to an end. The strength of government's contribution at both the central and local levels and that of local communities does not give that sense of ownership.

320. In the view of the district officials, the government's contribution to the implementation of the MVP is paying salaries of the community-level staff, such as community health nurses, teachers and agricultural extension agents, who were either already working in the project communities or posted there at the request of the MVP. One would argue that government would have incurred that cost irrespective of the MVP. The MVP also lobbied the government to improve the roads network and extend electricity to the project area. The contributions of the district assemblies (local government) were non-financial and could be said to be token. The district officials mentioned the time they spent accompanying the MVP staff on monitoring visits to project communities, at review and planning meetings and at capacity building events. They also talked of MVP's use of the district assembly's facilities such as meeting rooms. The contribution of districts is relatively insignificant when one considers that the MVP provided monthly allowances for these district officials to purchase fuel for their vehicles so that they can undertake monitoring visits in their districts or provided motor bikes for the field staff of cooperative, health and agriculture departments to enable them to do their work.

321. At the community level, the MVP did not make it mandatory for communities to contribute either cash or in kind towards the construction of schools, CHPS compounds and other infrastructure projects such as roads, culverts and boreholes. These projects were awarded to contractors. In some communities they provided food to the contracted workers or got women to fetch water for the construction workers or youth to mould blocks. It was only when some communities like Kinkadina and Jadema requested additional accommodation for teachers and nurses did the MVP agree on a cost sharing arrangement. The MVP agreed to support these two communities with cement and roofing materials in exchange for the communities putting up the main structure. The MVP staff

151 Shira Mitchell et al., The Millennium Villages Project: A protocol for the final evaluation, p. 3.

estimated that if the MVP had put up the additional accommodation for teachers in Kinkadina it would have cost around GHS100,000 but the cost of supporting the Kinkadina community to do so was GHS 20,000. At the endline, the MVP team admitted[152] that this is how they should have engaged the communities to build educational, health and agricultural infrastructural facilities. A finding in the RCA report bolsters the importance of the self-help approach. The report noted that,

> *In fact, there are signs of problems emerging with low community participation (the schools cannot get Parent Teachers Associations (PTAs) to take action, maintenance is left to 'from up' (i.e. reliance on government) and people are reluctant to provide local contributions, and pervasive comments such as 'you have to pay for everything in this village, nobody moves for free' suggests dependency and entitlement culture is developing). By contrast, the comparison village B2b had developed remarkably and closed this gap between itself and B3 (project), especially in terms of the access to education (its own community initiated primary school which had been adopted by the Ghana Education Service and the foundations of a new senior high school) but most importantly the rehabilitation of the dam had increased agriculture profitability.*[153]

10.3.2 Institutional impact

322. This section looks at the impact of the MVP on both district and community institutions. This is important because institutions are the fabric that hold a society together. A key concern of district officials was creating a bond that translates into communal spirit whereby people in the community are willing to help out for free because it is for the common good. This is a resource that district officials fall on as they undertake activities in these communities, often with very limited funding. This was what the GHS had tapped into over nearly 20 years with its community health volunteers.[154]

323. A concern raised by the district officials, particularly the Ghana Health Service, was that paying monthly allowances to CHWs or teachers weakened the sense of community responsibility. While the community health volunteer concept existed for over 20 years, the MVP modified it by adding extra responsibilities, paying volunteers a monthly allowance and changing the title from 'volunteers' to 'community health workers'. The MVP's 53 CHWs performed a wider and more intensive range of diagnostic and curative tasks using a mobile phone application (CommCare) and were supervised by Ghana Health Service community health nurses. Because of considerably higher demands on their time, the MVP began paying each CHW the monthly allowance of GHS150.

324. Health staff in the three districts said this may not be sustained post-MVP. In the meeting with the MVP team, they affirmed that prior to the project the Ghana Health Service collaborated with unpaid community health volunteers whose main functions included birth and death registration and mobilising communities for health interventions such as immunisations. The MVP staff did say that the monthly payment to CHWs was a contentious issue between the project and the GHS. However, they still went ahead because the CHW was the pivot around which their health programme revolved. In its 2013 Annual report, the Millennium Promise, which is a founding member of the Millennium Villages, stated, '*The MVP Health team has, from the onset, pioneered the concept of a professionalised cadre of community health workers (CHWs) as being a crucial pillar of a comprehensive community health care delivery*.'[155]

325. Similarly, in education, the CEW concept was introduced by the MVP within the cluster. The CEWs played the role of sensitising parents to send their children to school. They also stepped in when teachers were absent. Like CHWs, they were paid a monthly allowance.

152 Meeting between the PRA study Team and the MVP Transitional Team on 5 June 2017.
153 Reality Check Approach Endline Report, 2017, p. 68.
154 These are community members who are given basic training by the Ghana Health Service and who help periodically with such things as community mobilisation for immunisation programmes and generally monitoring health and sharing health information in the community.
155 2013 Millennium Promise Annual Report on the Millennium Villages Project, p. 17.

326. In agriculture, MVP supported the formation of cooperative unions, as noted in paragraph 269, page 109 of this report. At end-term, reports from the interviews with community members show that some of these cooperatives have become strong and active while in some communities they have collapsed. For instance, in Kasiesa, the cooperative was said to have been formed by the MVP at the beginning of the project from four existing farmer groups. The cooperative has been active and assists members to get access to improved farming input, they train members on best farming practices and also secure credit facilities for the members. They were given land by the community to put up a cooperative office. The farmer cooperatives are similarly reported to be active in Nabari, Zamsa and Zuasa. However, in Kunkua, it was reported that the two farmer cooperatives in the community have collapsed. These cooperatives do not meet, members do not have shares and they do not keep records (financial and administrative).

327. In addition to farmer cooperatives, MVP introduced the Village Savings and Loans Association (VSLA) concept, which is reported to have been of immense benefit to women as they are predominantly the members of these associations. A district official said that he was surprised to learn that an amount of GHS500,000 was raised in the MVP cluster through the VSLAs. He least expected such an amount to be raised in communities they considered poor. The members of the VSLA reported that MVP gave them training on group dynamics, management and investment to become economically independent and sustain the group. In Kasiesa for instance, it was reported that there are four VSLA groups – each section of the community has a group. Each group is made up of 30 women and a few men. The group meets every week and each member contributes between GHS2.00 and GHS10.00. The accumulated contributions, which are shared at the beginning of the farming season, have made the women economically active as they now have access to capital.

328. Women's access to funds has greatly improved hence more women now have their own farms and are able to contribute to the upkeep of their households. In Nabari, it was reported that apart from saving and loans activities, the VSLA has helped to create spaces for women to discuss issues pertaining to their welfare. It is also a platform that MVP uses to sensitise the women. In some communities, the VSLA concept is catching on. In Zamsa, apart from the two VSLAs that were facilitated by the MVP, namely, *Vaansa dem Chugsum* and *Ayiakjangsa,* a third group has emerged. This group is called *Kananwasa* and is based on the MVP's VSLA concept. According to a leader of the new group, they were motivated to form the group because of the financial capacity and freedom that members of the other two VSLAs have, which enables them to engage in economic activities to support their families. To succeed and avoid elite capture, the VSLAs require some supervision to ensure the rules are being followed. This point is brought to the fore in the RCA study where it is reported that, "*Although one group is on the brink of dissolution in A1 (project) because there was no leadership planning and another five are struggling, one susu group remains active and comprises thirty women with a literate male secretary*".[156]

329. The institutions of governance in the communities have remained the same, namely: chief, sub-chief, '*Tindana*' (landlord/land overseer), '*Magazia*' (women leader), assemblyperson, and unit committee (though this was hardly mentioned). In Kasiesa, they mentioned that a new institution, *queenmother*, has been introduced. As a result of the MVP's capacity building interventions, some of these institutions were said to have become stronger, more active, more influential or more consultative. In almost all the communities, the assemblyperson was mentioned as one institution that fits all these descriptions because of the roles it has played in the interventions of MVP. For instance, in Zamsa, before the start of the MVP in 2012, even the rich and averagely rich men and women said the assemblyperson used not to consult them but has now become the *'go to person'* for decisions related to development of the community, as he convenes meetings. Decisions taken at such meetings are then forwarded to the sub-chief for a collective consideration with other leaders in the community. While in Zamsa, the sub-chief was ranked second to the assemblyperson in terms of influence, in Kasiesa, Nabari and Kunkua, the chief or sub-chief is ranked first either because he has

156 Reality Check Approach Endline Report, p. 51.

power to summon all the other institutions, is active in mobilising the community for development or is educated and progressive. In some communities like Zamsa and Kasiesa, the *magazia*'s influence was said to be weak because she deals only with issues concerning women. However, in Gbedembilisi, where she also doubles up as the TBA, the *magazia* has some influence. It is the same in Nabari, where she is said to have brought the women together.

330. The institutions that were said, in most communities, to have become weaker over the project period are the traditional birth attendant (TBA), the herbalist and the *Tindana* (traditionally regarded as the custodian of the land and the link with the ancestors). The TBA has become weakened because of government policy that births should be at a health facility such as a CHPS compound. This policy was enforced by the MVP. TBAs were threatened with sanctions if they assisted a woman to deliver at home. On the other hand, in the initial stages of the project, they were given some token money if they accompanied a pregnant woman to the health facility to deliver. Also, the increasing number of women attending antenatal clinics meant their ties with TBAs had weakened. One exception was in Nabari, where the TBA has undergone training at the health facility and is active in delivering babies because the midwife is not resident in the community and therefore not reliable. The case of Nabari has raised the concern that if the TBAs are abolished from the health system and communities are faced with circumstances where there is no midwife or she is unavailable, they would have no fall-back option.

10.4 Streamlining the MVP approach into local government processes

331. A major expected outcome of the MVP in the institutional causal chain is that the MVP approach will be streamlined into local government processes. At community level, to some extent, it did so by using the technical staff of the district departments like health, education and agriculture to implement its interventions. But from the accounts of district-level staff, this was not the case with regard to management and financial processes at the district level.

332. At the community level, the MVP used the staff or volunteers of the local government institutions in the execution of the agriculture, health, education etc., projects. To that extent, through training and supervision, it may have streamlined some of its approaches into the processes used by these institutions at that level, such as the training of SMCs in the management of the schools. Even then, at that level, it sometimes bypassed some of the processes that these institutions have had in place over the years. An example was the decision by the MVP to turn the GHS community health volunteers into community health workers with a monthly stipend of GHS150. Although GHS protested that it could create new expectations from community health volunteers in neighbouring communities or could not be sustained at the end of MVP, the latter went ahead. Another example given was that the Department of Agriculture had a policy of one agricultural extension agent to serve a cluster of communities. For the MVP, the department had to provide an agricultural extension agent for each community in their cluster.

333. As also noted in paragraph 311 above, at district level the MVP used a parallel structure to manage its projects for which reason the achievement of this outcome was limited. It is only by using, not bypassing, the local government management and financial processes, that a project like the MVP would be able to influence them. Project funds were received and disbursed by the MVP team, often directly to recipients. There were very few instances when funds were disbursed into the accounts of district institutions to use and account to MVP. In most cases, payments were made directly from the MVP to contractors and suppliers. Similarly, allowances paid to community-level staff, such as nurses and midwives, as a top-up of their salaries or to CHWs or teachers were paid directly into their accounts. District officials gave examples of projects whose approach was contrary to that of MVP. For instance, in the Northern Region Small Towns Water and Sanitation (NORST) project, a district was able to construct two small town water systems worth GHS1.4 million using their own tender board to award the contract.

334. There were no instances where monies were given by the MVP directly to communities or their representatives to procure materials or services on their own. Even when MVP agreed to provide Kinkadina and Jadema with cement and roofing sheets to put up additional accommodation for teachers and nurses, these were procured and given to them by the MVP. This is in line with current local government processes where state funds are not given to communities, unless as a donation by a government institution.

10.5 Displacement effects: Changing patterns of expenditure

335. Beyond MVPs influence on local government and communities to sustain the achievements, we also consider whether there has been any noticeable diffusion and/or displacement of expenditure by government and NGOs. Any changes in expenditure by government and NGOs may occur in project and control areas for a number of reasons. We discuss here a few likely cases.[157]

- The project may cause a reduction of government and NGOs expenditures in the project area. This can occur if, for example, the project is offering the same services that are already being offered by other agencies. This is not a hypothetical case. The MV project provides, for example, mosquito bed nets that are also distributed in Ghana by the government and other international agencies. This substitution of existing projects dampens the observed impact of the intervention. Note that the lack of impact in this case does not mean bed nets are not effective (they are). It simply means that the intervention is not adding anything new to existing interventions.
- The project may cause an increase of government and non-government expenditures in control areas. Agencies operating in the project areas may divert resources to control areas after the intervention to avoid duplications. But a similar result can also occur by diffusion of the intervention if, for example, the government adopts MV interventions in the control areas or if it decides to match the MV expenditure in control areas perhaps for political reasons. If this occurs, the impact of the intervention is underestimated.
- Finally, the project may decrease government and non-government expenditures in the control areas. This may occur if, for example, the project requires matched funding by the government, which reduces expenditures from control areas to invest in the MV interventions in the project areas. Another possibility is if MV acts as a catalyst attracting funding in the areas by other agencies, for a school feeding project for example, that are then not invested in the neighbouring areas. If this perverse spillover effect occurs, the impact of the intervention is overestimated.

336. We investigate the project's effects above using community-level data collected in the project and control villages. Our survey collected information every year on the new projects implemented in each community over the previous year, whether they were implemented by the government or by another non-governmental agency, and the area of intervention such as, for example, health and agriculture, or project name. The information was gathered from a small group of 'knowledgeable' individuals, normally including community chiefs, teachers or other community leaders. The data were collected from 35 project villages and 68 control villages. The survey also collected data on projects funded by the district assembly in the following areas: childcare, communication, electrification, health, housing, irrigation, local transport, roads, sanitations, school, water and other welfare programmes. In this case, respondents were asked to report the amount spent by the district assembly on the project in each year, but this amount was unknown in most cases.

337. Government projects reported by respondents include the construction of boreholes, the construction of schools and teaching quarters, the building of CHPS centres, distribution of books,

157 We do not consider here the possibility of increasing NGO or government expenditure in the MVP areas, which is the fourth permutation. The reason for this is because we find no impact on most MDGs and we are looking for reasons why this might be so. We therefore consider cases that may have led to the underestimation of project effects. The case of MVP attracting more public investments would increase the project effect, not diminish it, and as such it is not a displacement but an actual project benefit. There is no bias unless the government is moving away resources from the control areas to invest in the project areas.

electrification, distribution of school uniforms, KVIP centres, LEAP, road and bridge construction, school feeding, solar panels and rehabilitation of dams. Many of these interventions are also provided by MVP and the likelihood of the substitution effect described above is high. Projects implemented by non-government organisations, which include NGO's, international organisations, religious organisations and political parties, consist of: 'agriculture', boreholes, construction of churches, day care, primary school and kindergarten, sanitation, teacher quarters, wells, CHPS compounds, microfinance, solar panels and mosquito bed nets. The type of projects implemented by NGOs is very similar to those provided by the government with the exception of income-generating interventions that are more prominent in non-government interventions. Unfortunately, we are not able to separate MV projects from other NGO projects in the data. While we are able to separate MV projects from government projects, it is not always reported whether the non-government project is funded by MV or SADA. This limits our ability to detect the impact of the intervention on the displacement of projects run by NGOs.

338. In Figure 46 below we plot the average number of projects per village in MV and CV areas from the baseline through the endline for (i) NGO projects; (ii) government projects; and (iii) district assembly projects. The presence of MV in the project areas is visible in the large increase in NGO projects (many of which are MV projects) in project areas after the baseline and in the following years (left chart in Figure 46). Patterns of new government projects and district assembly projects appear very similar suggesting the absence of substitution or displacement effects.

339. Table 44 below reports the results of a difference-in-difference analysis of project displacement. Projects in CV areas are the outcome variable, and the regressions estimate the impact of MV on the number of new projects implemented in CV areas.

Figure 46. Average number of projects per village in MV and CV areas

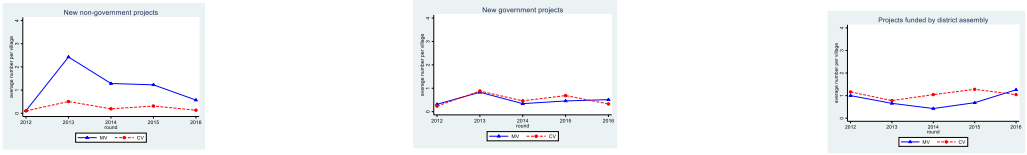


Table 44. Results of a difference-in-difference analysis of project displacement

	NGO projects	Government projects	District assembly projects
Baseline difference	–0.011	–0.079	0.162
	(0.199)	(0.162)	(0.268)
Change in CV areas	0.180	0.346**	–0.125
	(0.130)	(0.105)	(0.175)
Change in MV areas	1.264***	0.221	–0.243
	(0.181)	(0.147)	(0.244)
DD in CV areas	–1.084***	0.124	0.118
	(0.114)	(0.181)	(0.300)

340. The results of the DD analysis suggest the following. First, there is no sign that the number of projects implemented by the government and the district assembly in CV areas is decreasing to support projects implemented in MV areas. We find no support for a perverse effect of MV, whereby the project is siphoning out government resources. This implies that project effects are not overestimated and that they are more likely to represent lower bounds of the actual project effects. Second, it is likely that some substitution of government expenditure is occurring and some displacement of government and district assembly project is visible. New government projects increase less in MV areas than in CV areas after the intervention. Similarly, district assembly projects decrease more in MV areas than in CV areas after the intervention. These changes, however, are relatively small and not statistically significant. We are unable to investigate displacement of new NGO projects because we cannot identify the MV projects within the NGO projects in our data.

341. In conclusion, this analysis suggests that there are no perverse effects of the MV intervention on projects implemented in the control areas so that the findings of the evaluation are possibly an underestimate of the real effects but the size of the bias is likely to be small. The analysis also suggest that some substitution and displacement of government and non-government projects is likely to be taking place but not on a large scale. This is consistent with the data on interventions operating in the region from 2012 to 2016, as set out in the chapter on the context in northern Ghana (Chapter 2).

10.6 Exit strategy and sustainability

342. As noted in the institutional causal chain, a key objective of the MVP was that with increased capacity of local institutions, they will be empowered to manage their own development more efficiently and to enhance the sustainability of interventions. If this was the objective, this section looks at what plans MVP put in place for its exit. It also looks at the extent to which sustainability was factored into its interventions.

10.6.1 Exit strategy

343. Based on the institutional assessment, 12 out of 13 technical staff of the three partner districts could not state emphatically that MVP had an exit strategy.[158] It was only the representative of the Department of Cooperatives in West Mamprusi who said that MVP had one with them, but they did not have the resources to implement it. If they had one, it is unlikely that the project would have left it until the last months before meeting with the districts to discuss how some interventions, such as the ambulance service, could be sustained. At the midterm evaluation, neither the MVP nor the partner districts had an exit strategy in place, though the district officials said there had been talks about developing one together. However, at the time, the district partners were expecting MVP to come up with one because for the districts it was their technical staff who were implementing and

158 That is, a planned approach to ending the project or interventions in a way that the gains it had made can be sustained and any possible damage minimised.

monitoring the MVP interventions and all they had to do was to mainstream them into their medium-term development plans; and community structures like the PTAs had been trained and told to take responsibility for sustaining the interventions.

344. In 2016, before the project ended in December, the MVP held three meetings with the District Chief Executive (the political head), District Coordinating Director (administrative head) and heads of technical departments of the three partner districts to discuss their exit. The district administration assured the MVP that the projects will be integrated into the district Midterm Development Plans (MTDPs) and their district monitoring teams will include the MVP interventions as part of their regular monitoring. Although this was an expected outcome from the institutional causal chain above (i.e. development plans in place), there was nothing written up that could be referred to when the MTDP is being drawn in 2017–18. Also, it is difficult to see how the district monitoring teams would even get to the communities when it was MVP that was providing them with funds for fuel for their monitoring visits. This concern was affirmed when the GES representative in Mamprugu Moagduri said that from January to April 2017 (when the endline study was being undertaken) only two gallons of petrol had been provided by government to circuit supervisors for monitoring and that, sometimes, staff use their own pocket money to conduct monitoring.

345. It was also in the year of exit, 2016, that the MVP started to engage the district partners and communities on how they could manage the day-to-day operation and maintenance of the ambulance vehicles (both cars and tricycles), as well as the remuneration of the drivers. The MVP had over the period provided the funds for these costs so that the service could be provided free of charge to users. It was decided that post-MVP, users should be charged some fees to go towards the cost of running the service. Committees were then set up to consult communities on what the user fees should be. The amount to be paid by a user depended on the distance from the departure to destination points. According to the district officials, communities were not happy with the introduction of user fees for the ambulance at the exit of the MVP and wished this had been discussed right at the beginning of the provision of the service. According to some district officials, it also created some credibility gap between the district assemblies and the communities. This is because communities were thinking the districts were keeping the funds meant for the service for their own use or not willing to provide the service free, just as the MVP had done over the years. It was the same with the tractors for the ploughing service. As of April 2017, four months after the end of the MVP and the beginning of farm preparations, district officials and communities had not been told what was going to happen to the tractors. In the end, nine out of the ten were sold to individuals and only one to a farmer cooperative. According to a representative of the District Agriculture Department at Mamprugu Moagduri, the cooperatives were made to believe that the tractors would be sold to the strong and viable ones. The MVP transition team confirmed that they had originally planned to sell the tractors to the cooperatives. Since they were assets of SADA, the cooperatives had limited say in their disposal. However, they managed to get SADA to agree to sell five to individuals and one to a cooperative within the partner districts (I.e. two per district).

10.6.2 Sustainability

346. At the district level, the notion by the administrators of the three partner districts that all they needed to do to sustain the MVP projects was to include them in their regular monitoring visits or mainstream them into the medium-term development plans of the district assemblies, has been proven to be unrealistic. As pointed out in the midterm institutional study report,[159] the district assemblies in Ghana are often cash strapped because they lack the capacity to generate revenue of their own and the fund that they receive from the central government, referred to as the District Assembly Common Fund, is often six or nine months in arrears. It was for this reason that the district directors and supervisors of the key technical departments that the MVP worked with – agriculture, health, education, cooperatives etc. – were being given monthly fuel allowances by the project for

159 Edoardo Masset et al., Millennium Villages Evaluation Midterm Summary Report, 2016 p. 80.

monitoring. With the end of the MVP, it meant that these district officials are back to the situation they were in before MVP. That is, they are not receiving funds to purchase fuel for their vehicles in order to undertake regular monitoring and support visits to their staff in the field. Some are doing so from their own pockets. This was one of their concerns around sustainability at midterm.

347. Similarly, the claim by some district officials that all they must do to sustain the MVP projects is to mainstream them into the Medium-Term Development Plan is not a true reflection of the situation the district assemblies find themselves in. This is because a study conducted by SEND Foundation of 11 MTDPs showed that only 7.3% of planned activities were implemented.[160] It is for this reason that, at midterm, some district officials were apprehensive about how certain initiatives will be sustained when the MVP ends. They were right, as the situation at endline revealed.

348. Apart from the concern around how to sustain monitoring visits, mentioned above, there was also the concern about how the following initiatives were going to be sustained post-MVP:

- Ambulances (cars and tricycles) that had been acquired for use in emergencies, with fuel, maintenance costs and drivers' salaries provided by the MVP, are grinding to a halt. As already alluded to, as part of the discussions held with district and community stakeholders before MVP's exit, partner districts were asked to take over the management of the ambulance service. It was decided that users would be charged fees to go towards running the service. Committees were formed to consult the communities on what the user fees should be. It was decided that the amount to be paid by a user should depend on the distance from the origin to destination point. However, acknowledging that the service charge alone will not be enough to meet the cost of maintenance and salary of the ambulance drivers, the Builsa South District Assembly, for instance, committed to take on the maintenance cost of the vehicle. However, the reality on the ground is that at the time of the endline study in April 2017, the Builsa South Health Directorate had not received any support from the district assembly, but the ambulance had been serviced four times since January 2017 using fees charged to clients. Clearly, if this trend continues, it is only a matter of time before the ambulances would grind to a halt. Already in Nabari, the community members said they had 24 hours, 7 days a week access to free ambulance services from the period 2013 to 2016. With the exit of MVP this ambulance service is no longer available.
- The supply of drugs to the CHWs and to the health facilities has not been sustained. The Community Health Management Committees (CHMCs) responsible for managing the CHPS compounds agreed at the MVP exit meetings to mobilise funds to replace drugs dispensed by the CHWs, service and fuel motor bikes used by the health workers at the CHPS, buy reagents for the laboratory, and so on. According to a Builsa South Health Directorate representative, the CHMCs had not been able to do any of these. Four months after the exit of MVP, the shortage of drugs is being felt in the communities. In Zamsa, apart from the decline of drugs to CHWs, they also reported that though their health facility is NHIS accredited and hence community members with active NHIS are able to access health care, the supply of drugs to the CHPS compound has declined particularly after the exit of MVP. They indicated that they are mostly asked to buy drugs from pharmacy shops whenever they visit the facility for health care. The same complaint of decline in the supply of drugs to the health facility was also raised in Nabari.
- The concern around the recruitment of midwives for the health facilities had largely been addressed at the time MVP exited. In Builsa South District, the eight midwives MVP sponsored for midwifery training (five straight from senior high school and three community health nurses) to replace the retired midwives have completed it. Of the eight, five are yet to be granted financial clearance by the Ministry of Finance for them to be employed and deployed. The midwife trainees for West Mamprusi District are yet to complete because they started their training late. In Mamprugu Moagduri District, according to the health directorate representative, the retired midwives who were engaged by the MVP were still at post and working, at the time of the endline

160 ibid.

study. The Catholic Relief Services' (CRS) Mentoring and Coaching programme has engaged these retired midwives to mentor and coach those who have just completed the midwifery training to conduct skilled and safe deliveries.

- The concern of the district officials throughout the implementation of MVP that the monthly allowances paid by the MVP to the various categories of community-level staff – CHWs, community teachers, top-up allowances to community health nurses, agricultural extension staff etc. – cannot be sustained have proven to be the case. Their concern was that at the exit of MVP, the government institutions would not be able to sustain the payment of the allowances and the community volunteers/workers who have become used to receiving allowances would stop working, and this would ruin the activities that depend on these volunteers or workers. A case in point is the 53 CHWs under the MVP. They were seen as being pivotal to the community health services or interventions. Before exiting, MVP sought to get the CHWs absorbed into the Youth Employment Authority (YEA) programme of the government. The YEA programme has some qualification criteria based on some minimum education and age (not more than 35 years). Unfortunately, at the time of recruiting the CHWs, these had not been considered so most of them did not qualify to be taken onto the programme. As a result, some have reverted to the status they were before MVP, which is unpaid volunteers, while those absorbed into the YEA programme continue to be paid. This has created some resentment, with those not being paid becoming reluctant to continue to do voluntary service for GHS. The communities reported a decline in the services provided by the CHWs. In Kunkua, all the four well-being focus groups reported that since the exit of MVP the CHWs had stopped working. In Kasiesa, the community leaders said that the mobile phones that the volunteers used in tracking the gestation period of pregnant women and in reminding them when they were due for antenatal services were taken away from them at the end of the MVP. As a result, the volunteers were not able to monitor the pregnant women and remind them of the due dates for antenatal and delivery. In Naadema, they said that after MVP folded up, some of the activities of CHW such as the number of visits per household had reduced and malaria testing and treatment had stopped. In Zamsa, they attributed the reduction in the household visits by CHWs to a decline in supply of drugs which they administered at the household level.
- As noted earlier, the subsidised tractor service that MVP was providing to farmers in the project communities ended with its exit.

349. From the above, one can conclude that the exit strategy and sustainability of the MVP interventions had either not been thought through right at the design and planning stage of the project; or if that was done, then things did not go as they had planned or intended.

10.7 Other evidence on the sustainability of the integrated development approach

350. Sustaining the outcomes of a complex project like MVP has always been a challenge. In a synthesis of evaluations of six integrated rural development projects (IRDPs) financed by the Overseas Development Administration (ODA now DFID) and the World Bank,[161] the conclusions found that, '*Farm output did not increase as expected and economic rates of return were therefore substantially reduced. The objectives presented at appraisal were not achieved as planned.'* Of the ten main findings, the six findings that are relevant to sustainability and institutional impact are:

- Inhospitable economic situation. Many IRDPs were attempted in an economic situation that made the proposed developments nearly impossible. The recurrent budgets of governments were frequently unable to bear the burden of expenditure required by the project: for example, staff

161 DFID. 2004. EvSum438 Synthesis of Integrated Rural Development Projects.

employed by some projects were no longer being paid, buildings were not maintained, vehicles were not replaced and there was sometimes no fuel for the ones that were available.

- In the case of MVP, the partner districts did not have sufficient capital and recurrent budget to fulfil their part, especially in making funds available for monitoring and supervision by its technical staff. They had to rely on the project to provide motorbikes and fuel to the staff of the technical departments it worked with.
- Management of complex and multisector projects. The incorporation of non-agricultural components into the projects overloaded management so that implementation suffered. The integrated approach of many of the projects appeared to be based on the misconceived assumption that it was necessary to have all the components in the development of a particular area not only under one particular project but also under one management umbrella. While non-agricultural components should be planned and implemented concurrently if interrelated, this need not be under a single project management, or indeed within a single project.
- This finding has similarities to MVP. It was multisectoral – agriculture, health, education – all under one management, running parallel to that of government.
- Management too divorced from institutions. Generally, the management of projects was established in a new organisation. For the most part this had a detrimental effect on both project implementation and existing institutions.
- As has been pointed out in this evaluation, the management of MVP was not integrated into the existing decentralised structure of government but rather operated separately, with coordinators for each component, headed by a team leader. Project funds were directly managed by the team, who accounted directly to the donor.

351. Of the 10 lessons put forward to guide future projects, three resonate with the lessons from the MVP. These are:

- Emphasis should be given to improving the effectiveness and productivity of existing institutions rather than to creating new ones.
- It is right that integrated plans for rural development should cover multisectors but they should generally be used to generate single-sector and single-function projects. These should be implemented individually according to the priorities in the overall plan. There is a need for less complex projects.
- The long-term nature of achieving smallholder development and building institutional capacity suggests a greater use of phased programmes, covering a longer time frame than the typical three-to-five-year project. This point was recognised by MVP. The original design of the first generation of MVP was for five years but this was extended to 10 years to allow more time to reach the intended goal..

352. Sauri Millennium Village is one of the first generation of Millennium Villages started in Kenya in 2005. A more recently published study by Kimanthi and Hebinck (2016) noted that MVP '*forms part of the continued project approaches to development that has not been successful for decades*'. And that though it claims to incorporate bottom up approaches, it is largely a top-down project as it is based on a blueprint. As part of their conclusion, they state that:

> *Agrarian change is gradual and may not happen within the specified project duration. MVP was designed such that by 2015, Sauri will be an 'island' of success to prove that MDGs are achievable. This has not been possible. Technological change has been viewed too narrowly as a technical process rather than being approached as a socio-technical process that requires long periods of time for transformations to occur. Social changes cannot simply be engineered and results achieved within such a short time. Again, agrarian transformation largely comes from within. It is an endogenous process and that does not warrant development actors to develop communities*

directly even with deliverance of adequate amounts of 'what the community requires' (Umans and Arce 2014: 343). There is thus need for an alternative to development that will engineer positive change.[162]

10.8 Summary

353. The fifth output of the MVP aimed to achieve 'strengthened local institutions and community capacity to secure sustainability of MV gains'. At the level of the local government (district) institutions, according to the district officials, there was no qualitative difference in their capacity before or after the MVP. This was because the MVP created a parallel structure to manage the project. It did not embed the management within the local government structure and, consequently, could not influence or shape the institutional culture. Though the district officials participated in project review and planning meetings, they were there more as guests, not hosts, of the MVP. The MVP controlled the project funds and did not make use of the district tender boards for the procurement of services and supplies. It even made payments directly into the accounts of individual district staff without it passing through their institutions.

354. In the view of the district officials, they did not think that the MVP had an exit strategy because it had not thought through how some of the 'free service' interventions (free ambulance service, supply of drugs to CHWs, subsidised tractor service etc.), and monthly allowances to district officials or community-level service providers would be sustained. Consequently, barely four months after the MVP's exit, some of these interventions were already showing signs of decline. Community members also reported a decline in the number of home visits by the CHWs, shortage of drugs in the health facilities, and the sudden withdrawal or absence of the subsidised tractor service.

355. At community level, there were both gains and losses. The training the MVP had given to governance institutions like the traditional leaders has led to them being more consultative and participatory with community members. The position of the assemblyperson (i.e. the community's representative at the district assembly) has been strengthened because of the active role he/she played in the MVP interventions. A traditional institution weakened by the MVP interventions was the traditional birth attendant (TBA). This was because the MVP enforced the central government's policy of institutional deliveries. The risk though is that in a situation where there is no midwife or she is frequently absent, the community has no fall-back option.

356. MVP pushed on the formation of farmer cooperatives with mixed success. While some are thriving, others never took off or collapsed, even before the MVP's exit. The MVP introduced the Village Savings and Loans Association (VSLA) concept. Some are thriving and others struggling. The question is whether, before MVP's exit, they had enough supervision and coaching support that would ensure they abide by the rules of the association and would not suffer elite capture.

357. The findings regarding institutional sustainability of the MVP outcomes, outlined above, are not peculiar to this project. The evaluation reports of integrated rural development projects of the 1970s and 1980s similarly found this challenge to be a characteristic of complex and multisectoral projects.

162 Hellen Kimanthi and Paul Hebinck, 'Castle in The Sky': Sauri Millennium Village in Reality, 2016.

Chapter 11. Cost-effectiveness analysis

358. As the previous chapters have shown, there has been some impact as a result of the MVP, but the question remains about whether (or not) these impacts are of a sufficient magnitude relative to the resources deployed. Our main task in undertaking the CEA is to be able to provide planners in the Northern Region (or other development actors) the information needed to decide whether the MVP should be expanded in the poorer areas of the SADA region, or perhaps across all of Ghana. In this chapter, we report from the viewpoint of social costs and benefits that would accrue to the region in which the project would be implemented. Hypothetically, a 'policymaker' would need to know the present value of costs and benefits at the time at which the project commences as they would need to decide from all possible projects which ones should be implemented (as they produce the greatest effect relative to costs).

359. The unique nature of the MVP (in terms of the scope of its ambition and the complexity of interventions) meant that no direct comparison for the overall project was available in the literature.[163] Disaggregating costs and benefits by sector is a good alternative, however, as it allows for cost-effectiveness comparisons within specific result areas. For example, we can consider whether MVP delivered health or educational benefits more or less cost-effectively than other health or education programmes. Indeed, if the synergistic effects of MVP are real and significant, we should expect higher value for money from our 'sector CEAs' of MVP compared with the other single-sector interventions (in health, education etc.).[164]

360. This chapter first sets out the methodology and summarises the overall costs of MVP, then analyses the costs and effects for income and key sectoral interventions (health, education, agriculture and infrastructure). Full details of the CEA are provided in Annex F. After presenting the findings, the chapter ends with an important discussion on interpreting a CEA of a project such as this one.

11.1 Overview of approach to CEA

361. CEA seeks to compare the associated costs of a given intervention or project with the results generated by the same project, in order to determine whether or not the results represent good value for money. Costs and benefits are understood in present value (PV) terms (discounting for time preference) and in terms of social costs and benefits, rather than a narrow financial definition.

362. CEA assists policymakers and development planners in appraising an intervention or project versus alternative courses of action. In the case of the MVP, the present analysis should aid planners to decide whether or not to scale up the MVP approach in the wider SADA region or even across Ghana more broadly.

363. The following sections first set out the theoretical and methodological issues behind the CEA, before turning to present a summary of the costs and benefits associated with the MVP. The final section presents our conclusions as to the extent to which the MVP represented good value for money.

11.1.1 Methodology

364. The size and complexity of the MVP creates a number of challenges to conducting CEA. Within any one area of the project (such as health, education or agriculture), there is a wide range of interventions (and associated costs) targeting various results. Moreover, under the 'big push'

163 As confirmed by a systematic review undertaken by Masset et al. (2018).

164 Note: using the Difference in Difference analysis, the difference in impact between MV and CV areas (MV-CV) gives us the *net effect* of MVP. We then use the *net costs* of the MVP to produce our sector-based CEAs. Importantly, this rests on the assumption that there was no large project somewhere or massive diversion of expenditure that led to CV areas deviating from MV areas in the normal course of spending by NGOs or other programmes. Our analysis of spillover effects (Chapter 10) shows there is no evidence of this being the case, and so the costs of the MVP are assumed to be additional to the normal course of expenditure in the area.

approach to breaking poverty traps, the MVP targets synergies between these intervention areas, leading to complex causal pathways, and making it very difficult to link any one cost item with any one specific result. Finally, the MVP targeted long-term systemic change, meaning that the range of interventions can have a range of short-, medium- and long-term impacts – a number of which are likely to fall beyond the lifetime of the present evaluation.

365. **Comparators.** For a CEA to be most useful, comparators are required in order to determine whether or not a calculated cost-per-result is considered to represent good value for money or not. That is, could the same result be delivered at a lower cost through a different intervention? However, appropriate comparison projects are often hard to find, and CEA results are often interpreted somewhat subjectively by development planners, depending on the desirability of the results and the availability of funds. It should be noted that comparators do not need to be perfect. Given the limited evidence available, cost-effectiveness data on projects with any similarities to the present interventions, whether or not they took place in northern Ghana, may still help place the current results in context and support value judgements by planners.

366. **Synergistic benefits.** As mentioned above, the MVP should be able to take advantage of economies of scope by introducing interventions in several sectors that are mutually beneficial, generating cost savings through synergistic effects. For example, schools may benefit from reduced teacher absenteeism owing to fewer sick days, whereas increased household incomes may reduce the need for child labour and thereby increase school attendance. In the analysis below, we therefore look for increased cost-effectiveness through synergistic impacts.

11.1.2 Data

367. **Benefits.** Chapter 3 states how the quantitative findings were obtained. These results form the basis for interpreting population-level findings. The DD approach is used to report effectiveness; none of the estimations states the risk ratios or relative risks, which would require the baseline and endline absolute values for interpreting an estimated result from regression at the population level to be known. A DD result with the assumption of parallel trends can be reported as the difference in what has happened when the project was implemented and what would have happened if the project had not been in place. If the DD result is a percentage for an age group, then it can be reported as the relevant population within the MV area multiplied by the DD coefficient. If the DD result is an absolute value, it can usually be understood as a change for an individual or the household.

368. **Costs.** Cost data were provided by the project implementers. Unfortunately, the high level of aggregation in the data (as well as the inherent complexity of the project) made it difficult to map specific costs to specific results, as would be standard practice in CEA. Distinctions were, however, possible between recurrent expenditures and capital investments, whereas costs could be broadly distributed across sectors and sub-sectors, allowing for the sectoral analysis set out below.

11.1.3 Limitations

369. The CEA of the MVP has the following limitations:

1. A high level of cost data aggregation made it difficult to make precise estimates of the costs of certain interventions (i.e. distinguishing between the costs of vaccination, malaria prevention and prevention of stunting within the health budget).
2. The inherent complexity of the MVP, and the synergistic impacts involved, further complicated the exercise of mapping costs to results. The unique design of the MVP meant that accurate comparators were difficult to obtain.

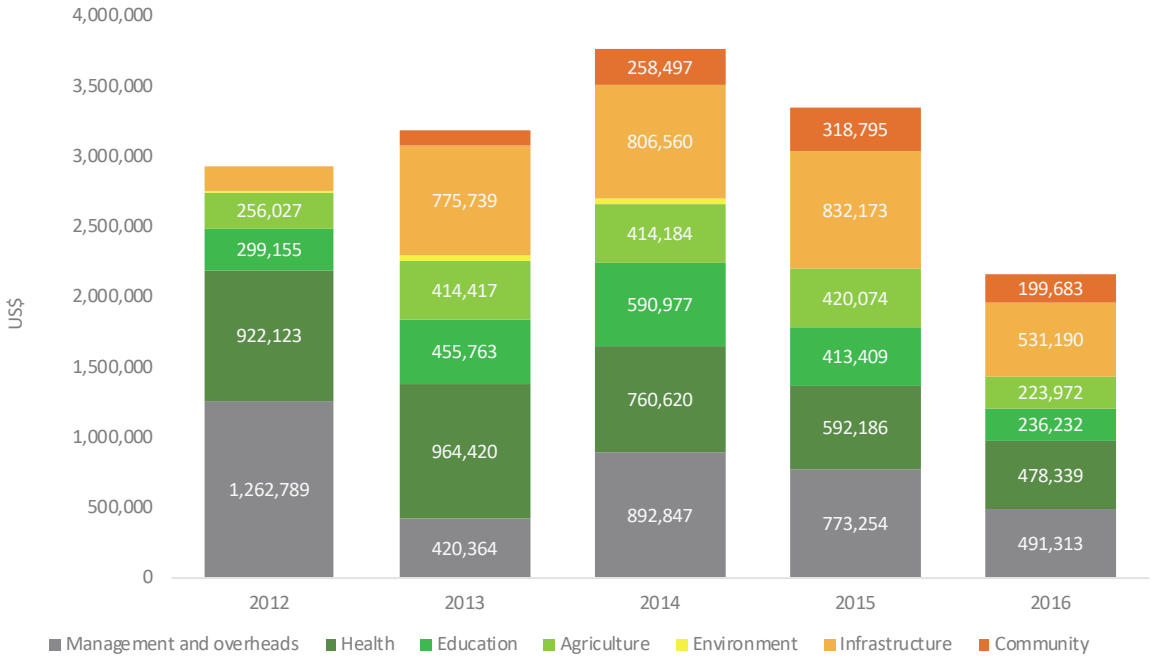
370. In light of these constraints, it was not possible to arrive at a single benefit-to-cost ratio for the MVP as a whole or for individual sectors. However, the sectoral discussions of cost-effectiveness provide a useful sense of the degree to which the MVP represented good value for money when compared

with other programmes. We elaborate on the limitation to the CEA study as a separate chapter following the presentation of the CEA analysis.

11.2 Costs

371. Total expenditure on the MVP was US$15.3 million over five years (2012–16) (see Figure 47). Management and overheads costs (including management, technical assistance and M&E)[165] were highest in Year 1 during the project set-up and lower thereafter. Health was initially the largest project area, although infrastructure became the largest by Year 3. Education and agriculture remained relatively constant expenditure areas throughout, whereas increasing amounts were spent on community development later in the project. Small amounts were allocated and spent on environmental interventions in the early years only.

Figure 47. Total MVP expenditure (2012–16, unadjusted)



11.2.1 Moving from 'expenditure' to 'costs'

372. Some goods can be bought at a given time but are used up over a longer period, providing value over the longer term. These are known as capital goods. Thus, the reported amount for the *purchase* of a good differs from the *use value* of that good. Some investments were made in 2016 and their use can continue until 2026, and, although the project ends in 2016, we may assume that they have some usage for the area. In carrying out the CEA, we take into account only costs up to mid-2016 (when the most recent benefit measurements were made). For accounting purposes, we occasionally note costs beyond 2016. We have adjusted the above expenditure figures according to the following steps to obtain the *use value* of the good at different time periods:

- Expenditure on assets (including physical assets such as computers and vehicles, as well as human capital generated through training and education) has been split across multiple years during which the asset in question was expected to generate returns.

165 Some US$880,000 was spent on research over the course of the project – however, these costs are not included in the following analysis as they are not deemed to have been necessary for the implementation of the project and should therefore be treated separately.

- For equipment, training and bicycles, we assumed a useful life of three years. For building renovation and motorbikes, we assumed a life of five years. For four-wheel drive vehicles and new constructions, we assumed a life of 10 years. These items are useful beyond the MVP period, and for that reason they are discounted over these periods.
- The purchase value of these capital goods has been annuitised using a 5% interest rate (the average Ghanaian gross domestic product (GDP) growth rate over the period and assumed opportunity cost of capital).
- All other goods and services were assumed to have been consumed during the year of purchase.
- Where assets were expected to continue to be productive beyond the project period, the share of their value falling beyond 2016 has been classed as 'investment'.
- All costs have been discounted at a rate of 5% (as per the above rate) to arrive at 2012 US$ PV. The figures were not adjusted for inflation owing to the limited US$ inflation over the period.
- Since the latest benefits data were collected in mid-2016, costs for 2016 were halved for the CEA calculations in order to ensure comparability between costs and benefits.
- Note the important distinction here between 'expenditure' (what was actually spent in a given year) and 'costs' (the value of goods and services distributed across years according to their period of use). The latter measure is more relevant for CEA.

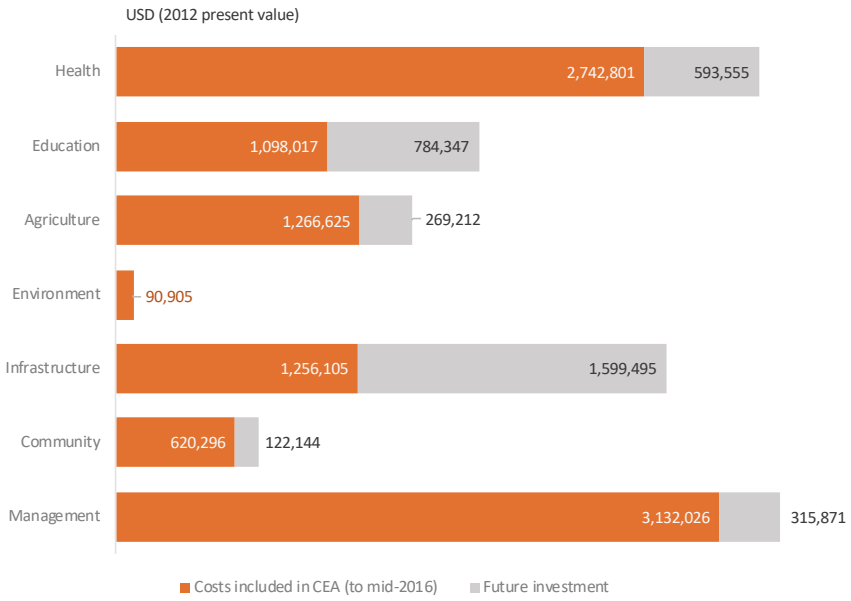
373. Following these adjustments, Table 45 presents the MVP costs per year in 2012 PV US$ terms. Under the 'Total for CEA' column, it can be seen that, for CEA purposes, we consider the total relevant cost for CEA to be US$10.4 million (2012 PV) (compared with the US$15.3 million actually allocated to date). This reflects the combined effects of discounting values after 2012, and (more significantly) the fact that around a fifth the total costs of the MVP are investments that are expected to generate benefits beyond mid-2016.

Table 45. MVP costs (2012 PV US$)

	2,012	2,013	2,014	2,015	2016 (1/2)	Total (CEA)	2016 (2/2)	Investment	Total
Management	889,001	395,543	523,256	466,129	204,001	2,477,929	204,001	119,169	2,801,099
M&E	89,054	14,047	30,462	35,645	11,592	180,799	11,592	5,944	198,334
Research	-	-	338,783	217,283	90,411	646,477	90,411	35,667	772,555
Technical assistance	-	-	294,449	202,021	-	496,470	-	-	496,470
Total management	978,055	409,590	1,186,949	921,077	306,004	3,801,675	306,004	160,779	4,268,459
Total m'gmt no research	978,055	409,590	848,166	703,794	215,593	3,155,198	215,593	125,112	3,495,903
Health	660,161	566,126	734,472	661,869	242,747	2,865,376	242,747	394,315	3,502,438
Education	235,041	151,990	249,942	324,199	157,458	1,118,630	157,458	600,897	1,876,985
Agriculture	246,063	296,413	297,007	369,349	98,846	1,307,679	98,846	193,725	1,600,249
Environment	14,030	43,266	38,283	1,194	449	97,222	449	-	97,672
Infrastructure	171,225	193,976	278,061	470,675	193,633	1,307,571	193,633	1,408,667	2,909,871
Community	-	42,694	138,707	273,430	118,082	572,912	118,082	107,412	798,406
Programme costs	1,326,521	1,294,466	1,736,472	2,100,716	811,215	7,269,391	811,215	2,705,016	10,785,621
Total costs	2,304,576	1,704,055	2,923,421	3,021,793	1,117,219	11,071,066	1,117,219	2,865,795	15,054,080
Total cost/ no research	2,304,576	1,704,055	2,584,638	2,804,511	1,026,808	10,424,589	1,026,808	2,830,128	14,281,525

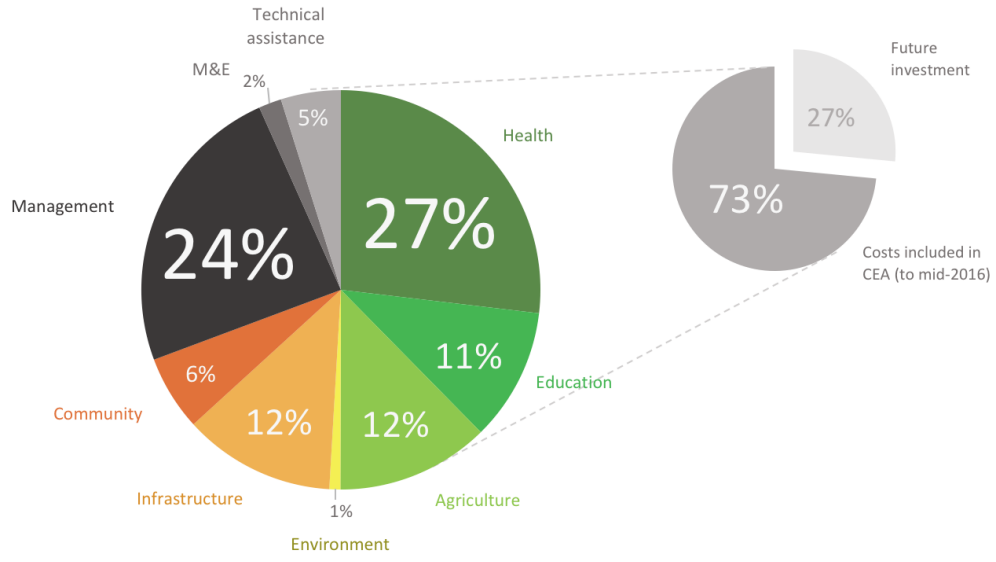
374. Figure 48 shows the sectoral breakdown of costs that are counted in the CEA on the one hand and costs that are expected to be associated with future benefits (investment) on the other. In the areas of infrastructure and education in particular, much of the expenditure to date has been on capital goods that are expected to continue to generate benefits for years to come. Since it would be inconsistent to compare results to date with the full upfront capital costs in these areas, we include costs in the CEA only up to the mid-2016 threshold.

Figure 48. Present vs. future costs for CEA purposes



375. In light of this, Figure 49 shows the sectoral share of costs included in the CEA. Health spending accounts for more than a quarter of the relevant costs to date. As noted above, while infrastructure makes up a large share of the overall five-year expenditure, we expect the majority of the infrastructure-related benefits to arise beyond the mid-2016 threshold – as such, it accounts for only 12% of the costs considered in the CEA.

Figure 49. Sectoral share of costs included in the CEA



376. Of the relevant costs included in the CEA, around a third (31%) was spent on management and overheads (including technical assistance and M&E), with two thirds on direct programme spend. It should be noted that, when considering the future replication or scaling of the MVP, there may well be cost savings on management and overheads, as projects learn from past experience and thereby reduce their research costs, while project management may be increasingly shifted from international to local staff.[166] Moreover, although we consider spending on M&E and technical assistance to have been important to the delivery of the present programme, these costs may be significantly reduced if the project were to be replicated.

377. Some distinctions need to be made between management costs and costs directly devoted to project costs. With regard to the treatment of salaries, staff who were directly working in a specific project area, such as CHWs and teaching assistants, had their salaries counted under the relevant sector. Staff employed to plan and implement the design of the project, on the other hand, had their salaries counted under the management budget. Thus, for example, the wages for the sector managers for health were paid through the management budget.

11.2.2 Per capita costs

378. To ensure comparability with benefits data under the CEA, we make two further adjustments to the cost data. First, we distribute the management and administration costs proportionally across sectors according to their size (i.e. health accounts for 27% of costs to mid-2016 and is therefore attributed 27% of management and administration costs). There are, of course, other ways distributing the costs; for example, by examining management costs that are most commonly found as a percentage of total costs within each sector. Our approach can be easily modified, but we do not believe it changes the overall conclusions on cost-effectiveness.

379. Second, costs are converted into per capita costs using the average yearly population in the MVP area of 26,376.[167] Table 46 presents the final per capita costs with distributed overheads used in the subsequent analysis.

Table 46. MVP cost per capita (2012 PV US$; proportionally distributed overheads)

Sector	2012	2013	2014	2015	2016 (1/2)	Total (CEA)	2016 (2/2)	Investment	Total
Health	43	28	41	34	12	156	12	16	176
Education	15	8	14	16	8	61	8	24	94
Agriculture	16	15	17	19	5	71	5	8	80
Environment	1	2	2	0	0	5	0	0	5
Infrastructure	11	10	16	24	9	71	9	56	146
Community	0	2	8	14	6	31	6	4	40
Grand total	87	65	98	106	39	395	39	107	541

380. It can be seen that, overall, the MVP was delivered at an average annual cost of US$88 per capita per year up to mid-2016, which compares favourably with the target of US$120 per capita per annum quoted in the introductory chapter. Within this, around US$35 per person per year was spent on health to mid-2016, followed by US$16 on infrastructure and US$16 on agriculture.

166 See Chapter 12 for further discussion and sensitivity analysis around management and overhead costs.

167 This was calculated by taking into account birth, death and net-migration rates in both CV and MV areas. The net migration rate in the MVP areas was different mostly because of large net migration in the last year of the project. However, the MVP population by itself constitutes a small population for birth and death rates to be statistically significant. For that reason, population adjustment is made through the net growth rate of both CV and MV areas. There is not much difference in which area was chosen. The net growth rate used here is negative, at –0.253%.

381. As of mid-2016, the total per capita cost of the project was US$395. As such, in order to break even, at least US$395 of benefits per capita would have to have been generated by the project by mid-2016. Including future investments, this figure rises to US$541 per capita. With these figures in mind, we turn now to examine the effectiveness data.

382. In summary:

- Total expenditure on the MVP between 2012 and 2016 was US$15.31 million, or US$14.0 million in 2012 PV terms. This is the value of goods and services during the time which the goods were purchased but not necessarily used.
- Some of the goods purchased can be used up to year 2026; these are capital investments. However, around a third of this represents capital investments (particularly in infrastructure and education) that are expected to generate benefits in the coming years. As such, only costs relevant to the period up to mid-2016 are used in the CEA.
- As of mid-2016, the total cost per capita was US$395 (in 2012 PV terms), or US$88 per capita per annum.
- Health and infrastructure were the largest sectors in terms of project spend. Management and overheads accounted for around a third of the total.

11.3 Effectiveness

383. The MVP had multiple goals, but these goals can be essentially reduced to three core ones:

1. To raise income through increased agricultural productivity, market development, microfinance and better infrastructure;
2. To improve health through development of a better health system delivering primary care at village level with referral to secondary and tertiary care through improved diagnostics, the provision of transport and electronic communications;
3. To improve educational achievements through improvements in schooling.

384. All three goals are intertwined. For example, better incomes provide better nutrition, leading to improved health, which in turn leads to lower workplace and school absenteeism. Education can also become cheaper for families through the provision of low-cost educational materials, while rising family incomes lower the need for child labour and increase the relative returns to schooling.

385. A precise mapping of interventions to results (and thus costs to effects) within any given sector is difficult to achieve. This is because we were given sectoral costs and broad cost categories which do not map to a specific result. Thus, we cannot say precisely that an amount was spent to achieve a result, and in any case for a multisector intervention, this would only be used for benchmarking. Instead, the important effect that we should expect is the synergy that all productive activities are produced more efficiently. We nonetheless point to some heuristic observations that sectoral costs undertaken to achieve results within MVP far exceed what would be spent had some other means been undertaken. One should note also that the lack of closely comparable projects in the literature leaves questions as to whether the observed results could truly have been delivered at such low costs given the limited pre-existing system-level infrastructure in health and education in the project area. We discuss this further, below.

11.3.1 Income

386. In addressing income gains, we answer two questions: (i) what was the overall income growth rate attributable to the MVP? And, (ii) is there any pattern in the growth rate of income? In response to the first question, as noted in Chapter 5, the MVP achieved significant income gains, which are summarised in Table 47. Using the DD approach to compare the MVs with the CVs, total gains for

the period 2012–16 averaged US$141 per capita (2012 PV) which have been transformed from the results reported regarding adult equivalent gains in Chapter 5.

Table 47. Gains in income over 2012–16

Av. DD effect	Fixed effects	Gains (Cedi)	Cedi/Dollar	Gains (US$)
2013*	0.27	123	2.09	59
2014	0.22	100	3.20	31
2015*	0.29	132	3.81	34
2016**	0.29	132	3.95	33
Total (US$)				157
Total (2012 PV US$)				141

* P-value = 0.1, ** P-value = 0.05
Notes: Dependent variable: Adult equivalent income / baseline standard deviation. Average adult equivalent adjustment: 5.285. Baseline standard deviation: 592. Values are per capita.

387. To ensure comparability with costs for the purpose of the CEA, income gains are quoted in US$ terms. The value of US$141 may only slightly understate the local purchasing power parity (PPP) in the villages. This is because exchange rate fluctuations reflect not just inflation alone but also current trade balance and a future assessment of export-import potential. The PPP downward fluctuation is lower than the unfavourable exchange rate fluctuation. Thus, there is a bit of downward over-adjustment in the exchange rate in terms of purchasing power.

388. For the CEA, we consider three sectors that were primarily targeting increases in income: agriculture, infrastructure and community development. Summing the per capita costs in each of these three gives a total of US$160 per capita to mid-2016, slightly higher than the observed benefits. This suggests that, while income gains were achieved, there may have been a negative rate of return on investment, and thus limited cost-effectiveness. This assessment is potentially severe as one does not expect infrastructure or community development to affect income alone and further impact may occur in the future. Agricultural activities alone contributed mostly to the rise during the last few years. On the other hand, one should expect such factors as health to also affect income. Apportioning costs from a complex project with multisectoral outcomes towards isolating costs of production of a particular outcome is fraught with conceptual difficulties. For example, Banerjee *et al.* (2015) for a poverty graduation programme implemented in various low and middle-income countries, report from their Ghana site that they achieved a benefit cost ratio of 133%. Thus, to produce US$141, a per capita amount of US$ 106 per capita would be invested.

389. While it is possible that MVP activities were successful in increasing income and earned a positive return, it would be highly difficult to adjust for the over-valued exchange rate in the past. In that case, the baseline dollar value would be lower, and, correspondingly, the DD measure would be higher.

390. Overall, in terms of income gain trends, it is difficult to say with any certainty whether the MVs have shifted to a higher growth trajectory, given the limited data points available for the 2012–16 period. The absence of significant changes in expenditure or consumption despite the income gains remains a puzzle (as discussed in Chapters 5 and 9), and this analysis suggests that income gains are not being viewed as permanent, and that patterns of growth are not likely to have changed.

11.3.2. Health

391. Estimating the cost-effectiveness of health interventions is made complicated by the holistic approach taken to improving the health system as a whole, as well as the limited time within which impacts are to be observed.

392. **Facilities.** The MVs saw improvements in health infrastructure relative to the CVs in terms of both physical infrastructure (buildings, rooms, vehicles and storage facilities) and staff (including a range of medical professionals from midwives to nurses to CHWs). While these facility improvements are significant, measuring their effectiveness is more challenging, particularly over a relatively small sample size and limited period of time.

393. **Mortality rates.** While many health outcomes will be measurable only in the longer term, we would still have expected improvements in IMR and U5MR over the period of the evaluation. Nevertheless, no significant improvements were observed under either measure.

394. **Vaccinations.** A total of 832 additional vaccinations were carried out as a result of the MVP. According to UNICEF (2016) vaccine cost estimates, the cost of the vaccines themselves should have amounted to around only US$60 per year under the MVP (Cooke et al. 2016). Once the necessary infrastructure (cold storage, delivery, staff etc.) is factored in, however, UNICEF estimates that the total unit cost may be around US$32 per vaccine. This would lead to a cost-effectiveness threshold of US$26,624 for the delivery of 832 vaccinations. Although we cannot say exactly how much of the MVP costs are associated with vaccinations, it is notable that this cost-effectiveness threshold amounts to just 0.7% of the total MVP health budget.

395. **Malaria.** There was an attributable decrease in the incidence of malaria of 5.71% across the MVP area, which translates to an estimated prevention of 891 cases. In a systematic review of malaria prevention costs, White et al. (2011) find the median cost per case to be US$25. In light of this, we assume a cost-effectiveness threshold of US$22,275 for the prevention of the 891 cases. While we cannot say exactly what proportion of the MVP budget contributed to malaria reduction, it is notable that US$22,275 would amount to just 0.6% of health spending to date – this suggests that the cost of reducing malaria under the MVP may have been significantly higher than the median value observed in White et al. (2011). Any impact of reducing malaria is also likely to yield economic benefits. Laxminaryan (2004) reported that a 10% decline in malaria resulted in 0.3% increase in overall household expenditure. Under the MVP, however, no increase in household expenditure was observed. Usually, expenditure is a result of increased income; while the latter was observed, the former was not in the MV area.

396. **Stunting.** Across the MVs, 467 fewer children showed stunting over the five-year period. Fink et al. (2014) find that every unit dropped in the height-to-age z-score (HAZ, a standard measure of stunting) is associated with 0.6 to 0.7 lost years of schooling, while each year of schooling is worth US$1,450 to US$2,000 in potential future incomes. As such, we estimate the MVP gains from reduced stunting to be in the range of US$0.4 million to US$1.1 million (equivalent to 10–28% of the total MVP health costs to date).[168.] No unit cost estimates were found in the literature relating to stunting. Although this is a health impact it may not be due only to health interventions. It could be due to a lower malaria rate and perhaps some reduction in food insecurity as noted earlier in our evaluation. It could also be that households with higher incomes pay more attention to their children's needs, both in terms of time and making purchases.

397. **Contacts with health workers.** Over the period, the MVP achieved 48,500 more contacts with health workers. It is expected that this increased coverage will lead to improved health outcomes in future. The quality of care provided to date is unclear. Doherty and Govender (2004) found that estimated costs per contact ranged from US$2 to US$7. Taking the midpoint of US$4.50, we arrive at a cost-effectiveness threshold of US$218,250 for 48,500 contacts. Once again, while we cannot say exactly how much of the MVP budget can be associated with these 48,500 contacts, the cost-effectiveness threshold of US$218,250 is equivalent to just 6% of the total MVP health budget, suggesting that the cost per contact may have been significantly higher than costs observed elsewhere. Further, the combined years of women between the ages of 15 and 49 contracepting over the 4.5 years was

168 Lower bound: one-unit HAZ improvement x 0.6 years x US$1,450 x 467 children. Upper bound: two-unit HAZ improvement x 0.7 years x US$2,000 x 467 children.

2,112. Programmes observed in sub-Saharan Africa can achieve the contraception protection noted above for US$60,000 in 2001 (Levine et al. 2006). While no cost estimates were available relating to stunting, the estimated potential benefits are substantial. The expected benefits from reduced stunting would only cover 10–28% of the total health costs. The above analysis, combined with a lack of evidence of improvements in the IMR and U5MR, suggest that the total health costs to mid-2016 are difficult to justify on cost-effectiveness grounds.

In summary, and with the caveat noted above regarding sectoral costs, most of the health achievements could have been achieved through other interventions spending about US$500,000–600,000. This amounts to one eighth the cost of the what was spent by MVP on health.

11.3.3 Education

398. As with health, the MVP education interventions sought to intensively improve the education system as a whole, thus making assessment of the cost-effectiveness ratio difficult, given a lack of comparable projects. The full impact of system-wide changes may take longer than the five years in which the current evaluation took place. The MVP area, however, saw a considerable increase in educational inputs such as increase in number of teachers, text books and equipment.

399. **Facilities.** In terms of overall improvements to the education system, there were significant improvements in the MVs in terms of number of classrooms, provision of school supplies and number of qualified teachers. Teacher salary payments became more regular, and student-to-teacher and functioning classrooms ratios improved. Participation in parent–teacher associations has increased by 17%, and wage expectations are now higher in the MV areas. However, teacher training remains limited, which may owe to the recruitment of older and more experienced teachers under the MVP, who would require less training at present. The number of children travelling more than 3 km to school also remains high, while the number of schools being built has decreased since 2012.

400. **Additional years of schooling.** The main positive impact has been the increased number of school years at the primary level. The number of years of schooling per child gained through the MVP in this age group is 0.21 years, or a total of 2,153 additional years of schooling in total. This was observed through asking direct questions about school attendance. Taking the Fink et al. (2014) and our own estimated gains in income per additional school year, we have estimated a projected future income gain of US$1,450 to US$2,000 per year of schooling. Applying this to all those who achieved an extra year of education, we may obtain a total income increase of US$3.1 million to US$4.3 million. This compares favourably with the total cost of US$1.6 million spent on education to date under the MVP. However, when comparing this with other projects, we find a range of values in the literature for the cost of retaining a child in school for a year. Baird et al. (2009) reports a cost of US$5 and Evans et al. (2009) find a cost US$91. While this is a wide range, these figures fall far below the MVP cost of US$736 per additional year of schooling.[169]

401. Although the returns to education appear significantly positive, in cost-effectiveness terms it seems that less intensive projects have been able to generate additional years of schooling at a far lower cost than the MVP.

402. In summary:

- Across the key impact areas of income, health and education, MVP compares unfavourably with other projects in the cost-effectiveness of service delivery.

169 US$1.6 million divided by 2,153 years of schooling.

- Returns to investment in education appear to be highest, although it is believed that similar results could have been achieved at a significantly lower cost.
- The cost-effectiveness of income and health-related interventions is highly questionable.
- Nevertheless, impacts are expected to continue to arise in future years. At the same time, a lack of precise comparators means the difficulties (and required costs) of delivering such a programme in northern Ghana may be understated in the CEA.

11.4 Summary of CEA findings

403. The cost-effectiveness of the MVP is presented as cost-consequence analysis. As we have noted previously, our literature search found the best information of alternative programmes through which many of the MVP-generated outcomes (positive gains) can be produced. All the alternative means come from stand-alone projects where as far as we could tell no systems-level interventions were made. In most instances the unit costs of producing most of these outcomes were quite low. Table 48 presents the costs-consequence analyses where we present the outcomes achieved, the costs of these outcomes had they been produced through alternative means, and the likely costs from the MVP project. Note that we do not produce a single cost-effectiveness measure but list the outcomes along with plausible costs.

404. The overall assessment of the cost-effectiveness of the project as of mid-2016 is one of poor value for money, with a number of examples of service delivery at lower cost being found in the literature, and a range of expected outcomes (such as improved infant mortality and increased expenditure and consumption) not having been observed. Although the project reported in Banerjee *et al.* (2015), a comparator, had multiple objectives, most of the projects that we compare MVP projects to are stand-alone projects with no emphasis on building systems-level changes. These projects can produce the impact that MVP produced for less than US$5 million whereas the MVP project spent US$10.4 million. Although some of these projects were not wholly placed in similar settings, the magnitude of the difference indicates that MVP did not yield value for money.

Table 48. Cost-consequence summary

MDG (and corresponding) indicators	Corresponding population-level measure	Costs using alternative programme	Most likely MVP costs
Income poverty, employment rate below poverty line (Income)	US$141, per capita. Total gain in 4.5 years: US$3.76 million	US$2.82 million (Banerjee *et al.* 2005)	Lower bound: US$1.82 million, Upper bound US$3.64 million
Net primary school attendance	2,153 school years	US$200,000	US$1.6 million
All health outcomes: Malaria reduction Stunting Increased health care usage and birth attendance Vaccination Contraception	891 fewer cases of malaria 467 cases of malaria Increase of contact with health workers by 48,500 832 all types of vaccination 2,112 couple year protection	All health cost achievements: US$400,000 to US$600,000	US$4.2 million
Sanitation	8,187 people affected per year	Not costed	
TOTALS		Less than US$5 million	US$10.4 million, project costs

405. Emphasising the joint production nature of MVP, we propose a heuristic argument: We start with the achievement of US$141 per capita income and weigh this against the fact this is part of the production process that spent US$ 395 per capita over the 4.5 years. It may help at this point to aggregate the values here; as the total gains from income gains from MVP is US$3.71 million with US$10.42 million spent over this period. This suggests that if other gains amounted to more than

US$6.72 million the project yielded positive returns. As we suggested educational achievements brought about through MVP could yield US$3.5 to US$5.4 million, in present value term. These values are seen in the future and thus uncertainties surround these values. The remaining US$1.3 to US$3.2 million should be compared to health gains: averting malaria, vaccination and a large change in contacts with health workers. During the current period we do not detect any changes in saving lives. If these outcomes yield 0.5 years of life extension on average over future years, it is possible that 13,000 life years gained could help better justify the MVP project. These gains are plausible. However, we have still not have achieved synergy in the production process given that most of these values can be achieved through other means much more cheaply.

406. In defence of the MVP, the holistic 'big push' approach inevitably increased the costs above those of programmes that have made use of existing infrastructure. Indeed, it is unclear whether some of the results achieved by the MVP could have been achieved without these substantial investments in wider infrastructure and systems. Moreover, additional impacts are expected to arise in the coming years – although this will depend on the sustainability of the systems and infrastructure that have been put in place (as discussed in detail in the previous chapter).

407. The CEA of the type conducted here is also unusual: most CEAs are conducted where not only are the analyses within a singular sector, where comparisons can easily be made with other programmes that have similar outcome measures, but also the interventions themselves can be very narrowly defined. For this reason, we provide the next chapter as a discussion on how to interpret the CEA study, including a sensitivity analysis, addressing spillover issues from a CEA perspective, and the appropriateness of comparing the MVP with other projects.

11.5 Interpretation of the cost-effectiveness findings

408. This section considers the CEA findings and discusses the interpretation within the broader literature on CEA, and some of the limitations with the methodology. This section also undertakes a sensitivity analysis of costs, considering how management and overhead costs may differ if the project were to be replicated to the wider SADA region, and the potential implications for cost-effectiveness. The section ends with a discussion on the internal validity of the analysis.

409. The use of CEA has a number of limitations in the case of the MVP. Each are discussed below.

11.5.1 Identifying specific outcomes and comparators for a holistic approach

410. Typically, CEA is used to assess the degree to which a specific service delivery represents good value for money – for example the cost of malaria treatment (White et al. 2011) or the cost of reaching a school pupil for remedial teaching (Evans and Papova 2015). The MVP sought to provide a comprehensive development package for villages within the SADA region, targeting multiple outcomes relating to incomes, education and health through a wide range of complementary interventions. This holistic, 'big push', approach meant that it was not possible to accurately isolate the average costs of individual outcomes.

411. As such, our lowest level of disaggregation within the MVP CEA is at the level of sectoral unit costs, which limits the analysis to a comparison between an overall sectoral cost encompassing a range of different outcomes. Moreover, the uniqueness of the MVP made comparator CEA ratios difficult to find. Ideally, comparators would be drawn from attempts to carry out similar interventions in similar contexts – the lack of past CEAs in the SADA region, and of projects globally that resemble the MVP, placed significant limitations on our ability to compare it with other delivery mechanisms.

11.5.2 The nature of long-term impacts

412. Long-term investments were extracted from the CEA in order to reflect the likelihood that benefits will continue to arise beyond the life of the project. It is, however, difficult to predict the scale and

nature of these future impacts, and therefore to make a judgement as to the degree of project expenditure to associate with benefits observed to date. For example, expenditure on infrastructure in the first five years may in fact be disproportionately likely to generate impacts beyond 2016, and so an unweighted distribution of costs across asset lifetimes may present an unreasonably critical value-for-money assessment of the early years.

11.5.3 Choice of discount rate and asset life

413. The chosen discount rate of 5% corresponds to the average Ghanaian growth rate over the period, and various asset lifetimes were selected as deemed appropriate for the local context. US$ inflation was fairly negligible during the project period, so US$ costs were not inflation adjusted. While the chosen rates could be fine-tuned, any such amendments would be very unlikely to change the results presented here. Changes would predominantly affect the long-term investment values, which do not feature in the CEA.

11.5.4 Importance of local context

414. There has been considerable progress in carrying out CEAs in recent years for different types of interventions across different sectors (see Masset et al. 2018 and Evans and Popova 2015). However, much of the CEA literature does not pay considerable attention to local context.

415. For example, in health and education, most CEA studies have been carried out at a small scale. Many of these indicate cost-effectiveness ratios that represent much better value for money than the MVP. This spending mostly depends on an education system already being in place. Developing new infrastructure in particularly underdeveloped areas – as with the MVP – is likely to involve very substantial upfront costs that are typically already covered by the government. This again limited the comparability of the MVP CEA with projects targeting similar outcomes in different contexts.

11.5.6 Comparability of MV and CV costs

416. The DD method was used to measure the net impact of the MVP versus the CVs. In order to conduct the CEA, we would ideally require an equivalent DD approach for costs. The 'parallel trend' assumption is that the level of service delivery, aside from the MVP itself, remained equal in both the MVs and the CVs throughout the project period. We expect the attributable outcome in the MV area to be the difference in the result (result R_{MV}) of summed activities of MVP, government and NGO activities in the MV area and the result of summed activities in the CV area carried out by the government and NGOs other than the MVP:

$$Y = R_{MV}(MV + GOV_{MV} + NGO_{MV}) — R_{CV}(GOV_{CV} + NGO_{CV}).$$

417. If the activities in both the regions are the same as carried out by government and other NGOs, we are able to state that the extra benefits we have noted are solely the result of MVP costs. If, during the course of the evaluation, however, a significant NGO or government project were set up in the CVs, this would likely distort the results: CV outcomes would probably be higher than expected, but the increased level of investment in the CVs would not have been captured in order to compensate for this and to fairly assess the performance of the MVP. Moreover, it might reasonably be suspected that the presence of the MVP may crowd out further investment in this area, and potentially push external investment towards the CVs instead.

418. We note in section 10.5 on displacement effects that there is little risk of the parallel trend assumption having been violated with regard to costs across the MVs and CVs: new government projects have increased less in MV areas than in CV areas since 2012. Similarly, district assembly projects decreased more in MV areas than in CV areas following the MV interventions. These changes, however, were relatively small and not statistically significant. Plus, as section 2.6 shows,

there were more interventions in the MV areas over the period than in CV areas, but this was marginal.

419. Table 49 presents the facility-level dataset in both CV and MV areas. Aside from a few indicators, the improvements in the MV region are much more significant than those in the CVs over the past 4.5 years, and it does not seem like there has been a significant increase in government expenditure in the CV region beyond what may have occurred in the MV region. Any displacement of expenditure from the MV region to the CV region seems unlikely. We therefore conclude that our account of the costs in the MV region as additional expenditure beyond what was spent in CV region is likely to be a realistic scenario.

Table 49. Indicators reporting on improvements in facilities by sector[170]

Health sector, facility accounting					
Indicators	*MV*	*CV*	*Indicators*	*MV*	*CV*
No. physician assistants posted	2	1	Total no. rooms	106	55
No. midwives posted	11	9	Condition of the building No. new No. poor No. dilapidated	 7 0 0	 4 7 1
No. staff registered nurses	15	8	Adequacy of supply Columns, how many had 15 of 30 indicators	6	3
No. enrolled nurses/clinical health assistance	23	17	Centres with treatment capacity (more than 10 of 16 procedures reported).	1	5
No. community health nurses	24	15	Facilities with basic delivery emergency care	3	3
Education sector, facility accounting					
Indicators	*MV*	*CV*	*Indicators*	*MV*	*CV*
Classrooms in good conditions	149	152	No. schools with sufficient staff quarters	2	17
Pupil to good classroom ratio	53	69	No. schools with electricity	5	1
Buildings needing repair Major repair	 1	 14	Average funding per school, US$	1,707	1,358
Minor repair	23	10	Percent staff paid last month	100	78
Total number of qualified teachers	178	180	Percent school health service	33	26
Student to qualified teacher ratio	44	59	Percent with sufficient benches	83	32
Infrastructure					
Indicators	*MV*	*CV*	*Indicators*	*MV*	CV
Market trading centre (Number of centres in the area)	7	8	Transport centre (No. centres in area)	13	6
Transport infrastructure to settlement (Villages connected by road)	25	38	Tarmac road connection	2	7

11.5.7 The use of CEA in decision making

420. Another issue is that there may be many less expensive ways to achieve stated objectives – but, within a given context in a region, cheaper interventions may not always be appropriate. For instance, within the MVP regions, there may be a need for some care provision that may be expensive. In health care and in education, some basic level of well-being may need to be assured, and this may require that some expensive interventions are put in place. If one wants to allocate a marginal dollar, it may be that the policymaker wants to send the marginal dollar to the poorer regions where effectiveness may be low along with a baseline of low-level health care. At low levels of well-being, there may be a trap where effectiveness of interventions is low until a threshold is crossed.

[170] Note that the CV area is larger than the MV area, and that we might expect more facilities in the CV area.

11.6 Sensitivity analysis of costs

421. Management and overhead costs amounted to 31% of all total costs. If the project were to be replicated, it is possible that these costs could be significantly reduced, such as through greater reliance on local staff, reducing spending on M&E and technical assistance or embedding it within existing structures to avoid parallel systems. To illustrate the potential effects of such cost reduction, Table 50 presents a sensitivity analysis of management costs based on five scenarios:

1. **Baseline** – actual MVP management and administration costs (including management, M&E and technical assistance, but excluding research costs not considered to be required for programme delivery)
2. **20% cost saving** – significant cost savings may be expected when an international pilot project is transferred to the recipient country government (WHO, 2003)[171]
3. **50% cost saving** – as above, with a higher savings rate
4. **No M&E/technical assistance** – pilot projects are likely to spend more on M&E and (international) technical assistance in order to learn and improve delivery
5. **Baseline + research** – reflecting the actual expenditure on MVP including all research costs.

Table 50. Sensitivity analysis: management costs (2012 PV US$ per capita)

	Baseline		Baseline –20%		Baseline –50%		Baseline ex-M&E, TA		Baseline + research	
	Total	Annual	Total	Annual	Total	Annual	Total	Annual	Total	Annual
Health	156	35	146	33	132	29	146	32	165	37
Education	61	14	57	13	52	11	57	13	65	14
Agriculture	71	16	67	15	60	13	66	15	76	17
Environment	5	1	5	1	4	1	5	1	6	1
Infrastructure	71	16	67	15	60	13	66	15	76	17
Community	31	7	29	7	26	6	29	6	33	7
Total	*395*	*88*	*371*	*83*	*335*	*75*	*370*	*82*	*420*	*93*

422. The results show that cutting management and overheads could substantially reduce the overall costs and improve value for money. Nonetheless, even with a 50% cost saving, the achieved income generation of US$141 per capita over the project life, for example, would only just be positive (as compared with US$136 per capita spent on agriculture, infrastructure and community development combined). Meanwhile, health and education costs would still be significantly above those discussed in the previous chapter.

11.7 MVP costs in context

423. In order to put the average costs of the above analysis in context, it is useful to compare them with current GoG expenditure. In 2016, GoG expenditure was 17.7% of GDP. With a national per capita GDP of US$1,515, this amounts to government spending of US$268 per capita per annum. The MVP per capita spend of US$80 per annum is therefore equivalent to almost a third of all government expenditure in Ghana on a per capita basis – a very substantial investment.

424. Of course, there is a substantial variation at the sectoral level. Table 51 presents the Ghanaian government spending by sector alongside the MVP costs, and shows that health-related MVP costs were almost 90% of what the government currently spends, whereas agriculture spending under the MVP was almost five times higher than current government spending. The reverse was true for

171 One line of argument is local staff are usually paid less than international staff, plus learning should reduce some costs.

education, where the government spends, on average, almost six times what the MVP spent on the sector. Table 51 also shows the cost saving scenarios from above.

425. Overall, even if the GoG could implement an MVP-style project with a 50% reduction in management and overhead costs, this would still represent a 25% increase in government spending. It is not clear how such a substantial increase could be achieved.

Table 51. Per capita expenditure for different sectors, Government of Ghana, 2016[172]

	Health	Agriculture	Education	All sectors
Government of Ghana spending (2016)	35	3	66	268
MVP (average annual)	31	14	12	80
MVP (20% management cost saving)	29	13	12	75
MVP (50% management cost saving)	26	12	11	68

426. Government spending is unlikely to be even throughout the country, and the MVP was designed to be administered in only the poorest parts of Ghana. For example, there were no secondary schools in the MVP region, while most of the agricultural public expenditure in Ghana has been devoted to cocoa (World Bank 2017), with limited funds reaching the MVP area. It is indeed likely that the amounts stated above overestimate government expenditure in the MV and CV regions.

427. As another point of comparison, WHO recommends a 5% of GDP investment in health. For Ghana, this amounts to US$76.[173] It could be argued that MVP spending helps close the gap between GoG health spending and the WHO recommended level.

428. Cash transfer programmes have been suggested as an alternative strategy to MVP. We estimate that the Ghana Livelihood Empowerment Against Poverty (LEAP), a national cash transfer programme that also operates in the same area as MVP, provides about US$ 17 per person annually.[174] This is far below the US$ 31 that MVP generated per capita annually as income. However, direct comparisons are difficult to make as it is important to consider how health and educational services would be purchased or acquired if these facilities were as limited as they were in the CV areas at the end of the project. Indeed, it is possible that LEAP was supplemented by regional development in health, education and other types of infrastructure (or that private sector was able to fill some of the gaps).

11.8 Conclusion

429. In conclusion, the CEA suggests that the MVP has not generated good value for money, with the estimated value of outcomes falling considerably short of associated costs in many areas, and comparator studies showing that similar outcomes have been delivered at far lower cost in other projects. As this chapter has acknowledged, however, there are a number of limitations with the CEA, particularly relating to the uniqueness of the MVP in terms of the scope of its holistic nature; and its attempts to develop new infrastructure across a broad range of sectors in a relatively underdeveloped location. The sensitivity analysis shows that transferring such a project to local ownership could improve the value-for-money proposition, but that even a 50% cut in overheads would still yield questionable cost-effectiveness overall. The MVP project spent a considerable amount in improving the health and educational system along with infrastructure development. We did not find equivalent comparator programmes that aimed to achieve such holistic changes. Nevertheless, the magnitude of the difference in costs of the impact when produced through

172 Government spending data: https://data.worldbank.org/indicator/NE.CON.GOVT.ZS. Health data, World Bank, https://data.worldbank.org/indicator/SH.XPD.PCAP?view=chart, Education values are based on http://ghana.gov.gh/index.php/news/3068-improving-education-in-cape-coast-is-the-responsibility-of-all-president-mahama accessed 18 April 2018. Educational budget is 1/3rd of all government expenditure. For agriculture, World Bank, Agricultural Global Practice, AFR01, *Ghana: Agriculture Sector Policy Note,* July 2017.

173 http://resyst.lshtm.ac.uk/news-and-blogs/target-uhc-how-much-should-governments-spend-health

174 UNICEF, 2016 https://www.unicef-irc.org/publications/pdf/RBMethods_2016_01.pdf

alternative means and the costs of MVP leads us to conclude that MVP did not yield value for money during the first 4.5 years of implementation.

Chapter 12. Summary and conclusions

430. The MVP had ambitious goals: to demonstrate how the MDGs could be achieved locally through an integrated approach to development. In northern Ghana, the project invested some US$16 million (approximately £11 million) of resources over five years from 2012 to 2016, in a cluster of over 30 communities covering on average 26,376 people. The area is extremely poor, with between 80% and 90% of the population living below the national poverty line. Drawing on poverty trap theory, the aim of the MVP was to bring about a sustained development pathway out of poverty through simultaneous investments ('a big push'), rather than a more typical approach of smaller investments that are specific to each sector. The approach has similarities to IRDPs in the 1970s and 1980s, but also has relevance going forward given that the SDGs focus on a holistic approach to sustainable development – with many similar (and synergistic) targets to the MDGs around poverty, nutrition, schooling, disease reduction and mortality.[175]

431. As a model to demonstrate to governments how to achieve the MDGs at a local level, the MVP approach has been subject to much controversy over the years. In 2012, DFID commissioned this independent evaluation to provide evidence of impact and cost-effectiveness. It follows on from a series of past MVPs that have been operational since 2015, and said to reach a total of half a million people in 14 different sites across 10 countries. Each of these MVPs is a cluster of villages that are located in a distinct agro-ecological zone, and overall, they represent farming systems used by 90% of the agricultural population of sub-Saharan Africa.[176] It is estimated that globally around US$300 million has so far been invested in these projects.[177]

432. While this evaluation is specific to one particular MV site in northern Ghana – which needs to be borne in mind when generalising – it provides insight into the MVP approach. If the MVP succeeded in achieving the MDGs at a local level, then it has profound implications for development. If it did not, then it raises concerns – however sincere and laudable the aims to assist the poor – about spending hundreds of millions of dollars *without* any scientifically robust evidence to know whether it works, how and for whom.

12.1 Overall findings

433. Overall, the MVP in northern Ghana did not achieve the overall MDG target to reduce extreme poverty and hunger at the local level. Where there are attributable changes to the MDG targets, these tended to be the more limited changes than those that will fundamentally improve people's health, educational and other outcomes. For instance, the project did increase attendance at primary school (Goal 2) but did not go beyond this MDG and improve the learning outcomes of children; the project did increase the proportion of births attended by professionals and women said to be using contraceptive methods (MDG indicators), but it is not possible to assess the effect on maternal health (Goal 5); and the project did increase the number of toilets (a target under Goal 7), but not beyond this MDG in terms of hygiene and sanitation practices. There are, however, exceptions. The project had a remarkable impact on stunting, which is a long-term health indicator and a predictor of socioeconomic outcomes in adulthood.

434. However, this does not mean the project had no effect, and there are changes attributable to the project in terms of:

- an improvement in multidimensional poverty and well-being

175 For instance, the MDGs share much common ground with SDGs 1–6 (no poverty, zero hunger, good health and well-being, quality education, gender equality, clean water and sanitation), and SDG 8 (work and economic growth).
176 http://millenniumvillages.org/the-villages/ accessed 27 November 2017.
177 The Millennium Promise/MVP website (http://millenniumvillages.org/the-villages/) states that the MVP budgets US$120 per person per year and has reached some 500,000 people. An estimation of the total investment is US$120 x 5 years x 500,000 people = US$300,000,000.

- an increase in incomes in the area
- a reduction in stunting and improved nutritional status of children
- a reduction in severe malaria
- increased vaccination against BCG, DPT and measles
- an increase in primary school attendance
- improvements in agricultural production
- improvements in food security.

435. There are also improved outputs in terms of:

- an increased number of CHWs operating in the area
- improvements in school facilities
- an improved ratio of pupils to qualified teachers
- an increase in the number of toilet facilities.

12.2 Impact on monetary poverty

436. While there has been no discernible impact on monetary poverty of the MVP (using household expenditure as an indicator), the dynamics between income, expenditure and savings appear to have changed in the project area. The analysis of incomes shows that incomes have doubled in the MV areas in comparison with the baseline,[178] whereas they increased by some 50% in the CV areas over the same time period.[179] As there is no increase in consumption (expenditure), this suggests a possible increase in savings by households. The analysis gives some credence to the notion that income gains were spent on durable goods, saved in cash or invested in livestock and assets, at least during the first few years of the project. The figures also show that households did not tend to invest any income gains in agricultural assets, except livestock, and that wealth was possibly stored for precautionary reasons. This is supported by the RCA study findings, which have consistently shown over the years that people tend to put surplus resources into 'easily liquefiable assets' (with a preference for home-based crop stores and keeping fowl and small livestock, such as sheep and goats).

437. The figures, however, do not fully explain the complex reality of (and difficulty measuring) income, expenditure and savings dynamics. Both the PRA and the RCA studies suggest that people are consuming more in the MVP areas, but this is also occurring more widely than just in the project area – with growing demand for cash. For example, marriages are said to be bigger with larger sound systems, funerals are bigger with more gifts for guests, more alcohol is consumed, there is more eating out, there is more expenditure on TVs and the hire of DVDs and there are more motorbikes and fuel costs.

438. Still, there is no evidence overall that the MVP is breaking the 'poverty trap' as, while incomes have increased, the project has not improved the income of any specific socioeconomic group. While people have not generally escaped the trap of (monetary) poverty, there is, however, an improvement in other aspects of well-being as a result of the project. Our analysis of the Multidimensional Poverty Index (MPI), as well as people's own wealth rankings, shows an improvement across many non-monetary dimensions. This is not because of any single dimension or welfare indicator, but rather because of improvements across multiple fronts (according to our sensitivity analysis of the MPI). The PRA and RCA studies similarly corroborate this finding, with people's realities of well-being having improved when they take account of road and electricity

178 This would, however, likely be much smaller if the likely measurement error were known.
179 This suggests a DD impact of 40% to 50% depending on the model specification. See Chapter 9 for details.

improvements, greater access to public provision of services (especially health, but also items such as tractor hire) and growing cash needs (where they could be met). The showering of benefits from the MVP (health facilities, CHWs, school buildings, teachers, roads, electricity, tractor services and so on) has had an impact in terms of improving people's circumstances. This was perhaps more in terms of access to public services (such as health facilities and education) than of any sustained economic improvement at the household level.

12.3 Impact on health outcomes

439. The project has had a mixed impact on disease incidence in the area. There has been some impact on the incidence of malaria among children under five, and particularly severe malaria and reducing the number of gametocytes. Gametocytes are responsible for the transmission of the infection from one subject to the other, so a reduction in their number suggests a potential lower spread of the disease in the population. The project has also increased the prevalence of vaccinations among children for three major vaccines (BCG, DPT and measles), though it did not change polio vaccination rates. The project nevertheless does not appear to have increased children's intake of vitamin A and deworming tablets; there was also no reduction in the reporting of the most common symptoms of disease affecting children, such as fever, coughs and diarrhoea.

440. Health services have improved in the project area, with a considerable investment by the MVP, including more health centres and more health workers than the baseline.[180] According to survey data, there has been a large increase in the number of visits made by adults and their children to health facilities. More than 40% of adults of both sexes reported a visit to a health facility during the previous 12 months, while 60% of mothers reported visiting a health facility over the previous 12 months. The PRA study suggests that people perceive a growing confidence in the diagnostic ability of the formal health care system, and, similarly, the RCA study notes a significant increase in the use of health facilities compared with the baseline. Both the RCA and PRA studies find that people likewise see an associated reduction in the use of traditional remedies or spiritual healing. While this may also apply to CV areas, the increased availability of formal health services may have also had some unintended effects. For example, the RCA study observed[181] that some people are more readily taking medicines 'even for minor things', and there has been an increase in self-medication using over-the-counter medicines available from medicine stores and peripatetic medicine sellers.

441. Alongside improvements in health facilities, there has been considerable investment in CHWs, with the project paying allowances to what was previously a volunteer position. The survey data find that nearly 80% of adults reported a visit from a CHW in the previous 12 months in MV areas, with nearly 60% of adults reporting a visit by the CHW in the previous month. The RCA study confirms that people experience an increasing number of CHW visits, but suggests that this is driven primarily by the need to distribute project items (e.g. bed nets, basic medicines), or to inform of a time and place for a particular session (e.g. village meetings for postnatal care, or vaccinations), rather than something more routine.[182] Despite the launch of the GoG's CHW programme in 2016,[183] the PRA study finds that in early 2017 some CHWs under the MVP were recruited into the new GoG programme and yet others complained of being jobless – raising doubts about the sustainability of paid CHWs.

442. Decreases in child mortality rates (for those under five years) are very similar in MV and CN areas, with no discernible impact on child mortality as a result of the project. Mortality rates were,

180 According to the Facilities Survey.

181 See Annex C. Endline Reality Check Approach, which is an in-depth study on a relatively small number of villages and households. It also came up once in the PRA study, so it is unclear how pervasive such effects might be.

182 This is not generalisable, but the RCA suggests that the notion of 'visits' by CHWs is more transactional and driven by project requirements, rather than simply that CHWs visit and administer health checks and advice within the home.

183 This programme was formally known as the Ghana Community Health Worker Programme under the Youth in Health Module of the YEA. It is supported by the One Million Community Health Workers Campaign, which was implemented by the Millennium Promise, and is currently hosted by the Center for Sustainable Development at the Earth Institute. See http://1millionhealthworkers.org/

however, already fairly low in the MVP area, and it is thought that this is because of a range of health sector pilots and interventions that over decades preceded the project, and that may have contributed to the observed continuous improvements.

443. Nonetheless, the project has reduced the prevalence of stunting. This is particularly encouraging, as stunting is an indicator of long-term undernutrition and an improvement in height generally lasts longer than an improvement in weight. The MVP implemented a number of interventions to improve the nutritional status of children. These included the provision of vitamin A, deworming, nutrition monitoring by CHWs and a wider package of health interventions. In addition, the project promoted food production and food security (see impacts below) and aimed at improving access to safe water sources and sanitation facilities. The PRA study found that mothers were consciously increasing the protein content of their children's diets. Mostly, this has been in the form of beans and eggs. Similar changes were reported by the non-poor in some CVs, and this was attributed to a combination of health education and rising prosperity. The higher consumption of beans is also influenced by the increasing cultivation of cowpeas in the region.

12.4 Impact on educational outcomes

444. The project has not improved learning outcomes according to our independent tests of children's cognitive skills. There is a negative impact on test scores at the endline (i.e. backward digit span, Easy Maths, Easy English and Advanced Maths tests) – although negative scores may result from an increased school attendance in MV areas by children of poorer backgrounds with no previous education.

445. The project has had a positive impact on all attendance indicators except for in senior secondary schools. There has been an average 8% improvement in primary school attendance as a result of the project, with the impact largest in the first and last years of the intervention. Attendance at any school by all children aged 5–18 has also increased by 5%, reflecting greater attendance by children outside the school-specific age range.

446. The project has also improved school facilities, staffing and student/teacher ratios.[184] In particular, the MVP has facilitated large changes in school infrastructure (with buildings generally in better condition in MV areas) and school supplies (alongside the other projects like Ghana Partnerships for Education Grant, G-PASS implemented by Camfed and the Girls' Education Unit) and an improvement in the number of qualified teachers. Other project improvements include MVs having better ratios for 'students to functional classrooms' and 'students to qualified teachers', more schools having toilets and all such schools having separate toilets for girls. There were also some misguided interventions by the project, such as those that attempted to increase attendance by girls. While this can only be beneficial, gender parity in education was not a core issue in the area, where more girls already attend primary, junior high and secondary schools.

447. There are also changes in staffing, with 'student to qualified teacher ratios' improving in MV areas, and fewer teachers teaching more than one class in the MV area. The PRA and RCA studies similarly find MV schools better endowed with teaching staff, although it is said[185] that this came at a cost to non-MV schools (with preferential treatment given to project schools, potentially depriving other schools). The superior teacher situation in MV schools is also the result of the project's recruitment of CEWs (a paid position) to help fill teacher deficits. The RCA study finds that many CEWs were recruited directly from the community, and their allowances have been stopped since the close of the project (although some have continued employment under other schemes, like YEA).

448. Overall, the MVP interventions have led to improvements in school facilities and numbers of staff, but without the consequential impact on learning outcomes. There is emerging (but not conclusive)

184 According to the facility survey.

185 In interviews in the PRA study, GES was said to have allocated increased numbers of trained teachers to the project's schools in response to active lobbying by the MVP.

evidence from the RCA and PRA studies that this may owe to a confluence of factors not fully addressed by the project. For example, the posting of teachers to these remote locations is viewed by some teachers as a short-term posting, and presents little motivation for them staying any length of time; and many CEWs are not eligible for allowances beyond the project lifespan. And, while we have no substantive evidence of the quality of teaching in classrooms, there are anecdotal suggestions that it is generally poor. For example, the RCA researchers observed teachers relying on chalk and talk lessons, with students simply copying sentences into their books; plus, punctuality and contact hours were observed in some areas to be limited (with teachers seen sitting around gossiping with each other). Although this is also likely to be the case in CV areas, it seems that, while the project has invested in facilities and teachers, it has not addressed other issues that affect the quality of teaching and learning outcomes.

12.5 Impact on agriculture

449. The MVP has had a sizeable impact on agricultural production (according to the household survey), with an approximately 38% rise over the period of implementation. This can be explained mostly by input increases (fertilisers, seeds, land, tractor rents and other animals/machinery for hire), with 74% of the productivity increase explained in this way. Both the PRA and the RCA studies confirm the importance of tractor hire in the area and how farmers perceive its contribution to productivity. The PRA study found that, quite consistently, women and poorer groups in the MVs noted improvements in their ability to access tractor services. Because ploughing is time-sensitive, and with the rich typically having greater economic influence and much larger farms, the poor previously simply could not have their farms ploughed in time. The PRA study also suggests that improved know-how (e.g. planting in rows and the correct plant spacing) has benefited the poor in addressing productivity and food security.

450. The land area dedicated to maize and beans has increased considerably in the MV areas, as the project enabled farmers to open up more land to cultivation (household data). The RCA study notes that people observe a big change from growing millet to maize (to which MVP has contributed) and this has enabled farmers in communities near river banks to plant a second crop of cowpeas in the dry season. The cultivation of cowpeas has become popular in the area, and the RCA finds that this practice has spread to other areas (with the CVs lagging slightly behind). There may, however, be unintended effects, particularly with the increased use of unregulated agrochemicals. Indeed, farmers told RCA researchers that they did not consume the cowpeas themselves *'as they have too much chemicals in them'* and grow small amounts among their maize closer to home where they do not intensively use chemicals.

451. The MVP has had a large impact on household food security and shortening the hunger season. The fraction of households reporting food insecurity decreased substantially in MV areas (survey data), particularly at midterm. MV also reduced the 'number of days without food in the previous month' although the impact is not statistically significant. Households continue to exploit a wide array of strategies to tide them over the hungry season. As one participant in the PRA study stated, '*We [no longer] have to sell our animals to buy food for our families; animals are [now] sold to pay senior high school fees and hospital bills.*' The introduction of maize in particular has a shorter cultivation period than millet (its main competitor for poor farmers in the area) and enables them to grow a second winter crop on the same land for the first time (e.g. cowpeas). With vastly superior resources, the MVP built on earlier efforts at promoting the shift from millet to maize production (such as by PAS and MoFA).

12.6 Concluding remarks

452. In many ways – and while the high ambitions of the project are to be admired – it is unsurprising that the MVP has made so little progress against the MDGs. Reducing poverty on this scale is very hard to achieve within a five-year period. Projects are rarely assessed against impact (or final outcome)

indicators such as the MDGs. Indeed, far from breaking the 'poverty trap', the project does not appear to have reduced poverty and hunger at all (Goal 1), although there are a few attributable effects, such as in education (Goal 2) and health (Goal 5).

453. The MVP is nevertheless a complex project, with multiple activities contributing to multiple outcomes. Our analysis has therefore gone beyond simply looking at the achievement of the MDGs at the local level and undertaken more exploratory analysis of other outcomes and impacts. With such a large investment of resources in a relatively small area (of around 35 communities), inevitably there are *some* impacts (such as on reducing stunting and severe malaria, and improving vaccinations, school attendance, agricultural productivity, food security and road access).

454. But is this impact sufficient given the size of the investment? And, by doing everything together, is there a synergistic effect that offers greater value for money than would arise through implementing individual sector-based interventions? In our cost-effectiveness analysis, we demonstrate that the project has so far not yielded sufficiently positive results, and what has been achieved could have been attained at a substantially lower cost (even when we take account of investments made for future usage). As such, the project seems to have fallen short of producing a synergistic effect; and the impact is not large enough for the project to be regarded as cost-effective, even when each sector is assessed independently of the others. Of course, in the longer run, the MVP may produce welfare gains. Importantly the investments in improving the health care service may enhance health outcomes later on; or other considerable investments in infrastructure (roads, health and school facilities) may have an impact on future outcomes.

455. Perhaps then, the most concerning findings are the early indications that the MVP approach will be difficult to be sustained by district institutions and at the community level; and there are signs that any gains made under the project are already being undermined. District assemblies in Ghana are often cash strapped because they are unable to generate revenue of their own, and the funds they receive from central government (the District Assembly Common Fund) are often three quarters in arrears. According to district officials, there is no qualitative difference in capacity as a result of the MVP because the project created a parallel structure (e.g. funds did not make use of district tender boards, payments were direct to the accounts of individual district staff etc.). Furthermore, it is their view that the MVP did not have a thought through exit strategy, particularly on how to sustain many of the 'free service' interventions (free ambulance services, supply of medicines to CHWs, subsidised tractors, monthly allowances to district officials or CHWs and CEWs).

456. In short, the evaluation finds that there were improvements, but these are relatively small and insufficient to reduce poverty (MDG 1) and break the poverty trap. This was also confirmed by the cost-effectiveness analysis that demonstrated the expected synergies failed to materialise, and many of the impacts observed could be achieved with fewer resources.

Appendix 1: Terms of reference

PO 5603 MV EVALUATION: TERMS OF REFERENCE

Title:	Impact Evaluation of a New Millennium Village in Northern Ghana

1. Introduction

1.1 The UK government's Department for International Development (DFID) manages Britain's development assistance to poor countries and works to eradicate extreme poverty. We are led by a cabinet minister, one of the senior ministers in the government. This in itself is a sign of how determined the UK government is to tackle poverty around the world. Guided by these principles, DFID works across the world on a bilateral basis with partner countries, with multilateral organisations and with civil society.

1.2 The GoG and DFID will be working with the Millennium Promise Alliance to implement a Millennium Village (MV) in northern Ghana. The MV project will commence in late 2011 and will last five years. The MV model is already being implemented in a range of sites across sub-Saharan Africa, where it is now entering a second five-year phase.

1.3 The MV model provides an integrated package of interventions to lift a rural community out of poverty. Its central hypothesis is that a local 'big push' addressing the most immediate capital deficiencies in communities and households is a necessary condition for reaching a threshold required to move towards local resilience and self-sustaining economic growth. Key to this is improved agricultural productivity and market development, enabling people in rural areas to save and accumulate wealth, stimulating investment and diversification into non-farm work.

1.4 The MV projects across Africa have set up comprehensive M&E systems. These are used to continually assess progress and adapt implementation mechanisms. The datasets produced have also fed into MV reports, including on results achieved. However, there is a noticeable gap in evidence of the model's overall effectiveness. A key MV report of results achieved was based on before-and-after analysis within the MV sites,[186] leading to criticism of the results attributed to the MVs and the lack of independent rigorous evaluation.[187] DFID has agreed with Millennium Promise Alliance that funding for a new MV in northern Ghana will be accompanied by such an independent evaluation, to provide robust evidence on the effectiveness of the MVP approach.

2. Objectives

2.1 DFID wishes to invite suitably qualified organisations to implement a robust independent evaluation of the new MV in northern Ghana. The evaluation will cover up to a 10-year period – subject to programme renewal – to answer evaluation questions of importance to the GoG, its Savannah Accelerated Development Authority (SADA), local stakeholders, DFID, and the international development community.

2.2 The evaluation will cover the costs of generating, analysing and quality assuring data, producing reports, and widely disseminating the results of the evaluation. The independent evaluation will build

186 For example, Michael Clemens and Gabriel Demombynes (November 2010), 'When Does Rigorous Impact Evaluation Make a Difference? The Case of the Millennium Villages',', World Bank Policy Research Working Paper 5477.

187 See for instance, DFID (2011), 'UK Aid: Changing lives, delivering results.'

on, expand and validate the MV project's own M&E of the MV site and their selected comparison site. It will include establishing baselines, ongoing evaluation during the implementation phase and, subject to further agreement, continued evaluation after completion of the five years of direct implementation by the MV project.

3. Recipient

3.1 The recipient is DFID, with the project being managed by the DFID Ghana office.

4. Scope of services

4.1 Appropriate methodologies will be used to answer the four key questions underpinning the evaluation of the MV in northern Ghana:

i. Does the MV *deliver on promises to reach the Millennium Development Goals* (MDGs) within the MV site?
ii. Are the positive impacts of the MV *sustainable* after direct implementation of the MV project has ended?
iii. Is the MV intervention package cost-effective in the results it achieves, compared with possible alternatives?
iv. What *externalities or spillover effects* does the MV generate, and do they significantly add to or detract from the positive impacts that might be achieved within the MV site?

4.2 Besides the four main evaluation questions listed above, key stakeholders have also raised other issues that need to be explored in the evaluation. In particular, the methodology and evaluation will aim to also examine:

a. Does the MV package *empower disadvantaged or marginalised* groups (e.g. females, the disabled, or the elderly)?
b. Does the MV achieve *additional benefits arising from synergies* across implementation of an integrated package of interventions?
c. Does the MV address common issues relating to *agriculture, infrastructure, or social and economic concerns*?[188]

4.3 Given the aim of evaluating the MV model as it will be applied in northern Ghana, the evaluation methodologies employed will not require a change in MV implementation. This is likely to preclude the use of randomised control trials, due to the nature of the MV's integrated package of interventions across a single site. However, proposal of any evaluation methodologies, including randomised approaches, will be considered if they are feasible, cost-effective, and able to answer the key evaluation questions.

4.4 At this point in time, the Evaluation Advisory Group for this independent MV evaluation considers that a difference-in-difference approach with mixed methods is the most likely approach to be able to meet the criteria.[189]

4.5 The independent evaluation will work with the MV project to identify appropriate comparison sites and may need to suggest additional variables to be used in the village matching process.[190]

188 Examples of questions relating to agriculture, infrastructure, and social and economic concerns are in the field visit report included in the list of documents.
189 A DFID team visited the proposed MV site in Northern Ghana and compiled a description of the site and a potential evaluation approach. Selected sections of the Visit Report are included in the accompanying documents.
190 The field report contains the current village matching checklist used by the MVP.

4.6 Surveys at the MV site and comparison sites will take place in year one (baseline) and at least twice more during the five-year MV direct implementation period.

4.7 Spillover effects in areas adjacent to the MV (and possibly beyond) will need to be assessed. Various methods could be employed for this but must be cost-effective given the primary emphasis on evaluation of impacts within the MV site.

4.8 DFID's funding to the MV in northern Ghana will be subject to a midterm review in year three. This will determine if there is sufficient evidence of progress against its objectives to justify completing the full funding to Year Five. The independent evaluation will play an integral role in this midterm review, providing a report on progress, assessing cost-effectiveness, and producing a cost-benefit analysis of the MV in northern Ghana based on the evidence available at that point.

5. The requirements

5.1 The evaluation must be carried out by researchers with a recognised international reputation and practical experience of rigorous impact evaluation. The evaluation must reflect the local context. It must be independent, robust, and credible. Findings of the evaluation should be published in stand-alone reports and through peer-reviewed journals.

5.2 The independent evaluation is being funded, sourced, and delivered separately from:

- The main project under which DFID will fund the implementation of a new MV in northern Ghana.
- The MV project's own internal arrangements for M&E. These will continue during the MV project period. They are essential for the MV's own management and implementation and will also provide a major portion of the data required for this independent evaluation.

5.3 Where data generated internally by the MV project are used, independent verification is required, if necessary on a sampling basis. The independent evaluation will need to verify the accuracy of surveys conducted by the MV project. The independent evaluation will be responsible for choosing the scale of surveys and the degree of sampling required, but methodologies must comply with generally accepted best practice. The independent evaluation will also review all survey instruments before they are sent to the field.

5.4 Additional survey modules or data collection methods may be required to address the key evaluation questions listed above.[191] The independent evaluation may need to work with the MV project to include additional modules in their surveys.

5.5 All findings, datasets, and methods for the evaluation component project must be published and made available to allow researchers to replicate findings. Publication in peer-reviewed journals should be an objective.

5.6 Participation will be expected in various fora, including international and national conferences, particularly in later years as evidence emerges. This will require high calibre expertise in presenting and debating findings. Costs of participation in such events will be borne by DFID or other parties.

6. Constraints and dependencies

6.1 *DFID Ghana will provide a grant totalling US$18.1 million over five years for implementation of the new Millennium Village in northern Ghana. This includes resources for the implementation of the MV,*

191 A draft of the current survey tools that are used by the MVP is included in the accompanying documents.

as well as technical support required to run the MV project's own M&E systems. The scale of the independent evaluation of the MV project will need to reflect the size of the MV, the degree to which the MV project's own M&E systems can be used and the extent to which their data will need to be validated, the need for any comparison sites in addition to the single comparison site to be selected and monitored by the MV project, and the intended 10-year period of the evaluation. The time frame for the initial provision of independent evaluation services will be for five years, but the evaluation framework that is designed should be for a full 10-year period.

6.2 The evaluation must remain independent of the MV project's own M&E processes but, at the same time, the evaluation team must work closely with – and can expect full cooperation from – the MV project, including the team working specifically on M&E for the northern Ghana site, and associated MV organisations.[192] Consistency is crucial between information collected from within the MV and MV-comparison site led by the MV project, and any additional comparison sites that might be led by the independent evaluation. It may be possible to contract the MV project's M&E resources to carry out data collection in additional comparison sites. It may or may not be possible to utilise M&E resources associated with the MVs during the five-year period after direct implementation of the MV in northern Ghana ends.

6.3 There are numerous factors that could have implications for the independent evaluation. For instance, the migration of households into and out of the MV site, and exogenous shocks within the MV site, nearby, or at a national scale. Such problems need to be considered and mitigating actions proposed; for instance, maintaining a statistically valid sample size in the MV and comparison sites will be crucial.

6.4 We do not want to be overly prescriptive on staffing arrangements but expect the evaluation team to put forward a highly experienced small core team of international and national experts, and a network of local field workers, who will be present at the site during key stages. It is also natural to expect a turnover of personnel during the life of the evaluation. Plans and mitigation measures need to be outlined.

6.5 The site is situated in a remote part of northern Ghana, two hours' drive from Tamale, the capital of Northern Region (which itself is 10 hours by road, or a 75-minute flight, from Accra). Local access is via basic non-paved roads. Movement across the middle of the proposed site can become restricted in the rainy season when the White Volta River floods, which is why a portion of the site is referred to locally as '*the overseas*'.

6.6 In addition to developing a strong working relationship with the MV project at the site and with MV organisations outside Ghana, the evaluation team will need to engage with other stakeholders. For instance, with local communities, district and regional officials, the SADA, national government agencies such as the National Development Planning Commission and the Ghana Statistical Service, and other organisations providing and assessing the impact of external assistance to the area (for example, the Millennium Challenge Corporation, CARE, and IPA/JPAL).

7. Reporting

7.1 The independent evaluation will report regularly to DFID Ghana's MV Advisor.

7.2 Annual reviews of the independent evaluation will be conducted by DFID, which will require full cooperation from the independent evaluation team, including providing an annual progress report

192 Such as the Millennium Promise Alliance based in New York, the Earth Institute at Columbia University, and the MDG Centre for West and Central Africa based in Mali.

against the logframe. These annual reviews will be determined by DFID's internal reporting requirements and may not fit with the schedule of MV surveys.

7.3 An Evaluation Advisory Group, organised by DFID, will guide the strategic direction of the independent evaluation, signing-off on key reports and outputs. This Advisory Group will include representatives of DFID, GoG, the MV project team and other key stakeholders. The Advisory Group will play a key role in agreeing the final design for the independent evaluation and is expected to meet at least before and after each major survey event (including initial establishment of baselines).

8. Timeframe

8.1 The independent evaluation will be designed for a 10-year period, to allow for assessment of sustainability of the MV's impacts but will be contracted initially for a five-year period.

8.2 The five-year MV intervention is scheduled to start its set-up phase in late 2011, with a detailed design phase of up to six months. All subsequent interventions will be sequenced according to the needs of local circumstances, as determined by the MV project. The MV project's own M&E, establishing detailed baselines, will commence during the design phase.

8.3 The parallel implementation of the Millennium Village and the independent evaluation is critical. Therefore, thorough baselines need to be established very rapidly. Major MV interventions are likely to start in the first few months of 2012. The independent evaluation needs to finalise its approach, identify survey locations and methods and commence validation of MV baselines and/or establish additional data collection early in 2012. An indicative initial timeline is outlined below.

Table 52: Output timeline

Date	Output
w/c 3 October	Pre-bid workshop. A half-day conference will be held in East Kilbride, Scotland, organised by DFID, for the MV project to outline their approach to implementation and to M&E, and to enable potential bidders to ask questions of the MV team and of DFID, for instance on survey methods and how new modules could be incorporated
7 November	Deadline for bid submission
w/c 21 November	Notification to all candidates of ITT outcome (NB there is a chance that bidders are expected to be invited for follow-up interviews up to this point)
December 2011	Contract signed. Initial design of the evaluation commenced
By end January 2012	Detailed design agreed with the Evaluation Advisory Group
February 2012	Baseline field activities completed

8.4 In view of the long-time horizon and to allow for changes during the lifetime of the contract, annual review points will be planned. The initial evaluation contract will be let for a period of up to five years in the first instance and will include break points at the end of Year One and Year Three. Progression from one period to the next will be subject to the satisfactory performance of the service provider, the continuing requirement for the services, and agreement on work plans and budgets for the following period.

8.5 At the end of Year Five, DFID will review the requirement, the performance up to that point, and the future scope – to determine whether the independent evaluation should continue to be conducted by the service provider. The contract could then be extended for a period of up to five years, with timing of break points for that extension agreed at that time.

9. Outputs

9.1 The independent evaluation will produce the following outputs:

I. An IDD within the first six weeks of contract exchange, outlining features of the proposed evaluation framework including key evaluation questions, methodologies to be employed, selection of comparison sites, and ways of working with the MV project and other key stakeholders. Key critics of the MV approach will be consulted on proposed evaluation design options before they are finalised.
II. Baseline surveys completed within the first six months of the implementation of the MV project.
III. Annual Progress Reports, based on DFID's logframe for the independent evaluation, to fit into DFID's internal reporting schedule.
IV. After each survey round, an initial report on evaluation approaches and data issues, and a detailed report following analysis of the data and other information.
V. Midterm report on the northern Ghana MV, assessing cost-effectiveness, and a cost-benefit analysis based on the evidence available at that point.
VI. 'Final Report' on the northern Ghana MV in Year 5, including answers to the key evaluation questions. A separate, easily understood summary of the evaluation findings.
VII. Data and reports available in the public domain, as quickly as possible.

10. DFID coordination

10.1 The DFID Ghana MV Advisor will be the direct point of contact in DFID for the independent evaluation and will arrange meetings of the Evaluation Advisory Group.

11. Background

11.1 Ghana has succeeded in reducing the national rate of poverty from 52% in 1992 to less than 29% in 2006.[193] This national-level improvement, however, has not been spread evenly. The dry northern savannah in particular experiences persistently high levels of poverty, estimated to be 69% in 2006.[194] There have been concerted efforts for decades to reduce the stubbornly high rates of poverty in the north[195] but with little success. The region exhibits the characteristics of what Jeffrey Sachs calls a 'poverty trap' deriving from a paucity of various forms of capital. GoG acknowledges the particular challenges faced by the north and in 2010 created the semi-autonomous Savannah Accelerated Development Authority (SADA). The associated SADA Strategy, 'A Sustainable Development Initiative for the Northern Savannah', emphasises 'transforming the northern Ghanaian economy and society into a regional nexus of increased productivity of food and a buffer against persistent droughts and sporadic floods'.

11.2 Sachs's ideas for tackling the 'poverty trap' have been taken forward in the form of Millennium Villages (MVs), through the non-profit organisation Millennium Promise. There are currently 12 MV sites being implemented across Africa, assisting communities to lift themselves out of extreme poverty. This is a 'big push' approach, providing an integrated and intensive programme of support and community development to people within a defined area, seeking to show how the Millennium Development Goals (MDGs) can be achieved by 2015, even in very poor rural areas of Africa.

11.3 The first MVs commenced in 2006. Their average results are reported as including a seven-fold increase in the use of bed nets among children, maize yields having tripled, and access to improved

193 Ghana Living Standard Surveys (GLSS) 3 and 5, conducted in 1992 and 2006.

194 CEPA and ODI (October 2005), 'Economic Growth in Northern Ghana', for DFID.

195 World Bank staff calculations, based on GLSS5 in 2006.

drinking water higher by 50 percentage points. However, the MVs have been subject to criticism, particularly related to the lack of rigorous independent evaluation of their impact. For instance, some results reported for MVs based on before-and-after comparison were found to have occurred to a similar degree in other sites within the same country. Critics suggest that it is unsurprising that channelling significant resources to a relatively small population will have some beneficial impact. Key questions, however, are around the **cost-effectiveness** and the **sustainability** of this approach. For instance, could the impacts achieved at MV sites be achieved at a lower cost through alternative approaches? And are the impacts sustained once the substantial pulse of increased resources to the area comes to an end? This independent evaluation project aims to provide evidence to help answer these questions.

11.4 The MV would represent an innovative approach to addressing the chronic poverty that afflicts north Ghana. It fits well with DFID's increased emphasis on innovation and on achieving real development results. It would be in line with DFID Ghana's new Operational Plan that proposes increased focus on the poor north of the country. The proposed MV is being closely coordinated with the SADA, to which DFID is providing institutional support in order to create an effective vehicle for facilitating and coordinating just this sort of development initiative. A separate Business Case is being developed in parallel for funding of the MV site in northern Ghana. However, given the innovative nature of the approach, and the high-profile debate that has surrounded it, DFID has agreed with the MV project that any support to a new MV would be accompanied by rigorous independent evaluation of the approach.

11.5 The aim of the independent evaluation is to strengthen the evidence base around MV interventions to inform decisions on possible scaling up, and to assess value for money from the use of UK taxpayer resources. The objectives of the evaluation are therefore to use rigorous and credible methods to:

a. Estimate the impact of the MV package of interventions within a cluster in northern Ghana over a 10-year period, reporting at regular intervals as data become available; and
b. Assess its cost-effectiveness compared with credible alternative uses of the resources.

11.6 The MV project team has produced a detailed discussion paper on how evaluation could be conducted of the proposed MV in northern Ghana. It notes that random sampling across a set of MV sites and control sites is not possible, given that this is effectively a single community-level intervention, with interventions delivered across the cluster, so that it is difficult to split part of the MV site to assess various interventions. However, the paper notes that key evaluation questions can be answered by employing a mix of evaluation methods, including:

- longitudinal household-level assessments over time;
- periodic assessment of impacts against interventions;
- non-randomised 'plausibility' evaluation against a separate local matched comparison group;
- comparison against a separate intervention such as cash transfers;
- comparison against regional trends;
- 'stepped-wedge' assessment of interventions introduced sequentially within parts of the MV.

11.7 These various options, and others, will be considered during the initial determination of feasibility and key design features of the independent evaluation.

12. Competition criteria

12.1 The consultants need to demonstrate proven experience in working on monitoring and impact assessment comparable to that of rural Ghana, including fieldwork. They need to demonstrate a

thorough grasp of the issues and present realistic M&E solutions directly related to the MV in northern Ghana.

12.2 Bids will be reviewed according to the following criteria (and weightings):

- Quality of Personnel (including, but not limited to, appropriate seniority/expertise, appropriate mix of skills, contacts/networks) **(30%)**
- Evidence of capacity to undertake work as set out in ToR **(20%)**
- Methodology (including use/numbers of days input) to develop cost-efficient innovative solutions to answer the evaluation questions **(25%)**
- Commercial **(25%)**

13. Performance requirements

13.1 The impact of the project will be better informed, evidence-based decision making that increases the effectiveness of future development interventions, based on improved understanding of the effectiveness of the MV model and integrated rural development approaches, and how to evaluate them. The success of the project will be determined by progress against the logical framework (included in the annex pack).

14. Format and content of responses

14.1 Bid responses should not exceed 50 pages (size 12 font, single-spaced lines), excluding CVs and other annexes. There is no obligation for evaluators of the bids to read the latter.

14.2 The Invitation to Tender documentation contains full guidance for suppliers. Suppliers must raise any questions relating to the ToR using the process for tender clarification set out.

22 September 2011

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Appendix 3: Glossary of key terms

This appendix provides definitions of key terms and focuses on explaining how specific indicators are defined and calculated.

The poverty headcount is the proportion of individuals in the population whose inferred income is below the national poverty line (the minimum level of expenditure required to allow the consumption of a basic basket of goods defined by the Ghana Statistical Service). We consider two poverty lines: a general poverty line, including a basket of basic food and non-food items, and a food poverty line, which only includes the minimum food requirements. The poverty headcount obtained in this way is easy to calculate and to understand but it is not an ideal measure of poverty as it is insensitive to the distribution and depth of poverty. Suppose consumption by a group of previously poor people drops dramatically, the poverty headcount will not change, though welfare of the population has considerably decreased. In other words, the poverty headcount is insensitive to changes in the distribution of poverty among the poor and, as such, is by itself not an appropriate indicator to assess the impact of public policies.

The poverty gap, unlike the poverty headcount, is sensitive to the distribution of poverty among the poor. The poverty gap is the percentage expenditure gap from the poverty line for the poor averaged across all the population. A reduction in expenditure by the extremely poor will increase the proportionate gap and will increase the poverty gap. The poverty gap therefore increases when the poor get worse off even if the poverty headcount remains unchanged. A drawback of the poverty gap is that it does not capture the severity of poverty. Suppose a monetary transfer is made from the poorest household to a less poor household, the poverty gap does not change while the severity of poverty has increased as the poorest person became even poorer.

The squared poverty gap is a measure that reflects the severity of poverty. The squared poverty gap is calculated in the same way as the poverty gap after squaring all gaps from the poverty line in order to give more weight to larger gaps, those of the extremely poor. One difficulty with the square poverty gap, and to some extent with the poverty gap, is that they are difficult to interpret. Poverty gap and squared poverty gap rates do not have obvious meaning unless they are compared across time or across populations. Poverty gap rates become useful, as in our case, when comparing groups or when looking at poverty trends over time. In particular, when making comparison across groups or over time, the poverty headcount tells us about differences and changes in the prevalence of poverty: with the poverty gap telling us about differences and changes in *the distribution of poverty*, while the squared poverty gap says something about differences and changes in *the severity of poverty*.

Expenditure is the sum of all goods and services consumed by the household over a year. Goods include food as well as non-food items and are used to calculate whether a household falls below the poverty line. Since market development in the area is limited, much of expenditure consists of consumption of own production of food and does not necessarily imply monetary transactions. The survey questionnaire reports the quantities of food items consumed by the household, whether purchased or produced in the farm. The monetary value of production is then imputed using best available prices for each commodity. Non-food items include expenditure in education, health, energy and transport. Purchases of durable goods are not included, but a monetary valuation of their annual value contribution to the household is performed. Similarly, housing rents are not available but, based on household housing conditions, we impute the monetary value of housing. Our surveys were conducted over a two-month period and in order to avoid seasonal bias in reporting of expenditure, most questions (including food expenditures) have a 12-month recall. All expenditures were then adjusted using the regional and monthly consumer price index provided by the GSS. All expenditures are in 2012–13 prices (the year in which the national poverty line was set) and are therefore comparable in real terms across the years.

Income is the sum of all revenues minus costs for each household and each sector of economic activity. As in the case of expenditure, production of goods not sold in the market is valued at best available market prices. The largest component of the income questionnaire collects data on all crops produced in each land plot and the amount of fertiliser, hired labour and other inputs used in the production process.

Livestock income includes a valuation of the change in animal stock over 12 months, as well as the value of animal food and non-food goods produced (such as, for example, milk and skins) and the costs incurred in production (such as, for example, fodder and veterinary costs). Each household member reported any income from wage employment for all jobs entertained over the year before the survey. All business (such as petty trading, small shops, food processing and the like) carried out by household members reported revenues and costs in a typical month or year. Finally, households reported all monetary transfers received from government programmes, relatives and other donations and gifts. As in the case of expenditure, figures were collected using a 12-month recall and were subsequently adjusted for regional and monthly price changes.

Adult equivalents by sex and age is employed by the GSS in the calculation of expenditure and income figures that were set in the late 1980s. They are based on recommended food intakes by age and sex obtained from the following test: '*Recommended Dietary Allowances*', 10th Edition, Washington DC: National Academy Press, 1989. See Table 53 below.

Table 53. Recommended dietary allowances

Age	Male	Female
0 to 5 months	0.26	0.26
6 to 11 months	0.29	0.29
1 to 4 years	0.45	0.45
5 to 6 years	0.62	0.62
7 to 10 years	0.69	0.69
11 to 14 years	0.86	0.76
15 to 18 years	1.03	0.76
19 to 50	1.00	0.76
Older than 50	0.79	0.66