Enhancing Climate-Resilient Agriculture and Water Supply in Drought-Affected Communities in Papua New Guinea

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Acknowledgements

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**List of Acronyms**

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<th>Acronym</th>
<th>Description</th>
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<tbody>
<tr>
<td>BCC</td>
<td>Behaviour Change Communication</td>
</tr>
<tr>
<td>CDC</td>
<td>Centre for Disease Control</td>
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<tr>
<td>CLTS</td>
<td>Community-Led Total Sanitation</td>
</tr>
<tr>
<td>DRR</td>
<td>Disaster Risk Reduction</td>
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<td>ECHO</td>
<td>European Commission Humanitarian Aid Office</td>
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<td>HWTSS</td>
<td>Household Water Treatment and Safe Storage</td>
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<tr>
<td>IOM</td>
<td>International Organization for Migration</td>
</tr>
<tr>
<td>JMP</td>
<td>Joint Monitoring Programme</td>
</tr>
<tr>
<td>MEL</td>
<td>Monitoring, Evaluation and Learning</td>
</tr>
<tr>
<td>NFI</td>
<td>Non-Food Items</td>
</tr>
<tr>
<td>NGO</td>
<td>Non-Governmental Organization</td>
</tr>
<tr>
<td>ODF</td>
<td>Open-Defecation Free</td>
</tr>
<tr>
<td>PHAST</td>
<td>Participatory Hygiene and Sanitation Transformation</td>
</tr>
<tr>
<td>PHHE</td>
<td>Participatory Health and Hygiene Education</td>
</tr>
<tr>
<td>POU</td>
<td>Point of Use</td>
</tr>
<tr>
<td>SPSS</td>
<td>Statistical Package for Social Sciences</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Aid for International Development</td>
</tr>
<tr>
<td>WASH</td>
<td>Water, Sanitation and Hygiene</td>
</tr>
<tr>
<td>WHO</td>
<td>World Health Organization</td>
</tr>
<tr>
<td>WMC</td>
<td>Water Management Committee</td>
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<tr>
<td>WUA</td>
<td>Water Users Association</td>
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</tbody>
</table>
Executive Summary

The projects funded through USAID and ECHO aim to increase the resilience of drought affected communities in Papua New Guinea through the broad framework of Disaster Risk Reduction (DRR).

The projects aims to reduce the risk of potential disaster by stabilizing the highland communities worst affected by the El~Niño induced drought and frost in Papua New Guinea. The targeted communities include Enga (Kandep and Laiagam), Jiwaka (Nondgul and Banz) and Simbu (Gumine and Saltnomane-Karamui).

At the outset of the programme, the project conducted a baseline survey to establish statistics on the current WASH conditions in the targeted communities under the AGWA project. Baseline data is necessary to adequately and precisely measure the impact of the investments made by the project at the end of interventions.

This report details baseline household water, sanitation and hygiene conditions, access to facilities, behaviours and management by users within the targeted communities prior to the start of any hardware and software activities planned in the project.

Major consolidated findings at the household baseline survey are;

Demographics
- 34% of the households have children less than 12 years of age; and
- 35% of the households have adults between 19 – 59 years.

Sanitation
- 91% of households share toilets;
- 42.9% of households practice open defecation in toilet absence;
- 1.4% of households use improved sanitation facility; and
- 2.9% of households with a toilet had a handwashing station close to it.

Water source and use;
- 85% rely on unprotected drinking water sources;
- 15% use protected water sources;
- 40% travel for a kilometer or less to the water source;
- 18.6% travel for 2km or more to their water source;
- 3% pay for water;
- Average water use per capita per day is 7.7 litres;
- 54.5% use water storage containers for multiple purposes; and
- 67.5% do not treat their drinking water.

Hygiene behaviour
- 2.9% of household self-reported handwashing with soap at 4 key times; and
- 47.1% had diarrhoea within 4 weeks prior to the survey.
Introduction and background

The project aims to reduce the risk of potential disaster by stabilizing the highland communities worst affected by the El~Niño induced drought and frost in Papua New Guinea. Over the six months, the project is expected to reach at least 40,000 people.

Through the broad framework of DRR this project is expected to increase resilience of the target communities to drought through the provision of immediate WASH assistance whilst encouraging the use of effective and locally developed hybrid varieties of crops and vegetables. This will be realized through the following summarized objectives;

- Train and mentor communities and relevant authorities to promote the dissemination and adoption of PHHE practices;
- Support on-going PHHE efforts with provision of NFI kits comprising of one (1) collapsible 15 litre water container and two (2) bars of soap;
- Improve access to safe water through drilling and/or repair of boreholes in schools and hospitals and training of their committees for operation and maintenance; and
- Training of master farmers on conservation agriculture and farming, and the distribution of agricultural kits consisting of fast growing seeds, tools, tubers and vines to affected households.

The table below shows the intervention areas in the different provinces;

<table>
<thead>
<tr>
<th>Province</th>
<th>Target districts</th>
<th>Wards</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enga</td>
<td>Kandep Laiagam</td>
<td>Kandep rural Maip Muritaka rural Wapenamanda rural</td>
</tr>
<tr>
<td>Jiwaka</td>
<td>North Wagi</td>
<td>Nondgul Banz Minj</td>
</tr>
<tr>
<td>Simbu</td>
<td>Gumine Saltnomane</td>
<td>Omkolai Gumine station Milaku</td>
</tr>
</tbody>
</table>
Survey methodology

Data collection

A household survey questionnaire (In English and translated to pidgin during data collection) was developed to gather information on water, sanitation access and hygiene practices required for the baseline survey. The questionnaire was designed by IOM and included questions to measure and ensured all WASH indicators were met. The questionnaire was reviewed as well as the data collection protocol and feedback provided for the final version that was used for the survey (see appendix 1).

Technical and instructional training was provided by IOM in partnership with the Department of health during week-long workshops in the intervention provinces of Enga, Simbu and Jiwaka. The enumerators were trained on MEL protocol, survey administration, and use of field data collection tools and techniques.

Sampling methodology

The baseline assessment included the administration of household surveys to a sample of 180 households across the nine intervention areas.

The sample size of each community was calculated using a sample size calculator. The calculation of households for the number required to ensure a representative sample is based upon the numbers of households at target district (using PNG 2011 Census statistics) and the expectation that each community will be provided with 100% coverage at the end of the project. The calculations were done with a confidence level of 95% and confidence interval of 7.24. The table below shows the sample sizes for each of the provinces;

<table>
<thead>
<tr>
<th>Province</th>
<th>Intervention area</th>
<th>Sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enga</td>
<td>Kandep</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Laiagam</td>
<td>26</td>
</tr>
<tr>
<td>Jiwaka</td>
<td>Nondgul</td>
<td>30</td>
</tr>
<tr>
<td></td>
<td>Banz</td>
<td>32</td>
</tr>
<tr>
<td>Simbu</td>
<td>Gumine</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>Saltnomane-Karamui</td>
<td>30</td>
</tr>
</tbody>
</table>

Households were selected using the “snake method” for random selection. This method was used because the community roster of households and a random number generator that was ideal and preferred were not available. The “snake method” requires that the survey enumerators select a random number, n. Survey enumerators then visit every nth house on one side of the road until the total number of surveys needed for the community have been collected.
Data management

Cleaning
Datasets were created and information keyed in to SPSS for data cleaning and manipulations, such as transforming selected variables from string to numeric format, in order to facilitate statistical analysis. Such variables denoting ages, number of people, distance, and time amongst others were converted from string to numeric variables.

Initial frequencies that exposed extreme values for some of the numeric variables were identified and those values excluded from analysis. This was to avoid skewness that would result from such data.

Analysis
Data was analyzed using SPSS Statistics version 17.0 for Windows. A 95% confidence limit (data are correct in 95% of cases) and +/- 7.24 confidence interval was used.

Majority of the project indicators are composite indicators and had to be computed from more than one data point/variable. More than 6 household-level indicators from the results matrix framework have been computed from the survey data.

Data has been analyzed to show the overall picture for the 180 households and represented using tables, diagrams and charts to illustrate the various patterns as surveyed.
Findings

Demographics

The majority of the respondents interviewed were male (82.9%). Over two thirds (82.9%) of the respondents were married with an average age of 33.5 years and the rest being single, divorced or widowed. The average household size was 6.7 people (measured by asking the respondent how many persons had slept in the household the previous night). 34% of the population had children less than 12 years of age and 35% with adults in the 19 - 59 years range.

Education and literacy levels are quite low in the intervention areas with more than a half of the respondents lacking any form of formal education. The PHHE to be delivered by the project would therefore need to be customized to a low-literate population.

Latrine usage and conditions

Access to sanitation is low in the intervention areas. 91% of the households surveyed shared toilets with other households, with the remaining 9% practicing open defecation. Major reasons cited for toilet sharing and open defecation included, unimportance of toilets (62%), construction costs (24%), and recent migration (14%). Only 1.4% of the respondents were observed to have an improved sanitation facility (JMP 2015) in their compounds with the majority (90%) of the pit latrines observed being traditional pit latrines lacking slabs.

1 According to the JMP (2015), an “improved” sanitation facility includes a flush/pour flush to a piped sewer system, a septic tank, or a pit latrine, a ventilated improved pit latrine (VIP), a pit latrine with slab, and a composting toilet.
"Improved sanitation facilities" refers to use of latrines not shared (JMP 2015). These are likely to ensure hygiene separation of human excreta from human contact, in essence preventing negative consequences resultant of the same.

Cleanliness, privacy and infrastructure of the present facilities were variable, although most of them showed signs (like pathways) of active usage. 2.9% of the households with toilets had a hand washing facility nearby. None of the latrines observed were in compliance with the SPHERE standards of sanitation, namely, a clean latrine with adequate materials for privacy, availability of water and cleansing materials, and minimization of fly and mosquito breeding, amongst others (SPHERE 2013).

**Drinking water sources**

More than two thirds of the populations (85%) surveyed rely on unprotected water sources. In this case, unprotected water sources include; uncovered springs, uncovered dug wells, surface drinking water sources (rivers, ponds), cart with small tank/drum, tanker truck, bottled water\(^2\). Protected water sources include public taps or standpipes, boreholes, covered dug wells, covered springs and rainwater collection (JMP 2015)\(^3\).

Only 15% of the population surveyed has access to and uses improved water source with the most common being piped water.

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\(^2\) Bottled water is considered “improved” for drinking only when the household uses an improved source for cooking and personal hygiene (JMP 2015)

\(^3\) Definition for unimproved and improved source borrowed from UNICEF/WHO JMP guidelines for improved and unimproved water sources
More diversity in terms of water sources is seen during the dry season with people relying and using water from more unprotected sources because of water scarcity and shortage. Vulnerability increases during this time leading to increased diarrhoeal and water-related diseases due to lack of access, adequacy and reliability of water.

There are two main aspects in access to water, exclusive use and the distance to the protected source. Improved access to water is defined in the JMP as the access to protected
water source within a kilometer of the household. Only 15% of the project intervention areas meet this JMP definition for improved access.

The table below shows the distances travelled to the water sources and average times taken to collect the water and their corresponding household percentages.

<table>
<thead>
<tr>
<th>Distance to source</th>
<th>Time taken to source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 km</td>
<td>0 - 20 mins</td>
<td>6.9%</td>
</tr>
<tr>
<td>0.1 to 1 km</td>
<td>20 mins – 1 hr</td>
<td>40%</td>
</tr>
<tr>
<td>1.1 km to 2 km</td>
<td>1 – 2hours</td>
<td>22.9%</td>
</tr>
<tr>
<td>2.1 km to 10 km</td>
<td>Over 2 hours</td>
<td>18.6%</td>
</tr>
<tr>
<td>Total</td>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

Management of drinking water sources

Poor management of water sources is a very big problem in the intervention areas. None of the water sources (protected or unprotected) in the areas surveyed is managed by a committee (WMC or WUA). Although the likelihood is low, the possibility of management is by an individual owner or none as observed. Only 3% of the respondents surveyed paid for water they fetched (rain water harvested) to the individual owners, and had to either rely on unprotected sources (75%) or go without water (25%) when they had no money to pay for the water.

Proper community management and tariff payment have been shown to be the key factors contributing to the long-term sustainability of water schemes.

Household water use

Majority of the households surveyed (62.9%) used 20 – 40 litres of water (1-2 jerricans) per day. The average amount of water reportedly used per capita water volume is 7.7 litres. This is less than the minimum amount of water recommended by WHO's’ of 20 litres per person per day to meet the most basic needs.
Most of this water is used for domestic (drinking, cooking, cleaning etc.) as opposed to productive purposes in the households. Productive use of water entails use of water for such purposes as watering animals and trees.

**Handling of drinking water**

Over two thirds of the overall respondents do not treat their water before drinking. Those who treated theirs preferred boiling (27%) followed by filtration (6%) as shown by diagram below.

Further to water treatment, safe storage using only-drinking-water containers are recommended to prevent contamination. More than half (54.5%) of the respondents used the drinking water storage containers for other purposes such as watering animals, bathing/washing, carrying and storing food. Safe storage containers are those with narrow
Hygiene practices

Handwashing at key times (before eating, before preparing food or feeding a child, after defecating or a cleaning a child who has defecated) prevents diarrheal diseases (Hernandez 2010). A vast majority of households surveyed reported washing their hands before eating (48%), less reported washing hands after toilet use (35.7%), and even lesser before food preparation (25.7%)\(^4\). Others were bathing daily (15%), use of dish rack (1.4%), and covering pit latrine hole (18.6%) amongst others. Less than half of the respondents reported washing their hands with either soap or ash, required to fully remove contamination from hand.

In essence, it was only 2.9% of the population demonstrating “proper hand-washing practices”, that is, at all key times and with soap or ash!

The proportion of households that; i) had a handwashing facility at the premises; ii) was near the latrine; and iii) had water available, was only 1.4%.

Diarrhoea, a water-borne disease (47.1%), malaria, a water-related disease (27.1%) and dysentery (17.1%) were reported as the most common diseases as shown above\(^5\). This was captured by respondents being asked to mention the disease and cohorts that that had been affected in their households, within 4 weeks prior to the survey. The underfives (0 – 5 years) and adults (20 – 59 years) were the most affected cohorts by these water-borne, water-washed and water-related diseases at 41.4% and 30% respectively.

\(^4\) Values add more than 100% because some households gave more than one hygiene practices

\(^5\) Values add more than 100% because some households reported more than 1 disease
The population surveyed indicated that their major source of information for health and hygiene information is self-known (63.8%) followed by the government's health department (24.6%) and, the NGOs working in the area as below.

![Source of health and hygiene information](chart)

**Key recommendations and conclusions**

The government and other stakeholders can take the following proposed actions to address the WASH conditions, behaviours and practices in the intervention areas through the findings presented above.

Majority of the population lacks formal education and the associated abilities to read and write especially for the women, who are the primary care takers. Health education messages need to be customized for low literacy levels; in this case the women and more interactive approaches like PHAST should be used.

Behaviour change communication (BCC) is a key action point that cannot be over-emphasized for hygiene and sanitation practices. Handwashing with water and soap/ash at critical times, and especially after defecation is rarely practiced. Needless to mention, almost all the population surveyed used shared toilets with a half practicing open defecation as an alternative to toilet use even when one is available. In as much as this may be considered to be lack of sanitation facilities, or lack of their maintenance, it is a learned behaviour or “tradition” that does not see its importance and the associated hand-washing with soap/ash after defecation, as necessary. All the partners, especially local actors need to promote the understanding of contamination effects resulting from open-defecation and non-washing of hands at key times. CLTS approach should be considered in some areas to the achievement of ODF villages.
There was no case of reported management of a water source by a committee. The creation of water management committees (WMCs) and water users association (WUAs) should be a high priority for provincial government and community members, including training addressing governance and finances. Formal management and tariff payment system creates ownership and in essence, discouraging dependency during occasional breakdowns resulting to non-functioning water sources and water unavailability. There’s need for community members to be sensitized to understand the need for water payment. The funds are used for operation and maintenance of the scheme, ensuring its operation and sustainability in the long run. Accountability on the management by the population depending on the specific water source will also be an added incentive to maintaining it.

The water use across the nine wards in the 3 provinces is at a paltry minimum with little or no water available for productive purposes. The least amount of water used in the households is possibly divided for domestic and other uses, leaving basic consumption and hygiene with very little water. It also explains the high number of diarrheal and water-related diseases that were self-reported during the survey. The amount of water available per day per person has to be increased as well as access to address these needs as envisaged by the assessment. A gap of 45 boreholes was observed in the 9 wards assessed and could be prioritized at essential infra-structures such as schools, clinics, urban centres and churches were huge population could access without security concerns.

BCC is another area recommended to be prioritized with emphasis on delivering HWTSS and point of use water treatment (POU). It was noted that very few community members treated or stored and handled their water safely for consumption. Lack of treatment can lead to waterborne diseases that are entirely preventable. All these arise from communities’ perception of water safety and the benefits associated with them. Health education regarding water treatment, handling, and storage should be customized and done in a localized manner.

The community education should ideally be done in collaboration with the governments’ health department which was reported by the communities to be their largest source of information.
References


