MORE THAN WATER

THE EFFECTS OF WATER, SANITATION AND HYGIENE INTERVENTIONS OF THE ONE MILLION INITIATIVE IN RURAL MOZAMBIQUE
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More Than Water: The Effects of Water and Sanitation Interventions of the One Million Initiative in Rural Mozambique

United Nations Children’s Fund
Three United Nations Plaza
New York, New York 10017

April 2017

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ACKNOWLEDGEMENTS

This evaluation is the result of programme, measurement and reporting efforts extending from 2007 to 2017. Gratitude is due to all the persons and institutions that played key roles, including the following:

1. The Government of Mozambique, which was primarily responsible for implementing the One Million Initiative (OMI) according to its national water and sanitation policy. Particular thanks are extended to Felicidade Paulo and Messias Macie of the National Water Directorate.

2. UNICEF Mozambique, which was the technical counterpart for the OMI in all policy, implementation and monitoring and evaluation issues. Particular thanks are extended to Sam Godfrey, Americo Muianga, Matteus Van Der Velden, Alberto Cumbana, Delfim Nhassavele, Carlot Muianga, Manuel Freitas, and Angelina Xavier. As the monitoring and evaluation focal point for the programme over much of its life, Matteus deserves special thanks.

3. The Government of the Netherlands, which was the major funder of the OMI, and rendered technical support in particular regarding programme design and at both the baseline and mid-line data gathering and reporting moments that are used extensively in this evaluation. Particular thanks are extended to Dick van Ginoven, Pim van der Male (DGR) and Rita Tesselaar (IOB).

4. The technical partners that gathered and analyzed the data at each stage of the evaluation, and then sent clean and clear data to the programme managers and evaluation report writing team. Particular thanks are extended to Dr. Jan Willem Gunning, Dr. Chris Elbers (Amsterdam Institute for International Development), WE Consult (www.we-consult.info) and Royal Haskoning DHV (www.rhdhv.co.mz).

5. The report writing team for this final report, who were able to build on the efforts of earlier reports as well as the data generated for the end-line survey. Particular thanks are extended to Matteus Van Der Velden, Mark Henderson and Sue Cavill for both technical reviews and drafting assistance, to Alexis Martin for copy-editing support, and to Celeste Lebowitz for formatting and dissemination support.

This report has been authored by Samuel Bickel, Senior Advisor of the Evaluation Office of UNICEF Headquarters in New York. He accompanied the OMI programme evaluation efforts from 2008 through this report. Any errors of fact and interpretation should not be attributed to those partners thanked above; they are the responsibility of the Evaluation Office alone. Of course, if the report is impressive, then the Evaluation Office accepts the credit.

Comments on this report may be directed to the UNICEF Evaluation Office at evalhelp@unicef.org.

Persons wishing to know more about the water, sanitation and hygiene (WASH) programme of UNICEF in Mozambique are directed to the UNICEF Mozambique web site at [url].

Persons wishing to know more about UNICEF’s WASH programming as a whole are directed to the UNICEF WASH web site at [url].

Persons wishing to review the other impact evaluations commissioned through the Government of the Netherlands programme to examine WASH impacts, of which the Mozambique OMI programme was one of five, are directed to the web site [url].
### ABBREVIATIONS AND ACRONYMS

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>AIID</td>
<td>Amsterdam Institute for International Development</td>
</tr>
<tr>
<td>CFS</td>
<td>Child-Friendly Schools for Africa Initiative</td>
</tr>
<tr>
<td>CFU</td>
<td>Colony Forming Units</td>
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<tr>
<td>CLTS</td>
<td>Community-Led Total Sanitation</td>
</tr>
<tr>
<td>DPOPH</td>
<td>Departamento Provincial das Obras Públicas e Habitação (Provincial Directorate of Public Works and Housing)</td>
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<tr>
<td>GPS</td>
<td>Global Positioning System</td>
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<td>HDI</td>
<td>Human Development Index</td>
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<tr>
<td>INE</td>
<td>Instituto Nacional de Estatistica (National Statistics Office)</td>
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<tr>
<td>IWP</td>
<td>improved water point</td>
</tr>
<tr>
<td>MDG</td>
<td>Millennium Development Goal</td>
</tr>
<tr>
<td>MZN</td>
<td>Mozambican Metical</td>
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<tr>
<td>NGO</td>
<td>non-governmental organization</td>
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<tr>
<td>OD</td>
<td>open defecation</td>
</tr>
<tr>
<td>ODF</td>
<td>open defecation free</td>
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<tr>
<td>OMI</td>
<td>One Million Initiative</td>
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<tr>
<td>PEC</td>
<td>participação e educação comunitaria (community participation and training)</td>
</tr>
<tr>
<td>PHAST</td>
<td>Participatory Hygiene and Sanitation Transformation</td>
</tr>
<tr>
<td>PRONASAR</td>
<td>Programa Nacional de Água e Saneamento Rural (National Rural Water Supply and Sanitation Programme)</td>
</tr>
<tr>
<td>PRS</td>
<td>Poverty Reduction Strategy</td>
</tr>
<tr>
<td>PSU</td>
<td>programme sampling unit</td>
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<tr>
<td>SDPI</td>
<td>Servico Distrital de Planeamento de Infraestrutura (District Planning and Infrastructure Services)</td>
</tr>
<tr>
<td>SINAS</td>
<td>National Information System for Water and Sanitation</td>
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<tr>
<td>UNICEF</td>
<td>United Nations Children’s Fund</td>
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<tr>
<td>WASH</td>
<td>water, sanitation and hygiene</td>
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<td>WHO</td>
<td>World Health Organization</td>
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EXECUTIVE SUMMARY

Context

Programme Overview

The One Million Initiative (OMI) was implemented as part of a regional partnership between the Government of Mozambique, the Government of the Netherlands and UNICEF, which aimed to enhance water supply, sanitation and hygiene in Eastern and Southern Africa. The initial duration was from 2006 through 2012, but was extended to 2013 with ‘top-up’ funding. The objectives were to reduce the incidence of water- and sanitation-related diseases, particularly among children and women living in rural areas. The overall purpose was to enable a minimum of 1.2 million unserved people to use domestic water from improved water sources; to enable 1 million people to use improved sanitation facilities and adopt safe hygiene practices; to enable 140,000 schoolchildren to access and use improved sanitation, handwashing and water supply facilities in 400 primary schools; and to ensure that 200,000 users had renewed access to safe water through the rehabilitation of their non-operational water points.¹

More specific targets were also set in relation to the baseline situation in the three central provinces where the programme was targeting 18 districts:

1. Increased access to and use of safe drinking water rising from 44 per cent, 46 per cent and 67 per cent to at least 70 per cent by 2012 in each of the target provinces;
2. Increased access to and use of improved sanitation facilities from an average of 42 per cent to at least 50 per cent in the target provinces;
3. Increased enrolment and retention of girls in 400 primary schools;
4. Increased to at least 1 million caregivers applying safe hygiene practices in the project area;
5. Reduction of non-operational water points from 30 per cent to 15 per cent in the project area.

Supporting objectives in institutional development were set. The purpose of this component was to strengthen sector capacities (particularly at the sub-national level) to plan, coordinate, implement and supervise sector activities and to document and disseminate lessons learned and good practices.

When OMI was launched in July 2006, Mozambique had already made substantial progress towards developing policies and approaches for rural water and sanitation. OMI worked within these existing frameworks. Its approach to rural water supply focused on community water points (mainly new, some rehabilitated) equipped with hand pumps and managed by new or revived village water and sanitation committees that were supported by non-governmental organizations (NGOs) skilled in community mobilization and institutional support. Community ownership of the water supply infrastructure meant responsibility for operation and maintenance costs. OMI also emphasised private sector involvement, particularly in the hardware aspects of construction, supervision, repair work or spare parts supply.

Drawing on the lessons of prior sanitation programming experience that showed a need for methods that were easier to master and more focused on changing behaviour, OMI introduced the Community-Led Total Sanitation (CLTS) approach in Mozambique. CLTS triggering is a direct and confrontational process in which people are plainly shown the links

between the faeces they leave in the open and the frequent contamination of their hands, the food they eat and the water they drink. If successful, triggering induces every household in the community to build a latrine and motivates every individual to give up the practice of open defecation (OD). Communities then commit to be designated open defecation-free (ODF) within a given timeframe. In 2010, the approach was modified (ODF+) to include essential hygiene behaviours such as handwashing with soap.

The CLTS approach was also used in education, termed School-Led Total Sanitation. UNICEF had supported the inclusion of WASH education in the school curriculum since 2001. OMI introduced School-Led Total Sanitation within the districts in the programme area that were already embraced in the Child-Friendly Schools for Africa Initiative (CFS).

Policy and geographic setting

Rural water supply policy at the time of OMI’s start was based on the following key policy principles:  
- As a highest priority, satisfying basic human needs for water, especially for the poor;
- Providing 20 litres of improved water per person per day from wells or boreholes with hand pumps;
- Ensuring a maximum of 500 people per water point, based on enumerated populations;
- Placing water points within a 30-minute walk for users;
- Pricing water at its ‘economic value’ to cover the costs of operation, maintenance, repair and replacement of equipment;
- Government responsibility for investments through regulation, facilitation and priority setting;
- Institutional capacity building, with emphasis on the district and community levels;
- Communities participating in all project phases through local consultative institutions;
- Direct service provision (e.g. for construction and project supervision) should be carried out by the private sector.

Three rural provinces were chosen as the intervention zones based on need, partner presence and a joint commitment to the policy principles. The rural economies of Manica, Sofala and Tete provinces are dominated by subsistence agriculture; in 2008, 86 per cent of households reported agriculture as their most important economic activity and only 6 per cent of households reported permanent paid employment. Nationally, the proportion of rural residents living in poverty was estimated at 55 per cent.

Impact assessment design and methodology

Origin and scope

UNICEF and the governments of Mozambique and the Netherlands agreed to include OMI in a global series of impact evaluations of Dutch-funded rural water and sanitation interventions. The impact evaluation effort was managed by the Netherlands Ministry of Foreign Affairs, Policy and Operations Evaluation Department, the Government of Mozambique, UNICEF Mozambique and the UNICEF Headquarters Evaluation Office.

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The objective of this impact assessment is to estimate the impact of a large-scale intervention on the use of WASH services and changes in hygiene practices. Identifying impacts to a level of acceptable certainty requires an appropriate set of methods and careful implementation followed by careful analysis. To attain the necessary certainty, a detailed baseline survey of 1,600 households was undertaken in August–October 2008, followed by a mid-term survey in 2010. In 2013, a final survey collected end-line data. This report therefore contrasts 2008 with 2013, and frequently shows the 2010 mid-point and differences between earlier and later programme results.

Key methodological issues

OMI was large-scale in that as much as 50 per cent of the population in the programme area was exposed to one or more elements of the programme over its life. Some communities received both rural water and the sanitation/hygiene interventions whereas others received just one or the other. Some communities were exposed to the programme during the 2008–2010 period; others just after 2010; and still others both before and after the 2010 mid-line survey. The school sanitation interventions were limited to the school-going population but the school water interventions covered both the school and the host community. Good record keeping by OMI meant that a full intervention history was available for each community.

A sample was drawn of 80 communities from 9 of the 18 districts covered by OMI. Nine districts were selected to reduce the logistical costs of data gathering across the full 18 districts. The districts selected and those not selected were similar in terrain, ethnicity, mean community size, government presence, community social structure and prior WASH programme exposure. Half of the sample was representative of the general population. Tracking what happened in this set of communities—which included both intervention and non-intervention locations—offered insight into overall programme impacts. The other 40 communities were drawn from a poorer, target section of the population. The sample of the poorer segment of the population was expected to get relatively more new safe water points and be more intensively affected by OMI.

The survey followed a panel design. Households visited in the 2008 baseline were marked by Global Positioning System (GPS) coordinates. These households were revisited in both 2010 and 2013. Out-movers in later rounds were replaced by the nearest household not already in the panel. In each of the sample communities, the following surveys were carried out:

1. A household survey from a systematic sample of 20 households selected from a randomly chosen contiguous group of approximately 100 households. This survey covered general household characteristics, health and water and sanitation/hygiene practices. The enumerators also made observations of the environment.
2. A focus group discussion was conducted in the neighbourhood of the sample households.
3. A water point survey was conducted in the same neighbourhood. This meant visiting the water point(s) used and gathering information about them.
4. Water samples were taken at a selection of households (10 per cent of sample) and at the water sources used by these households to test for microbiological contamination.

These several data sources, each collected in 2008, 2010, and 2013, represent the majority of the data used in this report. OMI programme records constitute an equally valuable information base. Both simple and complex statistics are presented. The household data, in particular, were sufficiently robust to permit regression analysis. The surveys were conducted by Mozambican research firms and governmental staff, with training and support from the Government of the

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6 The survey resulted in the More than Water impact report (IOB, 2011).
The results and the causality sections of this summary examine whether the explicit and implicit goals of the programme were met and the degree to which the programme was responsible for meeting them. The results segment presents the changes measured over the life of the programme and contrasts them against what OMI targeted or wished to see happen. However, the trends—even if positive—could reflect factors other than OMI. Consequently, the causality segment further explores which results can be linked to OMI activities, and the ways in which OMI caused or failed to cause change.

Results overview

Taking all results together, the trend is broadly and firmly positive. Of the 22 results discussed, 16 show that OMI targets were probably/mostly/definitely met or exceeded. Five of the results do not show the movement or achievement that had been sought, and one could not be calculated.

Results achieved against OMI programme-wide goals

**Goal 1a: Increased access to and use of safe drinking water from 44 per cent, 46 per cent and 67 per cent to at least 70 per cent in Manica, Sofala and Tete provinces, respectively, by 2012**

This goal was probably met, though there is some uncertainty due to data issues. The coverage in the combined intervention and non-intervention areas increased from 25 per cent to 40 per cent. This 60 per cent growth surpasses the growth rate needed to meet the target.

**Goal 1b: A total of 1.2 million persons benefit from improved water points, combining at least 200,000 persons benefiting from 400 rehabilitated water points, and 1 million benefiting from 2,000 new water points**

This target was mostly met. The number of beneficiaries reached was 1,157,000, just short of 1.2 million. This is based on 2,081 new or rehabilitated water points, or 87 per cent of the hardware target.

**Goal 2a. To enable 1 million people to use improved sanitation facilities and adopt safe hygiene practices**

The goal of 1 million people was exceeded by 30 per cent, as 1.3 million persons gained access to latrines meeting the national standard. The adoption of safe hygiene practices is a multi-part issue addressed below later.
Goal 2b: Increase access to and use of improved sanitation facilities from an average of 42 per cent to at least 50 per cent in Manica, Sofal and Tete provinces by 2012

This goal was met and significantly exceeded. Latrine ownership across all locations increased from 44 per cent to 60 per cent. More than 97 per cent of households with latrines used them, meaning the usage target was also met.

Goal 3a: Enable 140,000 schoolchildren to access and use improved sanitation, handwashing and water supply facilities in 400 primary schools

This goal was mostly met. A total of 335 schools and approximately 139,000 children benefited.

Goal 3b: Increased enrolment and retention of girls in 400 primary schools in Manica, Sofala and Tete Provinces by 2012

This goal was mostly met. Girls' enrolment increased from 65 per cent to 70 per cent over the programme period. The change for girls aged 6–10 (i.e. the principal ages for primary school) was approximately 9 per cent. In contrast, boys' enrolment hardly changed. As no retention data was gathered, that portion of the goal is not calculable.

Goal 4: Increase to at least 1 million the number of caregivers (particularly women) applying safe hygiene practices in the programme area

This goal was mostly met, though inconsistently so across the varied practices. There was significant growth in the rate of female handwashing at critical times, though more so for post-defecation moments than before eating. Use of latrines soared. The OD practices of all persons, and of women in particular, fell by at least one third. Safe disposal of child faeces maintained the high baseline rate. All told, it is highly probable that at least 1 million persons are applying more than one safe hygiene practice, though adherence to all desired practices is less.

Goal 5: Reduction of non-operational water points from 30 per cent to 15 per cent in the project zone

This goal was definitely met, but with a negative trend. A 2014 post-programme sustainability check (a rigorous, externally conducted random sampling of technical, social and institutional sustainability factors) found that 28 per cent of the sampled OMI water points constructed during the programme were not working. Earlier sustainability checks determined that water point functionality averaged 90 per cent between 2012 and 2014.

Results achieved at the community and institutional levels

This section discusses the performance indicators that were best measured at either the community or school levels.

Community and institutional results that did meet programme goals:
1. The quality of the water delivered at the source was microbiologically safe in the great majority of instances, reflecting good construction and protection against contamination.
2. The use of latrines by schoolchildren and handwashing by schoolchildren was seen in the great majority of programme schools.
Community and institutional results that did not meet programme goals:

3. The mean number of water users never achieved the governmental standards of 500 persons or fewer per water point. However, the trend was sharply positive as the programme returned to add water points to early intervention communities in later years. Overall, the number of users per improved water point in the poorer communities targeted by OMI fell from 3,357 to 810.

4. The hygienic conditions around the water points were frequently not up to standard, indicating persistent issues of community management. For example, more than 56 per cent of the improved water points had rubbish within 30 metres of the pump in 2013.

Community and institutional results of uncertain relationship to programme goals:

5. By the end of the programme, 45 per cent of communities that had been triggered for CLTS had become certified as ODF communities. There are strong reasons to believe that half or more of the uncertified 55 per cent achieved ODF status in 2014–2015.

Results achieved at the household and individual levels

This section discusses instances where change could occur only if the household or the individual affirmatively decided to adopt the behaviour. In none of these did the programme set specific targets. The programme goals below, which are used to weigh performance, are therefore reflections of the trends OMI would have wanted to see, but without goal quantification.

Household and individual results that did meet programme goals:

1. Some 66 per cent of families switched to improved water sources from unimproved sources when improved sources were introduced into their community; one third did not switch.

2. The amount of water consumed per person per day rose by approximately 25 per cent and on average equalled the government recommendation of 20 litres per person per day.

3. The exclusive use of water from improved sources for recommended purposes increased sharply, with the highest adherence for the four most important purposes (drinking, cooking, washing hands and washing cooking utensils).

4. A large majority of households reported drinking water from improved sources when away from the home, including when working on their agricultural fields.

5. More than 99 per cent of households with latrines used them. Therefore, the rapid growth in the presence of latrines meant that there was a huge increase in latrine use.

6. The level of handwashing with soap or ash after defecation or after handling baby’s faeces jumped 200–300 per cent from the baseline.

Household and individual results that did not meet programme goals:

7. There was very little improvement in preventing the contamination of water in the household after safe water had been provided at and drawn from the community source.

8. Although latrine usage in general increased sharply, there were many households and persons that did not build latrines and therefore continued to defecate in the open.

9. There was almost no improvement in handwashing before eating, despite the success with handwashing with soap or ash at other critical times.
Special focus: The equity dimension in the results observed

Both the Government and UNICEF sought to give special attention to poorer and other lagging populations in the OMI provinces. When the results were disaggregated by income or other equity concerns, they consistently showed disproportionate benefits for the disadvantaged group and a narrowing of the gaps, including in the following indicators:

1. Improved water point coverage in poor communities, and a decline in users per water point;
2. As a consequence, heightened access and higher consumption of improved water;
3. Latrine coverage among low income households and in low income communities; and
4. An equality in results for male and female students and teachers in school latrine access.

Causality

Most results observed in complex development programmes arise from the effect of multiple factors. This section describes the instances where the causal chain is convincingly clear, as well as instances where it is less certain but where interesting suppositions can be made.

Causal summation

In general, OMI successfully drove the changes leading to many of the observed results. The programme was more successful in achieving outcomes related to water provision than sanitation and hygiene. There may well have been unattributed benefits caused by OMI in non-intervention zones through the spill-over effects. OMI built on strong pre-programme work in health education messaging. It also made many choices that overcame obstacles and accelerated progress. These were seen in both the technical/operational areas and in the social/behavioural areas. There were instances where OMI accepted trade-offs to reach one goal at the expense of another. In other cases, OMI was unable to figure out how to change behaviours or reach other programme goals and those challenges remain.

Where OMI caused or did not cause particular results

Where OMI did cause positive shifts:

- OMI was clearly the cause of almost all growth in improved water supply coverage, through rehabilitations and new works.
- The infrastructure delivered safe water, linking water quality at the source to OMI efforts.
- The switch to improved water by many beneficiaries meant that the percentage of households drinking safe water improved due to OMI.
- The simultaneous implementation of the CLTS and hygiene programming had a significant independent effect on improved water consumption over and above the effect from improved water point provision.
- Safe water provision in schools, almost all due to OMI, led to increased school enrolment by girls.
- School WASH interventions were linked with improved water consumption, better latrine quality and greater practice of proper handwashing by students.
- Handwashing after handling one’s own or baby excreta improved due to the programme.
Where OMI did not cause particular shifts or cannot be verified as the cause:

- OMI brought change to most of the water indicators but did not emerge as the reason for the growth in improved water consumption. However, this is an outcome where the synergy between OMI and the broader environment is unclear.
- OMI hygiene education was largely unable to deliver a reduction in household water contamination due to unsafe storage and cleansing practices. In fact, a counter-intuitive finding that washing water vessels with soap increased contamination was observed.
- There was a broad lack of comparative advantage for OMI in the sanitation outcomes of latrine ownership, latrine quality, latrine use and latrine cleanliness. However, there is most likely a linkage that is not completely caught in the data, as explored below.
- There was no OMI advantage in the safe disposal of baby excreta.
- Handwashing before eating began low and stayed low no matter what OMI did.
- OMI latrine interventions had no impact on school enrolment.

OMI and the national and regional context—the secular trend

For years prior to OMI, the Government of Mozambique and partners promoted the use of improved water, the construction and use of latrines and handwashing. While not all families and communities changed their behaviours then, the great majority were repeatedly exposed to these messages. The health system infrastructure promoting good WASH behaviours before OMI did not turn off during OMI. OMI can be thought of as having intensified an existing sustained health education approach through new operational and behavioural strategies.

Very little non-OMI attributed growth in water infrastructure was observed during the programme period, indicating that the cost and technical demands presented major barriers to community action. However, there was significant positive change in non-OMI communities in the use of improved water, in the steady growth in latrine ownership, the equivalent levels of latrine quality, and the near equal levels of latrine cleanliness and latrine usage.

Was there spill over from the OMI programme and can OMI be credited with non-OMI improvements? If so, the means of influence and transfer were the following:

- Demonstration: OMI models of action at the community and family levels made the changes visible and allowed non-OMI supported onlookers to conclude that they too could do it. The very low cost of the latrine and hygiene actions promoted by OMI meant cost was not a major barrier.
- Identification: The CLTS methodology elicits a combination of disgust at the aesthetic and health consequences of OD as well as pride about taking action to eliminate the problems. Shame and pride are universal emotions that easily flow across communities.
- Indirect transfer: Adding improved water points reduced the pressure on existing water points outside the OMI sites. This allowed those continuing to use the water points—safe and unsafe—to draw more water and spend less time queuing.
- Systemic strengthening diffusion: District administrations were equipped, financed and staffed under OMI, and so in addition to the intervention communities, it is quite possible that strengthened WASH and outreach capacities benefited non-intervention communities within the district.

A narrow view of the data would conclude that OMI in many instances did nothing more than accelerate the adoption of new water and sanitation behaviours. A more likely hypothesis is that the presence of OMI galvanized non-OMI-supported families and communities through
the spill-over phenomenon. OMI can be given some credit for non-OMI community performance.

**Choices made by OMI that helped achieve project goals**

The Government and partners made a wide range of choices in OMI design and implementation that helped to explain the results seen. They also accepted trade-offs among goals and had incomplete success in overcoming certain obstacles.

**Technical and operational choices**

OMI made technical and managerial choices that on balance drove the programme to meet its goals. OMI chose technologies that function in Mozambique and could be implemented under the OMI cost ceilings. The latrine designs included low-cost options that met minimum standards and that greatly increased the affordability for poor rural households. The programme accurately targeted underserved, poorer-than-average communities in support of equity goals. It located water points well, reaching population concentrations and, in the case of school water points, placing them where both the school and the community had access.

OMI aligned with the Government’s ongoing safe water and hygiene promotion messaging, building on the existing knowledge and credibility of earlier work. The programme then made important adjustments, which are outlined in the next section on behavioural and social factors.

In two major instances, noted below, OMI made choices that advantaged certain goals but that were problematic for others. This underscores that it can be impossible to meet competing goals within a single policy approach.

1. OMI accepted or endorsed a user charge strategy that successfully generated sufficient funds for ongoing operation and maintenance but was insufficient for major breakdowns and long-term replacement. The lower user charges made water affordable for almost everyone.
2. OMI placed improved water points in many needy communities at ratios well above 500 users per improved water point. This allowed them to serve more communities rather than serving fewer communities with multiple water points to preserve the targeted 500 to 1 ratio. However, this might have an impact on the service life of the infrastructure as it will be used above the recommended levels.

**Social and behavioural choices**

Responding to the social and behavioural context in Mozambique required more than a proper technical or operational approach. OMI was generally wise. Although OMI aligned with prior safe water and good hygiene messaging, it made important adjustments. It incorporated CLTS principles of triggering both shame in OD and a dirty environment and pride in solving problems. This was much less common globally during the OMI planning phase than after OMI started. OMI worked with the community leadership, in tune with the national preference for community level action. At the same time, it advocated for a latrine model and behaviours that did not depend on community action, but that any family and household could do. OMI also respected gender differences. The construction of separate latrines for males and females in schools for both teachers and students led to much greater usage and coverage.
OMI was organized to take advantage of its social and behavioural understanding. It financed a large-scale social mobilization component and used national NGOs with roots in the districts and communities. It left communities to move at their own pace, allowing the time needed to reach ODF status even if it took longer than planned. Communities also proved adept at settling on a user charge strategy that was perceived as fair and successful in generating funds for operation and maintenance. Part of this fairness was the exemption of the community’s poorer members from the user fees. Some of this broad success is likely due to the employment by OMI of a full-time national anthropologist. The anthropologist conducted research and trained and retrained the social mobilization NGOs in proper community approaches.

Restraints to achieving OMI goals and issues that OMI was not able to resolve

It is untrue to say that OMI made choices that worked against meeting programme goals but it is true that OMI was unable to overcome obstacles in some important instances:

1. Many communities failed to meet expectations despite OMI’s mobilization and quality assurance efforts. Instances include the nearly 20 per cent of communities that did not institute any user charges, the persistent OD in certain communities and households, and the dirtiness of the environmental conditions around as many as 60 per cent of the water points.

2. Although the analysis above credits OMI with substantial influence in non-OMI locations through the spill-over effect, it is not apparent that OMI consciously supported the spill-over dynamics. This may have been a missed opportunity to help communities to reach the level of latrine coverage needed for the collective benefits of OD reduction (the ‘herd effect’).

3. At the household level, no real answers were found to spur greater handwashing before eating (as opposed to handwashing after defecations), keeping water from safe sources safe and latrine cleanliness.

4. Although not a specific programme goal, there was a desire to see households ‘move up the sanitation ladder’, that is, replace basic latrines with latrines meeting the national standard when rebuilding was needed. This was essentially not observed and the premise that households can be motivated to invest greater effort in better latrines was not seen.
CHAPTER 1: PROBLEM AND CONTEXT

1.1 Demography and society

In 2007, the population of Mozambique was 20.6 million, with 69 per cent of the population classified as rural and an average population density of 26 people per square kilometre. By 2014, the total population had risen to 25.4 million. Table 1 provides demographic data for the three provinces where the OMI operated.

<table>
<thead>
<tr>
<th>Province</th>
<th>Population</th>
<th>Population/km²</th>
<th>% rural population</th>
<th>Annual population growth rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manica</td>
<td>1,438,476</td>
<td>23</td>
<td>75</td>
<td>3.8</td>
</tr>
<tr>
<td>Sofala</td>
<td>1,671,864</td>
<td>25</td>
<td>62</td>
<td>2.4</td>
</tr>
<tr>
<td>Tete</td>
<td>1,801,528</td>
<td>21</td>
<td>86</td>
<td>4.2</td>
</tr>
</tbody>
</table>

All three provinces are predominantly rural and have population densities below the national average. Although the demography of Sofala province is influenced by the presence of Beira, the second largest city in Mozambique, Sofala demonstrated the slowest rate of population growth among the three provinces. Tete showed the highest rate of population growth, in part due to strong in-migration – mostly of young men – due to its expanding extractive industries economy. The OMI baseline study conducted in 2008 surveyed 80 communities in nine districts across the three provinces and found that average population size ranged from 632 in Guro district, Manica, to 3,338 in Gorongosa district, Sofala.

Variance in rural settlement distribution and size depends primarily on the productivity of the natural environment and, to a lesser extent, ethnic and cultural factors. In all areas, however, there are nucleated settlement patterns that make the provision and use of service points such as boreholes and wells a feasible strategy. At the same time, the distance that community members must walk to reach a water point within their settlement varies significantly, and the populations of some rural communities are large enough to require two or more water points to ensure a minimum supply.

Although residents of the three provinces share a common history – centuries of colonial domination and 40 often-turbulent years as citizens of independent Mozambique – they also belong to many different ethnic groups. Community institutions function largely in local languages, with only a minority of rural people fluent in Portuguese, the official language. The political, military and social experiences of Mozambicans varied during the liberation struggle and subsequent civil war. Many people in northern Tete province, for example, spent years in refugee camps in Malawi and retain strong links with that country.

Standard social features prevail across the OMI area, however, including: the resurgent role of and respect for traditional authorities following the favourable shift in government policy towards them;
the gendered distribution of roles in rural livelihoods, with a prominent place for women in regards to water supply and sanitation; and a general willingness to pursue group action and responsibility in the development and management of local infrastructure. Despite significant progress in the extension of administrative services across the 10 provinces and 130 districts of Mozambique, rural society still fends for itself in many ways.

1.2 Natural environment

The natural environment in the three OMI provinces ranges from the coastal lowlands of Sofala to the cooler uplands where Tete province borders Malawi at altitudes of more than 1,500 metres above sea level. The agricultural potential of these provinces varies with their respective soils, topography and rainfall. Rainfall, for example, ranges from less than 500 millimetres per year in northern Manica province to more than 1,000 millimetres per year in some areas near the Sofala coast and in the Tete highlands. Parts of Tete and Manica provinces are at high risk of drought, and Sofala is vulnerable to cyclones and flooding.11 Across the country, average rainfall is expected to decrease by 5–10 per cent during the twenty-first century due to climate change.12 Seasonal rainfall patterns influence fluctuations in disease risk related to OD as well as the availability of water for collection from rivers and pools.

Groundwater resources are widely available in the three OMI provinces, and boreholes equipped with hand pumps are the technical backbone of the rural water supply strategy. Access to these resources varies, however. Negative boreholes (where drilling finds saline or little or no water) are common, and in some areas – notably Machaze district in Manica province – adequate yield is only available at depths unreachable by the hand pumps commonly used in Mozambique. Angonia and Changara (Tete), Guro and Mossurize (Manica) and Maringue (Sofala) are districts with common hydrogeological problems. Due largely to salinity, only five out of 30 boreholes drilled in Chemba district (Sofala) in 2009 yielded water that was palatable or safe for drinking. To date, investigations suggest that arsenic levels in groundwater are not a significant concern in these provinces. Current and anticipated levels of groundwater extraction with hand pumps for domestic use are not believed to pose any threat to groundwater availability, although the rates and mechanisms of aquifer recharge in these provinces are not yet well understood. The development of commercially irrigated agriculture and the rapid expansion of mining in Tete province could influence groundwater availability for domestic use if those activities exploit aquifers rather than surface water.

1.3 Economy and poverty

The rural economies of Manica, Sofala and Tete provinces are dominated by subsistence agriculture and characterized by low productivity. Eighty-six per cent of households covered by the 2008 baseline survey reported that agriculture is their most important economic activity. Only 6 per cent of households reported permanent paid employment. Animal husbandry was the most commonly mentioned second or third economic activity.13 Poverty in rural Mozambique is marked by isolation, inadequate infrastructure and the consequent lack of access to goods and services. The proportion of rural residents living in poverty is estimated at 55 per cent.14

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Although little of the commercial farming established by colonial settlers has survived, the commercial agriculture sector is now expanding. There has been significant economic growth and infrastructural development along the Beira corridor between Beira and the border with Zimbabwe. The strongest economic activity is in the rapidly expanding coal mining sector in southern Tete province, which has led to rapid commercial growth in Tete city and attracted labour from the rural hinterland.

In 2014, Mozambique’s Human Development Index\(^\text{15}\) (HDI) value was 0.416, ranking the country at 180 out of 188 total countries and territories. Mozambique’s HDI value places it within the low human development category and below the average for countries in sub-Saharan Africa.\(^\text{16}\) When the value is discounted for inequality, a measure of socio-economic disparity within the country resulting in the vulnerability of marginalized groups, the HDI falls to 0.273.

### 1.4 Health and nutrition

Rural Mozambicans experience a heavy disease burden, which is tied to the poor nutritional status of children and high poverty levels. In 2002, 8 per cent of deaths in Mozambique were caused by diarrhoeal disease.\(^\text{17}\) The 2008 baseline survey for the OMI reported that more than 90 per cent of household members sampled had not been sick with diarrhoea or other waterborne diseases over the previous six months – a period that coincided with the dry season, when these illnesses are much less common.\(^\text{18}\) Although cholera is not a major killer, periodic outbreaks – often associated with floods such as those in 2008 – cause significant suffering in these provinces. In contrast, malaria is a constant factor in regards to quality of life and economic productivity. In 2002, malaria caused 9 per cent of all deaths.\(^\text{19}\) Nationwide, an estimated 10.5 per cent of Mozambicans aged 15 to 49 were HIV positive in 2015.\(^\text{20}\) As in other southern African countries, the burden of HIV and AIDS is a major constraint on the economy and institutions. Table 2 provides data on child mortality and nutrition and illustrates the high rate of child stunting and child wasting in 2008.

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\(^\text{15}\) The HDI is a composite measure that analyses a country’s average achievements in the areas of health, education and living standards. Performance is expressed as a figure between 0 (low achievement) and 1 (high achievement).


\(^\text{18}\) WE Consult, Baseline Survey Final Report: A WASH baseline survey under the NL-UNICEF partnership for WASH: One Million Initiative, WE Consult for UNICEF, Maputo, 2009, p. 31. It is important to note, however, that measuring the incidence of diarrhoea is difficult due to inconsistencies related to recall and reporting.


1.5 Water and sanitation policy and institutional context

The evolution of water and sanitation policy in Mozambique can be traced back to the 1991 Water Law. The Water Law affirmed all inland water resources as the property of the state, articulated a river basin approach to water resource management and established the National Water Council. It assigned overall responsibility for water management to the Ministry of Public Works and Housing through the National Water Directorate.

Mozambique’s rural water and sanitation policy is rooted in the 1995 National Water Policy (revised in 2007). The National Water Policy emphasises the decentralized, autonomous and financially self-sustaining provision of water supply and sanitation services; a greater role for the private sector; integrated water resource management; recognition of water as an economic as well as a social good; greater beneficiary participation; and greater focus on capacity building. The National Water Policy essentially triggered a withdrawal of the central government and its ministries and institutions from operational service provision.25

The second Poverty Reduction Strategy (PRS II), which covered the period 2006–2009, emphasised the key roles of enhanced water supply and sanitation and effective water resource management in strengthening human capital. PRS II established the objective of covering 55 per cent of the rural population with safe water supplies by 2009 and 70 per cent by 2015. For rural sanitation, the targets were 40 per cent by 2009 and 50 per cent by 2015.26 These targets were maintained and elaborated in PRS III, which covered the period 2010–2014.

The National Water Resources Management Strategy was approved in 2007. The Strategy includes water resources development, river basin management, flood-risk analysis and monitoring. Regional

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22 (Below -2 standard deviation from median weight for age.
23 (Below -2 standard deviation from median height for age.
24 (Below -2 standard deviation from median weight for height.
water management administrations were established, but so far have had little influence on rural water and sanitation interventions.

Urban water supply is the responsibility of the Water Supply Investment and Asset Holding Fund, which was established as an autonomous public body in 1999. The Council for the Regulation of Water Supply was established in 2000 to regulate and monitor the water supply operations in all major urban areas. Together these two entities implement a delegated management framework through which public-private partnerships are established for water utilities. Assets are owned by the Government, and operations are managed by the private sector under a concession, lease or management contract.

The Water and Sanitation Infrastructure Administration was established in 2009 to handle the portfolio of small urban water supplies, many of them district capitals. The Administration holds primary responsibilities for their management, including drainage and sanitation systems, and uses the delegated management framework model to contract private sector operators. The Administration is currently responsible for water in 131 towns and cities and for sanitation in 150 towns and cities. Also in 2009, the mandate of the Council for the Regulation of Water Supply was further expanded to regulate all of these public piped water supply and sanitation systems.

In each province, the Departamento Provincial das Obras Públicas e Habitação (Provincial Directorate of Public Works and Housing or DPOPH) is responsible for sector coordination through its water and sanitation department. The Servico Distrital de Planeamento e Infraestrutura (District Planning and Infrastructure Services or SDPI) are responsible for coordinating water issues at the district level. As autonomous entities, the municipal governments are responsible for establishing water and sanitation services within their jurisdictions.

The Rural Water Supply and Sanitation Strategic Plan was developed in 2007 for the period 2005–2015, leading up to the Millennium Development Goals (MDGs). The Programa Nacional de Água e Saneamento Rural (National Rural Water Supply and Sanitation Programme or PRONASAR) was created based on this plan and serves as the vehicle for a sector-wide approach by the Government and its development partners. In 2010, PRONASAR was launched in 15 districts where no other major donor-funded water and sanitation projects were active. In parallel, a common fund was established by five key sector partners, including the Government of the Netherlands and UNICEF. PRONASAR is intended to absorb and integrate all rural water and sanitation interventions during the coming years. It includes both common fund investments and bilateral contributions.

For rural water supply in Mozambique, the key policy principles are:

- The highest priority is to satisfy basic human needs for water, accounting for the circumstances of the poor;
- Providing an average of 20 litres of water per person per day from wells or boreholes with hand pumps;
- A planning standard of 500 people (100 households) per water point, later revised by PRONASAR to 300 people, with actual coverage based on enumerated populations.

• Users should not have to walk for more than 30 minutes to reach the water point;
• The price of water should reflect its economic value (the costs of operation, maintenance, repair and replacement of equipment should be covered);
• The Government is responsible for investments;
• The Government should refrain from direct service provision but should be responsible for regulation, facilitation and priority setting;
• Institutional capacity building is a priority, with emphasis on district and community levels;
• Communities should participate in all phases of the water project cycle, through local democratic (i.e. consultative) institutions;
• Direct service provision (e.g. for construction and project supervision) should be carried out by the private sector.

National NGOs play important roles in the rural water and sanitation sector. Despite their not-for-profit status, they function as part of the general pool of non-governmental service providers and bid for contracts, along with the private sector. Their principal roles involve extension, education and animation work at the household and community levels – known in Mozambique as participação e educação comunitaria (community participation and training or PEC). They fill an important gap in capacity, often working side by side with technicians in the district administration.

1.6 External funding agencies’ policies and support for rural water and sanitation

The water and sanitation sector in Mozambique is characterized by a high level of external development assistance, which accounted for 85 per cent of all investments over the three years embracing the start of the programme. Despite the Paris Declaration on Aid and Effectiveness 2005 principles, there has been uneven progress in terms of the harmonization and integrated management of external support. The Netherlands was an early contributor to a budget support programme with the National Water Directorate called Water and Sanitation Sector Support. Most other external funding agencies have been slow to engage with sector budget support; however, since 2006, the Government of Mozambique has been writing all significant externally funded projects on budget and on plan, even though disbursements often still do not go through the national treasury, which was the case with the OMI.

The Netherlands is a major supporter of the water and sanitation sector in Mozambique, as are the World Bank, the African Development Bank, the European Union, the United Kingdom Department for International Development, the Swiss Development Corporation and UNICEF. The United States Millennium Challenge Corporation financed significant infrastructure investments between 2008 and 2013. Several international NGOs are also active, including HELVETAS, CARE, World Vision International, WaterAid and SNV.

In this crowded water and sanitation landscape, there are several layers of coordination. The Government and development partners meet annually at the Joint Annual Review for both stock-taking and work-planning. The Water and Sanitation Group (co-chaired by UNICEF during the OMI period) is a monthly information-sharing forum for all sector partners. A donor group with a rotating chair also meets regularly to discuss issues and agree on common positions to be taken with the

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National Water Directorate. At the provincial level, water and sanitation thematic groups have also been established.

2.1 Objectives, purpose and anticipated results

OMI was implemented as part of a regional partnership between the Government of the Netherlands and UNICEF, which aimed to enhance water supply, sanitation and hygiene in Eastern and southern Africa. The initial duration was from 2006 through 2012, but was extended to 2013 with ‘top-up’ funding. OMI had two components – one technical and one institutional – with each component guided by a logical framework, and the following five result areas: rural sanitation; rural water supply; hygiene education; school sanitation and hygiene education; and community-based water resource management. The latter result, which was linked with the regional water management administrations, was ultimately dropped and not implemented.

Figure 1. Districts covered under the One Million Initiative

Technical component

The objectives of the technical component were to reduce the incidence of water- and sanitation-related diseases, particularly among children and women living in rural areas, and to increase economic growth and raise the country’s HDI rank. The overall purpose of the technical component
was to enable a minimum of 1.2 million unserved people to use domestic water from improved water sources; to enable 1 million people to use improved sanitation facilities and adopt safe hygiene practices; to enable 140,000 schoolchildren to access and use improved sanitation, handwashing and water supply facilities in 400 primary schools; and to ensure that 200,000 users had renewed access to safe water through the rehabilitation of their non-operational water points.\textsuperscript{31}

The OMI technical component anticipated the following five results:\textsuperscript{32}

1. Increased access to and use of safe drinking water from 44 per cent, 46 per cent and 67 per cent to at least 70 per cent in Manica, Sofala and Tete provinces, respectively, by 2012;
2. Increased access to and use of improved sanitation facilities from an average of 42 per cent to at least 50 per cent in Manica, Sofala and Tete provinces, by 2012;
3. Increased enrolment and retention of girls in 400 primary schools in Manica, Sofala and Tete provinces, by 2012;
4. Increased (to at least 1 million) number of caregivers (particularly women) applying safe hygiene practices in the project area;
5. Reduction of non-operational water points from 30 per cent to 15 per cent in the project area.

The water supply targets combined a planned 200,000 people benefitting from an estimated 400 rehabilitated water points and 1 million people using 2,000 new water points. These plans were based on the Government standard at the time of 500 or fewer users per water point.

\textbf{Institutional component}

The objective of the institutional component was to increase access to water supply and sanitation through improved management of sector funds and programme activities. The purpose of this component was to strengthen sector capacities (particularly at the sub-national level) to plan, coordinate, implement and supervise sector activities and to document and disseminate lessons learned and good practices.\textsuperscript{33}

The OMI institutional component anticipated the following five results:\textsuperscript{34}

1. Roles and activities of the different actors in this and other similar projects clarified;
2. Planning, monitoring and evaluation systems improved;
3. Districts and provinces provided with resources to meet the requirements of this and other projects;
4. Competence and performance of the human resources of the sector developed to meet the requirements of this and other projects;
5. Actual and future partner competence and performance improved, in order to respond to the complexity of this and other similar projects.

\textsuperscript{32} Ibid., p. 12-13.
\textsuperscript{33} Ibid., p. 15.
\textsuperscript{34} Ibid.
2.2 Approach and activities

Introduction

When OMI was launched in July 2006, Mozambique had already made substantial progress towards developing policies and approaches for rural water and sanitation (see Chapter 1). OMI worked within existing frameworks rather than inventing or imposing different strategies, and supported significant improvements to approaches in the sub-sector. The second half of 2006 and much of 2007 were devoted to initial staffing, procurement and capacity building arrangements, although some community-level mobilization (i.e. PEC) activities and rehabilitation of existing water points took place in 2007. Field operations were fully underway from 2008 until the end of 2013.

Water supply

The OMI approach to rural water supply focused on community water points equipped with hand pumps and managed by new or revived village water and sanitation committees. While the emphasis was on the construction of new water points, rehabilitation of existing water points was also an important part of the approach. The standard Afridev hand pump extracts groundwater up to a depth of approximately 40 metres. Over the course of OMI, efforts were made to refine the technical approach so that communities in areas with more difficult conditions could also benefit. For example, the stronger Afripump was introduced in some areas where suitable aquifers are found at greater depths, and several mini-piped systems were rehabilitated. The latter used a diesel- or solar-powered pump to extract water from deep boreholes into an elevated tank from which water is distributed to community standpipes as well as health posts and schools. In addition, Mozambican authorities urged OMI to support the rehabilitation of piped systems in small towns. In late 2011, the Government of the Netherlands funded a separate project – entitled ‘Rehabilitation of Three Piped Water Systems in Mozambique’ – to do this in three towns within the OMI area.

The OMI approach conformed to national policy in two important ways. First, it emphasised community ownership of water supply infrastructure along with responsibility for operation and maintenance costs. A central aspect of OMI’s strategy was the use of PEC service providers to stimulate the formation of community water and sanitation committees or to revive moribund ones. An initial, pre-construction community contribution, a rural water policy feature, did not happen in practice. A 2010 survey found that initial payments were made for only 15 per cent of the water points. Household water payments were common, however. According to the 2010 and 2013 field surveys, fees were paid at approximately 80 per cent of the sample of improved water points. Where OMI had improved the water supply and undertaken sanitation interventions, payment was reported at 92 per cent of the sample points. A monthly user payment of MT5–15 (US$0.16–0.50) per household was reported in most instances.

Second, OMI emphasised private sector involvement. Neither UNICEF nor government agencies were directly engaged in construction, supervision, repair work or spare parts supply. Instead, OMI stimulated networking between engineering and drilling companies, artisans and retailers. OMI followed the government procurement system and procedures. All engineering and PEC contracts were issued by the provincial departments of public works and housing. UNICEF observed but did not participate in tender review and contract award activities. Most of the disbursements to contractors were paid directly by UNICEF in consultation with the provincial departments of public works and housing. Advances for contractors went through the provincial departments, which obtained the relevant verifications from district authorities.
As it gained experience, OMI refined its technical approach to water supply in various ways. Contracting arrangements changed. Initially, OMI used third-party management contracts, employing engineering firms to undertake geo-hydrological investigations (geophysical siting of the boreholes) and to supervise separately contracted drilling contractors. Although there was good progress in drilling wells, many were negative and there was uncertainty about who should carry the responsibility for this ineffective expenditure. In 2009, a turnkey approach was adopted: drilling contractors were responsible for borehole siting and had to carry the responsibility for failed boreholes. This represented a significant transfer of risk. Following the identification of numerous sub-standard pumps and parts during the 2008 drilling programme, tighter criteria and procedures were established to ensure appropriate quality. Hand pumps were procured and installed by the drilling contractors as part of the turnkey approach. The Afridev hand pumps were sourced from China, India and Mozambique.

Sanitation and hygiene

Drawing on its experience in 2008, OMI revised the sanitation approach to replace Participatory Hygiene and Sanitation Transformation (PHAST)—which was slow to bring about behaviour change and difficult to master—with CLTS. OMI also developed an integrated ‘PEC Zonal’ approach to rural water and sanitation extension work across its target districts.

Under the revised approach, contracted NGOs undertook a PEC Zonal programme of integrated water, hygiene and sanitation education and mobilization across an entire district. The NGOs were awarded renewable one-year contracts by the provincial departments of public works and housing, subject to adequate performance against agreed indicators. PEC Zonal aimed to create a comprehensive approach to community mobilization. It was designed to increase the sustainability of water and sanitation services by enabling economies of scale related to demand for spare parts and services; involving and empowering service authorities at district and sub-district levels and service providers at community level; and facilitating post-construction support and monitoring, including tracking routine maintenance and repairs, latrine construction and ODF status (see Table 3). The NGOs employed social mobilizers, who in turn recruited and trained activists at the community level, local residents who received a monthly stipend and bicycles to assist them in their work.

The approach to contracting NGOs for PEC activities also evolved. Initially only written reports of activities undertaken were required of the NGOs, but this was found to be inadequate for measuring the substance of the field work. Beginning in 2009, these contracts stipulated achievement of targets, using indicators related to sustainability, sanitation, water point committees and hygiene promotion. Performance evaluation of PEC implementers was strengthened over the OMI life-span, but remained challenging.
Table 3. PEC Zonal components and phases

<table>
<thead>
<tr>
<th>Component</th>
<th>Implementation phase</th>
<th>Post-construction phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community rural water supply</td>
<td>- Promotion and awareness raising</td>
<td>- Community mechanisms for cost-sharing and operation and maintenance of water facilities</td>
</tr>
<tr>
<td></td>
<td>- Demand creation</td>
<td>- Revitalizing water committees for water points not built by OMI</td>
</tr>
<tr>
<td></td>
<td>- Facilitating community organization, planning and decision-making on the selection of type of services</td>
<td>- Capacity building of local mechanics and vendors</td>
</tr>
<tr>
<td></td>
<td>- Establishing gender-balanced water committees and community mechanisms for cost-sharing and operation and maintenance of water sources</td>
<td>- Monitoring water service performance</td>
</tr>
<tr>
<td>Community rural sanitation</td>
<td>- Triggering sessions at the community level</td>
<td>- Capacity building of local artisans, demonstration centres and constructing latrines</td>
</tr>
<tr>
<td></td>
<td>- Capacity building of local leaders and activists on sanitation and hygienic use of latrines</td>
<td>- Monitoring hygiene and sanitation practices and facilities</td>
</tr>
<tr>
<td>Hygiene education</td>
<td>- WASH promotion</td>
<td>- Monitoring hygiene practices and facilities</td>
</tr>
<tr>
<td></td>
<td>- Promoting handwashing facilities and hygienic use of latrines</td>
<td></td>
</tr>
<tr>
<td>School sanitation and hygiene</td>
<td>- CLTS triggering sessions in schools and communities for hygiene and sanitation promotion, linking schools with communities; key messages include handwashing, appropriate faeces disposal and latrine maintenance</td>
<td>- Monitoring hygiene practices and facilities</td>
</tr>
<tr>
<td></td>
<td>- Monitoring hygiene practices</td>
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</tbody>
</table>

CLTS triggering is a direct and confrontational process in which people are plainly shown the links between the faeces they leave in the open and the frequent contamination of the food they eat. CLTS makes use of participatory rural appraisal tools such as transect walks, participatory mapping, demonstrations, action planning and participatory monitoring and evaluation.

- Transect walk: Walk through the village during which areas of OD and the types of latrines currently in use are pointed out.
- Mapping OD areas: Participatory mapping of households, water sources, OD areas and boundaries between OD areas, water sources and households drawn using locally available materials.
- Calculation of faeces: Scope of the sanitation problem is illustrated by calculating the amount of faeces produced.
- Action planning: Activities include forming sanitation action groups with representatives from neighbourhoods in the community; listing or mapping households showing their access to sanitation; and digging pits as temporary latrines.

If successful, triggering induces every household in the community to build a latrine and motivates every individual to give up the practice of OD. In a process facilitated by the PEC NGO, communities

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then apply to be designated ODF.

In 2008, a multi-sectoral evaluation team organized by UNICEF assessed ODF applications made by 159 communities; as a result, a total of 34 communities were awarded ODF status. A generous hierarchy of prizes accompanied the awards. Awards initially included prizes for the district administrator of the district with the highest number of ODF communities and for the leader of every sub-district or administrative post containing ODF communities. On the recommendation of a study commissioned by the programme, a more modest system of awards was instituted in 2009, when 619 communities were mobilized through the CLTS process. Despite the less generous prizes, 130 communities were awarded ODF status.

ODF communities were identified with a sign declaring their ODF status, usually placed at the entrance to the village. ODF awards were phased out after 2010 but this process of application, evaluation and public award ceremonies proved to be a powerful incentive to enhance good sanitation practice.

Even as CLTS and the ODF concept became known and were adopted by the sector, challenges remained. There are many reasons why some communities achieved more cohesion and common purpose than others and consequently found it easier to achieve ODF status. Even in a willing community, it only takes a few uncooperative individuals to preclude the required 100 per cent achievement level. Even if a community failed to reach ODF status, however, many of its residents would have changed their hygiene and sanitation practices and the community would have progressed along the path of improved WASH conditions.

As measured at the end of OMI, ODF communities experienced some slippage – a common global phenomenon in CLTS programmes. In the 2013 sustainability check, a 17 per cent slippage rate was reported from a sample of 30 communities, based on residents reporting having practiced or seen someone practice OD in the previous three days or enumerators observing faeces in the open. Three factors may have contributed to this: the arrival of new families; weak local leadership; and the failure of households to replace rain-damaged or filled latrines.

Early on, OMI promoted the use of cement slabs by supporting – with limited success – the creation of 32 centres for the demonstration of latrine construction techniques. These centres were intended to support the creation of artisan associations for slab manufacture and to stimulate local traders to stock and sell spare parts for hand pump repair services. Although many effective links remained in place between village committees and individual hand pump mechanics, the demonstration centres and artisan associations were less successful.

In Mozambique, there are ‘improved’ latrines, which use a cement slab (as per the urban standard); ‘traditional improved’ latrines with a platform of more durable clay or wood that is considered cleanable; and ‘traditional’ latrines, which are not considered hygienic. Most of the latrines constructed during OMI were built from local materials and did not have a cement slab. In 2010, OMI adopted the ‘safe sanitation’ (or ODF+) approach, which encouraged local materials but included essential hygiene indicators that would support safe and sustainable sanitation:

- A durable and easily cleanable slab
- A lid that closes the hole of the latrine completely

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38 WE Consult, OMI Sustainability Check 2013, WE Consult, Maputo, 2013.
- Walls around the latrine, which provide privacy
- A roof to prevent rain from reaching the floor of the latrine
- A door or curved wall to provide privacy
- A handwashing system (e.g. tippy tap) with soap or ashes

The adoption of the ODF+ concept acknowledged the need to move households up the sanitation ladder and to better reflect this in monitoring and planning instruments. OMI redesigned its strategy and assigned the PEC NGOs to move previously ODF-declared communities, as well as those that had not been declared, towards ODF+ status, thus moving from basic sanitation to safe and sustainable infrastructure.

To promote the scale-up of CLTS, instead of counting individual communities, a new strategy was adopted to reach entire administrative areas: ODF localities or ODF administrative posts. PEC NGOs began to concentrate their work in single localities, a geographical area with 10 to 20 villages, aiming to eventually have an ODF administrative post with two to three localities. This concept aimed to reduce the costs of triggering, monitoring and evaluating, and to increase the health impact in targeted communities. It was also hoped that a higher density of ODF communities might increase the chances of neighbouring communities adopting good practices.39 By 2014, there were 10 ODF localities and two ODF administrative posts.40

Figure 2. Triggering and scaling up the CLTS approaches

Schools

The design of the schools component took into account existing policies and programmes in Mozambique with which UNICEF was already intensively involved. Since 2002, the Government of

Mozambique, UNICEF and other partners had made progress towards developing a child-centred hygiene education programme in schools, which included the promotion of child-to-child sanitation committees. UNICEF had supported the inclusion of water, sanitation and hygiene education in the school curriculum that was introduced in 2001 and had implemented CFS, which, in Mozambique, focused on seven districts. This "integrated, multi-sectoral, minimum quality package" included WASH components.

The OMI schools strategy was to align with CFS and launch implementation in the two CFS districts that were also OMI target districts. Following a baseline assessment of schools in each district, interventions involved the construction of water supplies and latrines as required (one latrine per 50 pupils, equipped with simple handwashing facilities) and hygiene education programmes that link schools with communities. The CLTS approach, termed School-Led Total Sanitation, was also used in the schools component for the following reasons:

- Schoolchildren learn quickly and become active agents of change at the family level;
- Triggering in schools, when done in parallel with the community, may have a complementary effect;
- Triggering in schools can generate synergies between teachers and parents (school and community);
- Schools have a concentration of many children (risk of spreading diseases);
- Proper disposal of faeces can reduce diarrhoeal diseases by 32 per cent;
- Correct handwashing can reduce diarrhoeal diseases by 35 per cent.

Monitoring and sustainability

A comprehensive monitoring approach was developed at an early stage. UNICEF and the governments of Mozambique and the Netherlands agreed to include OMI in a series of impact evaluations of Dutch-funded rural water and sanitation interventions being carried out by the Netherlands Ministry of Foreign Affairs, Policy and Operations Evaluation Department. For this purpose, a detailed baseline survey of 1,600 households was undertaken in August–October 2008, followed up by a mid-term survey in 2010. In 2013, a final survey collected end-line data that was analysed by AIID under contract with the UNICEF Evaluation Office.

In 2008, OMI developed a methodology for and undertook the first in an annual series of sustainability checks. These third-party exercises were contracted out to private sector service providers. In a sample of intervention communities, a series of assumed indicators of sustainability were investigated, spanning institutional, technical, social and financial factors. Using the same methodology, sustainability checks were carried out every year during 2008–2013.

The 2008 sustainability check showed that none of the communities surveyed had achieved a 'satisfactory' level of sustainability with regard to rural water supplies. This led OMI to investigate its

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43 Ibid.
45 The survey resulted in the More than Water impact report (IOB, 2011).
operations and approaches in detail and renew its commitment to promoting sustainability at all levels. Workshops at district and administrative post (sub-district) levels examined the results of the first sustainability check and agreed on measures to address them:

- A manual database was created for all water points in the district as a monitoring and management tool at the district and administrative post levels. Handwritten on flip chart paper, these databases showed basic demographic data about each locality in the district, as well as the numbers of working and broken hand pumps; information about user contributions to operation and maintenance costs; and numbers of improved and traditional latrines, bathrooms, drying racks and rubbish pits.
- Agreements were forged between local mechanics and community leaders for the provision of maintenance and repair services. In principle, every community water and sanitation committee could call on its designated service provider as needed.
- Local entrepreneurs were identified to procure, stock and sell spare parts.
- Ongoing preventive maintenance was carried out by community committees.

In subsequent years, annual sustainability check results were used extensively at district and provincial planning and review workshops to identify implementation bottlenecks and reach agreement on the steps needed to address deficiencies. Sustainability became an increasingly prominent theme in the training provided by PEC NGOs for community water and sanitation committees and community leaders. Register books were designed and introduced for use by committees to record group membership, payments, maintenance issues, events and expenditures. The National Information System for Water and Sanitation (SINAS) was launched in 2007 by the National Water Directorate and development partners, including UNICEF and the World Bank Water and Sanitation Program, as an integrated, harmonized system covering basic water supply and sanitation parameters. OMI provinces and districts contributed to SINAS with the creation of manual databases and the launch of data collection and monitoring procedures at the community level (see below). Meanwhile, SINAS continued to introduce monitoring instruments and train provincial and district personnel in other provinces to achieve national operation.

The OMI approach to institutional sustainability included the employment of additional staff to work at the provincial and district levels (the DPOPHs and SDPIs, respectively, with additional monitoring and evaluation support from SNV Netherlands Development Organisation); training of government personnel and community members; and provision of operating resources such as vehicles, motorcycles and computer equipment to DPOPH and SDPI offices.

To build human resources in the target areas, OMI employed 30 technical staff: 12 were posted to DPOPH offices and one to each SDPI office. The Government paid the salaries for these staff since their posts were established within the government structure. Training for government personnel included:

- Construction quality control, water supply and quality, sanitation and financial management for 50 provincial and district technicians and supervising engineers;
- HIV/AIDS training for 86 provincial and district technicians and NGO staff;
- Database management training for three provincial and 18 district technicians;
- Community mobilization approaches and CLTS for PEC NGOs.

### 2.3 Institutional strategy

The OMI institutional strategy was to operate within the existing structures and systems of the National Water Directorate and provincial and local governments, building the capacities of these...
partners for service delivery. UNICEF undertook no direct implementation, except for the annual contracting of third-party monitoring through the sustainability checks. In line with decentralization efforts and to promote sustainability, leading roles were given to district authorities, primarily through the SDPIs, and to communities themselves.

OMI supported a regional technical team to work from the Provincial Directorate of Public Works and Housing office in Beira, Sofala province. This small group of UNICEF staff and consultants provided oversight, facilitation, support and training, working through the provincial directorate of public works and housing offices in Manica, Sofala and Tete provinces. Annual planning and programming of field activities (water supplies, PEC and CLTS, and the schools component) were undertaken by the SDPIs in consultation with DPOPHs and PEC NGOs, with support from the regional team. DPOPH and SDPI offices were strengthened with the additional recruitment of professional staff (referred to above) who were then transferred to the government payroll.

PEC NGOs were contracted by the DPOPHs to spearhead community mobilization, sanitation and hygiene promotion in close collaboration with the SDPIs, for one or two years. The NGO staff operated as part of the SDPI team, programming their work jointly, and sharing office space and transport. The PEC Zonal approach obliged them to work across entire districts, but the effort-intensive CLTS was concentrated in communities identified in consultation with district authorities as more interested or ready to engage. Over time, a more spatially coherent strategy was applied (as described in Section 3.2).

Figure 3 shows the four levels of government administration and the PEC NGOs working side by side, with communication in both directions, and both structures interacting with communities and their water and sanitation committees.
The community water and sanitation committee was at the heart of the implementation strategy at the local level. The concept of such a user-representative group was already well established in Mozambique prior to the OMI. OMI had to revive defunct or weak committees in some places, and it facilitated the establishment of new ones in others. The 2008 baseline survey found that 64 per cent of the 42 improved water sources had committees. In 2010, the percentage was higher at 77 per cent of 86 improved water sources. By 2013, all sampled OMI water points had committees. In terms of composition, 94 per cent of the committees had sufficient members, and important positions (president, treasurer, tariff collector, hygiene promoter) were filled by different people. Gender balance was advocated for but usually not achieved. Forty-one percent of water committees met the milestone of four meetings per year, which was considered optimal. Responsibilities included locking and unlocking the pump, ensuring cleanliness and discipline at and around the water point, arranging repairs, promoting latrine construction and enhanced hygiene in the community and, in some cases, managing small gardens watered with runoff from the pump apron.

Committees commonly had a water point maintenance group responsible for upkeep and contacting a local hand pump mechanic when needed. The 2013 sustainability check found that 93 per cent of water points in the sample were operational at the time of the visit. The duration of the last breakdown, if any, was usually less than one day (65 per cent). However, when major breakdowns did occur, the disruption of service was likely for more than seven days, indicating the time required to get the mechanic and the right spare parts in place.

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47 DPOPH, Sofala.
48 WE Consult, OMI Sustainability Check 2013, WE Consult, Maputo, 2013.
49 Ibid.
CHAPTER 3: METHODOLOGY

3.1 Overall objective

The objective of the impact assessment is to estimate the impact of a large-scale intervention on the use of WASH services and changes in hygienic practices. Identifying the impacts to a level of acceptable certainty requires an appropriate set of methods and careful implementation followed by careful analysis. This chapter describes the major methodological aspects of the evaluation and covers the following themes:

1) The intervention ‘arms’ and how these were defined or varied over time;
2) The intervention and control populations and how particular issues were resolved;
3) The sampling strategy employed in the surveys;
4) Data collection issues, including methods, quality assurance and risk mitigation; and
5) The statistical analysis methods employed with the quantitative data.

3.2 Programme scale

OMI was large-scale in the sense that the individuals affected by the programme represented a large proportion of the population. As much as 50 per cent of the population in the programme area was exposed to one or more elements of the programme over its life. While this means the impacts were broadly visible and that they should be able to be seen and measured, it also created complications in terms of differentiating the intervention populations versus the control populations. Separating the two was a fundamental concern during all three measurement phases.

3.3 Potential intervention arms

Interventions under OMI had five broad aims:

1) Providing safe water points at the community or sub-community level;
2) Increasing the number of latrines at the household level;
3) Promoting improved hygiene awareness and practices at both the community and household levels;
4) Providing safe water and latrines as well as hygiene education at the school level;
5) Building capacity at the institutional (government, NGOs, private sector partners) and community levels.

Intervention aims 1-4 are amenable to statistical impact evaluation approaches and are covered in this report. Capacity building (intervention aim 5) is described at points where it is relevant to the impact determinations, but it is not specifically assessed in this report.

The actual ‘levels’ or ‘intensities’ of the four intervention areas mentioned above differed between sampled communities. Some communities received both rural water and the sanitation/hygiene interventions whereas others received just one or the other. The school sanitation interventions were limited to the school grounds and the school-going population; the water points were sited so both the school and the community would benefit, and the number of water points was based on the community population, not just that of school-goers.
The interventions also occurred during different blocks of time, meaning that their duration varied at the time of the final impact survey. Some communities were exposed to the programme during the 2008–2010 period; others just after 2010; and still others both before and after the 2010 mid-line survey. The water and the sanitation/hygiene interventions might have begun in a community simultaneously or at different times.

A full intervention history was available for each sampling unit (normally a community or a section of a large community). This information benefited the sampling design and analysis of this survey in that outcomes can be compared for different combinations of interventions, often considering the length of exposure.

3.4 Issues and solutions in defining intervention and control populations

**Consistency**

The approaches described in this section were developed in 2008 and were employed in all three data-gathering years.

**Water supply: Communities**

In 2008, the programme had a list of all communities in the intervention provinces but did not have a list of the communities that would receive programme benefits each year through 2013. There was no fixed protocol for determining which communities would benefit when there were more qualifying communities than could be reached with available resources. The list would emerge in stages through yearly or biennial plans. The determination would be made based on a variety of factors – for example, responsiveness to the mobilization activities – and was not made through random assignment.

There was, however, a good starting point. A list of communities that were very likely to get a safe water facility in 2008 or 2009 had already been determined. A sample of these would predominantly consist of treatment communities. In contrast, a sample of communities not on this list consisted of those that would either not receive a safe water facility (control communities) or those that would receive a safe water facility later in the course of the programme. It was decided to provisionally identify communities not on the 2008–2009 list as the control group; this became the basis for the baseline analysis.

It is noted that the communities on the two lists (to receive 2008–2009 water interventions or not) were not directly matched. As a result, there may have been differences in mean population size, settlement density and other factors.

Three factors helped to stabilize some of the uncertainty arising from this context. First, the size of the two groups was large enough that even the conversion after 2009 of a percentage of the control communities to intervention communities left a sample size at the control community and household levels that was large enough to perform the statistical comparative analysis. Second, households that received the intervention(s) in later years, were removed from the control population for the period that they were in intervention communities. The use of the panel method—described below—allowed the assignment of every household to the control or intervention group in each survey round.
based on their known community status. Third, as described later in this section, the statistical regression analysis compensated to a large extent for the lack of randomization or the attrition of the control communities.

**Water supply: Households**

The programme did not commit to meeting all of the needs of selected communities: for example, it might have installed only two water points when more than two were indicated by population figures. Consequently, the sampling scheme needed the flexibility to identify households within selected communities as within either the intervention or control groups, and not to automatically assume that they were in the intervention service area.

To cope with this issue, sub-community programme sampling units (PSUs) were created of approximately 100 neighbouring households. Random sampling of PSUs meant that any one of them had an equal chance of being selected, and the households within could be attributed to either the intervention or control populations. Within the PSUs, 20 households were sampled to observe household-level outcome variables.

**Sanitation services**

It was not possible to employ the same tactics at the community level for sanitation sampling and analysis. Latrine promotion was universal, and incentives or rewards were occasionally but not always employed. Crucially, latrine construction was ultimately the choice of the household (albeit influenced by community decisions), so it could not be predicted beforehand. Similarly, the hygiene education and promotion component of the programme targeted all communities whether or not they received safe water facilities.

In response, the surveys did not employ a separate community-based sampling approach for sanitation and hygiene. Rather, it followed the water supply sampling scheme. The requested information was asked of all households in both the water supply intervention and control groups. Identifying the impact of latrine density and hygiene promotion was therefore dependent on sufficient variation of these interventions in the sample. A significant and intended benefit was the ability to cross-tabulate the hygiene and sanitation results by the level of safe water provision.

**WASH in schools**

The WASH-in-schools interventions were geographically separated from most of the community water and sanitation interventions, being limited to the two districts included in a separate programme of school improvements using CFS approaches. Further, the list of target schools was known in 2008 or could be surmised but not the likely schools in future years. Thus, a random sample of intervention and control schools was identified for that year alone, with additional intervention schools determined in later years.
3.5 Sampling strategy

The sampling method was consistent across the 2008, 2010 and 2013 surveys. Details about the sampling procedure can be found in Annex X and are briefly summarized here.

Communities for water, sanitation and hygiene data

A sample was drawn of 80 communities from 9 of the 18 districts covered by OMI. Nine districts were selected to reduce the logistical costs of data gathering across the full 18 districts. The districts selected and those not selected were similar in terrain, ethnicity, mean community size, government presence, community social structure and prior WASH programme exposure.

Half of the sample, or 40 communities, was representative of the general population of the nine sample districts. Tracking what happened in this set of communities offered insight into programme impacts as a whole. The other 40 communities were drawn from a poorer, target section of the population. The sample of the poorer segment of the population was expected to get relatively more new safe water points and be more intensively affected by OMI. This oversampling of ‘treatment communities’ achieved greater statistical precision when comparing (high intensity) treatment with no treatment (or low intensity treatment) communities.

Household level water, sanitation and hygiene data

As noted above, sub-community PSUs were created. There were many more than needed to be sampled. Each had about 100 households and each had an equal chance of being selected as a sample site for data collection. Annex X describes the essentially random method by which a first household starting point was determined and the movement pattern through which subsequent households were selected.

Twenty households were visited and data was collected on all three programme elements. The exception was water quality. A 10 per cent sample (two households) of water as stored for use in the house was taken per cluster.

WASH in schools

A separate survey was conducted among 80 schools from the two programme districts participating in CFS. These districts are not covered by the other surveys. As with the community water component, initial control schools that later became intervention schools were reassigned to the intervention cadre for the later rounds of analysis. In the visits, a random sample of 20 students (10 boys and 10 girls) was taken to collect individual data on latrine use, etc.

Attaining consistency across the entire programme period

The survey followed a panel design. Households visited in the 2008 baseline were marked by GPS coordinates. These households were revisited in both 2010 and 2013. Out-movers in later rounds were replaced by the nearest household that was not already in the panel.
3.6 Data collection

Variety of data gathering efforts

In each of the sample communities, several surveys were carried out:

1. A household sample was conducted among 20 households selected (by systematic sampling) from a PSU, that is, a randomly chosen contiguous group of approximately 100 households (or 500 persons). This survey covered general household characteristics, health, water and sanitation/hygiene practices. The enumerators made observations of the environment and recorded replies to the questions posed.
2. A focus group discussion was conducted in the neighbourhood containing the 20 sample households.
3. A water point survey was conducted in the same neighbourhood. This meant visiting the water point(s) used and gathering information about them.
4. Water samples were taken at a selection of households (10 per cent of sample) and at the water sources used by these households to test for microbiological contamination.

Information from health posts close to the sampled location was collected and an effort was made to link the water-related morbidity and mortality data to the population and the water point information. Use of this information was not successful, probably because the catchment area of a health post was normally too large to identify the effect of the interventions.

Quality assurance

Minimizing seasonality distortions: All sample households, schools and communities were visited in August and September during each of the three survey rounds in 2008, 2010 and 2013. This minimized seasonal variations in water access.

Instrument design: The original survey and other tools were designed in 2008 and modified in later rounds by the same team. The team included representatives from the UNICEF Mozambique Country Office, the Government, the UNICEF Evaluation Office and the Government of the Netherlands through its core staff and through contracted expertise. Instruments were developed according to prevailing best practices. In the instance of water quality surveys, the processes and standards employed nationally under governmental regulations were followed.

Instrument testing: All instruments were translated and tested for understanding in pilot surveys. Misunderstandings and other problems were corrected before application.

Selection, training and oversight of field staff: For each round, the contract was bid through a public tender. The best-in-market firms for WASH work responded. Most of the enumerators had either a college level education or had extensive prior experience in household surveys. Multi-day training in the tools was given, including practical applications of the interviews, data recording formats, utilization of the GPS tool, etc. All enumerators spoke the local language of the area in which they worked.

In the field, teams of two or four persons were deployed per community, depending on the total sample size in the community and population density. Supervisors reviewed the work daily and revisits were made to clarify uncertain information. Supervisors alone took the water quality samples after receiving particular additional training. These were taken when the enumerators were picked up.
at the end of the visit, and the samples were immediately sent to the specified laboratory for analysis. Supervisors also conducted the focus group discussions.

Data entry and analysis: Completed survey forms were double coded and entered into the master database for analysis. A first round of analysis was conducted locally. In addition, an external centre of expertise, AIID, was contracted to do the higher level statistical analysis used in this report. AIID, which has particular expertise in WASH, had helped to develop the sampling approach and had conducted the analysis of the earlier rounds. It possessed the data files from the 2008 and 2010 rounds that made the trend analysis possible.

The statistical analysis and the resulting draft report was reviewed by OMI stakeholders and the UNICEF Evaluation Office. The Evaluation Office authored the final report.

Overall assessment: The level of investment and the high level of global and national support meant that the three rounds, including the final 2013 effort, were among the best managed monitoring and evaluation approaches seen in any UNICEF programme in recent years. Care is taken, however, to indicate in this report any instances where the reader needs to use caution in considering the results.

Identified risks and reactions

Contamination: This does not refer to literal contamination of the water but to the difficulty in separating the intervention and control communities. Numerous problems were mentioned in the sampling section above (e.g. coping with the uncertainty related to which communities would receive the OMI water services). In addition, other projects/programmes were active in parts of the OMI geographic area. They tended to be smaller efforts led by NGOs. They resulted in 23 water points being constructed during the OMI programme period. Of these, 13 were in OMI control communities and 10 were in OMI intervention communities. No adjustment for these extra works were made in this analysis.

Under-estimation of impact: Potential under-estimation of impact is possible based on two complementary factors. As noted in the contamination discussion above, more non-OMI water points were delivered to the control communities, which can raise their end-line results more than if they had been equally distributed. Second, within the survey districts and communities used to gather the impact data, 8 out of 30 new water points were constructed either before the baseline survey (seven) or after the end-line survey (one). This means that programme benefits were inaccurately represented in that they inflated the baseline above what it actually was and missed benefits that occurred after the survey. There is the distinct possibility that the OMI water supply impact is under-estimated. However, no adjustments have been attempted in this report.

Health impacts: Two problems caused the diarrhoea data to be removed from the analysis. First, the household survey used a non-standard recall question for diarrhoea incidence. This led to unreliable answers. Second, an attempt to collect water-related disease data from health clinics could not be used since the catchment area of a health post extends across numerous communities and therefore mixes intervention and control populations in a way that prevented accurate analysis.
3.7 Data analysis

Difference in differences

Because the sample is both selective (poor communities were oversampled) and assignment to the OMI was not random (instead being based on an annual selection process that prioritized more needy communities), the statistical analysis had to go beyond comparison of mean outcomes for treatment and control communities. One widely used solution to account for selectivity in treatment is the econometric technique of ‘difference-in-differences’ estimation, also called the ‘double difference’ method. This method helps analyse changes over time with precision rather than by looking at the before and after levels. An example is provided in the box.

Using the difference-in-differences method

If the prevalence of water-related diseases is found to be higher in treatment villages than in control villages, more investigation is needed before concluding that WASH interventions had a negative effect. Quite possibly, the villages had a higher rate of disease before the programme began. Difference in differences is a way to control for this possibility.

The method works as follows:

- Suppose that the initial prevalence was 50 per cent in villages that later received treatment versus 30 per cent in control villages that received no treatment.
- Suppose that after the interventions, prevalence was 25 per cent in the intervention villages and 20 per cent in the control villages.
- Disease prevalence only fell by 10 per cent in the control villages but fell by 25 per cent in the intervention villages.
- Even though it remains higher, the burden in the intervention villages has shrunk by much more. It is 15 per cent lower than is expected since without the intervention it probably would have also fallen by just 10 per cent.
- The additional 15 per cent impact is interpreted as the causal effect of the intervention.

Double differencing was the main approach employed for impact analysis in the mid-line report, and thus maximizes the ability to contrast the final results with the interim results. It is also a recommended method when, as in this evaluation, a panel survey visiting the same households in each round is employed.

Regression analysis

Technically, the method of double differencing is implemented by calculating changes (over time) in a result of interest such as the prevalence of diarrhoea on a number of ‘explanatory’ variables. For instance, the result might be diarrhoea prevalence and the explanatory variables might include new or repaired water points, hygiene education and the construction of new latrines. The greater the number of variables, the more complex the analysis. OMI is very complex because the programme introduced a range of interventions.

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50 In some publications on the One Million Initiative it is erroneously suggested that assignment was in fact random.
51 For a more technical description of the methodology, see Elbers et al.: 2012.
OMI had scale as well as complexity, which brought benefits in that the spread of districts, communities and intervention points allowed for a large sample to be taken. Proper sampling and data collection techniques allowed the regression to go beyond identifying what variables had a role in the result. It can indicate both what works and by how much, allowing for the comparative importance of the interventions to be determined.

To get trustworthy answers about what has caused the observed results, certain critical rules and conditions must be met. The most important of these interpretive rules and how they are handled in this report are described in the accompanying box, which takes as an example one of the tables included in the report. The data in Table 4 can help illustrate what caused households to switch from unimproved water sources to improved water sources. A total of 3,483 households provided answers that were included in the analysis. Each of the households was interviewed in all three rounds.

### Table 4. What makes households switch to improved water point (IWP) sources?

<table>
<thead>
<tr>
<th>Direction</th>
<th>Cause</th>
<th>Effect</th>
<th>Linked to OMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive: Increases IWP usage</td>
<td>Presence of an OMI-provided improved water point</td>
<td>33.9%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Presence of OMI-led CLTS activities</td>
<td>13.7%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>General trend not due to OMI</td>
<td>12.3%</td>
<td></td>
</tr>
<tr>
<td>Negative: Decreases IWP usage</td>
<td>None identified</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral: Has no effect on IWP usage</td>
<td>Household size</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Household wealth</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A user guide to interpreting the regression-based statistical tables in the report

What is being explained in this example? Over three rounds, almost 37 per cent of the households switched from unimproved water sources to improved water sources (data not shown in the table). The programme wants to know why they switched.

What are the factors that might explain why households started to use safe water sources? The table tests five possible factors: 1) that the community that the household is a part of received a water point intervention; 2) that the community received a sanitation/latrine promotion intervention; 3) that the community received no intervention; 4) that family size determines who uses safe water; and 5) that family wealth determines who switches.

How should ‘effect’ be interpreted? The estimate shows what part of the change is potentially due to the variable. Thus, the 33.9 per cent of the change is potentially due to the OMI water intervention. Even better, it is 33.9 per cent of the 60 per cent total change visible in the table (33.9 +13.7 +12.3), or more than 56 per cent of the entire observed change. By comparison, household size had no effect.

Sometimes the variables can work against the change by stimulating the opposite effect. There were no variables working against the change in this instance.

---

52 Source: Household surveys 2008, 2010 and 2013. The dependent variable is 1 if the household uses a safe water source; otherwise, the dependent variable is 0. Sample size was 3,483 households.
53 Causality is accepted if the p value is <= to 0.05 per cent. All noted effects have a p value is <= to 0.05 per cent.
What causes are linked to the OMI programme? Aspects that the OMI programme consciously tried to manage or influence are noted with a checkmark. These might be items that had the impact sought or might have had no impact or even a negative impact; it simply says where the OMI was active. Items without the checkmark were either considered not relevant by OMI or were beyond the ability of the programme to influence (e.g. household size). In this instance the two variables linked to OMI each had a distinct positive impact on switching from unimproved to improved water points.

How is effect determined? Why are some things said to be effective and not others?
Causes are said to have an effect (i.e.to be effective) if they meet certain statistical criteria. Three measures in particular were used: standard error, t-values, and p-values.

The standard error shows how consistent the results were: were positive effects seen in most communities that had the intervention or were they clustered in some places and not others? The t- and p-values indicate ‘statistical significance’, which is essentially the likelihood that the results occurred by chance due to the sample not having actually been taken from a representative group of households.

This evaluation follows the convention employed in most statistical analysis. It uses a threshold of a 95 per cent confidence level, meaning that the regression must conclude that it is 95–100 per cent certain that there is a real effect. If the confidence level is below 95%, it is felt that it is too risky to believe in the estimate, as it may be simply due to a sample that does not reflect the whole population accurately.

The regression tables in this report do not present the standard error or the p- or t-values. It was felt that this would make the report easier to understand. The raw data, including these aspects, are available upon request to the UNICEF Evaluation Office.

Not all data in this report are analysed using the double difference method or via regression techniques. Some tables compare levels of outcomes rather than changes. Without the regression analysis, the analysts must use more qualitative means to identify possible causal effects. This depends on contextual information and knowledge of proven associations from global research. When contextual information and agreement with global research are considered strong, the text will draw a conclusion. In all cases of regression or non-regression analysis, appropriate justification must be provided.
CHAPTER 4: WATER AT THE COMMUNITY AND HOUSEHOLD LEVELS

4.1 Introduction

This chapter analyses the impact of OMI on rural water supply. It is organized to answer the evaluation questions listed in the Executive Summary.

4.2 Total interventions and beneficiaries

The programme benefited xx people through the rehabilitation of 392 water points (98 per cent of target) and 1,157,164 people through the construction of 1,689 new water points (84 per cent of target). Although the target for the number of new facilities constructed was not met, the target of 1 million persons served through new facilities was exceeded.

A total of 1,689 water points were installed under OMI, missing the target of 2,000 new water points. An additional 392 existing water points were rehabilitated during the beginning phase of the programme, bringing the total number of water points in service to 2,081. Although the fulfilment of annual work plans varied considerably, overall OMI met 87 per cent of the programme’s infrastructure target. The number of beneficiaries reached through new facilities (1,157,000) exceeds the number of beneficiaries targeted by 15 per cent. This is because the number of users per water point was higher than projected.

Table 5. New water points and beneficiaries, 2008–2013

<table>
<thead>
<tr>
<th>Year</th>
<th>New water points (OMI annual target)</th>
<th>New water points (actual)</th>
<th>% of target achieved</th>
<th>Number of beneficiaries enumerated</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>280</td>
<td>333</td>
<td>119</td>
<td>243,102</td>
</tr>
<tr>
<td>2009</td>
<td>470</td>
<td>313</td>
<td>67</td>
<td>252,763</td>
</tr>
<tr>
<td>2010</td>
<td>406</td>
<td>355</td>
<td>87</td>
<td>308,324</td>
</tr>
<tr>
<td>2011</td>
<td>500</td>
<td>453</td>
<td>91</td>
<td>218,886</td>
</tr>
<tr>
<td>2012</td>
<td>338</td>
<td>104</td>
<td>31</td>
<td>57,541</td>
</tr>
<tr>
<td>2013</td>
<td>84</td>
<td>131</td>
<td>156</td>
<td>76,548</td>
</tr>
<tr>
<td>Total</td>
<td>2,078</td>
<td>1,689</td>
<td>84(^{56})</td>
<td>1,157,164</td>
</tr>
</tbody>
</table>


\(^{55}\) Source: OMI programme data. The number of beneficiaries includes the users of 10 mini systems.

\(^{56}\) This percentage is for new water points only. When combined with the higher achievement of rehabilitated systems, the total target met is 87 per cent.
4.3 Average number of users per improved water point

Against a target ratio of users to water point of 500 or fewer, OMI achieved a ratio of 685. This exceeds the recommended guidance. The trend was favourable, with the ratio declining over time.

The Government of Mozambique national guidance target ratio was a maximum of 500 persons per water point. OMI adopted the government standard as its target ratio. During the period 2008–2012, the average number of users per water point was 808. After 2010, the average declined to 367 persons per new water point. Within the targeted poorer section of the population, although the ratio per water point was higher than across the entire OMI beneficiary population, the decrease in the ratio over the life of the project was much more dramatic, declining from 3,357 in 2008 to 810 in 2013.

Looking specifically at the population per functioning water point, the equity impacts of OMI are clear. The PEC interventions were targeted at the poorer communities in the intervention districts, particularly those that had lower levels of access to improved water sources at the start of the programme. Table 6 indicates that the population per functioning improved water point in the Instituto Nacional de Estatistica (National Statistics Office or INE) sample (designed to be representative of the population across the three provinces) was 3,071 in 2008 (namely 64,500/21) and had fallen to 1,955 in 2013. In the PEC sample (designed to represent the poorer communities), the population per functioning improved water point was 3,357 in 2008 to 857 in 2013. This reflects the worse initial conditions for the PEC section of the population, as well as the targeting of programme interventions at this group.

The improvement is in regards not only to the increase in the number of water points but also to the increase in the percentage of water points that function.

Table 6. Average number of users per improved water point, 2008 and 2013 (sample communities only)

<table>
<thead>
<tr>
<th></th>
<th>All communities</th>
<th>All communities</th>
<th>Poorer communities</th>
<th>Poorer communities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2008</td>
<td>2013</td>
<td>2008</td>
<td>2013</td>
</tr>
<tr>
<td>Improved water point</td>
<td>32</td>
<td>42</td>
<td>26</td>
<td>62</td>
</tr>
<tr>
<td>Functioning improved</td>
<td>21</td>
<td>33</td>
<td>14</td>
<td>58</td>
</tr>
<tr>
<td>water point</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>% functioning</td>
<td>66</td>
<td>79</td>
<td>54</td>
<td>94</td>
</tr>
<tr>
<td>Population</td>
<td>64,500</td>
<td>64,500</td>
<td>47,000</td>
<td>47,000</td>
</tr>
<tr>
<td>Population per</td>
<td>2,015</td>
<td>1,535</td>
<td>1,807</td>
<td>758</td>
</tr>
<tr>
<td>improved water point</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Population per</td>
<td>3,071</td>
<td>1,954</td>
<td>3,357</td>
<td>810</td>
</tr>
<tr>
<td>functioning improved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

57 This planning figure was lowered in 2012 by the Government of Mozambique to 300 per water point, but OMI agreed to keep using the 500 figure through the life of the project.

58 Numbers in this table and others can differ from equivalent data presented in the 2010 mid-line report. The figures in this report are considered to be more accurate.

59 ‘All communities’ refers to the INE sample, as described in the methodology chapter. ‘Poorer communities’ refers to the PEC sample.

60 Updated population figures were not available for 2013, but the rate of growth is judged to be similar for the two samples.
Complementary data confirms the same trend. Communities that kept a ledger of users (to facilitate fees collection) were asked to share user data. Whereas one third (34 per cent) had more than 500 households registered as users in 2010 (at a mean of five persons per household, 100 households equals 500 persons), this had declined to just 20 per cent by 2013 exceeding the target. By programme’s end, the largest population for a single water point was still 3,000 persons (600 households).

4.4 The percentage of the population using improved water sources

The sample indicates that the percentage of all households in the population using improved water sources for drinking has increased from 24.9 per cent in 2008 to 40.3 per cent in 2013. Water point interventions are well targeted. They are placed in locations where many households were previously employing unsafe water sources.

The number of households using improved water sources as their main source of drinking water increased between the two survey rounds, as evidenced in Table 7. Progress in the general population can be estimated from the INE sub-sample (representative of the population in the nine survey districts). It rose from 24.9 per cent to 40.3 per cent during the same period. Among the poorer communities that were the particular target of OMI, coverage as determined by the PEC sample increased from 14.6 per cent in 2008 to 53.6 per cent in 2013.

Table 7. Percentage of households using improved water sources as their main source of drinking water: Entire OMI service area

<table>
<thead>
<tr>
<th></th>
<th>Poorer communities (based on the PEC sample)</th>
<th>All communities (based on the INE sample)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>14.6</td>
<td>24.9</td>
</tr>
<tr>
<td>2010</td>
<td>42.0</td>
<td>31.7</td>
</tr>
<tr>
<td>2013</td>
<td>53.6</td>
<td>40.3</td>
</tr>
</tbody>
</table>

An interesting point to keep in mind is the relation of the survey coverage to the water coverage estimates. Within the survey districts and communities used to gather the impact data, 8 out of 30 new water points were constructed either before the baseline survey (seven) or after the end-line survey (one). Combined with the fact that new water points supplied by non-OMI institutions were in control to intervention communities by a ratio of 13:10, there is the distinct possibility that the OMI water supply impact has been underestimated.

Households can switch to an improved water source only if they have access to one, and must also be willing to make the change. Table 8 shows data from both intervention and control villages. It shows that many but not all households do make the switch when new improved water sources are introduced in their communities. The complement of the 54 per cent of sample households using improved water as their main source is that 46 per cent of households are not using mainly safe sources.

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61 Source: Based on weighted calculations from data gathered in 2008 and 2013 household surveys.
A critical finding is that 33 per cent of households in communities where a water point intervention took place (i.e. new or rehabilitated water points) did not switch to using an improved source. Possible reasons for the barriers to accessing the improved water sources are discussed below. A few households (1.4 per cent) switched to unimproved sources, perhaps due to problems with the water point, conflicts in the community or household relocation to points distant from the source.5

### 4.5 Causes of improvements in improved water point usage

OMI interventions have two powerful impacts: the provision of an improved water point increases safe water use by 34 per cent and exposure to hygiene programming (CLTS) independently increases safe water use by 14 per cent. These explain about 80 per cent of all of the observed change.

While it is a positive finding that a large number of households switched from unimproved to improved water sources in the intervention communities, this finding does not prove that the interventions alone induced this shift. The regression reported in Table 9 addresses this issue. It links safe water usage to the water and CLTS interventions, further taking into account a general trend towards better water sources, household size and wealth.
Table 9. What makes households switch to improved water point sources?

<table>
<thead>
<tr>
<th>Direction</th>
<th>Cause</th>
<th>Effect&lt;sup&gt;64&lt;/sup&gt;</th>
<th>Linked to OMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive: increases improved</td>
<td>Presence of an OMI-provided improved or</td>
<td>33.9%</td>
<td>✓</td>
</tr>
<tr>
<td>water point usage</td>
<td>rehabilitated water point</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Presence of OMI-led CLTS activities</td>
<td>13.7%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>General trend not due to OMI</td>
<td>12.3%</td>
<td></td>
</tr>
<tr>
<td>Negative: decreases improved</td>
<td>None identified</td>
<td></td>
<td></td>
</tr>
<tr>
<td>water point usage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral: has no effect on</td>
<td>Household size</td>
<td></td>
<td></td>
</tr>
<tr>
<td>improved water point usage</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Household wealth</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Control communities increased safe water coverage by approximately 12 per cent between 2008 and 2013. This increase is not directly due to OMI, though the motivational effect of watching OMI efforts may have stimulated control communities to invest with their own resources or seek alternative providers. However, the impact of the OMI programme far exceeds this general trend: A household in an intervention community where both the water and the CLTS interventions were implemented was almost 60 per cent more likely to use safe water in 2013 than in 2008 before the interventions took place \(0.339 + 0.137 + 0.123 = 0.599\). Almost 80 per cent of that increase is due to OMI interventions \(47.6/59.9\).

Two of the statistically significant effects are not surprising: first, that there was a general trend outside of OMI, and second, that an OMI-provided water point increases improved water usage. More unexpected is the strong independent effect of exposure to CLTS programming. Households encouraged to build latrines and adopt good sanitation practices also became receptive to safe water messages to the degree that many also changed their water behaviour.

4.6 Barriers to accessing an improved source of drinking water – Distance

| Distance from the improved water source is highly correlated with usage. Usage is nearly universal (90 per cent) within 100 meters of the source. At 1 kilometre, usage decreases to 46 per cent. Only 33 per cent of households living between 1 and 2 kilometres from an improved source use it. The additional decline in usage is statistically significant at each new distance. |

The percentage of the sample households using an unimproved water source fell from 58 per cent in 2010 to 46 per cent in 2013. As noted above, even 33 per cent of the households in communities with improved water sources continued to use unsafe water for all purposes.

Table 10 examines the linkage of use of an improved source of drinking water to distance from the improved source. It is important to note exactly what is being measured. Distance is measured in kilometres in a straight line between the household and the location of the nearest improved source, using the GPS measurements. Since trails may not be in a straight line, the actual distance walked might be longer.

<sup>64</sup> Causality is accepted if the p value is \(<=\)0.05 per cent. All noted effects have a p value of \(<=\)0.05 per cent.
The regression shows that distance has an increasingly negative impact on the use of improved drinking water. For instance, 90 per cent of households living within 100 metres of an improved source use it, while only 33 per cent (0.9 minus 0.57) of households living between 1 and 2 kilometres from an improved source use it.

Table 10. Household use of an improved source of drinking water and distance from the source

<table>
<thead>
<tr>
<th>Distance from the safe water source</th>
<th>Usage trend</th>
<th>Usage of water from an improved source (%)</th>
<th>Effect 66</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= to 250m</td>
<td>Positive: usage is unaffected (does not decline) due to distance</td>
<td>90.0</td>
<td></td>
</tr>
<tr>
<td>250-500m</td>
<td>Negative: usage declines</td>
<td>72.9</td>
<td>-17.9%</td>
</tr>
<tr>
<td>500-750m</td>
<td>Negative: usage declines further</td>
<td>53.2</td>
<td>-36.8%</td>
</tr>
<tr>
<td>750-1000m</td>
<td>Negative: usage declines further</td>
<td>46.1</td>
<td>-43.9%</td>
</tr>
<tr>
<td>1-2km</td>
<td>Negative: usage declines further</td>
<td>32.8</td>
<td>-57.2%</td>
</tr>
<tr>
<td>2-3km</td>
<td>Neutral: usage stabilizes at 1-2 km rate</td>
<td>32.3</td>
<td>-57.7%</td>
</tr>
<tr>
<td>&gt;3km</td>
<td>Negative: usage declines further</td>
<td>8.5</td>
<td>-81.5%</td>
</tr>
</tbody>
</table>

4.7 Barriers to accessing safe water: Cost to the user

In 2008, only 38 per cent of improved water points had a monthly payment system. In 2010, this rose to 64 per cent and in 2013, to 80 per cent. User charges do not seem to act as a barrier to accessing improved water sources by any group, including by normally disadvantaged populations such as female-headed households or households in the lower wealth quartiles. Locations with higher user charges do not have a lower percentage of households using water from the improved source.

User charges are normally promoted for the following four reasons:
1. The willingness of the community to establish and collect them is an indication of communal support for the water point;
2. Collecting and guarding money helps develop local self-governance capacities useful in water and other sectors. It often opens avenues for marginalized social groups to be seen as capable and contributing.
3. The monies collected can fully or partially cover the cost of ongoing operations and maintenance. This stimulates community pride and reduces the stress on public ministries.
4. The monies collected can partially or fully cover the eventual cost of pump replacement. This allows governments to extend additional new works as the capital replacement costs in the government budget for old works are lessened.

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66 All noted effects have a p value of <= to 0.05 per cent.
In line with government policy, OMI promoted user charges for the first three reasons but not for the fourth. The actual fee levels were always established by local decision-makers. This section asks the narrow question of whether the user charges affected access. It does not attempt to determine if the charges met any of the four goals above. It is the OMI intent that the charges not be set so high as to discourage access.

**Presence of user fees**

Table 11 presents the type of water fees as reported by households in communities served by improved water points.

<table>
<thead>
<tr>
<th>Table 11. Payment mode for user charges for improved water sources^67</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>No payment</td>
</tr>
<tr>
<td>Per month</td>
</tr>
<tr>
<td>Per bucket</td>
</tr>
<tr>
<td>Per breakdown</td>
</tr>
<tr>
<td>Other</td>
</tr>
</tbody>
</table>

The OMI programme successfully stimulated a growth in the percentage of communities collecting user fees from 55 per cent to 82 per cent. It also consolidated practice around a monthly fee model rather than selecting the fee models that required more administrative effort (per bucket) or were unpredictable in timing and targeted just at immediate expenses rather than future needs (per breakdown).

Households were not asked why they did not pay for water. Based on programme monitoring data, however, it is clear that some communities were inefficient at governance or resistant to fees. Many communities with a payment system also exempted their poorest members from paying fees.

**Amount of user charges**

Table 12 provides the mean and median monthly payments for water points with user charges. Over time, the monthly charges increased slightly faster than inflation in Mozambique, which averages approximately 7 per cent per annum. The amounts in Table 12 are in line with user charges reported in the household survey (*see Table 11*).

<table>
<thead>
<tr>
<th>Table 12. Monthly payments during the dry season according to water committees (MZN per month)^68</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode</td>
</tr>
<tr>
<td>Mean payment</td>
</tr>
<tr>
<td>Median payment</td>
</tr>
</tbody>
</table>


^68 Source: Water point surveys 2008, 2010 and 2013. During the OMI programme years, the average exchange rate was MZN30 per US$1.
Household survey data confirm the same general range and trend of costs between 2008 and 2010 (no data were collected in 2013). As expected, collections were higher for locations with interventions than for locations without and the averages had risen significantly as OMI and non-OMI providers implemented a user charge policy.

**Effect of user charges on access**

The 2010 and 2013 median of 10 units of Mozambican currency (MZN) cost a household about US$0.33. There is no indication that this was a barrier to access. When asked about their opinion of the user charges, most households said that what they were asked to pay was reasonable or cheap (87.9 per cent in 2008, 81.1 per cent in 2010 and 87.1 per cent in 2013). A formal ‘cross section’ regression using survey data from 2010 found no evidence that locations with higher user charges had a lower percentage of households using water from the improved source. In sum, no OMI information source has indicated that female-headed households or households in the lower wealth quartiles were in a disadvantaged position in terms of using improved water sources.

Qualitative data offered interesting insights about non-payment, though this was asked at just a few survey sites. Respondents said that people could still get water even if they did not pay, irrespective of whether they are unable or unwilling to pay.

### 4.8. Why households use particular water points

Distance is the most important factor determining which water source a household uses, but is less important for users of improved water sources who are willing to travel longer distances. Users of unimproved sources are slightly more drawn to the absence of a user charge and users of improved points are highly motivated by the perception that water is of better quality.

Households were also asked why they were using a particular water point. Table 13 summarizes the answers.

**Table 13. Reasons given for choosing the water point used, by type of source used (percentage of households)**

<table>
<thead>
<tr>
<th>Reason</th>
<th>Unimproved water point</th>
<th>Improved water point</th>
</tr>
</thead>
<tbody>
<tr>
<td>Closest water point to household</td>
<td>72.6</td>
<td>70.9</td>
</tr>
<tr>
<td>Short waiting time</td>
<td>9.1</td>
<td>5.3</td>
</tr>
<tr>
<td>Water point always has water</td>
<td>16.9</td>
<td>14.9</td>
</tr>
<tr>
<td>Water is free</td>
<td>13</td>
<td>4.4</td>
</tr>
<tr>
<td>Reasonable cost</td>
<td>0.8</td>
<td>9.3</td>
</tr>
<tr>
<td>Good water quality</td>
<td>5.9</td>
<td>59.5</td>
</tr>
<tr>
<td>Other</td>
<td>34.8</td>
<td>11.2</td>
</tr>
</tbody>
</table>

Most importantly, Table 13 re-emphasizes the important role that distance plays. More than 70 per cent of households mention distance as the reason for using a particular source regardless of whether the source is an improved water point.
Two additional points separate the users of unimproved and improved water sources.

a) Good water quality is mentioned in communities as reason for using an improved source 10 times more often than by users of unimproved sources (59.5 vs. 5.9 per cent). This reflects knowledge and attitude changes resulting from the mobilization and health education activities of many actors, including but also preceding and extending beyond OMI. Over the years, a common message transmitted by civil authorities and health and water staff alike was that water from a hand pump source was better. In this instance, knowledge and attitude positively affect practice and behaviour.

b) That the water is always free is an attraction for 13 per cent of those using unimproved sources versus just 4.4 per cent of those using improved sources. Even though the regression data showed that cost was not an obstacle, it might be for a small percentage of households.

When these preferences were cross-tabulated with the distance of the household from the water point, one additional interesting finding emerges. At all distances starting at 250 meters, users of improved sources are between 16 and 27 per cent less likely to cite convenience (use of closest source or that the waiting time is short) as the reason they use the improved source. Put another way, the water education efforts of OMI and others convinced a large number of households to willingly invest more labour to reach and consume safe water even when a nearer unsafe water point existed.

4.9 Amount of water consumed for domestic purposes

The amount of water taken home has increased considerably since 2008 and 2010. The 2013 survey indicated a mean domestic water use of 19.54 litres per person per day, an increase of 6.9 litres per person per day compared with 2008. Both the intervention and non-intervention locations saw large growths in consumption.

<table>
<thead>
<tr>
<th>Table 14. Trends in water consumption (litres per person per day)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All</strong></td>
</tr>
<tr>
<td>2008</td>
</tr>
<tr>
<td>2010</td>
</tr>
<tr>
<td>2013</td>
</tr>
<tr>
<td>Change 2008-2013 (litre)</td>
</tr>
<tr>
<td>Number of locations</td>
</tr>
</tbody>
</table>

Mean consumption has increased significantly, with growth occurring after the 2010 mid-line and approaching the recommended Government of Mozambique standard of 20 litres per person per day. Median consumption mirrors the mean. In 2010, only 13.7 per cent of the households in the sample consumed more than 20 litres per person per day. In 2013, the percentage of households using at least the recommended 20 litres per person per day was 43.1 per cent. OMI locations receiving water interventions did slightly better in all metrics but the
broader conclusion is that there is very little difference seen across users of improved or unimproved water sources and the different intervention categories.

The growth in water intervention-only communities is expected. The growth in CLTS-only intervention communities is more surprising. As shown in Table 14, regression data indicates an independent effect of CLTS promotion on the willingness of households to switch to safe water sources. Table 29 indicates that this effect is not small (i.e. that it leads households to also greatly increase the amount of water consumed). One possible causal route is via health education about water quality. The surveys asked households to rate water quality on a five-point scale. Regression data showed that one step forward on the scale increased daily consumption 0.9 litres per person. Health education campaigns that discuss water quality without providing more safe water—as was the case in CLTS-only communities—can still stimulate consumption by improving the value given to safe water.

The reason for consumption growth in non-intervention communities is more speculative. The two most likely answers are: a) the general trend toward more improved water points, including through non-OMI providers, made more water available; and b) that the overall increase in water availability thanks to OMI and others reduced pressure on the existing water points and allowed communities to relax rationing rules. Indirect confirmation for point (b) is provided in responses in community discussions about the time needed to fetch water. The time needed to fetch water from improved sources barely shifted from 2008 to 2013 (falling from 82 minutes per day on average to 80 minutes), while the time needed to fetch water from unimproved sources fell from 90 to 75 minutes. It is possible that improved sources drew in so many users that waiting times barely fell at the improved sites and reduced the lines at unimproved sites.

4.10 Domestic and non-domestic uses of improved water

This discussion investigates two related topics of water use by households that consume improved water: a) what they use the improved water for; and b) what they use unimproved water sources for, if in fact they use them.

Households that consume water from improved sources employ it for a variety of purposes:

1. 100 per cent: Drinking
2. 98.6 per cent: Cooking
3. 94.7 per cent: Washing hands
4. 94.1 per cent: Washing kitchen utensils
5. 86.8 per cent: Bathing
6. 74.2 per cent: Laundry
7. 20.3 per cent: Water needs of small animals
8. 7.9 per cent: Water needs of large animals
9. 7.4 per cent: Construction
10. 1.7 per cent: Irrigation of gardens

The vast majority of households use water from improved sources for domestic purposes only. They particularly employ it when it will be ingested (drinking, indirectly via cooking) or will touch...
their skin (washing, bathing). This shows a strong adherence to health education messages. When there is ‘surplus’ improved water, it is used for non-domestic purposes, especially for small animals.

One quarter of the households (25.2 per cent) that consume improved water also use a secondary water source.69 The comparison of how the secondary sources are used for domestic purposes is instructive:

1. 0 per cent: Drinking
2. 1.4 per cent: Cooking
3. 5.3 per cent: Washing hands
4. 5.9 per cent: Washing kitchen utensils
5. 60 per cent: Bathing
6. 98 per cent: Laundry

Secondary source water use is almost entirely excluded from domestic needs. Given that just 25 per cent of households use secondary sources, even the bathing and laundry uses of secondary sources are employed by a distinct minority of households using safe water (by 15 per cent and 25 per cent, respectively).

A specific question was asked on water use away from the household, particularly water use when working in the agricultural fields. If family members consume unsafe water while working in the fields, it can severely undercut the protective effects of the safe water consumed at home. Eleven per cent of households with access to safe water use alternate unsafe sources in the field. The 2013 figure is a decrease by more than one third from 2008 when those with safe water access used unsafe sources 18 per cent of the time. This also indicates that health education and increased availability are having a positive impact over time.

4.11 Water quality at the source

Data sources note

The sections of this chapter that discuss water quality should be read in light of the following methodological issues:

1. The sample base is relatively small. The target included samples from two households per sampling unit visited for the household survey. Two samples were taken from each of the two households, or four samples total per location. One sample was taken from the drinking water source and the second from the container used to store the water in the house.
2. The pair of samples were taken from 79 households in 2008, 150 in 2010 and 160 in 2013. The distribution of water samples was nearly equal in 2008 between the intervention and control communities of that year (37 vs. 42 households), and was equal in the other two rounds. Forty-one households had samples taken in all three rounds.
3. The 2010 contamination figures are significantly out of line with those of 2008 and 2013. If they represent problems handling the samples, they might affect the comparison of different sample populations.70

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69 Ibid.
70 There were problems reported with handling water samples in 2008 while in 2013 a different agent was responsible for water sampling and analysis.
As a result, the data on water quality are less reliable than that of other water findings in this chapter.

**Water quality at source**

Improved water sources delivered clean water at rates 50–90 per cent greater than unimproved sources. Water from an improved source was clean 97.7 per cent of the time in 2013. Both types of sources showed major cleanliness gains between 2010 and 2013. Cleanliness gains occurred despite high levels of contamination risk in the environment immediately around the improved water point such as animal faeces, rubbish and animals: 40 per cent were rated as unhygienic in 2013, down from a prior rate of about 32 per cent in 2010.

Coliform (CFU) contamination counts from 2010 and 2013 are presented in Table 15. All samples were taken directly at the community water source and could not have been contaminated by the household storage vessels. The sample is separated by whether the source was unimproved or improved.

**Table 15. Safe water provision by improved and unimproved sources, 2010 and 2013**

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>Unimproved source</th>
<th>Improved source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2010</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of samples</td>
<td>149</td>
<td>85</td>
<td>64</td>
</tr>
<tr>
<td>CFU count = 0 (%)</td>
<td>36.9%</td>
<td>3.5%</td>
<td>81.2%</td>
</tr>
<tr>
<td>CFU count 1-10 (%)</td>
<td>6.0%</td>
<td>5.9%</td>
<td>6.2%</td>
</tr>
<tr>
<td>CFU count &gt; 10 (%)</td>
<td>57.0%</td>
<td>90.6%</td>
<td>12.5%</td>
</tr>
<tr>
<td><strong>2013</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of samples</td>
<td>158</td>
<td>73</td>
<td>85</td>
</tr>
<tr>
<td>CFU count = 0 (%)</td>
<td>75.3%</td>
<td>50.7%</td>
<td>96.5%</td>
</tr>
<tr>
<td>CFU count 1-10 (%)</td>
<td>4.4%</td>
<td>8.2%</td>
<td>1.2%</td>
</tr>
<tr>
<td>CFU count &gt; 10 (%)</td>
<td>20.3%</td>
<td>41.1%</td>
<td>2.4%</td>
</tr>
</tbody>
</table>

The improved sources are, as expected, significantly less prone to contamination. The percentage with any contamination was about 19 per cent in 2010 and under 4 per cent in 2013. In 2013, almost 98 per cent of the samples met the standard for drinking water (CFU count < 10). Unimproved sources had more than 90 per cent unsafe readings in 2010. They had vastly better performance in 2013 but still were far more likely to be contaminated than improved sources. Households that switched from an unimproved to an improved source increased their probability of drawing clean water by 53 per cent.

---

72 CFU counts of less than 10 in rural water supplies are considered acceptable for human consumption according to Government of Mozambique standards. For treated public systems, the standard is a CFU count of 0.
Environmental sanitation around the water point

The generally high quality of water drawn from improved sources in 2013 occurred despite contamination threats in the immediate environment.

Table 16. Environmental conditions at the improved water source drawing point

<table>
<thead>
<tr>
<th>Potential source of contamination around the borehole</th>
<th>2010</th>
<th>2013</th>
<th>Trend 2010-2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Environmental sanitation around the boreholes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latrines within 30 metres of the water point</td>
<td>7.6%</td>
<td>2.1%</td>
<td>-5.5%</td>
</tr>
<tr>
<td>Rubbish spread within 30 metres</td>
<td>66.7%</td>
<td>56.7%</td>
<td>-10%</td>
</tr>
<tr>
<td>Signs of animals approaching within 10 metres</td>
<td>53%</td>
<td>29.9%</td>
<td>-23.1%</td>
</tr>
<tr>
<td>Condition of the boreholes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stagnant water less than 2 metres from the water point (indicates insufficient drainage)</td>
<td>30.3%</td>
<td>13.4%</td>
<td>-16.9%</td>
</tr>
<tr>
<td>Cracks in cement floor or in the drainage channel</td>
<td>18.2%</td>
<td>18.6%</td>
<td>+0.4%</td>
</tr>
<tr>
<td>Base too small (less than 2 meters)</td>
<td>50%</td>
<td>54.6%</td>
<td>+4.6</td>
</tr>
<tr>
<td>Overall borehole condition rating of unhygienic due to the presence of faeces, kitchen rubbish or stagnant water</td>
<td>31.8%</td>
<td>40.2%</td>
<td>+8.4%</td>
</tr>
</tbody>
</table>

Although the environmental trends are favourable compared to 2010, the conditions of the platform of the borehole overall did not improve. In effect, drinking water quality standards are being met despite high levels of contamination risk.

Overall impact across the OMI programme area

Recalling that OMI did not work in all communities in the programme area, the overall impact is a reflection of the improvement in water quality at the source, combined with the percentage of communities that received improved sources. Table 17 presents the key data. Note that this data links water quality to the communities as a whole, not to individual households.

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73 Source: Sanitary inspection of borehole and immediate surroundings by a survey team member at the time of visit, 2010 and 2013.
### Table 17. Water quality at the source (% of locations with or without water interventions)\(^{74}\)

<table>
<thead>
<tr>
<th>Year</th>
<th>% of samples meeting drinking water standards</th>
<th>% of contaminated samples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>All locations</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>70.4% (38)</td>
<td>29.6% (16)</td>
</tr>
<tr>
<td>2010</td>
<td>38.9% (44)</td>
<td>61.1% (69)</td>
</tr>
<tr>
<td>2013</td>
<td>75.3% (119)</td>
<td>24.7% (39)</td>
</tr>
<tr>
<td><strong>Locations without intervention</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>75.0% (24)</td>
<td>25.0% (8)</td>
</tr>
<tr>
<td>2010</td>
<td>22.7% (10)</td>
<td>77.3% (34)</td>
</tr>
<tr>
<td>2013</td>
<td>68.8% (44)</td>
<td>31.2% (20)</td>
</tr>
<tr>
<td><strong>Locations with intervention</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2008</td>
<td>63.6% (14)</td>
<td>36.4% (8)</td>
</tr>
<tr>
<td>2010</td>
<td>49.3% (34)</td>
<td>50.7% (35)</td>
</tr>
<tr>
<td>2013</td>
<td>79.8% (75)</td>
<td>20.2% (19)</td>
</tr>
</tbody>
</table>

In a continuation of the pattern seen in several earlier instances, the positive effects are particularly apparent in the intervention locations. This consolidates the view that the communities targeted for the first interventions in 2008 and 2009 began in a worse condition and benefited on average more than the population as a whole. Recalling that 33 per cent of households in intervention communities did not switch to improved water sources after they became available, it is likely that the great majority of the contaminated samples in locations with interventions did not come from persons that started with or switched to improved water.

### 4.12 Water quality at the point of use

When households switch to an improved water source, this increases the probability by 53 per cent that the water is also clean at the point of use. However, water that was uncontaminated at the source was often contaminated at the point of use. Counterintuitively, both the 2010 and 2013 analyses have concluded that that washing water containers with soap decreases water quality.

Fetching water that is safe when drawn from the source does not guarantee that the water is still safe when and where it is used (point of use). The inability to keep safe water from being contaminated in the household before it is used or consumed is a well-established WASH phenomenon. It appeared in the OMI programme area as shown in Table 18.

Table 18. Trends in contamination at source and point of use

<table>
<thead>
<tr>
<th>Year</th>
<th>% contamination at source</th>
<th>% contamination at point of use</th>
<th>Change in level of contamination</th>
<th>% of safe source samples contaminated in the household</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>36.7%</td>
<td>50.0%</td>
<td>-13.3%</td>
<td>21.0%&lt;sup&gt;75&lt;/sup&gt;</td>
</tr>
<tr>
<td>2010</td>
<td>63.1%</td>
<td>86.5%</td>
<td>-23.4%</td>
<td>63.3%</td>
</tr>
<tr>
<td>2013</td>
<td>24.7%</td>
<td>46.2%</td>
<td>-21.5%</td>
<td>28.5%</td>
</tr>
</tbody>
</table>

As noted, the 2010 data are an anomaly. Even if it is discounted, the OMI programme has had little success in regards to improving water quality at the point of use. Increases in quality at the point of use are significantly undercut by a consistent >20 per cent incidence of contamination between the source and the household.

Table 19. What determines water safety at the point of use?<sup>76</sup>

<table>
<thead>
<tr>
<th>Direction</th>
<th>Cause</th>
<th>Effect&lt;sup&gt;77&lt;/sup&gt;</th>
<th>Linked to OMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive: increases water quality at point of use</td>
<td>Water is drawn from an improved water point</td>
<td>53.0%</td>
<td>✓</td>
</tr>
<tr>
<td>Negative: decreases water quality at point of use</td>
<td>Water sample tested 2010</td>
<td>-16.9%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Soap is used to clean the water storage container</td>
<td>-14.1%</td>
<td></td>
</tr>
<tr>
<td>Neutral: has no effect on water quality at point of use</td>
<td>Household size</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Household wealth</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water is treated before use</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>CLTS intervention</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Same container for fetching and storing water</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Water sample tested 2013</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

As expected, consuming safe water does have a powerful protection effect. Persons switching to water from an improved source are 53 per cent less likely to consume contaminated water, meaning that many households are able to reserve the advantages of the improved water point. In two instances, however, there are statistically significant negative associations:

a) The water sample was drawn in 2010: This association is considered not true because of concerns over the handling and testing of the samples.

b) The washing of household water storage containers with soap: This association was established in both the 2010 and 2013 samples. It is counter-intuitive and there is no obvious explanation. The most plausible reason is that soap and safe water alone are not used in the cleaning, as it is seen that washing is often accompanied by using dirt or sand as an abrasive agent.

<sup>75</sup> A total of 13.3 per cent of the 63.3 per cent of the samples that were not contaminated at the source were contaminated at point of use (or 21 per cent). The 2010 and 2013 figures are calculated likewise.


<sup>77</sup> All noted effects have a p value of </= to 0.05 per cent.
The linkage of the OMI programme to contamination via the use of soap is not evident. However, the fact that the association was seen in 2010 and continues in 2013 indicates that any health education or other measures taken in response did not work as well as was intended.

The other factors that do not have a statistically significant impact include several that strong theoretical possibilities. Very few households treat the water, which for good reason they believe to be safe. Using the same container to draw and store the water offered protection against contamination but not at a significant enough level (p value of 0.20 instead of the threshold 0.05). Similarly, the presence of the CLTS programme has no effect on water quality at point of use; in fact, it had a negative impact but again is not significant (p of 0.15).

There are many other potential contamination routes that were not included in the survey. Follow up field work would be needed to arrive at a more definitive set of factors securing or threatening water safety.
CHAPTER 5: SANITATION AND HYGIENE AT THE COMMUNITY AND HOUSEHOLD LEVELS

5.1 Introduction

OMI sanitation activities aimed to increase access to and use of improved sanitation facilities from an average of 42 per cent to at least 50 per cent in Manica, Sofala and Tete provinces by 2013. The physical outputs targeted the household construction of 200,000 new latrines. The mobilization, management training and health education elements (commonly called the ‘software’ element) employed the CLTS methodology and replaced (or was implemented alongside) the Participatory Hygiene and Sanitation Transformation methods previously employed by OMI.\textsuperscript{78} Hygiene education aimed to promote increased cleaning of toilets, safe handling of baby excreta and handwashing with soap.

5.2 Total intervention and beneficiaries

The programme benefited 1.3 million persons using the number of latrines as the metric. This is 30 per cent more than OMI had originally targeted.

Table 20 shows that by the end of the programme, the target of 1 million people gaining access to sanitation facilities\textsuperscript{79} was exceeded by 30 per cent. The data presented in Table 20 reflects actual households that constructed a new latrine.

<table>
<thead>
<tr>
<th>Year</th>
<th>New latrines</th>
<th>Beneficiaries</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planned</td>
<td>Actual</td>
</tr>
<tr>
<td>2008</td>
<td>6,000</td>
<td>66,000</td>
</tr>
<tr>
<td>2009</td>
<td>121,000</td>
<td>55,143</td>
</tr>
<tr>
<td>2010</td>
<td>53,000</td>
<td>96,224</td>
</tr>
<tr>
<td>2011</td>
<td>20,000</td>
<td>24,785</td>
</tr>
<tr>
<td>2012</td>
<td>4,000</td>
<td>7,669</td>
</tr>
<tr>
<td>2013</td>
<td>10,000</td>
<td>11,165</td>
</tr>
<tr>
<td>Total</td>
<td>200,000</td>
<td>260,986</td>
</tr>
</tbody>
</table>

CLTS interventions in the later years of OMI did not lead to as many new latrines as in the early years. One speculative reason is that most households that wanted latrines built them early in the life of the programme. A second, confirmed reason, is that OMI emphasized safer latrine

\textsuperscript{78} For a discussion of the Participatory Hygiene and Sanitation Transformation approach, see WHO (2011).

\textsuperscript{79} ‘Better’ does not imply that these facilities are improved or adequate as conventionally understood. See Chapter 3, Table 26 for an assessment of latrine safety.

\textsuperscript{80} Source: OMI programme data. The number of latrines was calculated based on one latrine per household with five beneficiaries per latrine. The number of beneficiaries is estimated by the implementing NGOs.
designs after the mid-term review, and households needed more time and resources to construct them, which slowed the growth rate. There may also have been operational factors at work such as funding availability for mobilization activities.

The fast growth in the early years underscores the joint impact of low-cost barriers and fast and widespread sanitation mobilization activities. Consequently, it appears that although the programme was able to accelerate the pace of latrine adoption through rapid start-up, given the slowdown after the programme mid-point, it may simply have shifted the timing of the adoption without increasing the total adoption rate.

5.3 Latrine ownership and the presence of the One Million Initiative

Latrine ownership increased from 44 per cent to 60 per cent across the entire OMI programme zone from 2008–2013. Although CLTS intervention communities adopted earlier than communities with no intervention, most of this gap was reduced by the end of the programme. A water point intervention had no effect on latrine ownership, which contrasts with the fact that CLTS sanitation programming had a positive effect on water use behaviour.

Household latrine ownership: Overall trends

Taking both intervention and control locations together, the pattern established above is observed: rapid growth in the early years and slower growth in the later years.

Table 21. Trends in latrine ownership, 2008-2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Latrine ownership in all locations (%)</th>
<th>Percentage change</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>43.9</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>54.9</td>
<td>+11% from 2008</td>
</tr>
<tr>
<td>2013</td>
<td>59.8</td>
<td>+4.9% from 2010</td>
</tr>
</tbody>
</table>

+15.9% 2008-2013
Household latrine ownership: By CLTS intervention history

Table 22. Latrine ownership and CLTS intervention

<table>
<thead>
<tr>
<th>Year of survey</th>
<th>Percentage of households owning latrines</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>OMI did not intervene in the household’s community</td>
</tr>
<tr>
<td>2008</td>
<td>44.1</td>
</tr>
<tr>
<td>2010</td>
<td>48.1</td>
</tr>
<tr>
<td>2013</td>
<td>56.9</td>
</tr>
<tr>
<td>Change 2008–2010</td>
<td>4.0</td>
</tr>
<tr>
<td>Change 2010–2013</td>
<td>8.8</td>
</tr>
<tr>
<td>Change 2008–2013</td>
<td>12.8</td>
</tr>
</tbody>
</table>

The rapid acceleration of latrine ownership in early intervention communities has already been noted. Three other trends are particularly interesting in this table:

1. The relatively slow but steady and perceptible growth in the non-intervention communities eventually closed much of the gap that developed during the first years of the programme. This therefore represents either diffusion outwards from the intervention communities or the ‘secular trend’ occurring throughout Mozambique. If non-intervention communities were building less safe latrines than the intervention communities, however, the two growth patterns do not reflect use of the same technology.

2. The communities where OMI intervened after 2010 had almost the same growth pattern as those where OMI did not intervene at all.

3. There was slippage in the early intervention communities from the peak ownership observed in 2010. By 2013, ownership was receding at an annual rate of 3.7 per cent. In particular, this represents latrines that fell into disrepair and were not replaced.

---

82 ‘Secular trend’ means what would have happened anyway because of forces already at work and therefore not due to the intervention. A programme is considered to cause changes if it makes things happen that were not likely to be caused by the secular trend.
### Households' latrine ownership: Regression analysis

**Table 23. What makes households build latrines?**

<table>
<thead>
<tr>
<th>Direction</th>
<th>Cause</th>
<th>Effect[^4]</th>
<th>Linked to OMI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive: Increases latrine ownership</td>
<td>Presence of an OMI CLTS intervention between 2008–2010</td>
<td>8.8%</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Year 2010</td>
<td>7.6%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Year 2013</td>
<td>9.5%</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Household wealth</td>
<td>4.7%</td>
<td></td>
</tr>
<tr>
<td>Negative: Decreases latrine ownership</td>
<td>None identified</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Neutral: Has no effect on latrine ownership</td>
<td>Presence of an OMI CLTS intervention after 2010</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Presence of an OMI water point intervention</td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Household size</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The regression table also reveals interesting relationships:

1. As one would expect, as a household grows richer, it is more likely to own a latrine. This is one factor that is unrelated to OMI activities. Given that the Government of Mozambique was using many platforms (mass media, health centre personnel, etc.) to advocate for latrine usage in all districts and across the country, the abstract concept of secular trend appears to have important components that are distinct from an on-the-ground programme.

2. The general or secular trend was so strong that it overtook the effect of OMI. Only one of three tested OMI aspects actually increased latrine ownership. CLTS interventions in the 2008–2010 period did, and later CLTS interventions and water point interventions did not.

3. The absence of effect from the water point intervention is surprising to a degree. In the prior chapter, regression analysis showed that the CLTS hygiene/sanitation interventions had a strong and independent positive effect driving improved water consumption by households. It is therefore clear that the two arms of an integrated WASH programme such as OMI can influence one another. Yet the water intervention appeared to have no impact on the sanitation adoption.

One operational strategy employed by OMI is particularly noteworthy in this context. Unlike in the water interventions, OMI sanitation mobilizers visited nearly all communities. After the community had been ‘triggered’, the decision of whether or not to continue working with the village was made based on community enthusiasm. The NGOs leading this process apparently made accurate assessments. The communities they judged most motivated and cohesive became the core of the 2008–2010 efforts. Those that were less cohesive were either retriggered after 2010 or were considered control communities. This can potentially explain two things: a) why a percentage of households in control communities built latrines (because they had experienced the triggering and made a family commitment even if the village was not broadly motivated); and b) why the control and post-2010 CLTS intervention communities showed similar ownership patterns (because neither were highly motivated and thus were

[^38]: Source: household surveys 2008, 2010 and 2013. Sample size: 3,483 households
[^4]: Causality is accepted if the p value is \(\leq 0.05\) per cent. All noted effects have a p value is \(\leq 0.05\) per cent.
equally influenced by the secular trend but not really by OMI).

**Household latrine ownership and community open defecation-free status**

Although it makes intuitive sense that all households in communities declared ODF would have latrines, the data do not show this to be the case.

**Table 24. Latrine ownership in communities that have been declared ODF (per cent of households owning a latrine)**

<table>
<thead>
<tr>
<th>Survey round</th>
<th>Year that the community became ODF</th>
<th>Not yet</th>
<th>2008-2010</th>
<th>After 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>43.7</td>
<td>45.0</td>
<td>43.6</td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>50.7</td>
<td>70.8</td>
<td>59.1</td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>58.3</td>
<td>64.6</td>
<td>62.7</td>
<td></td>
</tr>
<tr>
<td>Number of locations</td>
<td>57</td>
<td>12</td>
<td>11</td>
<td></td>
</tr>
</tbody>
</table>

Table 24 shows that latrine ownership in ODF communities did not reach 100 per cent. In the 2013 survey, latrine ownership was 6 percentage points higher in ODF communities than in other communities.

There are three possible explanations for incomplete latrine ownership coverage in ODF communities, of which two seem to be partial explanations:

1. **That there are uncounted latrines:** It is believed that the reporting of latrine ownership is accurate—that there are not a lot of uncounted latrines built. The discrepancy is not due to a large hidden population of latrine owners.

2. **That households share latrines:** The national ODF protocol in Mozambique allows for households to share latrines if they wish. While this is relatively uncommon in Mozambique, there was an increase in sharing reported between 2008 and 2013. In 2008 only 10.2 per cent of households reported that they shared latrines with other families; in 2010 and 2013 shared latrines were used by 11.1 per cent of households. This explains part of the discrepancy.

3. **That ODF certifiers overlook some OD behavior:** Even in ODF communities, some households report OD practices by one or more members of the household (25.6 per cent of men in 2010 and 34.3 per cent of men in 2013), some of which certainly occurred while working in the nearby agricultural fields. Households without latrines may stop OD during the period before the certification process and resume it afterwards. The certification teams may also have missed the small percentage of OD since they sampled only 10 per cent the households but did not visit all, or may have unofficially accepted a small percentage of OD on the premise that the community should not be denied certification because not all children or very poor or stubborn persons can be persuaded to use a latrine at all times (i.e. at work, at school, in public places or at home).
5.4 What causes households to build latrines

The principal reasons households build latrines are to have better health and to avoid shame over not having one. The power of health education and community-wide decision taking is revealed in these reasons.

During the community surveys, community representatives were asked whether there had been a CLTS intervention in their community. Almost all communities that indicated such an intervention also reported that at least some households have improved or changed their latrines (or built one) (36 out of 37 communities in 2010 and all 42 communities in 2013). Table 25 summarizes their responses in regards to what motivated these changes.

Table 25. Main reasons to change latrine condition after the CLTS intervention

<table>
<thead>
<tr>
<th>Reason</th>
<th>2010</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Better for health</td>
<td>59.5% (22)</td>
<td>81.0% (34)</td>
</tr>
<tr>
<td>Shame over not having a latrine</td>
<td>32.4% (12)</td>
<td>26.2% (11)</td>
</tr>
<tr>
<td>Participate to win a prize</td>
<td>2.7% (1)</td>
<td>7.1% (3)</td>
</tr>
<tr>
<td>Good leadership</td>
<td>2.7% (1)</td>
<td>7.1% (3)</td>
</tr>
<tr>
<td><strong>Total communities</strong></td>
<td><strong>37</strong></td>
<td><strong>42</strong></td>
</tr>
</tbody>
</table>

This data is ‘soft’—it is derived from a few people making generalizations rather than from the decision-takers themselves—and therefore should not be trusted completely. If accurate, the data do, however, point to some important connections. Building on government efforts predating the programme, OMI worked to educate the populace about the health benefits of latrines. Table 25 justifies this strategy. It also shows that one of the key elements in the CLTS approach—the fostering of a community decision that creates social pressure on residents to adhere to or feel shame over not following a common practice—is an important motivator for health, among other factors. In contrast, incentives and good leadership are relatively unimportant, indicating that adopters do not need to be motivated by material rewards and that OD/ODF/latrines are seen as subjects that the average community member can understand and take action on.

5.5 Latrine quality

OMI sought both ‘safe sanitation’ (a set of five criteria) and ‘improved sanitation’ (any latrine that meets the national criteria for improved sanitation). By programme’s end, fewer than 10 per cent of latrines met all conditions for improved sanitation, and less than 5 per cent met all conditions for safe sanitation. Coverage of individual criteria could range up to 93 per cent. The least common were a cement slab, a properly fitting lid and the presence of a handwashing facility with soap or ash. CLTS communities did not perform better over time. Households show little inclination to move up the sanitation ladder (i.e. construct better quality facilities after first building the lowest quality facility).

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85 Source: Community surveys 2010 and 2013.
Definitions and data collection.

In 2010, Mozambique adopted the concept of ‘safe sanitation’, in which latrines must meet the following five criteria to be considered safe: 1) a durable slab (which can be any local material that is easy to clean); 2) a lid that properly closes the hole; 3) a superstructure that protects the slab and provides privacy; 4) a roof that prevents rain from reaching the latrine floor; and 5) the presence of a handwashing facility with soap or ash. Safe sanitation is a somewhat more restrictive definition than ‘improved sanitation’ because it adds the handwashing element. Under national standards, latrines are considered improved sanitation if they hygienically separate human excreta from human contact and include any of the following technologies: flush toilet; piped sewer system; septic tank; flush/ pour flush to pit latrine; ventilated improved pit latrine; pit latrine with slab; and composting toilet.

In the household survey, enumerators inspected the latrines used by households to check whether they satisfy the conditions of safe sanitation. Table 26 summarizes the findings of the inspection.

Data on latrine components versus safe and improved sanitation criteria

Table 26. Latrines and safe and improved sanitation

<table>
<thead>
<tr>
<th>Overall latrine ownership</th>
<th>All locations 2010</th>
<th>CLTS locations 2010</th>
<th>All locations 2013</th>
<th>CLTS locations 2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households owning latrine</td>
<td>878</td>
<td>330</td>
<td>945</td>
<td>513</td>
</tr>
<tr>
<td>Percentage of households owning latrine</td>
<td>54.9</td>
<td>71.7</td>
<td>59.8</td>
<td>62.6</td>
</tr>
<tr>
<td>Components of improved sanitation</td>
<td>Percentage of household latrines showing the component</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Durable slab</td>
<td>1.8</td>
<td>0.9</td>
<td>4.3</td>
<td>5.7</td>
</tr>
<tr>
<td>Safe hole</td>
<td>51.9</td>
<td>43.6</td>
<td>53.8</td>
<td>56.7</td>
</tr>
<tr>
<td>Roof</td>
<td>32.3</td>
<td>31.2</td>
<td>28.6</td>
<td>29.2</td>
</tr>
<tr>
<td>Latrine lid that completely closes (meets standard)</td>
<td>20</td>
<td>26.4</td>
<td>30.6</td>
<td>30.6</td>
</tr>
<tr>
<td>Presence of a latrine lid (whether meets standard or not)</td>
<td>91.6</td>
<td>93.1</td>
<td>87.1</td>
<td>86.9</td>
</tr>
<tr>
<td>Safe hole and roof</td>
<td>17.4</td>
<td>13</td>
<td>15.2</td>
<td>17.2</td>
</tr>
<tr>
<td>Safe hole and roof and lid that completely closes</td>
<td>2.8</td>
<td>4.2</td>
<td>7.9</td>
<td>9.0</td>
</tr>
<tr>
<td>Components of safe sanitation</td>
<td>Percentage of household latrines showing the component</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Privacy</td>
<td>65.1</td>
<td>63.3</td>
<td>44.3</td>
<td>42.7</td>
</tr>
<tr>
<td>Handwashing facility</td>
<td>37.0</td>
<td>48.5</td>
<td>43.3</td>
<td>45.0</td>
</tr>
<tr>
<td>Handwashing facility has soap or ash</td>
<td>17.9</td>
<td>22.4</td>
<td>23.2</td>
<td>24.2</td>
</tr>
<tr>
<td>Handwashing facility close to latrine</td>
<td>18.5</td>
<td>28.5</td>
<td>26</td>
<td>29.2</td>
</tr>
</tbody>
</table>
Few latrines satisfied all of the conditions of improved sanitation in 2013 (3–4 per cent in 2010 and 8–9 per cent in 2013), and even fewer qualified for safe sanitation (1–1.5 per cent in 2010 and 4–5 per cent in 2013). In general, multi-component criteria are present in just one in every six houses or fewer. Certain individual aspects can have 50 per cent or higher coverage (privacy, proper lid, hole that is safe to use). Components requiring more care in crafting (lid that completely closes) or that are more costly (durable slab) are present much less frequently.

In 2010, the households in CLTS intervention locations were more likely to have a handwashing facility and a latrine with a lid compared with households in non-CLTS locations, while latrine owning households in CLTS communities had a lower share of latrines with a ‘safe hole’. By 2013, the differences between CLTS and non-CLTS locations had mostly been equalized, with minor improvements in most dimensions.

Certain components have weakened over time. The percentage of latrines that properly screened users from onlookers (privacy) is the component with a decline large enough to show a worrying trend. It is unclear whether privacy actually worsened or whether the numbers changed due to revised interviewer instructions that caused the survey team members to make different ratings.

### Materials used in latrine construction (2010 only)

Table 27 reports on findings from the second survey round (2010) on the sustainability of the latrines with respect to the material used for construction and the condition of the latrine building. The large majority of the latrines constructed as a result of OMI were built from traditional materials.

<table>
<thead>
<tr>
<th>Material of latrine's walls</th>
<th>Condition is good</th>
<th>Condition is reasonable</th>
<th>Condition is bad</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cement or burnt blocks</td>
<td>3.8</td>
<td>2.1</td>
<td>0.1</td>
<td>6.0</td>
</tr>
<tr>
<td>Clay blocks</td>
<td>26.4</td>
<td>16.3</td>
<td>0.9</td>
<td>43.7</td>
</tr>
<tr>
<td>Cane</td>
<td>6.1</td>
<td>16.9</td>
<td>1.6</td>
<td>24.6</td>
</tr>
<tr>
<td>Other (grass, sticks, plastic, etc.)</td>
<td>11.7</td>
<td>11.6</td>
<td>2.4</td>
<td>25.7</td>
</tr>
<tr>
<td>Total</td>
<td>48.0</td>
<td>46.9</td>
<td>5.1</td>
<td>100.0</td>
</tr>
</tbody>
</table>

The programme promoted the use of concrete latrine slabs in the early years only and through demonstration centres. This outreach mode had limited success. In 2013, the percentage of latrines with cement or burnt block walls slightly increased from 6–10 per cent, but clay blocks are still most common at over 45 per cent. Most of the latrines are in good or reasonable condition.
condition but the percentage that are in poor condition increased from 5–10 per cent.

In Mozambique, as in many other nations, it has proved difficult in the short term for governments and partners to motivate households to move up the sanitation ladder. Families and communities often lack the economic resources or do not perceive the added benefit of investing in more elaborate structures.

5.6 Reported latrine use

Ninety-seven per cent of households that own latrines use them. This is a consistent figure and does not vary by exposure to CLTS programming. This makes latrine acquisition a clear target for sanitation programming in Mozambique, as use inevitably follows.

One of the more remarkably consistent set of findings appears in the data looking at the relationship between latrine use and latrine ownership.

Table 28. Latrine use and ownership (per cent of sample using a latrine)\(^{86}\)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Men</td>
<td>100</td>
<td>100</td>
<td>99.4</td>
<td>6.5</td>
<td>10.6</td>
<td>11.4</td>
</tr>
<tr>
<td>Women</td>
<td>100</td>
<td>99.9</td>
<td>99.3</td>
<td>6.4</td>
<td>11</td>
<td>12.8</td>
</tr>
<tr>
<td>School-children</td>
<td>99.8</td>
<td>100</td>
<td>97.8</td>
<td>6</td>
<td>9.3</td>
<td>11.1</td>
</tr>
<tr>
<td>Other children</td>
<td>86.1</td>
<td>58.5</td>
<td>67.1</td>
<td>5.3</td>
<td>6.3</td>
<td>5.8</td>
</tr>
</tbody>
</table>

In all survey rounds:
- More than 97 per cent of the latrines were reported to be used by households that possess them
- Male and female behaviour and adult and schoolchild behaviour is identical
- Schoolchildren use latrines at a much higher rate than children not in school, though it is likely that the largest percentage of non-school goers are very small children that households are reluctant to take to the latrine
- Sharing latrines is a limited practice, though it does increase perceptibly. Even so, seven in every eight households that do not own latrines do not use latrines.

Regression results (not reported) show that given ownership, the additional effect of the CLTS intervention on latrine use is minimal. Apparently, the CLTS intervention is effective in Mozambique in raising latrine usage only insofar as it promotes latrine ownership. Once that is accomplished, there is little additional benefit for the remainder of the CLTS activities. More positively, it appears that households that own a latrine will actually use it. This sets a clear and unambiguous target for sanitation promotion.

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\(^{86}\) Source: Household surveys 2008, 2010 and 2013. The numbers are based on self reports by household respondents, but are confirmed by the inspection of sanitary facilities carried out by the interviewers.
5.7 Open defecation: By demographic group

OD declined from 53 per cent to 40 per cent over the life of OMI. Men, women and schoolchildren showed very similar behaviour. The decline was most rapid during the early years of OMI.

The CLTS intervention is specifically aimed at reducing the practice of OD. Figure 4 presents the survey evidence on OD.

Figure 4. Open defecation practices

In 2013, almost 40 per cent of the sample population was still practicing OD (more than 50 per cent among non-school-going children (i.e. 'other children'), compared with about 52 per cent in 2008 (60 per cent of other children). The patterns of rapid decline and stabilization/slight rise is very similar for men, women and schoolchildren.

The effect was much more pronounced for households in the communities with early CLTS interventions (i.e. interventions before the midline survey). This echoes the earlier discussion about the secular trend and the operational choices made by OMI that led to the concentration on the communities most likely to change in 2008–2010. Put in more technical terms, while these results may be the causal effects of CLTS, they might simply reflect the non-random allocation of the CLTS intervention over locations.

87 Household surveys, 2008 and 2013.
The most important issue is how these levels of OD equate with health outcomes. As with immunization programming, not everyone needs to practice the safe behaviour to confer broad protection across the community. This is the so-called herd effect. Whereas immunization targets 80 per cent coverage, WASH research indicates substantial herd effect benefits appearing at 70 per cent coverage (i.e. complete adherence to ODF behaviours). Taken as a whole, the programme area was moving toward the herd effect on a large scale but still had some distance to go at the end of OMI.

5.8 Open defecation: Community open defecation-free status

Approximately 45 per cent of the communities that began the ODF process (i.e. were triggered) were certified ODF by the end of 2013. The lag time from triggering to certification can be well over a year, so other communities likely completed the process in 2014 after the programme officially concluded. There is evidence that certification was often awarded despite visible shortcomings in regards to OD practice, presence of latrines and latrine quality. A full 46 per cent of the households with latrines live in non-ODF certified communities; that is, they reside in communities that were not certified or in communities where the intervention did not take place. The latter situation, called ‘spill over’, implies that spontaneous diffusion (individually decided, outside the programme scope) contributes to sanitation coverage success.

As part of the CLTS intervention, communities could apply to be awarded ODF status. A large body of qualitative evidence indicates that achieving this public recognition is a major motivating factor for many communities. Table 29 depicts the linkage between the number of communities ‘triggered’ and the achievement of ODF status.

Table 29. Triggered and ODF communities, 2008–2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Triggered</th>
<th>Planned</th>
<th>Actual</th>
<th>% target achieved</th>
<th>Declared ODF</th>
<th>Planned</th>
<th>Actual</th>
<th>% target achieved</th>
<th>Population of ODF communities</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>159</td>
<td>151</td>
<td>95</td>
<td>82</td>
<td>34</td>
<td>41</td>
<td>26,724</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>619</td>
<td>693</td>
<td>112</td>
<td>34</td>
<td>151</td>
<td>444</td>
<td>125,498</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td>605</td>
<td>370</td>
<td>61</td>
<td>310</td>
<td>282</td>
<td>91</td>
<td>276,544</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td>265</td>
<td>0</td>
<td>0</td>
<td>123</td>
<td>246</td>
<td>200</td>
<td>173,546</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td>150</td>
<td>12</td>
<td>8</td>
<td>72</td>
<td>80</td>
<td>111</td>
<td>45,965</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td>150</td>
<td>712</td>
<td>475</td>
<td>252</td>
<td>97</td>
<td>38</td>
<td>55,827</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>1,948</td>
<td>1,938</td>
<td>99</td>
<td>873</td>
<td>890</td>
<td>102</td>
<td>704,104</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Before analysing the figures, it is important to look at the fidelity or accuracy of the ODF designation. The surveys allowed the survey teams to verify the ODF designation that had been awarded by the certification authorities. This unofficial verification shows some major discrepancies:

- In ODF communities, respondents reported that some household members still practice OD (25.6 per cent of men in 2010 and 34.3 per cent of men 2013);

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88 Source: OMI programme data.
- Only 72.5 per cent of households reported owning a latrine in 2010 (from all communities that became ODF prior to 2010) and 61.8 per cent reported owning a latrine in 2013 (from all communities that became ODF prior to 2013). Even the additional households that share with another household cannot raise their levels to 100 per cent;
- Interviewers observed latrines without lids (54.4 per cent in 2010 and 42.6 per cent in 2013), or handwashing facilities (63 per cent in 2010 and 56.7 per cent in 2013). Both of these are ODF criteria which, if not present in all latrines, mean that the community has not achieved ODF status.

Either the communities made a major effort to meet all the standards to achieve certification and then watched some people resume non-ODF behaviour afterwards, or the certification teams overlooked a certain percentage of non-standard behaviour/facilities on the theory that getting very close to being ODF is good enough.

Accepting some softness in the certification at the community level, there are a number of interesting findings:

1. Not all communities achieve ODF status. There is a conversion process between triggering and certification that many communities cannot overcome. Whether the OMI teams have been able to identify the magnitude of the gaps to be covered and improve the success rate over time is not clear.
2. There is a lag time from triggering to conversion. The full picture does not become clear for approximately two years. Consequently, the 45 per cent conversion rate (870 communities certified ODF versus 1,939 triggered) probably underestimated true performance. In 2014 alone, an additional 463 communities in the programme provinces were certified ODF, which almost certainly includes a great many from among the 712 communities triggered by OMI in 2013.
3. Given that OMI sought community dialogue and agreement and did not endorse punitive rule-making by communities, this extended time may be the trade-off to get broad and voluntary adherence without coercion.
4. The sample communities actually underperformed the whole. Only 23 of the 80 communities were certified ODF. The positive conclusion is that the sample communities did not get special incentives or support to inflate their performance and in fact were normal in CLTS/ODF terms.

The most interesting finding by far is the difference between the population living in ODF-certified communities (704,000 persons) and the population in households with latrines (1.3 million). Households can stop defecating openly in their immediate home area independent of the rest of the community and many have chosen to do so. In contrast to the improved water model, low-cost latrines are substantially more decentralized and attainable through family action. With low economic barriers, they can spread through the demonstration effect and word of mouth.

### 5.9 Hygiene awareness and practices: Latrine cleanliness

The cleanliness of latrines has improved, particularly in locations that received the CLTS intervention. In all three survey rounds, more than 90 per cent were classified as clean or very clean by enumerators, except in the 2013 survey round at locations with only the CLTS intervention (82.5 per cent). This percentage did not change significantly between 2008 and
2013 but deteriorated slightly in locations with only the CLTS intervention, where water shortage may be an issue.

Enumerators were asked to visually assess the cleanliness of the latrines during the household survey visit and did so only for households that owned their own latrine. They could rate it as "clean" (defined as the complete absence of faeces or urine on the slab) or as “dirty” or “very dirty”.

**Figure 5. Percentage of dirty and very dirty latrines**

Figure 5 suggests a general increase in cleanliness between 2008 and 2010 and a slight deterioration between 2010 and 2013 in all but the ‘no intervention’ sites. Overall, more than 90 per cent of the latrines were classified as clean or very clean in 2013 and even in the group with the highest number of dirty latrines, 80 per cent of latrines were still classified as clean.

Continuing some of the discussions that emerged earlier in this chapter, the data are of further interest in the following ways:

1. There was some slippage between 2010 and 2013, but less than is frequently observed in sanitation programmes. Although reversion to OD behaviour/latrine abandonment has been at high levels in some other countries, the rate in the OMI area is actually quite modest.

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89 Source: Observations made by enumerators during a total of 2,500 household surveys conducted during the three survey rounds in 2008, 2010 and 2013.
2. Cleaning latrines requires cleaning materials, including water, and the slippage is most severe in non-water invention communities. This makes logical sense, and is one of the many ways in which water and sanitation interventions influence one another.

3. The outliers in trend terms are the ‘no intervention’ locations, where there was no slippage. Although it is unclear why there would be no regression, the trend line coincides with earlier comments on the ‘secular trend’. Households in non-intervention communities appear to trail intervention communities. They watch and see if it is worth adopting and perhaps have more individual commitment to proper sanitation than some families in intervention communities. Families in intervention communities may build a latrine due to social expectation but show their lack of conviction of its value by not cleaning it.

5.10 Hygiene awareness and practices: Safe handling of baby excreta

There was already a high level of safe hygiene practice in 2008, and this changed very little over the programme period. The presence of the OMI programme made no difference since safe behaviour was already widely practiced.

Households were asked how they had handled excreta from children under 3 years the last time they needed to. Safe disposal of baby excreta includes disposal in a latrine or burial. Table 30 summarizes the results.

Table 30. Handling of baby excreta (percentage of households reporting)

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Overall</th>
<th>No Intervention</th>
<th>Water only</th>
<th>CLTS only</th>
<th>Water and CLTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safe disposal 2008</td>
<td>84.8</td>
<td>80.4</td>
<td>83.3</td>
<td>81.3</td>
<td>89.3</td>
</tr>
<tr>
<td>Safe disposal 2010</td>
<td>84.9</td>
<td>73.2</td>
<td>89.4</td>
<td>83.8</td>
<td>90.7</td>
</tr>
<tr>
<td>Safe disposal 2013</td>
<td>83.9</td>
<td>84.4</td>
<td>80.7</td>
<td>82.2</td>
<td>85.7</td>
</tr>
<tr>
<td>Change 2008–2013</td>
<td>-0.9</td>
<td>4.0</td>
<td>-2.6</td>
<td>0.9</td>
<td>-3.6</td>
</tr>
</tbody>
</table>

The percentages of safe disposal are generally high and have not changed significantly between the survey rounds. The small differences between intervention groups are not statistically significant. As with several other sanitation measures, there was a high level of good practice at the start of the programme, reflecting the acceptance of the hygiene messages disseminated over the years. OMI had little room to change practices and had no discernible impact.

5.11 Hygiene awareness and practices: Handwashing at critical times

Using soap or ash to clean hands rather than just water was a rare practice in 2008, at 10–20 per cent adherence. There was large growth in soap and ash use and CLTS communities

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improved more than non-intervention communities. The improvement was limited to washing after defecation or when handling baby faeces, which reached 36–60 per cent. Households are apparently not convinced of the need to wash before eating. Persons not using soap or ash cited lack of information and that it had never become a habit as the reasons they did not wash before eating. This indicates that the practice still has room to grow.

Interrupting disease transmission depends on washing hands at critical times. The three critical times addressed in the OMI are before eating, after defecating and after disposing of babies’ faeces. Washing with water alone was not considered a safe cleaning method. More than 90 per cent of respondents self-report that they wash their hands with water. Tables 31a-c show the percentage that said they washed their hands with soap or ash at critical moments.

**Table 31a. Men’s use of ash or soap during handwashing at critical times**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Before eating</td>
<td>12.7</td>
<td>20.9</td>
<td>20.8</td>
<td>8.1</td>
</tr>
<tr>
<td>After defecation</td>
<td>20.0</td>
<td>43.6</td>
<td>62.6</td>
<td>42.6</td>
</tr>
</tbody>
</table>

**Table 31b. Women’s use of ash or soap during handwashing at critical times**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Before eating</td>
<td>11.8</td>
<td>19.2</td>
<td>19.0</td>
<td>7.2</td>
</tr>
<tr>
<td>After defecation</td>
<td>18.8</td>
<td>40.3</td>
<td>60.4</td>
<td>41.6</td>
</tr>
<tr>
<td>After disposing of baby’s faeces</td>
<td>18.5</td>
<td>34.1</td>
<td>52.6</td>
<td>34.1</td>
</tr>
</tbody>
</table>

**Table 31c. Schoolchildren’s use of ash or soap during handwashing at critical times**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Before eating</td>
<td>9.4</td>
<td>15.9</td>
<td>15.9</td>
<td>6.5</td>
</tr>
<tr>
<td>After defecation</td>
<td>14.0</td>
<td>32.2</td>
<td>52.7</td>
<td>38.7</td>
</tr>
<tr>
<td>After disposing of baby’s faeces</td>
<td>11.7</td>
<td>24.3</td>
<td>36.3</td>
<td>24.6</td>
</tr>
</tbody>
</table>

The data in the tables are for all respondents. They show that people became much more likely to use soap or ash when there was a risk of exposure to their own or to a baby’s faeces, though always less so when cleaning babies. Since the baselines were low in 2008, this largely reflects programme influence. This is one area where exposure to CLTS had some additional impact, compared with non-intervention communities. Both adults and children in CLTS exposure communities were about 10 per cent more likely than the mean seen in the tables to wash their hands after defecating than in non-programme communities.

Considering the start from a low baseline and that there is a cost involved if soap is used, the growth in handwashing is very impressive. Furthermore, there was no slippage, unlike with

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91 As men are not normally engaged in cleaning children after the child defecates, this critical moment is not applicable and was not asked.
latrine use. Recalling that the same households were visited for each of the surveys adds to the confidence that this represents a sustained behaviour change.

The success noted here only extends to cleaning faecal matter. There was some growth in handwashing before eating, but this good behaviour never exceeded 20 per cent. Family members did not seem to be convinced that there was a health threat at this moment in their daily life. Otherwise, there are no behavioural differences between men and women, and schoolchildren trend with the adults though at slightly lower rates.

When asked about their reasons for not washing hands, most respondents mentioned lack of information (60.6 per cent in 2010 and 47.1 per cent in 2013) and lack of habit (67.2 per cent in 2010 and 60.7 per cent in 2013). These percentages do not differ significantly between the intervention groups. They do show there is further potential to raise the coverage of this good behaviour, however, as very few claim a disbelief or resistance to the idea. If they can be persuaded as many others were and can develop this as a habit instead of an experiment, the rate could easily climb well past 80 per cent for washing faecal matter.
CHAPTER 6: SCHOOL WATER, SANITATION AND HYGIENE

Note to readers/reviewers: Certain data in this chapter remain to be confirmed, particularly around the numbers of latrines in schools in 2008, 2010, 2013. The sourcing and reliability of the data are being reviewed. The data on operation and maintenance systems and on the effects of WASH in schools on enrolment are not under question and can be considered reliable. When an updated version of the chapter is approved it will be circulated as a replacement to this version.

6.1 Introduction

With the objective of increasing girls’ enrolment and learning outcomes, OMI set out to provide water supply, latrine construction and hygiene education in 400 primary schools serving 140,000 pupils and teachers.

6.2 WASH-in-schools interventions

OMI’s work in schools was merged with UNICEF’s existing child-centred hygiene education programme and the Child-Friendly Schools for Africa Initiative. In the districts where the CFS intervention took place (Changara, Tete and Mossurize, Manica), OMI funds for school interventions were pooled with CFS programme funds (also administered by UNICEF).

The CFS standard WASH package included the construction of three blocks of sanitary facilities (with one or two latrines in each block and urinals for boys) with handwashing facilities, a new water point if there was none in the school compound, and sanitation promotion and hygiene education.92

Most of the analysis presented in this section is based on data derived from a survey of 80 schools in the CFS districts that received WASH interventions. The results are therefore only representative of the CFS area and no wider conclusions can be drawn for schools or OMI districts more generally.

6.3 Total interventions and beneficiaries

Overall, OMI established water supply in 335 primary schools serving 117,250 pupils and 145 sanitation facilities serving 50,750 pupils. The OMI schools component ultimately established 72 per cent of planned new water facilities and 36 per cent of planned new school latrines.

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92 In seven provinces in Mozambique, one district is chosen for CFS interventions. Districts selected for CFS are not (necessarily) representative of the OMI intervention at the schools.
Table 32. School water supplies and sanitation facilities, 2007–2013

<table>
<thead>
<tr>
<th>Year</th>
<th>School water supplies</th>
<th>School sanitation facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Planned</td>
<td>Built</td>
</tr>
<tr>
<td>2007</td>
<td>50</td>
<td>47</td>
</tr>
<tr>
<td>2008</td>
<td>30</td>
<td>77</td>
</tr>
<tr>
<td>2009</td>
<td>80</td>
<td>66</td>
</tr>
<tr>
<td>2010</td>
<td>40</td>
<td>22</td>
</tr>
<tr>
<td>2011</td>
<td>80</td>
<td>49</td>
</tr>
<tr>
<td>2012</td>
<td>30</td>
<td>31</td>
</tr>
<tr>
<td>2013</td>
<td>50</td>
<td>43</td>
</tr>
<tr>
<td>Total</td>
<td>360</td>
<td>335</td>
</tr>
</tbody>
</table>

Tables 33 and 34 indicate where and when the OMI water and sanitation interventions were implemented.

Table 33. Water and sanitation interventions at schools between 2008–2013 and assigned treatment status

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>No interventions</th>
<th>Water only</th>
<th>Sanitary facilities only</th>
<th>Both water and sanitary facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Target</td>
<td>40</td>
<td>5</td>
<td>12</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>Control</td>
<td>40</td>
<td>13</td>
<td>6</td>
<td>15</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>80</td>
<td>18</td>
<td>18</td>
<td>19</td>
<td>25</td>
</tr>
</tbody>
</table>

Table 34. Timing of OMI interventions at the schools

<table>
<thead>
<tr>
<th></th>
<th>New water point</th>
<th>New sanitary facilities</th>
</tr>
</thead>
<tbody>
<tr>
<td>No intervention</td>
<td>37</td>
<td>36</td>
</tr>
<tr>
<td>Before baseline</td>
<td>17</td>
<td>0</td>
</tr>
<tr>
<td>Between base and midline</td>
<td>19</td>
<td>42</td>
</tr>
<tr>
<td>After midline</td>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>

93 Source: OMI programme data. Number of pupils calculated based on 350 pupils per school/shift.
94 Source: OMI programme data.
95 Source: OMI programme data.
6.4 Schools with a functioning improved water source

In 2013, 48 of the 80 schools (60 per cent) had a functioning improved water source in the school yard or within 200 metres of the school yard, compared with 23 schools (29 per cent) in 2008. The percentage of schools with a functioning improved water source within 200 metres of the school yard was 65 per cent among the schools with an OMI water point intervention and 54 per cent among the other schools in 2013.

In 2013, 62 out of 80 schools reported an improved water point for drinking, compared with 59 (of 80) in 2010 and 41 (of 80) in 2008. However, there were far fewer schools with improved, functioning water points within 200 metres of the school yard: there were only 41 schools (51 per cent) that met all three criteria in 2013. Table 35 reports on the number of improved water points at the surveyed schools.

**Table 35: Drinking water source and water point interventions at schools**

<table>
<thead>
<tr>
<th>Drinking water source in 2008</th>
<th>Overall</th>
<th>No water intervention</th>
<th>New water point before baseline</th>
<th>New water point between base and midline</th>
<th>New water point after midline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved</td>
<td>41</td>
<td>27</td>
<td>8</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Improved and functioning</td>
<td>37</td>
<td>24</td>
<td>7</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Improved and within 200 metres</td>
<td>23</td>
<td>19</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Improved, functioning and within 200 metres</td>
<td>21</td>
<td>17</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drinking water source in 2010</th>
<th>Overall</th>
<th>No water intervention</th>
<th>New water point before baseline</th>
<th>New water point between base and midline</th>
<th>New water point after midline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved</td>
<td>59</td>
<td>25</td>
<td>14</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Improved and functioning</td>
<td>53</td>
<td>21</td>
<td>13</td>
<td>14</td>
<td>5</td>
</tr>
<tr>
<td>Improved and within 200 metres</td>
<td>45</td>
<td>18</td>
<td>13</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Improved, functioning and within 200 metres</td>
<td>40</td>
<td>14</td>
<td>12</td>
<td>12</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Drinking water source in 2013</th>
<th>Overall</th>
<th>No water intervention</th>
<th>New water point before baseline</th>
<th>New water point between base and midline</th>
<th>New water point after midline</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved</td>
<td>62</td>
<td>24</td>
<td>15</td>
<td>17</td>
<td>6</td>
</tr>
<tr>
<td>Improved and functioning</td>
<td>53</td>
<td>20</td>
<td>14</td>
<td>13</td>
<td>6</td>
</tr>
<tr>
<td>Improved and within 200 metres</td>
<td>48</td>
<td>20</td>
<td>11</td>
<td>13</td>
<td>4</td>
</tr>
<tr>
<td>Improved, functioning and within 200 metres</td>
<td>41</td>
<td>16</td>
<td>10</td>
<td>11</td>
<td>4</td>
</tr>
</tbody>
</table>

**Change in drinking water source (2008–2013)**

96 Source: School surveys 2008, 2010 and 2013 and programme data on interventions.
Thus, the OMI intervention resulted in 20 more improved, functioning water points within 200 metres of each school. The increase in the number of improved water points at schools is primarily attributable to the programme.

At the baseline, only 4 out of 43 schools (9 per cent) with an OMI water point intervention had functioning water points near the school premises, compared with 17 out of 37 (46 per cent) among the other schools. The newly created water points were therefore well-targeted.

### 6.5 Schools with improved sanitation facilities

The number of schools with latrines increased from 66 in 2008 to 73 in 2013. In 2010, 71 out of 80 schools had separate latrines for boys and girls. According to the 2013 survey, the situation deteriorated after 2010, with 20 schools reporting no latrines and three schools reporting latrines shared by boys and girls. However, the quality of latrines used in schools improved from mostly ‘traditional’ latrines in 2008 to predominantly VIP (Ventilated Improved Pit) latrines in 2013.

#### Number of latrines per school

OMI built new latrines in 44 out of 80 sampled schools. These latrines were mostly built in 2009 and 2010 (in 42 schools). The remaining two school latrines were built after the midline survey (see Table 36). The intervention benefited students as well as teachers.

<table>
<thead>
<tr>
<th></th>
<th>No latrine intervention</th>
<th>Latrine intervention</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys only (students)</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Girls only (students)</td>
<td>0</td>
<td>10</td>
</tr>
<tr>
<td>Male and female teachers only</td>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td>Male teachers only</td>
<td>-7</td>
<td>-6</td>
</tr>
<tr>
<td>Female teachers only</td>
<td>-1</td>
<td>0</td>
</tr>
</tbody>
</table>

In 2013, seven schools (9 per cent) did not have any latrines, which was more than in 2010 but considerably less than in 2008 (18 per cent). Most schools have more than one latrine. The number of schools without a latrine was halved between 2008 and 2013.

---

Table 37. Number of latrines per school (number of schools in category)\textsuperscript{98}

<table>
<thead>
<tr>
<th>Number of latrines in school</th>
<th>2008</th>
<th>2010</th>
<th>2013</th>
<th>Change 2008–2013</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No latrine intervention</td>
</tr>
<tr>
<td>0</td>
<td>14</td>
<td>6</td>
<td>7</td>
<td>-2</td>
</tr>
<tr>
<td>1</td>
<td>9</td>
<td>1</td>
<td>0</td>
<td>-3</td>
</tr>
<tr>
<td>2</td>
<td>17</td>
<td>6</td>
<td>4</td>
<td>-3</td>
</tr>
<tr>
<td>3</td>
<td>18</td>
<td>44</td>
<td>39</td>
<td>5</td>
</tr>
<tr>
<td>4 or more</td>
<td>22</td>
<td>23</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>Number of schools</td>
<td>80</td>
<td>80</td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

Number of separate latrines for girls, boys and school personnel

The number of gender-separated latrines went up considerably between 2008 and 2010 but declined after 2013. In all schools with an OMI latrine intervention, there were separate latrines for boys and girls in 2010. Three programme schools reported shared latrines for boys and girls in 2013.

Table 38. Number schools with sanitary facilities and use by specific groups\textsuperscript{99}

<table>
<thead>
<tr>
<th>Number of schools where latrines are used by...</th>
<th>2008</th>
<th>2010</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Everybody</td>
<td>10</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Male teachers and students only</td>
<td>5</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Female teachers and students only</td>
<td>2</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Male and female students only</td>
<td>7</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Boys only (students)</td>
<td>47</td>
<td>71</td>
<td>57</td>
</tr>
<tr>
<td>Girls only (students)</td>
<td>46</td>
<td>70</td>
<td>56</td>
</tr>
<tr>
<td>Male and female teachers only</td>
<td>16</td>
<td>51</td>
<td>44</td>
</tr>
<tr>
<td>Male teachers only</td>
<td>27</td>
<td>21</td>
<td>14</td>
</tr>
<tr>
<td>Female teachers only</td>
<td>14</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>Total number of latrines</td>
<td>225</td>
<td>287</td>
<td>253</td>
</tr>
</tbody>
</table>

Number of latrines per 100 students

The number of latrines per students increased, particularly in the intervention schools where the number of latrines per students has almost doubled.

\textsuperscript{98} Source: School surveys 2008, 2010 and 2013.
Table 39. Number of latrines per 100 students\textsuperscript{100}

<table>
<thead>
<tr>
<th></th>
<th>2008</th>
<th>2010</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>No latrine intervention</td>
<td>0.69</td>
<td>0.87</td>
<td>1.01</td>
</tr>
<tr>
<td>Latrine intervention</td>
<td>0.62</td>
<td>1.01</td>
<td>1.18</td>
</tr>
<tr>
<td>Overall</td>
<td>0.65</td>
<td>0.95</td>
<td>1.10</td>
</tr>
</tbody>
</table>

**Improved type of sanitation facilities**

Table 40a shows the types of latrines at the schools as reported by the schools. Because the schools could only report one type of latrine, the survey reported the most common type in each school. Table 40a shows a shift from unimproved (traditional) latrines to improved (VIP) latrines. Improved sanitation facilities are more likely to ensure hygienic separation of human excreta from human contact.

Table 40a. Type of latrines at schools (number of schools)\textsuperscript{101}

<table>
<thead>
<tr>
<th>Type of latrine</th>
<th>2008</th>
<th>2010</th>
<th>2013</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional latrine (i.e. stick and mud, mud bricks, grass roof, etc.)</td>
<td>35</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Latrine with slab</td>
<td>16</td>
<td>62</td>
<td>1</td>
</tr>
<tr>
<td>Latrine with conventional material (i.e. cement blocks, durable roofing (usually tin))</td>
<td>2</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>VIP latrine</td>
<td>12</td>
<td>0</td>
<td>53</td>
</tr>
<tr>
<td>Ecological latrine</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>No latrine at school</td>
<td>14</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total number of schools</strong></td>
<td>80</td>
<td>80</td>
<td>80</td>
</tr>
</tbody>
</table>

Table 40b shows that the schools have equal numbers of latrines for girls and boys, independent of the type of latrine. Although the 2013 data shows an increase in the availability of improved sanitation facilities (VIP latrines), there are still a high number of schools with latrines shared by boys, girls and school personnel (women and men).

Table 40b. Number of latrines by type and user groups\textsuperscript{102}

<table>
<thead>
<tr>
<th>Type of latrine</th>
<th>Boys</th>
<th>Girls</th>
<th>Women</th>
<th>Men</th>
<th>Shared</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional latrine</td>
<td>23</td>
<td>23</td>
<td>2</td>
<td>11</td>
<td>8</td>
<td>67</td>
</tr>
<tr>
<td>Improved traditional latrine</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Latrine with slab</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Latrine with conventional material</td>
<td>9</td>
<td>9</td>
<td>0</td>
<td>0</td>
<td>6</td>
<td>24</td>
</tr>
<tr>
<td>VIP latrine</td>
<td>77</td>
<td>77</td>
<td>6</td>
<td>6</td>
<td>55</td>
<td>221</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>112</td>
<td>112</td>
<td>10</td>
<td>19</td>
<td>71</td>
<td>324</td>
</tr>
</tbody>
</table>

\textsuperscript{100} Source: School surveys 2008, 2010 and 2013.
\textsuperscript{101} Source: School surveys 2008, 2010 and 2013.
\textsuperscript{102} Source: School survey 2013.
6.6 Reported latrine usage for girls, boys and school personnel

Students reported increased use of latrines, possibly reflecting both the improved availability of facilities and sanitation promotion in schools. No data was collected on actual use, however. No data are available on latrine usage by school personnel.

At each of the survey schools, 10 students were randomly selected and asked about their latrine usage. The results are shown in Table 41. The increased use of latrines reported by students over time is highly significant: in the vast majority of schools (70 out of 71) all boys and girls reported using latrines by 2013. No data are available on latrine usage by school personnel.

Table 41. Latrine use by students

<table>
<thead>
<tr>
<th></th>
<th>Number of schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2008</td>
</tr>
<tr>
<td><strong>Boys</strong></td>
<td></td>
</tr>
<tr>
<td>Nobody uses latrines</td>
<td>6</td>
</tr>
<tr>
<td>Everybody uses latrines</td>
<td>56</td>
</tr>
<tr>
<td>Latrines are being used but not by everybody</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total number of schools responding</strong></td>
<td>65</td>
</tr>
<tr>
<td><strong>Girls</strong></td>
<td></td>
</tr>
<tr>
<td>Nobody uses latrines</td>
<td>6</td>
</tr>
<tr>
<td>Everybody uses latrines</td>
<td>52</td>
</tr>
<tr>
<td>Latrines are being used but not by everybody</td>
<td>7</td>
</tr>
<tr>
<td><strong>Total number of schools responding</strong></td>
<td>65</td>
</tr>
</tbody>
</table>

6.7 Handwashing practices for girls, boys and school personnel

The practice of handwashing after defecation has reportedly become more common. In 2013, students from all schools reported washing their hands. This is compared with 2010, when 52 per cent of schools reported that all students washed their hands after defecation, and 2008, when 8 per cent reported that all students washed their hands after defecation. The reported improvements in handwashing have been accompanied by the use of soap or ash. No data are available on handwashing by school personnel or on handwashing before meals.

In 2013, school survey enumerators found that 53 out of 80 schools (66 per cent) had handwashing facilities, whereas in 2010, 41 schools had handwashing facilities (51 per cent). Students were also asked about their handwashing practices after defecation. Handwashing was reported as much more common in 2013 and 2010 than in 2008, possibly reflecting increased hygiene awareness (which may or may not have increased the actual practice). In addition to reports of the increased practice of handwashing, the use of soap or ash to wash

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hands is also reported as more common. More than 70 out of 74 responding schools reported that all boys and girls use soap or ash when washing their hands. No data are available on the handwashing practices of school personnel.

Table 42. Handwashing practice by students after defecation

<table>
<thead>
<tr>
<th></th>
<th>Number of schools</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2008</td>
</tr>
<tr>
<td><strong>Boys</strong></td>
<td></td>
</tr>
<tr>
<td>Nobody washes hands</td>
<td>66</td>
</tr>
<tr>
<td>Almost nobody washes hands</td>
<td>2</td>
</tr>
<tr>
<td>Most students wash their hands</td>
<td>5</td>
</tr>
<tr>
<td>Everybody washes hands</td>
<td>6</td>
</tr>
<tr>
<td><strong>Total number of schools</strong></td>
<td>79</td>
</tr>
<tr>
<td><strong>Girls</strong></td>
<td></td>
</tr>
<tr>
<td>Nobody washes hands</td>
<td>68</td>
</tr>
<tr>
<td>Almost nobody washes hands</td>
<td>1</td>
</tr>
<tr>
<td>Most students wash their hands</td>
<td>2</td>
</tr>
<tr>
<td>Everybody washes hands</td>
<td>8</td>
</tr>
<tr>
<td><strong>Total number of schools</strong></td>
<td>79</td>
</tr>
</tbody>
</table>

6.8 Schools with an operation and maintenance system in place

Most schools have a maintenance group to take care of the water point used by the school. The number of schools with an operation and maintenance system for the water source increased from 32 in 2008 (40 per cent of the sample schools) to 56 in 2010 (70 per cent) to 54 in 2013 (67 per cent). No schools reported having a budget for the maintenance of latrine facilities. Schoolchildren were typically responsible for cleaning school toilets.

More than 80 per cent of schools had a maintenance group for the improved water point (borehole or tap) used by the school. For OMI schools, this percentage was even higher at more than 90 per cent. Normally the community water committee handled school water point management because the school did not have this capacity and the water point was shared. Students are typically responsible for cleaning the latrines. In 2013, this was the case in 70 of the 80 schools. No schools had a budget for maintaining the latrine facilities.

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6.9 Effect on school enrolment and outcomes (for girls and boys)

Enrolment increased between 2008 and 2013, especially for children under 11 years of age. The increase was strongest between 2008 and 2010 and there was a decrease in enrolment between 2010 and 2013. By 2010, girls’ enrolment had almost caught up with boys’ enrolment. From the school survey, it appears that enrolment increased significantly in schools with water point interventions. However, there is no statistical evidence to conclude that these changes in enrolment at the household and school levels are systematically related to water and sanitation interventions. No data was collected on secondary school enrolment or on learning outcomes.

Effect of school level WASH interventions on school enrolment

The school survey illustrated the impact of school level interventions on primary school enrolment. There was a strong increase in enrolment in schools with water point interventions, with or without an accompanying latrine intervention. Student enrolment at schools without interventions was lower, suggesting that parents take water and sanitation facilities into account when choosing to enrol their child in a school. Notably, latrine interventions without water point interventions were more common in schools with a decline in enrolment.

Table 43. Percentage change in enrolment in the survey schools over the period 2008–2013

<table>
<thead>
<tr>
<th></th>
<th>Overall</th>
<th>No interventions</th>
<th>Water point intervention only</th>
<th>Latrine intervention only</th>
<th>Both water and latrine interventions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>-12%</td>
<td>-31%</td>
<td>13%</td>
<td>-25%</td>
<td>11%</td>
</tr>
<tr>
<td>Girls</td>
<td>-9%</td>
<td>-34%</td>
<td>20%</td>
<td>-19%</td>
<td>11%</td>
</tr>
<tr>
<td>Total</td>
<td>-11%</td>
<td>-35%</td>
<td>16%</td>
<td>-22%</td>
<td>11%</td>
</tr>
</tbody>
</table>

Effect of community level WASH interventions on school enrolment

Given that the 80 schools in the surveys were sampled from districts other than the household and community surveys, there is no information in the surveys on the community interventions taking place around the schools. In addition, because the school survey did not include all schools in a district, the surveys do not indicate what percentage of children were enrolled in school. Data from the household surveys were therefore used to analyse the impact of the community interventions on school enrolment.

School enrolment among children from sample households increased between 2008 and 2013, especially for children under 11 years of age. The increase was strongest between 2008 and 2010 and there was a decline in enrolment between 2010 and 2013. In 2010, girls’ enrolment nearly caught up with boys’ enrolment (74 per cent for girls and 76.6 per cent for boys) and between 2010 and 2013, the gap between boys’ and girls’ enrolment remained steady (at 70.1 per cent vs. 73.3 per cent).

105 Source: School surveys 2008, 2010 and 2013. Note: The sample includes only schools for which enrolment information is available for all three rounds.
Table 44a. Percentage of school-aged girls enrolled in school[^106]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>34.2</td>
<td>50.3</td>
<td>39.2</td>
<td>16.1</td>
<td>-11.1</td>
<td>5.0</td>
</tr>
<tr>
<td>7</td>
<td>61.1</td>
<td>72.5</td>
<td>61.3</td>
<td>11.4</td>
<td>-11.2</td>
<td>0.2</td>
</tr>
<tr>
<td>8</td>
<td>61.7</td>
<td>84.4</td>
<td>76.4</td>
<td>22.7</td>
<td>-8.0</td>
<td>14.7</td>
</tr>
<tr>
<td>9</td>
<td>65.5</td>
<td>71.9</td>
<td>81.6</td>
<td>6.3</td>
<td>9.7</td>
<td>16.0</td>
</tr>
<tr>
<td>10</td>
<td>74.6</td>
<td>85.1</td>
<td>84.8</td>
<td>10.5</td>
<td>-0.2</td>
<td>10.2</td>
</tr>
<tr>
<td>11</td>
<td>84.6</td>
<td>89</td>
<td>86.6</td>
<td>4.4</td>
<td>-2.4</td>
<td>2.0</td>
</tr>
<tr>
<td>12</td>
<td>79.2</td>
<td>86.8</td>
<td>77.9</td>
<td>7.6</td>
<td>-8.9</td>
<td>-1.3</td>
</tr>
<tr>
<td>13</td>
<td>74.7</td>
<td>73.4</td>
<td>80.6</td>
<td>-1.3</td>
<td>7.2</td>
<td>5.9</td>
</tr>
<tr>
<td>14</td>
<td>70.1</td>
<td>77</td>
<td>64.2</td>
<td>6.9</td>
<td>-12.8</td>
<td>-5.9</td>
</tr>
<tr>
<td>15</td>
<td>61.1</td>
<td>68.6</td>
<td>59</td>
<td>7.5</td>
<td>-9.5</td>
<td>-2.0</td>
</tr>
<tr>
<td>16</td>
<td>54.7</td>
<td>52.8</td>
<td>55</td>
<td>-1.9</td>
<td>2.1</td>
<td>0.2</td>
</tr>
<tr>
<td>Total</td>
<td>65.2</td>
<td>74</td>
<td>70.1</td>
<td>8.8</td>
<td>-4.0</td>
<td>4.8</td>
</tr>
</tbody>
</table>

Table 44b. Percentage of school-aged boys enrolled in school[^107]

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>29.7</td>
<td>50.6</td>
<td>44</td>
<td>20.9</td>
<td>-6.6</td>
<td>14.3</td>
</tr>
<tr>
<td>7</td>
<td>54.4</td>
<td>69.3</td>
<td>63.3</td>
<td>14.9</td>
<td>-6.0</td>
<td>9.0</td>
</tr>
<tr>
<td>8</td>
<td>68.4</td>
<td>75.4</td>
<td>76.5</td>
<td>7.0</td>
<td>1.1</td>
<td>8.1</td>
</tr>
<tr>
<td>9</td>
<td>76.9</td>
<td>77.3</td>
<td>81.3</td>
<td>0.3</td>
<td>4.0</td>
<td>4.4</td>
</tr>
<tr>
<td>10</td>
<td>84.9</td>
<td>88.6</td>
<td>81.4</td>
<td>3.6</td>
<td>-7.2</td>
<td>-3.5</td>
</tr>
<tr>
<td>11</td>
<td>79.7</td>
<td>86.6</td>
<td>83.7</td>
<td>6.9</td>
<td>-2.8</td>
<td>4.1</td>
</tr>
<tr>
<td>12</td>
<td>80.4</td>
<td>89</td>
<td>83.1</td>
<td>8.6</td>
<td>-5.9</td>
<td>2.7</td>
</tr>
<tr>
<td>13</td>
<td>84.1</td>
<td>82.9</td>
<td>82.1</td>
<td>-1.3</td>
<td>-0.8</td>
<td>-2.1</td>
</tr>
<tr>
<td>14</td>
<td>82.1</td>
<td>80.5</td>
<td>77.3</td>
<td>-1.6</td>
<td>-3.2</td>
<td>-4.8</td>
</tr>
<tr>
<td>15</td>
<td>80.5</td>
<td>73.9</td>
<td>75.9</td>
<td>-6.5</td>
<td>1.9</td>
<td>-4.6</td>
</tr>
<tr>
<td>16</td>
<td>80</td>
<td>68.9</td>
<td>56</td>
<td>-11.1</td>
<td>-12.9</td>
<td>-24.0</td>
</tr>
<tr>
<td>Total</td>
<td>72.3</td>
<td>76.6</td>
<td>73.3</td>
<td>4.3</td>
<td>-3.2</td>
<td>1.1</td>
</tr>
</tbody>
</table>

Changes in enrolment do not appear to be systematically related to water and sanitation interventions in the household’s village. Regression analysis (not presented here) suggests that boys’ enrolment is 8.5 percentage points lower in villages with water point interventions and 9.5 percentage points higher in locations with CLTS interventions, contrary to the findings at the

school level (see Table 43). It did not appear that the interventions had a significant effect on girls’ enrolment.

6.10 Conclusion

Outputs from OMI’s schools component did not fully achieve expected new construction results, with 93 per cent of planned new water facilities and 52 per cent of planned new school latrines established over the course of the programme.

Three factors contributed to the low achievement of WASH-in-schools outputs through the OMI:

1. During the first half of the programme, larger firms were hired to carry out the construction work, which turned out to be a poor choice because the firms were geographically distant (in the provincial capitals) and lacked interest in small contracts. Better progress was achieved when small local firms were selected, though the need for quality supervision remained important.

2. The cost of construction materials rose dramatically over the life of the programme. The school WASH package was costed at US$12,000 per school in 2006 and US$25,000 per school in 2012. The rise in costs reflected the non-availability of skilled artisans due to the lure of the extractive industries.

3. Top-up funds for both water and sanitation arrived in late 2012 or early 2013, meaning that critical procurement time was lost and 2013 achievements were compromised.

The increase in the number of improved water points at schools was almost exclusively attributable to OMI. The number and use of latrines in schools increased, particularly gender-separated latrines, before 2010. The numbers have declined to some extent since 2010. In the vast majority of schools (70 out of 71), all boys and girls were using latrines by 2013. The practice of handwashing after defecation reportedly became much more common in schools. School enrolment increased modestly, particularly for girls, but this appears to be unrelated to OMI interventions at school and community levels. It is likely that enrolment decisions are largely based on other factors.
CHAPTER 7: CONCLUSIONS

7.1 Introduction

This chapter returns to the explicit and implicit goals of the programme to ask whether these goals were met and the degree to which the programme was responsible for meeting them. As the aim is not to repeat all of the data presented in the preceding chapters, the actual data cited here will be slender, though necessary references will be made. The emphasis is on the analysis and providing sufficient justification to be convincing. The chapter is organized into two sections: 1) results measured; and 2) causal explanations.

It is important that readers keep in mind that Section 1 does not present the impact of OMI. Rather, the section presents the changes measured over the life of the programme and contrasts them against what OMI targeted or wished to see happen. However, the trends—even if positive—could reflect factors other than OMI. Consequently, the results are further examined in Section 2 to explore which can be linked to OMI activities, and the ways that OMI caused or failed to cause change.

Given the many indicators addressed in OMI, the discussions of each are necessarily very brief. It should also be noted that the programme did not set specific targets for a number of results; hence, these are indicators of broad trends. In addition, the nuances in interpretation that were made in the detailed chapters earlier are not repeated, and readers are asked to check the earlier text for important qualifications that may exist.

7.2 Results summation

Taking all results together, the trend is broadly and firmly positive. Of the 22 items examined in the following sections, 16 show that OMI targets were probably/mostly/definitely met or exceeded. This includes items where there were OMI targets and others where no specific target was set but there is a clear desirable outcome. Five of the results do not show the movement or achievement that had been sought, and one could not be calculated.

7.3 Results achieved against OMI programme-wide goals

As described in Chapter 2, OMI had five technical goals. This section asks if each goal was met.

**Goal 1a: Increased access to and use of safe drinking water from 44 per cent, 46 percent, and 67 per cent to at least 70 per cent in Manica, Sofala and Tete provinces, respectively, by 2012**

This goal was probably met, though there is a degree of uncertainty due to data issues. The access to and use of safe drinking water did increase significantly in all three provinces. Based on the sampled communities (see Table 18), the coverage in the combined intervention and non-intervention areas increased from 24.9 per cent to 40.3 per cent. This 60 per cent growth in coverage surpasses the growth rate needed to meet the target. However, the lower initial coverage rates found in 2008 in the sample communities compared with the 2006 baseline
based on district administrative records when the goal was established introduces a small residual doubt regarding whether the target was met.

**Goal 1b:** A total of 1.2 million persons would benefit from improved water points, combining at least 200,000 persons benefiting from 400 rehabilitated water points, and 1 million benefiting from 2,000 new water points

This target was mostly met. The number of beneficiaries reached was 1,157,000, just short of 1.2 million. This is based on 2,081 new or rehabilitated water points, or 87 per cent of the hardware target.

**Goal 2a. To enable 1 million people to use improved sanitation facilities and adopt safe hygiene practices**

The goal of 1 million people was exceeded by 30 per cent, as 1.3 million persons gained access to latrines meeting the national standard. The adoption of safe hygiene practices is a multi-part issue addressed later in this chapter. In general, some parts of that goal were met and other parts were not.

**Goal 2b: Increase access to and use of improved sanitation facilities from an average of 42 per cent to at least 50 per cent in Manica, Sofal and Tete provinces by 2012**

This goal was met and significantly exceeded. Latrine ownership across all locations increased from 44 per cent to 60 per cent. More than 97 per cent of households with latrines use them, meaning the usage target was also met.

**Goal 3a: Enable 140,000 schoolchildren to access and use improved sanitation, handwashing and water supply facilities in 400 primary schools**

This goal was mostly met. A total of 335 schools and approximately 139,000 children benefited. As seen in Chapter 6, Table 11, 168,000 child beneficiaries are noted. However, some schools received both water and sanitation interventions; the best estimate after removing double-counting is 139,000.

**Goal 3b: Increased enrolment and retention of girls in 400 primary schools in Manica, Sofala and Tete Provinces by 2012**

This goal was mostly met. The goal did not specify enrolment targets. The data shown in Chapter 6 indicate that girls’ enrolment increased from 65 per cent to 70 per cent over the programme period. The change for younger girls aged 6 to 10 years—i.e. the principal age groups attending primary schools—was about 9 per cent. In contrast, boys’ enrolment hardly changed. As no retention data was gathered in this evaluation, that portion of the goal is not calculable.

**Goal 4: Increase to at least 1 million the number of caregivers (particularly women) applying safe hygiene practices in the programme area**

This goal was mostly met, but with variations. There was significant growth in the rate of female handwashing at critical times, though more so for post-defecation moments than before eating. Use of latrines soared. The OD practices of all persons, and of women in particular, fell by at least one third. Safe disposal of child faeces maintained the high baseline rate. All told, it is
highly probable that at least 1 million persons are applying more than one safe hygiene practice, though adherence to all desired practices is less.

**Goal 5: Reduction of non-operational water points from 30 per cent to 15 per cent in the project zone**

This goal was definitely met, but with a negative trend. A 2014 post-programme sustainability check (a rigorous, externally conducted random sampling of technical, social and institutional sustainability factors) found that 28 per cent of the sampled OMI water points constructed during the programme were not working. Earlier sustainability checks determined that water point functionality averaged 90 per cent from 2012-2014.

**Table 45. Overall success in meeting OMI programme goals**

<table>
<thead>
<tr>
<th>Goal number</th>
<th>Short title</th>
<th>Goal performance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>Safe water access and use rises to 70%</td>
<td>Probably met</td>
</tr>
<tr>
<td>1b</td>
<td>1.2 million beneficiaries of improved water points</td>
<td>Mostly met</td>
</tr>
<tr>
<td>2a</td>
<td>Enabling 1 million persons to use sanitation facilities</td>
<td>Significantly exceeded</td>
</tr>
<tr>
<td>2b</td>
<td>Access and use of improved sanitation facilities</td>
<td>Significantly exceeded</td>
</tr>
<tr>
<td>3a</td>
<td>Schoolchild access to water and sanitation facilities</td>
<td>Mostly met</td>
</tr>
<tr>
<td>3b</td>
<td>School girl enrolment and retention</td>
<td>Mostly met</td>
</tr>
<tr>
<td>4</td>
<td>Applying safe hygiene practices</td>
<td>Mostly met</td>
</tr>
<tr>
<td>5</td>
<td>Water point functionality</td>
<td>Probably met</td>
</tr>
</tbody>
</table>

**7.4 Results achieved at the community and institutional levels**

This section discusses the performance indicators that are best measured at either the community or the institutional (i.e. school) levels. In some cases, OMI had direct accountability at the community or institutional levels. In other cases, the OMI mobilization and management model assigned accountabilities to the communities and institutions themselves. Readers are asked to recall that this evaluation did not assess OMI’s institutional component goals (see Section 2.1 for these goals), so the discussion here focuses only on results for beneficiaries.

**Community and institutional results that did meet programme goals**

1. The quality of the water delivered at the source was safe in the great majority of instances, reflecting good construction and protection against contamination.
2. The use of latrines by schoolchildren and handwashing by schoolchildren is seen in the great majority of programme schools. This reflects the adoption of hygienic behaviour by schoolchildren as well as effective oversight and management of facilities by school authorities.
Community and institutional results that did not meet programme goals

3. The mean number of water users per water point throughout the programme and at the end exceeded governmental standards of 500 or fewer per water point. However, the trend was sharply positive as the programme added water points in several communities in later years. For example, the number of users per improved water point in the poorer communities targeted by OMI fell from 3,357 to 810.

4. The environmental conditions around the water points (e.g. cleanliness) were frequently not up to standard, indicating persistent issues of community management. For example, more than 56 per cent of the improved water points had rubbish within 30 metres of the pump in 2013.

Community and institutional results of uncertain relationship to programme goals

5. By the end of the programme, 45 per cent of communities that had been triggered for CLTS had become certified as ODF communities (though of course this means that 55 per cent had not). However, there are strong reasons to believe that half or more of that 55 per cent achieved ODF status in the year after the programme ended. Equally strong are indications that ODF certification was granted to communities that did not meet all of the criteria.

7.5 Results achieved at the household and individual levels

This section discusses the performance indicators that are best measured at the household level. In none of these cases did the programme or the community as a whole have direct accountability. Rather, these are instances where change could occur only if the household or the individual affirmatively decided to adopt the behaviour. Their decision-taking could occur against a backdrop of a social or government/OMI expectation, but there was no punitive measure if they chose not to. These can be considered fair measures of free choice. In none of these did the programme set specific targets, meaning that the programme goals used to weigh performance are reflections of the trends they would have wanted to see, but without quantification.

Household and individual results that did meet programme goals

1. Some 66 per cent of families switched to improved water sources from unimproved sources when improved sources were introduced into their community. Of course this also means that one third did not switch.

2. The amount of water consumed per person per day rose by approximately 25 per cent and on average equalled the government/WASH sector recommendation of 20 litres per person per day.

3. The exclusive use of water from improved sources for recommended purposes increased sharply, with the highest adherence for the four most important purposes (drinking, cooking, washing hands and washing cooking utensils). Usage for secondary purposes where the health consequences are less severe (bathing and laundry) also improved but was frequently used together with water from unimproved sources.
4. A large majority (89 per cent) of households report drinking water from improved sources when away from the home, including when working on their agricultural fields. This represents a 42 per cent reduction from the 19 per cent who used unsafe sources away from home at the 2008 baseline.

5. The rapid growth in the presence of latrines meant that there was a huge increase in latrine use. Only 12 per cent of households without latrines use a latrine that they share with someone else. More than 97 per cent of households with latrines use them.

6. A sharp upward level of handwashing with soap or ash after defecation or after handling baby’s faeces was observed; the levels jumped 200–300 per cent from the baseline.

Household and individual results that did not meet programme goals

7. There was very little improvement in preventing the contamination of water in the household after safe water had been provided at and drawn from the community source.

8. Although latrine usage in general increased sharply, there were many households and persons that did not build latrines and therefore continued to defecate in the open. While this percentage was down sharply in ODF-certified communities, it occurred at a much larger scale in communities that were ‘triggered’ by the programme but had their participation discontinued due to lack of progress during the mobilization period.

9. There was almost no improvement in handwashing before eating, despite the success with handwashing with soap or ash at other critical times when faeces were involved.

7.6 Other results issues: Equity and potential variability

The equity dimension in the results observed

Both the Government and UNICEF sought to give special attention to poorer and other lagging populations in the OMI provinces. They were joint subscribers to the human-rights based approach to programming philosophy prominent in UNICEF and partner thinking when OMI was developed, and likewise equal endorsers of the equity approach in force since 2010–2011. When the results could be disaggregated by income or other equity concerns, they consistently showed disproportionate benefits for the disadvantaged group and a narrowing of the gaps, just as is sought through human rights-based approaches to programming and equity programmes. These pro-equity results include the following:

1. Improved water point coverage in poorer communities, and a decline in users per water point;
2. As a consequence, heightened access and higher consumption of improved water;
3. Latrine coverage among low income households and in low income communities; and
4. An equality in results for male and female students and teachers in school latrine access.

Not all equity differences disappeared. Wealth remained a mild but statistically significant predictor of latrine ownership, and males simply do not occupy themselves with cleaning babies after they defecate. But overall, there were widespread and statistically meaningful equity benefits.
Results that may be larger or smaller than was calculated in the evaluation

There are four instances where it is possible that the data in the evaluation understate the progress made. It is not possible to quantitatively compensate for them and increase the success rate of the items, but the possibility of better-than-calculated performance should be registered:

1. There was some programme activity conducted before the baseline survey was taken in 2008. This was true with respect to safe community water infrastructure (rehabilitation or new works), including some works in what became the control communities. By elevating the baseline of the control communities, it reduced the difference between the control and intervention samples.

2. Pre-baseline works were especially important for school water points and latrines. School WASH results may have been understated by a large percentage.

3. For reasons that are not clear, 33 per cent of households in water intervention communities did not switch to drinking improved water. This could have affected the water quality results (see Chapter 4, Table 17) because water quality was only compared at the community level. If the contrast had been made at the household level, it would probably have shown a larger quality difference in favour of the intervention households.

4. As noted above, the lag time for community ODF certification means that the certification rate in 2013 clearly understates actual ODF certifications, as many communities met the criteria and were certified in 2014.

There was one contrary instance where performance may be better or worse than calculated. Water quality testing was subject to some organizational issues (see Footnote 70). This qualifies the data as a whole as less solid than other water data. The actual quality results could be worse or better than what has been presented.

7.7 Causal explanations: Introduction and summation

Introduction

Although there were many results presented above, additional analysis is needed before it is concluded that OMI caused the results. This section assesses how influential OMI was by examining what OMI did and didn’t do and what is known about the context.

As a general starting philosophy, most results observed in complex development programmes arise from the effect of multiple factors. This section describes the instances where the causal chain is convincingly clear, as well as instances where it is less certain but where interesting suppositions can be made. Less than half of the results listed in Section 1 can be statistically linked through regression analysis to one or more causes. However, this evaluation makes judgments based on a range of evidence and not just regressions. When necessary, cautions are noted about the relative softness of the evidence behind the conclusion.

Causal summation

In general, OMI successfully drove the changes leading to many of the observed results. The programme was more successful in water provision than sanitation and hygiene. There may
well have been unattributed benefits caused by OMI in non-intervention zones through the spill-over effects. OMI built on durable existing strengths such as health education messaging. It also made many choices that overcame obstacles and accelerated progress. These were seen in both the technical/operational areas and in the social/behavioural areas. There were also instances where OMI accepted trade-offs to reach one goal at the expense of another. In other cases, OMI was unable to figure out how to change behaviours or reach other programme goals and those challenges remain.

7.8 Where OMI caused and did not cause the shifts seen

This section gives the overview of results attributed or not attributed to OMI, as was presented in detail in chapters 5, 6 and 7. Subsequent sections analyse the change mechanisms in more detail.

Where OMI did cause positive shifts

- OMI was clearly the cause of almost all of the growth in improved water supply coverage, through rehabilitations and new works.
- The hardware delivered safe water, linking water quality at the source to OMI efforts.
- The switchover to improved water by many beneficiaries meant that the percentage of households drinking safe water increased due to OMI, even if there was little improvement in how the households handled or treated the water to prevent contamination.
- Interestingly, the simultaneous implementation of the CLTS hygiene programming had a significant effect on improved water consumption over and above the effect from improved water point provision. Not all of this can be attributed to OMI, as discussed later, but certainly a lot of it is due to OMI.
- Safe water provision in schools, almost all due to OMI, led to increased school enrolment, particularly of girls.
- School WASH interventions, where OMI was the only real programme at work, are linked with improved water consumption, better latrine quality and greater practice of proper handwashing.
- Although very few household level sanitation changes can be linked to OMI, handwashing after handling one’s own or baby excreta improved due to the programme.

Where OMI did not cause particular shifts or cannot be verified as the cause

- OMI brought change to most of the water indicators but did not emerge as the reason for the growth in improved water consumption. However, this is one of the outcomes where the synergy between OMI and the broader environment is unclear, and in fact OMI may have had more impact than can be directly measured. It is reasonable speculation that greatly increasing the number of improved water points helped ease crowding at all pre-existing water points, allowing those persons that continued to use them to draw more water.
- OMI hygiene education was largely unable to deliver a reduction in contamination of water within the household due to unsafe storage and cleansing practices. The baseline
did not move in this indicator, and in fact a counter-intuitive finding that washing containers with soap increased contamination was observed.

- In contrast to the broad success in water outcomes, there was a broad lack of comparative advantage for OMI in sanitation outcomes at the household level. Latrine ownership, latrine quality, latrine use and latrine cleanliness did not show a distinct advantage in OMI communities compared with control communities. However, there is most likely a linkage that is not completely caught in the data. The small or nil differences between the OMI control and intervention populations need to be seen against a general trend across Mozambique of better sanitation practices. This is explored in more detail below.

- In hygiene outcomes, there was no OMI advantage in the safe disposal of baby excreta, probably because the baseline was high and it was hard to improve on it.

- Handwashing before eating began low and stayed low no matter what OMI did.

- While school enrolment did rise as a result of OMI water interventions, there is no evidence that OMI latrine interventions had any enrolment benefits.

### 7.9 OMI and its interaction with causal factors found in the national and regional context—the secular trend

Readers should recall that this evaluation did not attempt to reconstruct the health, safe water and sanitation and hygiene education activities of the Government and partners in the programme area before or during the programme. The data for this discussion is drawn from key informants and rational speculation based on the baseline data and performance in the control communities.

**The heritage of years of pro-WASH education and mobilization**

The Government of Mozambique and partners were promoting good WASH behaviour for a number of years prior to OMI. Messages that endorsed the use of improved water, the construction and use of latrines and handwashing were widely disseminated and consistently reinforced. Household members heard these messages through advocacy activities tied to community projects, in visits to health clinics, at school and via radio and other mass media. While not all families and communities changed their behaviours—as the baseline numbers show—the great majority were repeatedly exposed to these messages.

**OMI and ongoing efforts to spread pro-WASH behaviours: The spill-over phenomenon**

The infrastructure promoting good WASH behaviours before OMI did not turn off during OMI. OMI can be thought of as having intensified an existing sustained health education approach through new operational and behavioural strategies. OMI’s efforts ran in parallel with existing efforts and synergies between them are possible. The key synergy appears to be this: OMI modelled what actions to take to realize the good behaviour that many voices were endorsing, and many families and communities outside of the programme adopted these behaviours when there were few or no barriers to action.

Very little non-OMI growth in water infrastructure was observed during the programme period, indicating that the cost and technical demands presented major barriers to community action.
Where the barriers were small or non-existent, however, there was significant growth in regards to many of the results beyond the OMI communities. Spill over was seen in at least the following indicators:

- The use of improved water, where a percentage of families in communities beyond the normal service area of an improved water source were willing to walk longer distances and abandon their nearer but less safe source for the improved source.
- The steady growth in latrine ownership and the similar levels of latrine quality. Since OMI did not subsidize latrines and the acceptable technology was cheap and reliant on families’ own labour, there was no barrier for anyone beyond the OMI area to adopting it if they wanted.
- The relatively equal levels of latrine cleanliness and latrine usage, both of which depend on household motivation and have no cost or specialized knowledge barrier.

**How spill over works**

If in fact there was a synergy between OMI and non-OMI communities and districts, the means of influence and transfer were the following:

- **Demonstration:** Most importantly, OMI demonstrated what could be done. Models of action at the community and family levels made the changes visible and allowed households and communities to conclude that they too could make the changes.
- **Identification:** OMI mobilized emotions and feelings that spur action, and these feelings easily move beyond the OMI borders. The use of the CLTS methodology for sanitation triggering was key here. It elicits a combination of disgust at the aesthetic and health consequences of OD as well as community and family pride about taking action to eliminate the problems. Shame and pride are universal emotions and are easily spread by word of mouth.
- **Indirect transfer:** Adding improved water points reduced the pressure on existing water points, including those outside the OMI project communities. This allowed those continuing to use the water points—safe and unsafe—to draw more water.
- **Systemic strengthening diffusion:** District administrations were equipped, financed and staffed under OMI, and so in addition to the intervention communities, it is quite possible that strengthened WASH and outreach capacities benefited non-intervention communities within the district.

**Overall conclusion**

A narrow view of the data would conclude that OMI in many instances did nothing more than accelerate the adoption of new water and sanitation and hygiene behaviours, that in fact these changes were going to occur anyway due to the secular trend and OMI merely hastened them. However, this places the emphasis only on the end result of near parity between intervention and control. A more likely hypothesis is that the presence of OMI galvanized non-OMI families and communities through the spill-over phenomenon. Non-OMI families and communities were moved to action by the accumulated effects of prior health education programmes, a very low cost intervention, the demonstration effect, and emotional labelling. It is reasonable to conclude that this would not have happened at any level near the amounts seen, particularly in sanitation and hygiene, without the presence of both the OMI and non-OMI actors.
7.10 Choices made by OMI that helped achieve project goals

The Government and partners, including UNICEF, considered past lessons and global learning in designing the programme. They made a wide range of choices in OMI design and implementation that helped to explain the results seen. They also accepted trade-offs among goals and had incomplete success in overcoming certain obstacles. Of course, results are not the consequence of one choice alone but of the cumulative impact of many choices, so the following discussion does not link particular choices with particular results.

Technical and operational choices

Within the range of options open to them, OMI made technical and managerial choices that on balance successfully drove the programme to meet its goals. OMI chose technologies that function in Mozambique and could be implemented under the OMI cost ceilings. The latrine designs included low cost options that met minimum standards and that greatly increased the affordability for poor rural households. The programme accurately targeted underserved, poorer than average communities in support of its equity goals. It also located the water points well, reaching population concentrations and, in the case of school water points, placing them where both the school and the community had access.

OMI aligned with the Government’s ongoing safe water and hygiene promotion messaging, which built on the existing knowledge and credibility of earlier work. The programme then made important adjustments, which are outlined in the next section on behavioural and social factors.

OMI also made technical and operational choices that helped achieve certain goals but were problematic for others. This underscores that it can be impossible to meet all goals within a single policy approach. The following three kinds of trade-offs were made:

1. OMI accepted or endorsed a user charge strategy that successfully engaged community talents and created sufficient funds for ongoing operation and maintenance. However, this meant that there would be insufficient capital for major breakdowns and long-term replacement. In effect, the Government accepted the long-term capital financing role.

2. OMI was unable to meet its goal of 500 or fewer users per safe water point. It placed improved water points in many needy communities at ratios well above 500:1. This allowed them to serve more communities rather than serving fewer communities with multiple water points to allow them to reach the targeted 500:1 ratio. However, it is noted that after 2010, OMI began installing additional improved water points in earlier intervention communities where the user ratio remained very high.

3. OMI considers that it maintained standards in the community ODF certification process. The data from the 2013 survey indicates that many households and therefore many communities were not meeting the ODF standards. If this is true, then OMI chose to allow certification for the positive message it sent, even if this weakened true ODF performance. The evidence for this trade-off is less certain than for the first two.

Social and behavioural choices

Responding to the social and behavioural context in Mozambique requires more than a proper technical or operational approach. OMI was generally wise. The choices made are a major causal factor for the successful programme results.
Although OMI aligned with prior safe water and good hygiene messaging, it made important adjustments. It incorporated CLTS principles (growing in part out of earlier PHAST work) of triggering both shame in open defecation and a dirty environment and pride in solving problems. This was much less common across the world in the 2006–2007 planning phase than it has become since then. It worked with the community leadership and the understood Mozambican preference for community level action. At the same time, it advocated a latrine model and behaviours that did not depend on community action, that any family and household could do. OMI found a good balance between collective and household level action. OMI also respected gender differences. The construction of sex-specific latrines in schools for both teachers and students led to much greater usage and coverage.

Operationally, OMI organized itself to take advantage of its social and behavioural understandings. It financed a large scale social mobilization component and used national NGOs with roots in the districts and communities. It left communities to move at their own pace, for example allowing the time needed to reach ODF status even if it took longer than the expected period. Communities also proved adept at settling on a community water point user charge strategy that was perceived as fair and successful in generating funds for operation and maintenance. Part of this perceived fairness was the exemption of the community’s poorer members from the user fees.

An interesting tactic used that might explain much of this success was the employment of a full time national anthropologist. WASH programmes often conduct anthropological or sociological research in the design phase. OMI employed the anthropologist throughout the programme, including in persistent training and retraining of the social mobilization NGOs.

### 7.11 Restraints to achieving OMI goals and issues that OMI was not able to resolve

It is untrue to say that OMI made choices that worked against meeting programme goals. It is true that OMI was unable to overcome obstacles in some cases. Put another way, if there were options open to OMI to reach the goals, they failed to find them. These important instances are the following:

1. Many communities failed to meet expectations in certain areas despite OMI’s mobilization and quality assurance efforts. Instances include the nearly 20 per cent of communities that did not institute any user charges, the persistent OD in certain communities, and the dirtiness of the environmental conditions around as many as 60 per cent of the water points.

2. Although the analysis above credited OMI with substantial influence in non-intervention communities and households through the spill-over effect, it is not apparent that OMI consciously supported the spill-over dynamics. This would have meant reducing the effort in intervention communities or increasing costs by hiring more social mobilization teams, both of which would have had negative consequences within OMI. Still, this may have been a missed opportunity to expand programme impact, especially in helping communities to reach the level of latrine coverage needed to achieve the collective benefits of OD reduction (the ‘herd effect’).

3. At the household level, no real answers were found to a number of sanitation and hygiene obstacles. As noted earlier, handwashing before eating, keeping water from safe sources safe and latrine cleanliness did not change as desired.
4. Although not a specific programme goal, there was a desire to see households ‘move up the sanitation ladder’, that is, replace basic latrines with higher quality ones when rebuilding was needed. This was essentially not observed and the premise that households can be motivated to invest greater effort in better latrines was not seen.

There were certain constraints for which no real OMI response appears to have been available. The most important was the rapid escalation of construction costs due to wage competition for the comparatively few skilled WASH technicians with the rapidly growing mining sector. When OMI had to pay higher unit costs to build its facilities while facing a fixed budget, a lower achievement level—e.g. school latrine coverage—can still be a good accomplishment. The understandable pressure to distribute improved water points to more communities even if this resulted in far more than 500 users per water point may well have been irresistible.
ANNEXES

All annexes to this report are available electronically on the website of the UNICEF NYHQ Evaluation Office. Please click here to access the annexes. As of the completion of this report in April 2017 there were 14 documents placed on-line, listed in order from A1 to A14. Other documents not listed here may be added later and will be identified as A15 or higher. In addition, the annex page may contain links to internet sites where more extensive information can be found on the UNICEF Mozambique WASH program, the global UNICEF WASH approach, and other relevant material may be found.

Annexes as of April 2017 are the following:

A2. OMI Mid-Term Evaluation Report 2011
A3. End line survey analysis by AIID (2014)
A6. 2013 Sustainability Check
A7. 2015 Sustainability Check
A8. OMI Final Report to Donor (2014)
A11. Contract Management Case Study
A12. PEC Zonal Case Study
A13. CLTS Case Study
A14. Sustainability Case Study

Annexes 1-7 were produced by institutions completely independent of the Government of Mozambique and of the UNICEF-Mozambique Office. Annexes 8-14 were produced in cooperation with or under the managerial oversight of the Government and/or UNICEF.

Suggestions for additional content to include as annexes to the main report are welcomed. Please send the suggestion—including the material referenced—to Evalhelpdesk@unicef.org.