Technical Assistance Consultant's Report

Project Number: TA 4456 - KIR
December, 2007

Kiribati. Preparing the Outer Island Growth Centers Project – Phase 2 (Water Supply and Sanitation)

Working Papers (Volume 2)

Working Paper No 10: Existing Infrastructure Survey for Water and Sanitation

(Financed by the Asian Development Bank)

Prepared by the designated Project Team Members, TA 4456 - KIR

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Melbourne, Australia

For Ministry of Finance and Economic Development (MFED)
Ministry of Line and Phoenix Islands Development (MLPID)

Asian Development Bank

Report Structure – Volume 2

The Working Papers contained in this volume detail work completed in Kiritimati Island, Kiribati, during October - December, 2007, in respect of a feasibility study undertaken for a proposed ADB investment project in water and sanitation. The feasibility study was undertaken as the main output of Phase 2 of the *TA No. 4456 - KIR: Preparing the Outer Island Growth Canters Project (Kiritimati Island).* [1]

The results of the TA are contained within 3 main reports;

- the Executive Report (Volume 1);[2]
- the Working Papers (Volume 2 - the current volume) which provide the detail of the overall feasibility study and the summary Executive Report, and
- the draft Kiritimati Island Development Plan (KIDP - Volume 3) which addresses overarching island development issues and directions on Kiritimati Island.

The Working Papers are contained in this volume in the following order;

1. Hydrology
2. Water Supply
3. Sanitation
4. Economic and Financial Analysis
5. Social and Poverty Analysis
6. Initial Environmental Examination
7. Summary Initial Environmental Examination
8. Environmental Information and Assessment
9. Institutional Arrangements for Improved Island Planning and Development
10. Existing Infrastructure Survey for Water and Sanitation

[1] The team comprised Paul Jones, Development/ Planner/Team Leader, Tony Falkland, Civil Engineer and Water Resources, Tony McDonald, Environmental Adviser, Jonathan Powell, Community Development Adviser, Marcus Napud, Economist and Ian White, Water Resources/Engineer. Ms. Makurita Bauro proved liaison support to the TA while based in Tarawa. Special thanks to Ms. Maketara Ioane, Resource Economist, from the MLPID and GoK TA counterpart for her valuable assistance and support in Kiritimati Island.

[2] A draft ADB Report and Recommendations to the President (RRP) was also prepared for internal ADB consideration. The Executive Report is based on the information contained in the draft RRP.

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March, 2008

Kiribati: Preparing the Outer Island Growth Centers Project – Phase 2 (Water Supply and Sanitation)

Working Paper No. 10: Existing Infrastructure Survey for Water and Sanitation (Volume 2)

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1. Background

This Working Paper presents the main results of a household survey undertaken to assess the existing condition of water supply and sanitation in Kiritimati Island. The survey was a 100% full island survey covering all households as well as business and government enterprise.

The survey was undertaken by I-Kiribati, primarily senior students (school leavers), in the week 29th October to 2nd November, 2007. The total number of households, business and enterprises surveyed on Kiritimati Island was 626. Existing maps from the Land Management Division (LMD) were used to delineate the island into 25 sub areas for survey. Households and other premises as identified on dated map layers in Land Management Division (LMD), Ministry of Environment Lands and Agricultural Development (MELAD), were correlated with aerial photos sourced from Google Earth (the best available aerial photography at that time). A final map layer comprising the above as well as additional households as identified when in the field (as covered by cloud layer in the aerial photography) was produced by the LMD. The breakdown of households, business and enterprises by village on Kiritimati Island is as follows.

- London to Tennessee - 250
- Tabwakea - 232
- Main Camp to Banana - 100
- Poland - 44

The data derived from the survey at the island and village level including extent of the piped water supply, septic sanitation systems, number of existing wells and rainwater tanks, covered and uncovered wells, and the like, has been used to assist in the design, including formulation of Project assumptions and establishment of baseline indicators at both the island and village level. Data used to compile this Working Paper are contained in two separate excel files – one with all base data as entered by village and household for each question in the questionnaire, and the second containing selected tables and graphs used to compile this Working Paper. For some data, there were minor discrepancies such as total data for a question exceeding the 626 households. For example, on the question of 'Use of Septics', the yes and no answers totaled 627. For use in the draft RRP and Project designs this was rounded off to 626 to align with the overall total number of households, business and enterprises surveyed on Kiritimati Island.

Additional assessment of the original data sheets and results contained in this Working Paper are explored elsewhere, especially in understanding trends and issues in Sanitation - see Working Paper 3.

The original English questionnaire and the translated I-Kiribati questionnaire are attached as an Annex to this working paper.

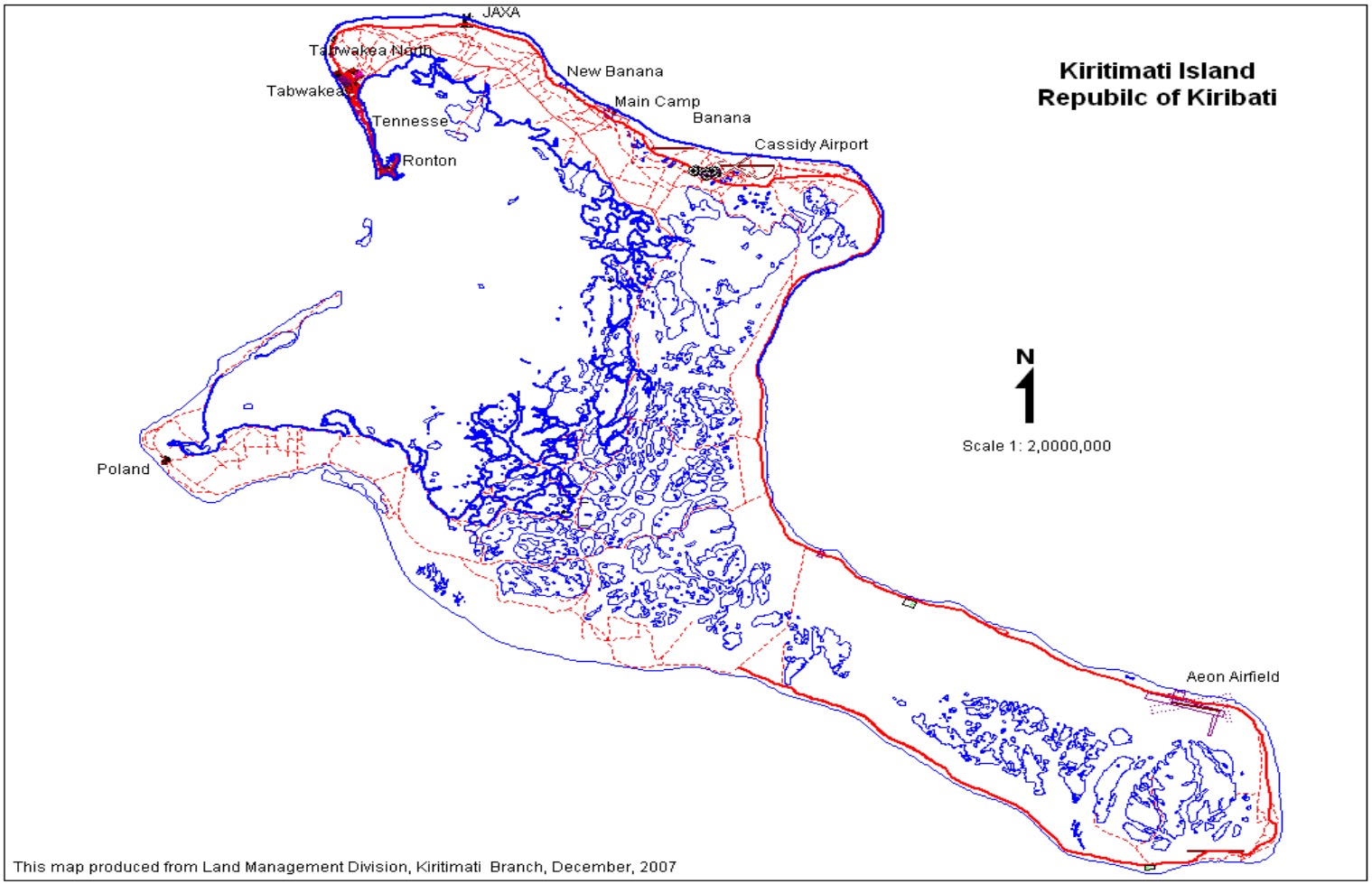

Figure 1 Map of Kiritimati

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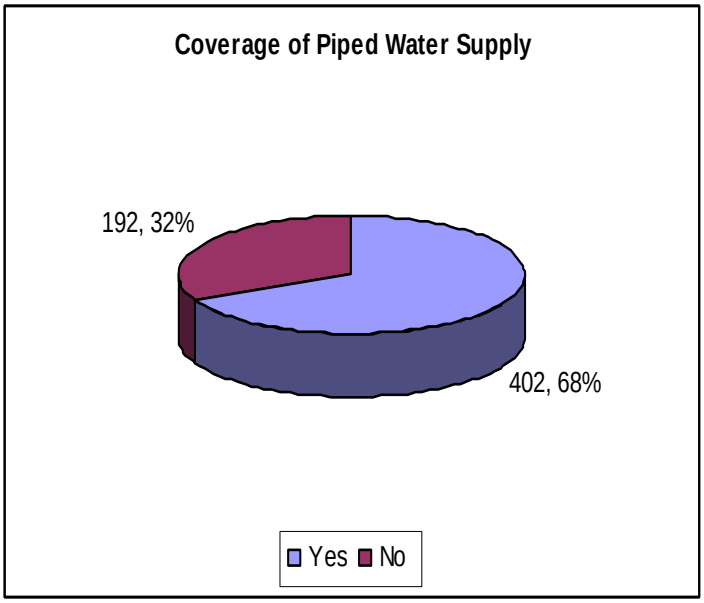


Figure 3 Leaks in Outside Pipes

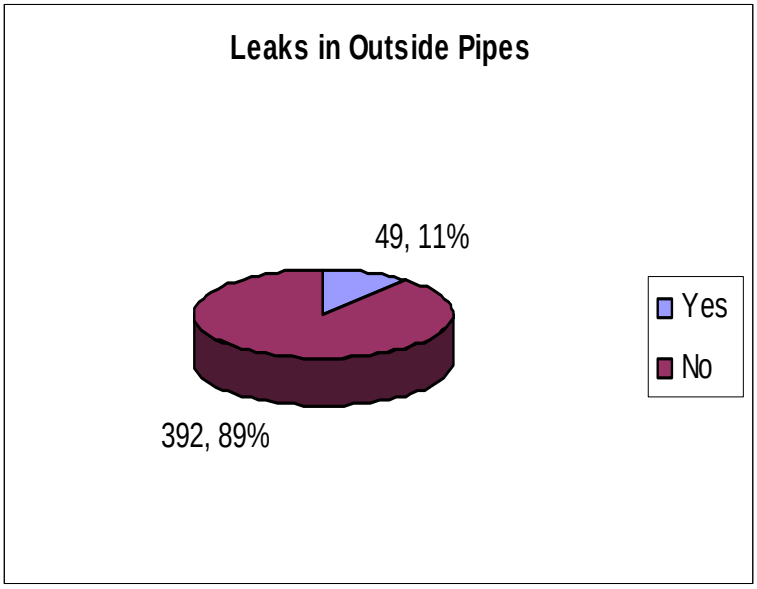


Figure 4 Leaks in Inside Pipes

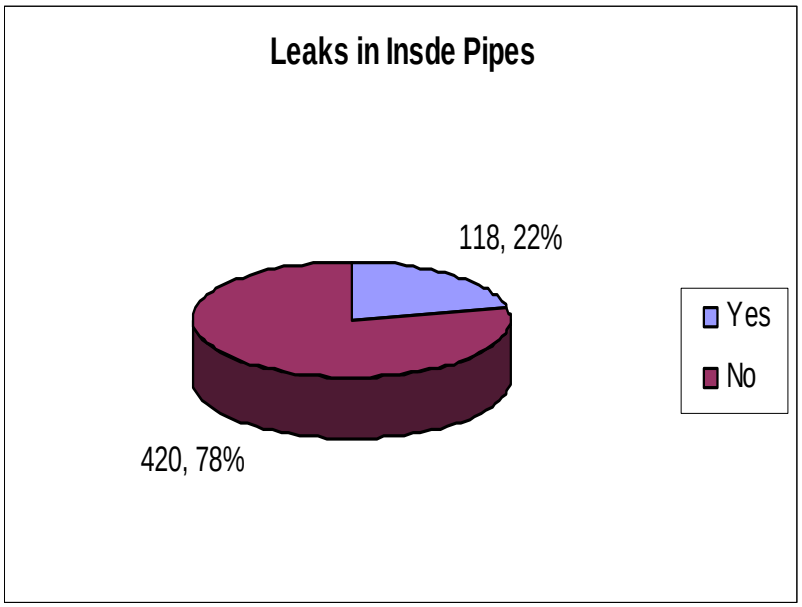


Figure 5 Leaks from Taps and Showers

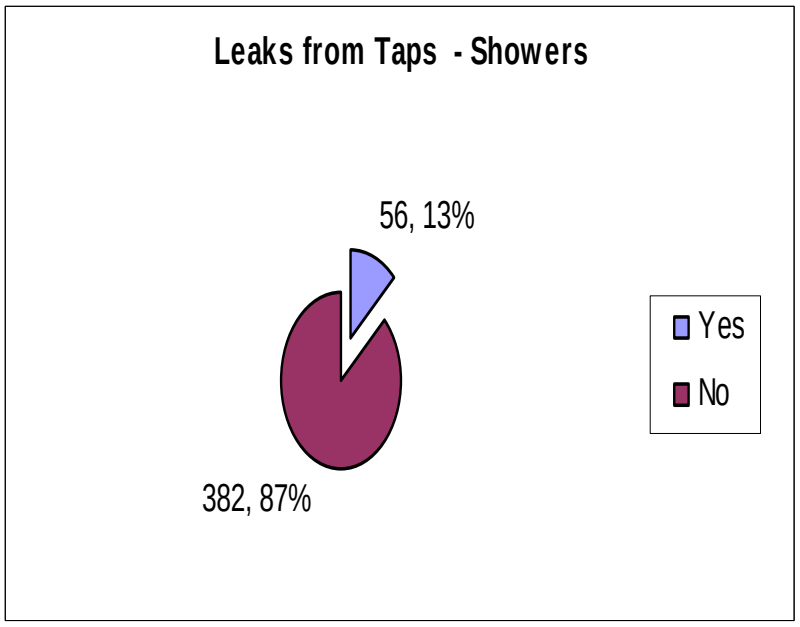
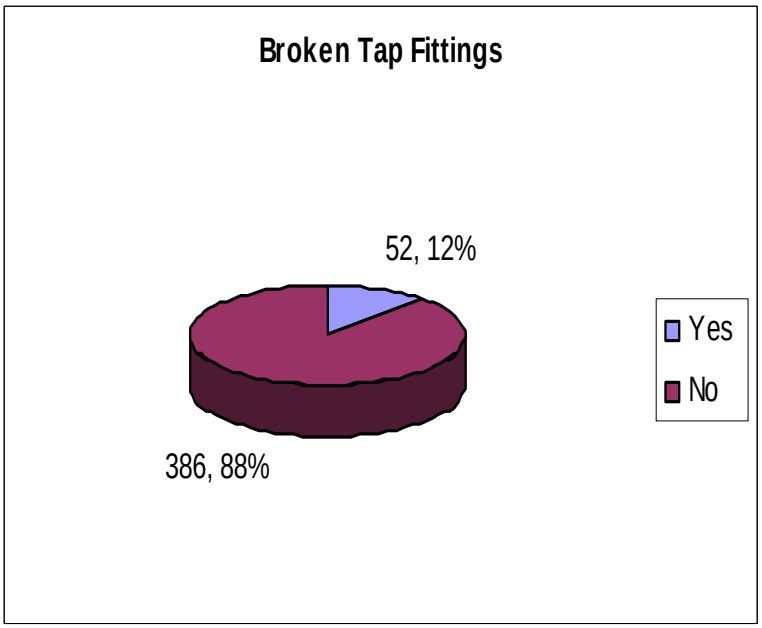


Figure 6 Broken Taps Fittings



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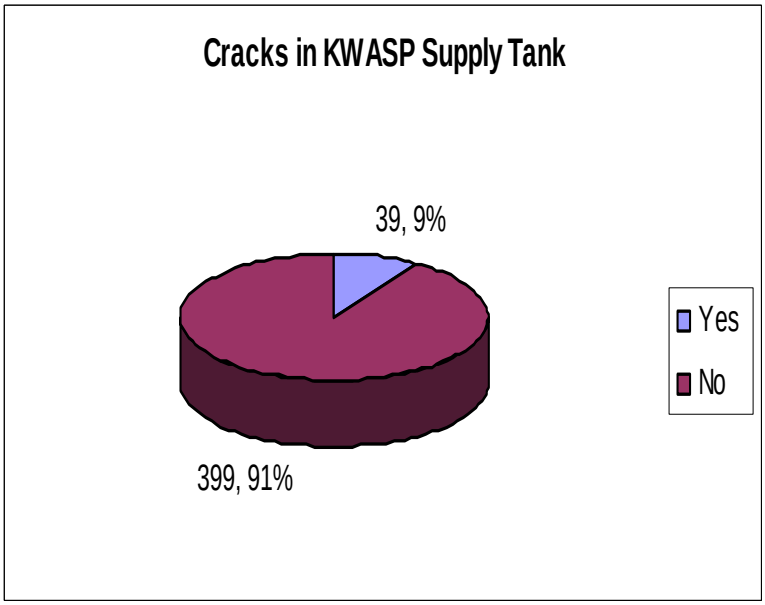

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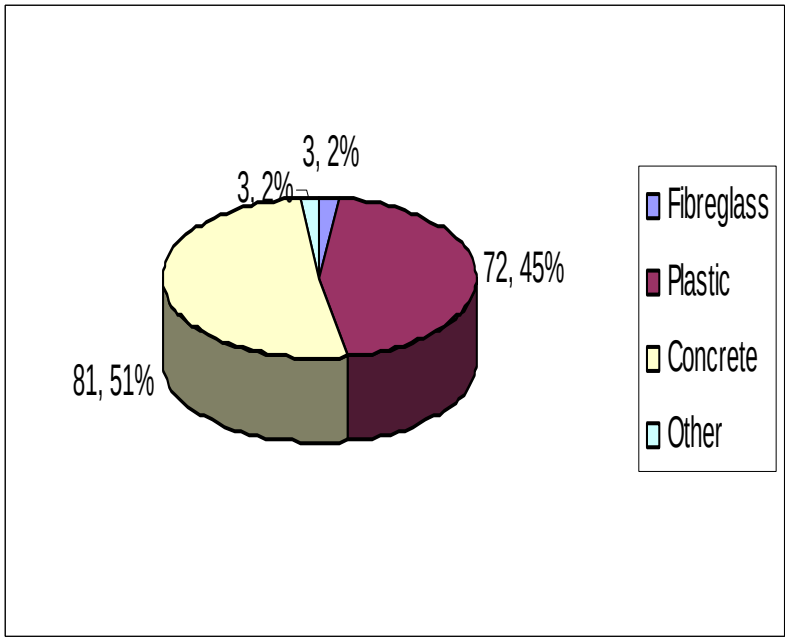

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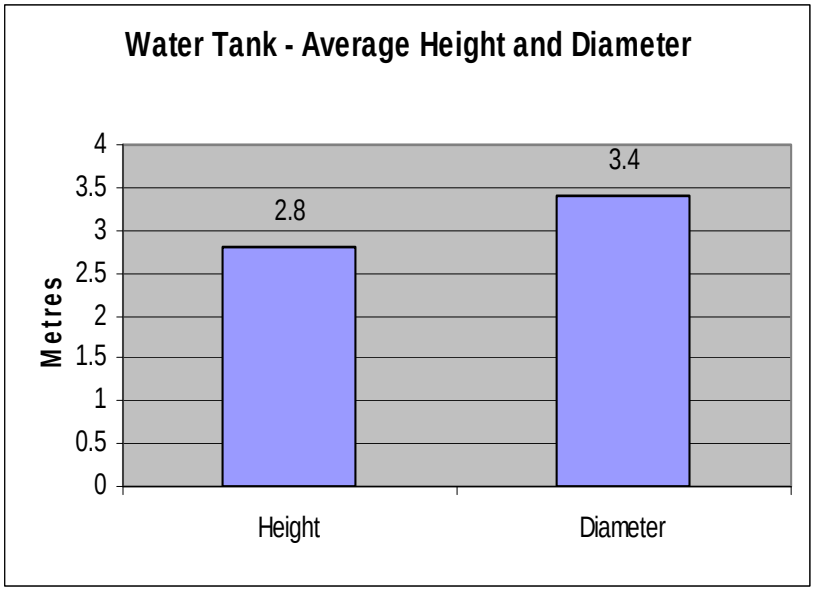

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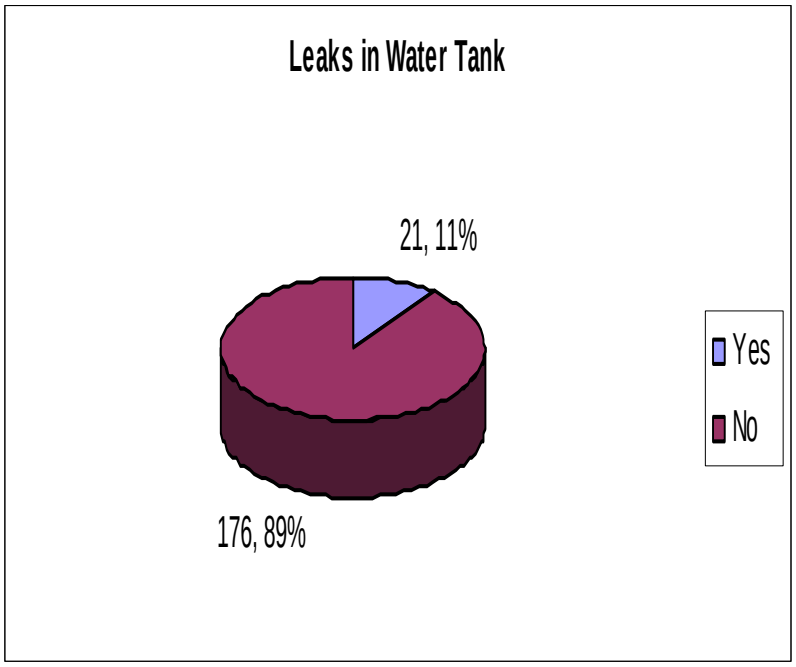

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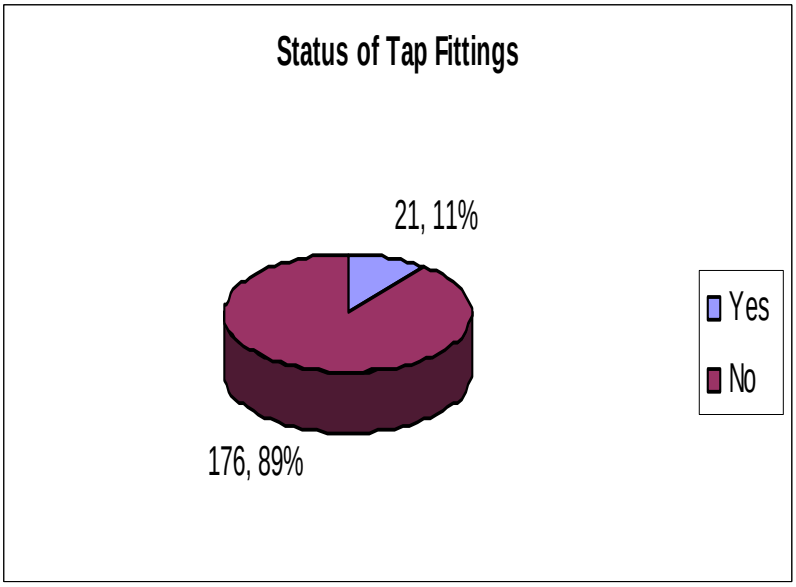

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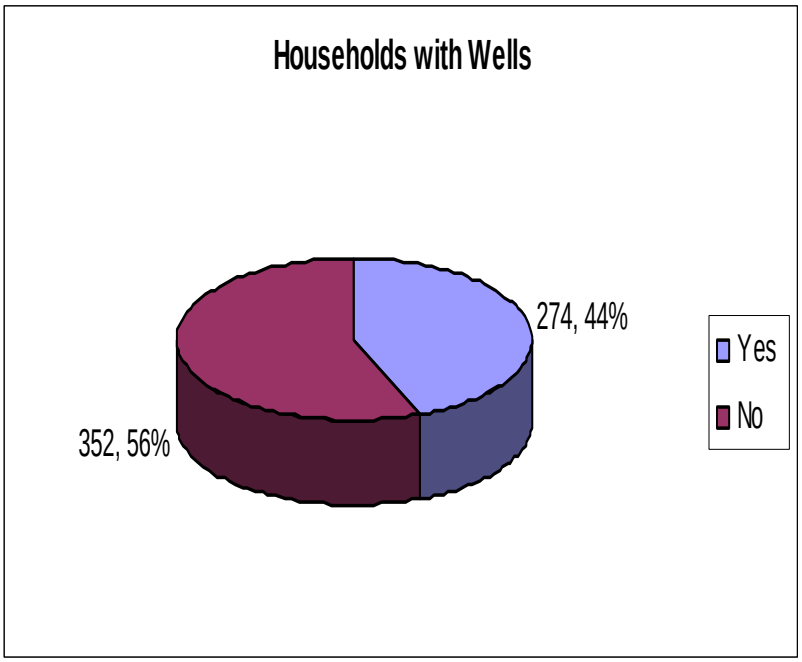

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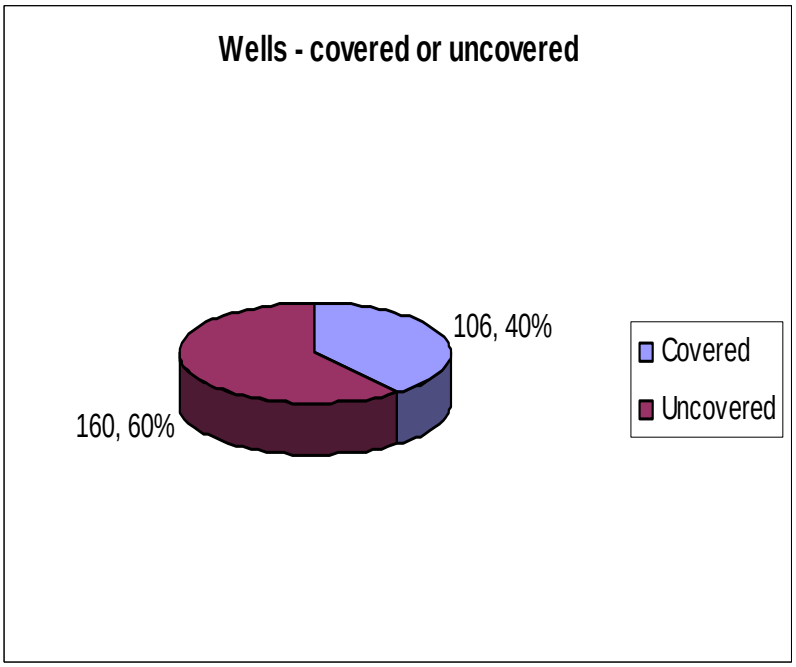

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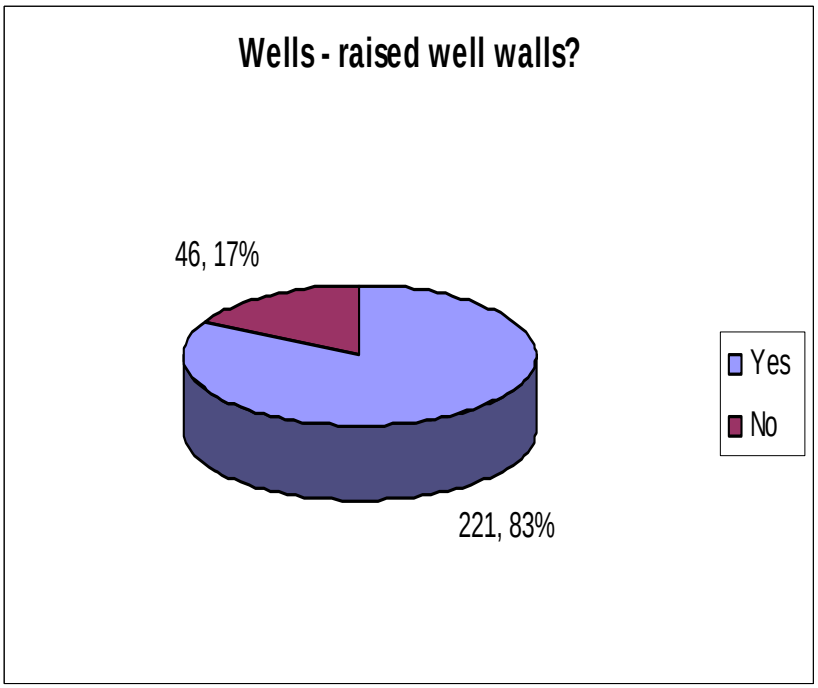

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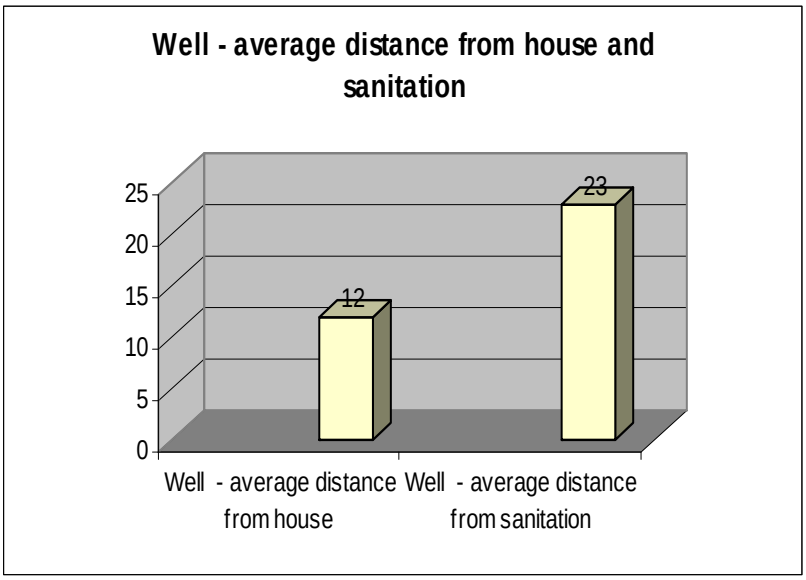
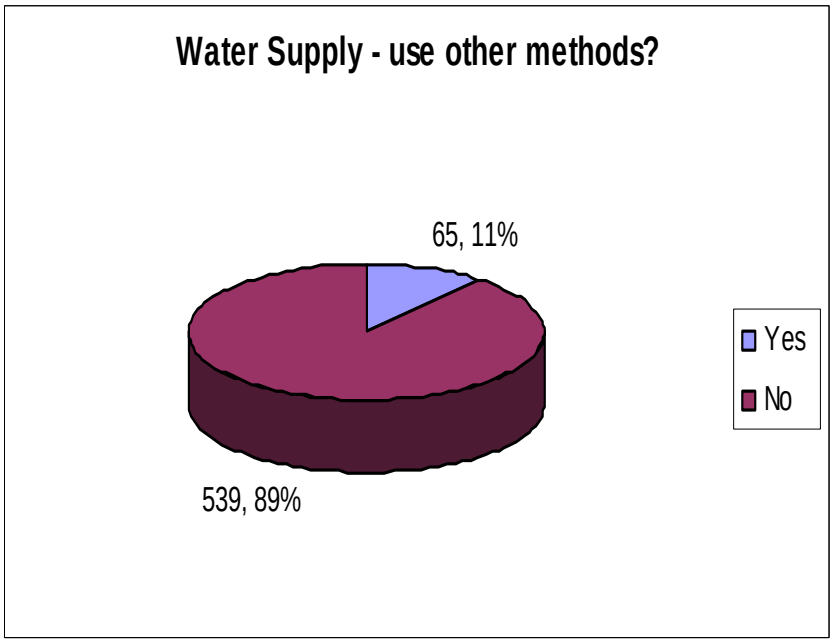


Figure 16 Other Methods of Water Supply besides Piped System or Well (such as drums, cooler boxes, pots, old rainwater tanks, buckets, etc)



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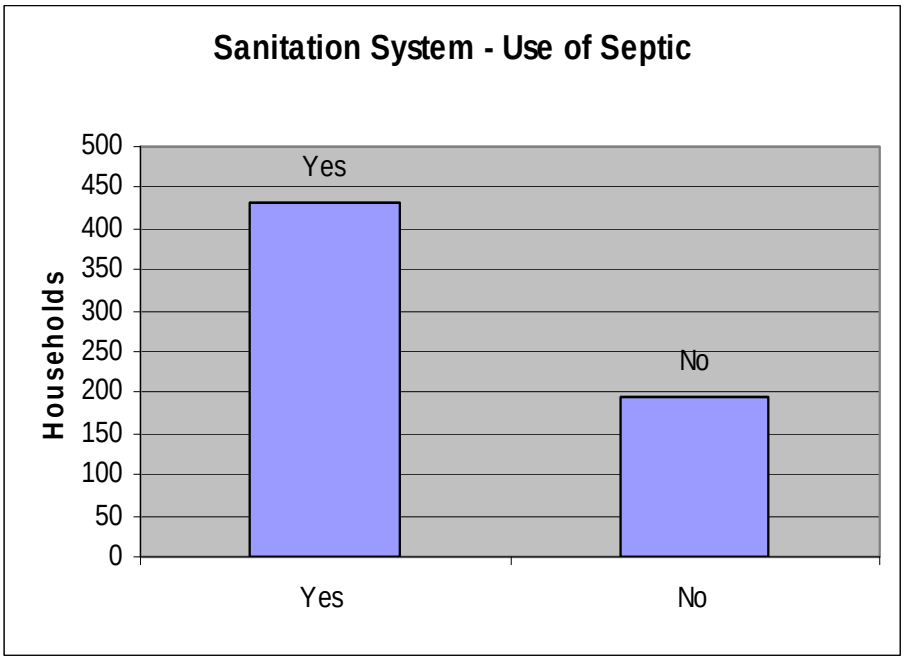

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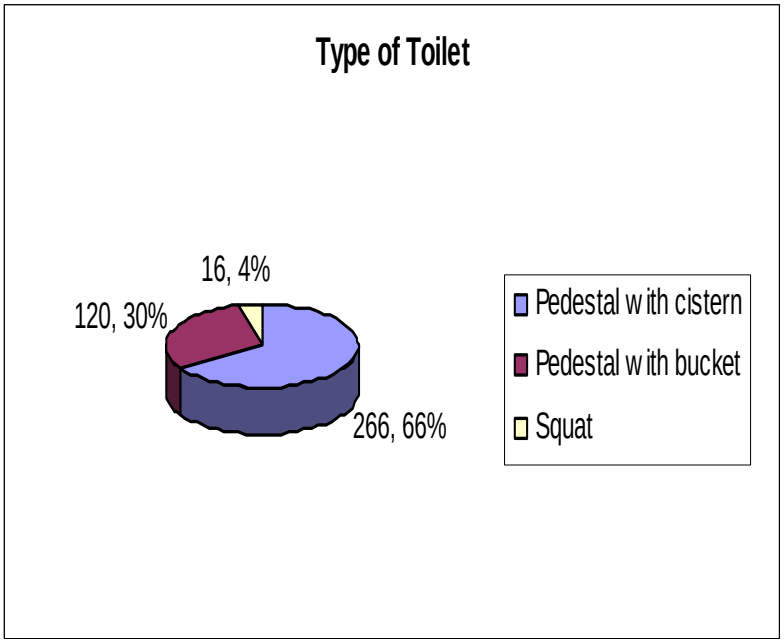

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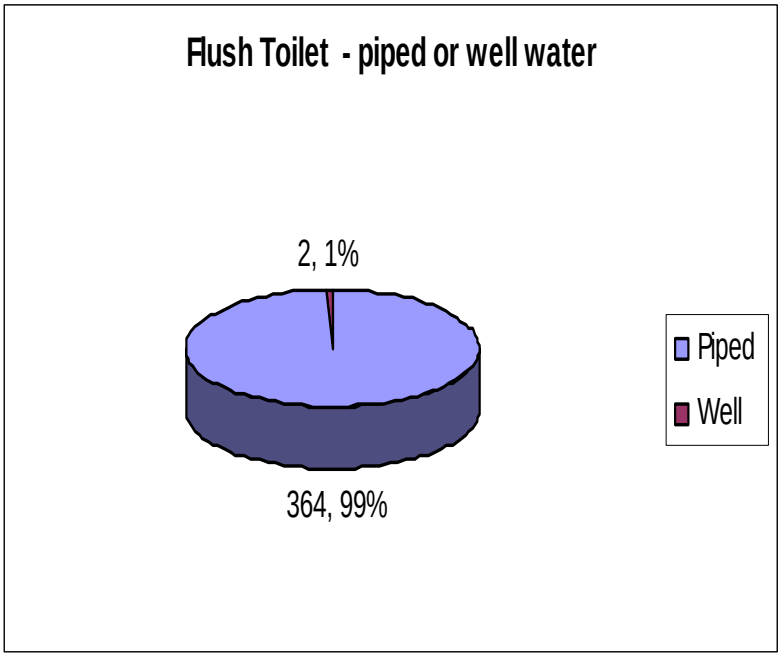


[1] Data underlying the results of this question should be treated with caution as field observation suggests the number of wells being used for a flush toilet was much greater in all villages.).

Figure 20 Leaks in Pipes in Septic System

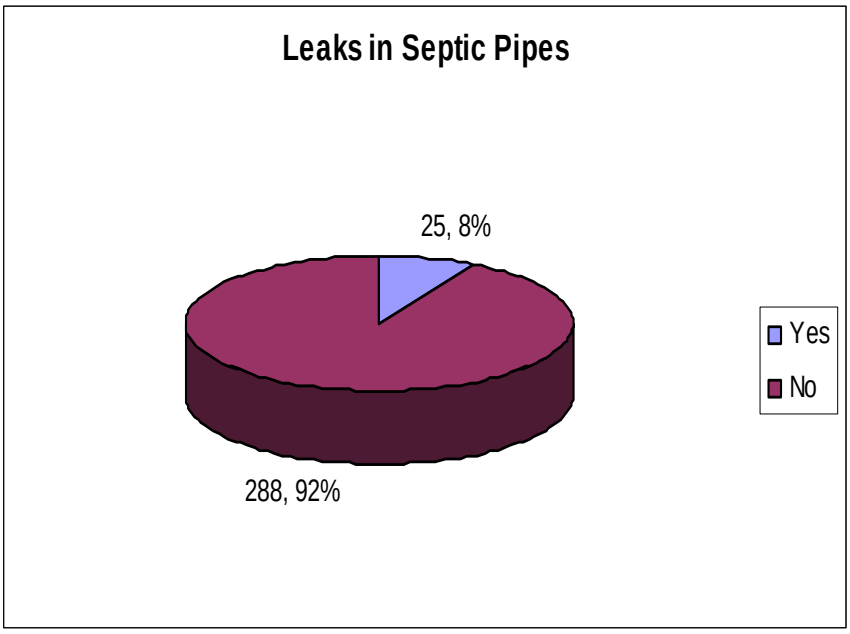


Figure 21 Leaks in Toilet Cistern

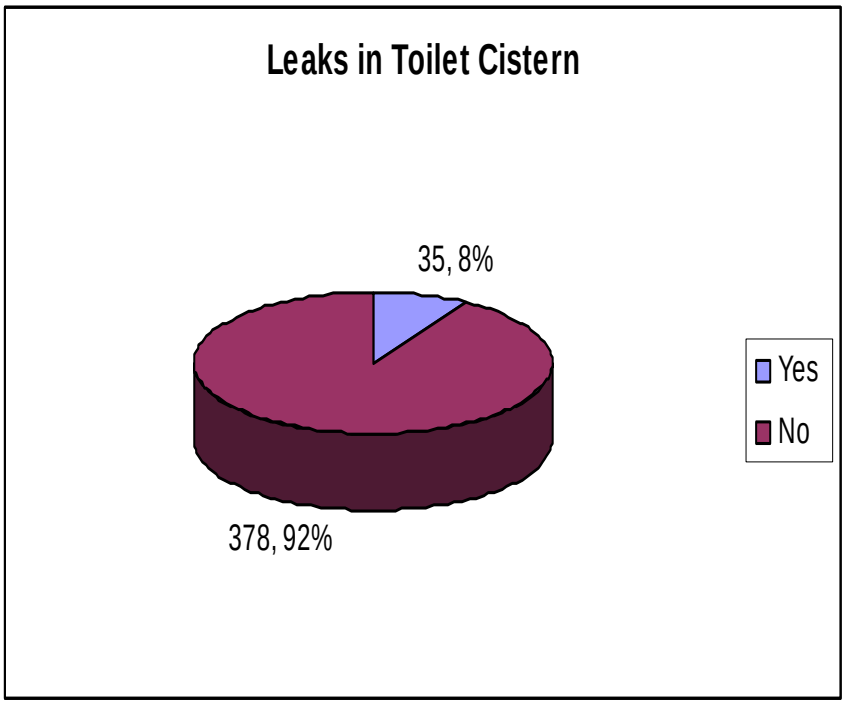


Figure 22 Broken Tap Fittings

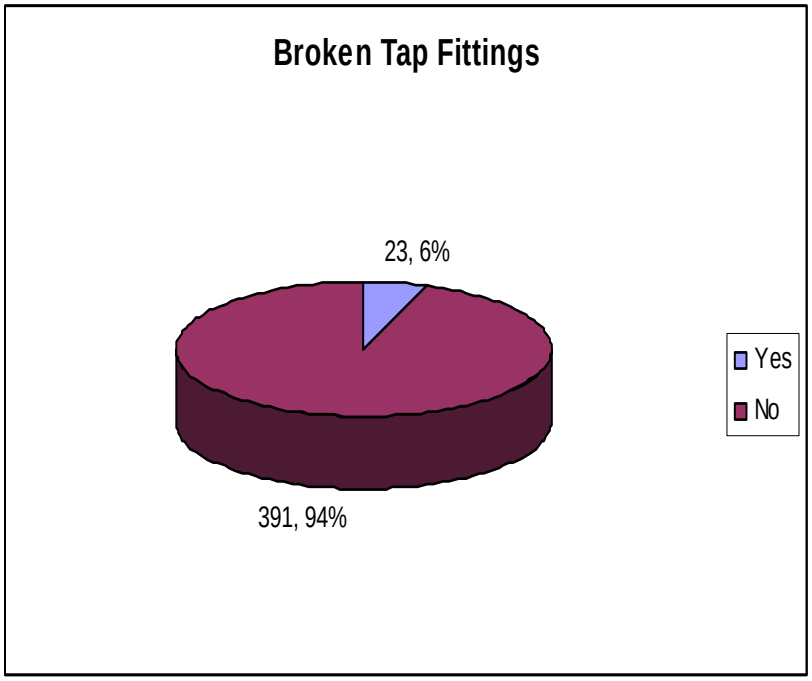
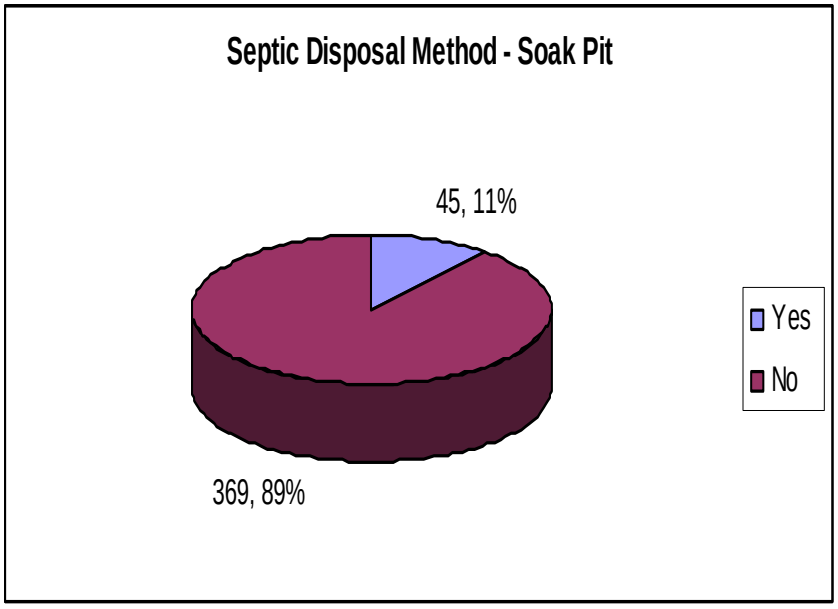


Figure 23 Disposal Method for Septic – Soak Pit



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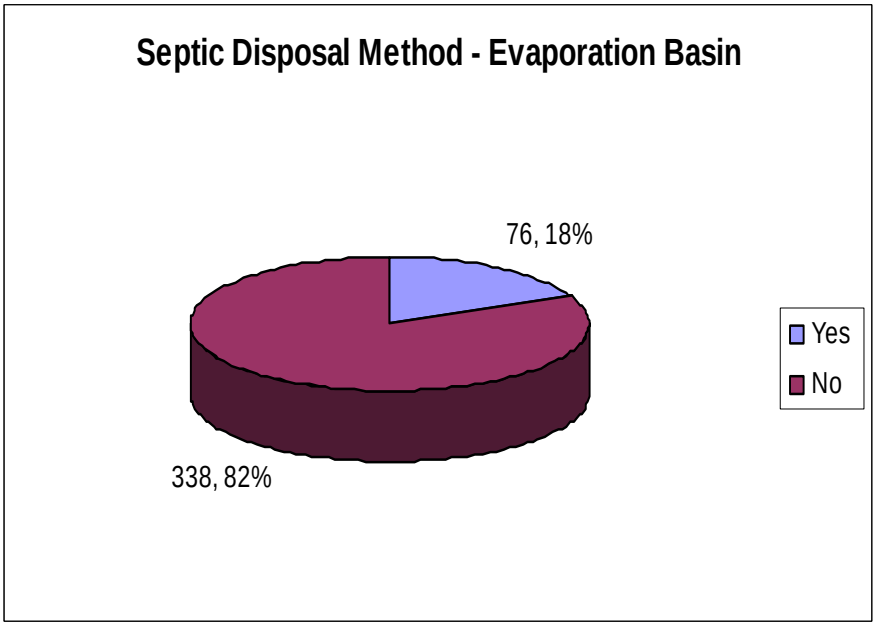
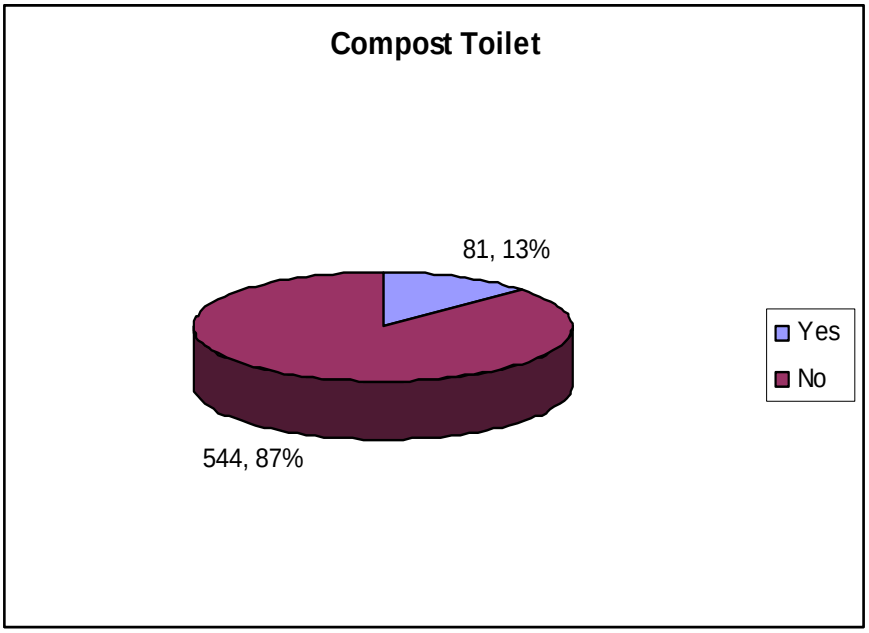


Figure 25 Compost Toilet at Household [2]



[2] Note – this question explored whether households had a compost toilet or not. The above cannot be interpreted as reflecting usage of compost toilets as the number being used as a toilet was unlikely to be higher than 5 at the island level.

Figure 26 Damages and Breakages to Compost Toilet

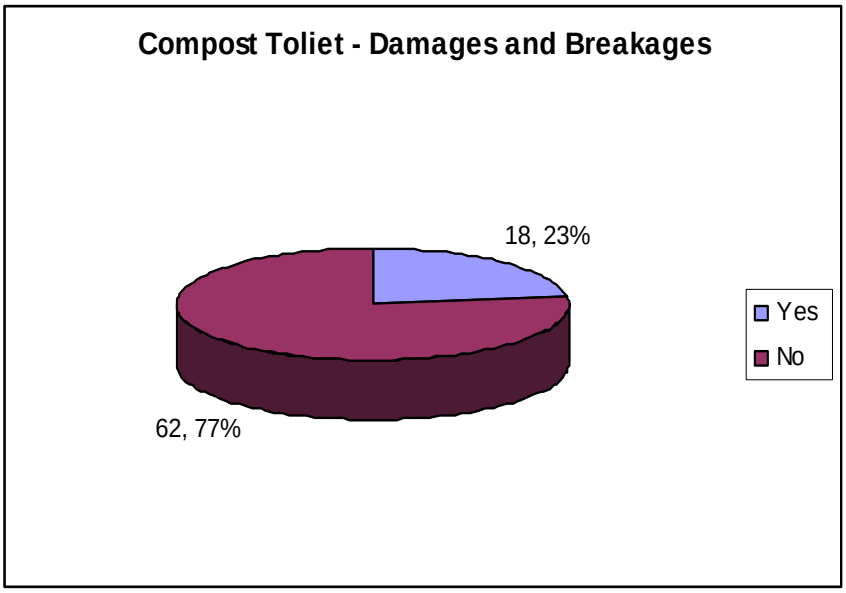


Figure 27 Problems with the Compost Toilet

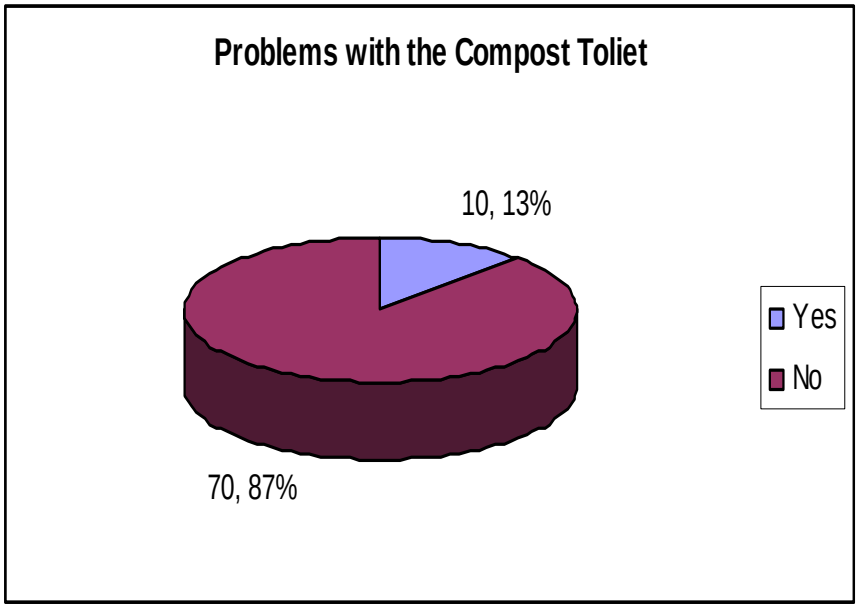


Figure 28 Pit Toilets

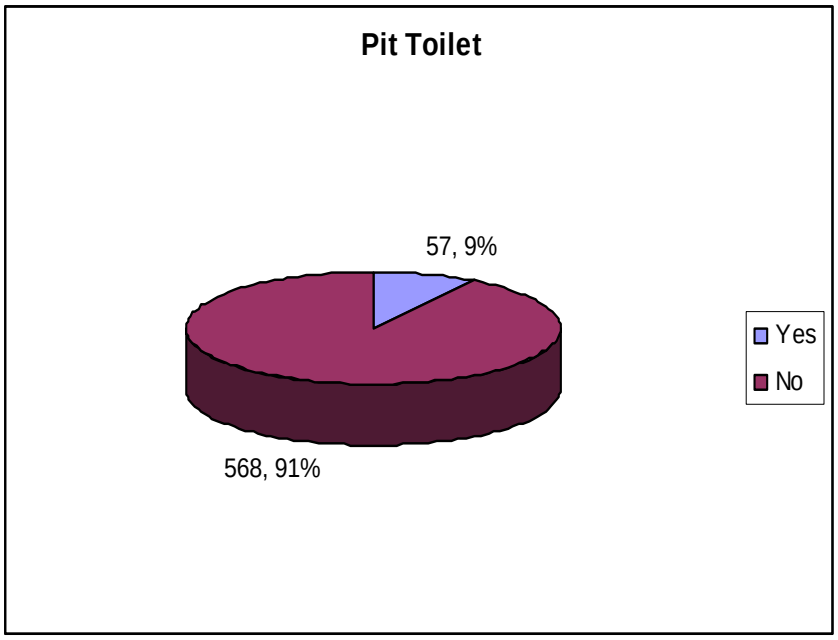


Figure 29 Presence of Vegetables, Garden Beds and Fruit Trees

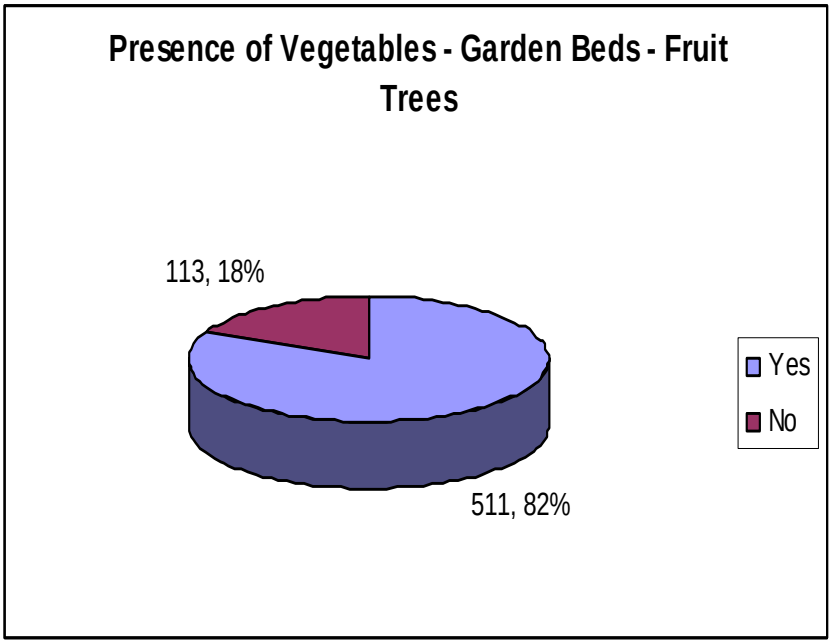
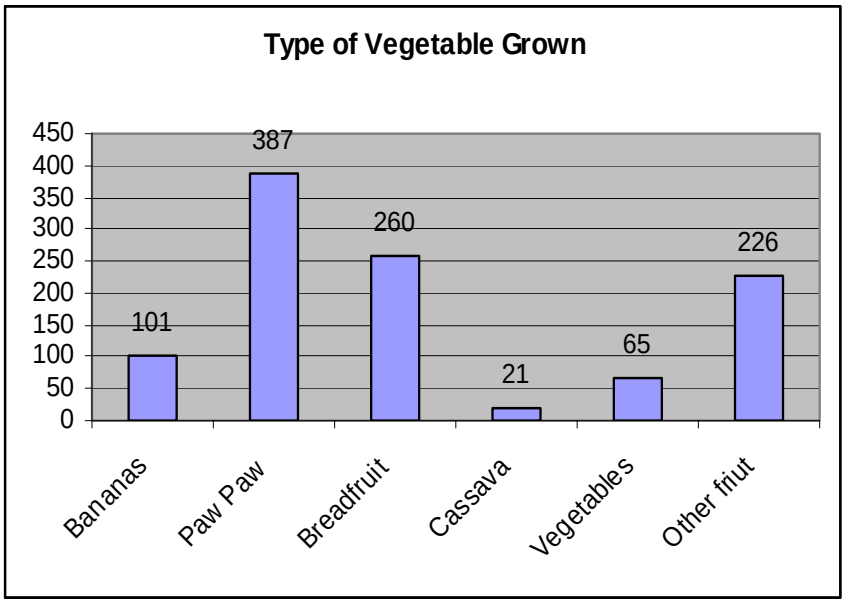


Figure 30 Type of Vegetable Grown



B. Water and Sanitation Hardware Information at the Village Level

Figure 31 Coverage of Piped Water Supply to Households by Village

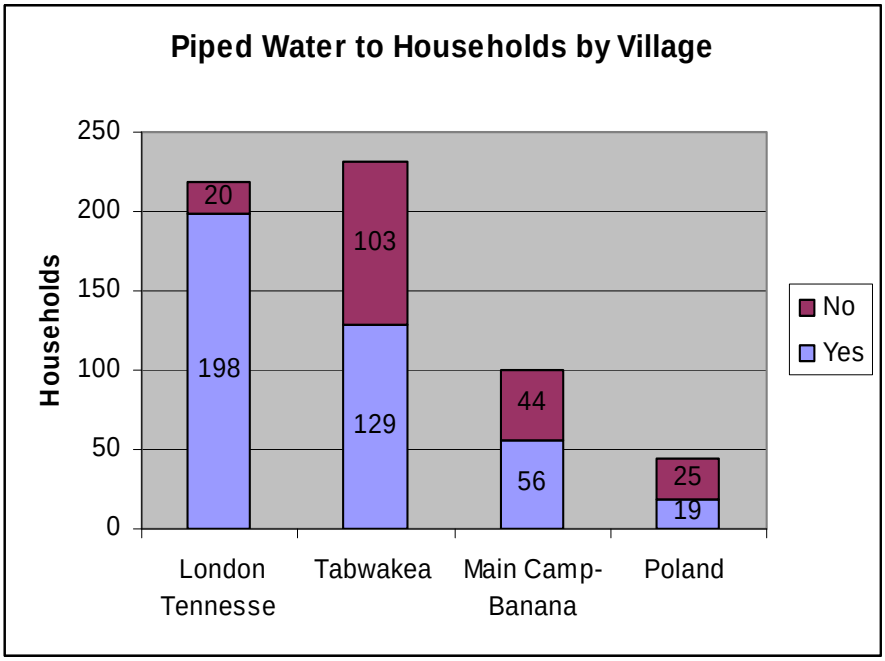


Figure 32 Leaks in Outside Pipes by Village

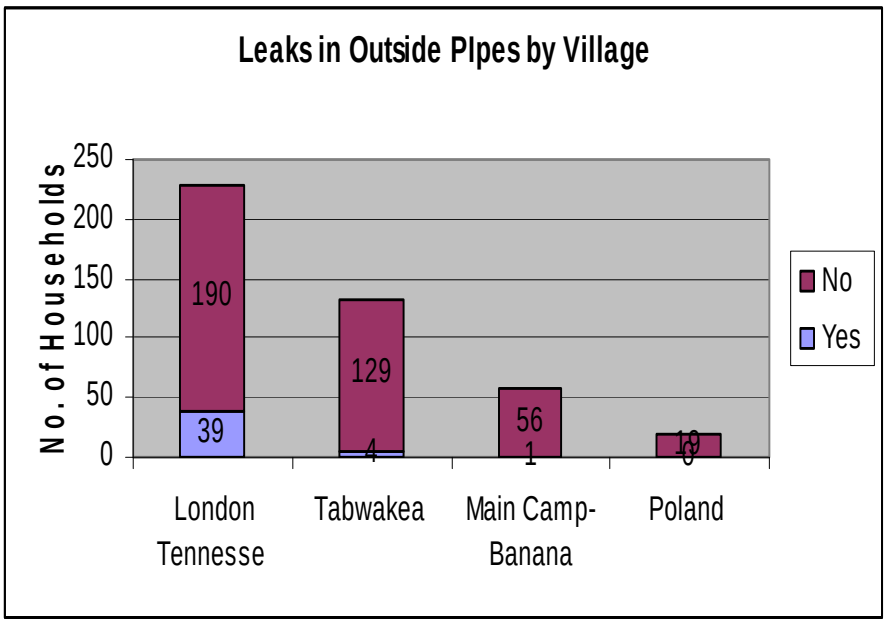


Figure 33 Leaks in Inside Pipes by Village

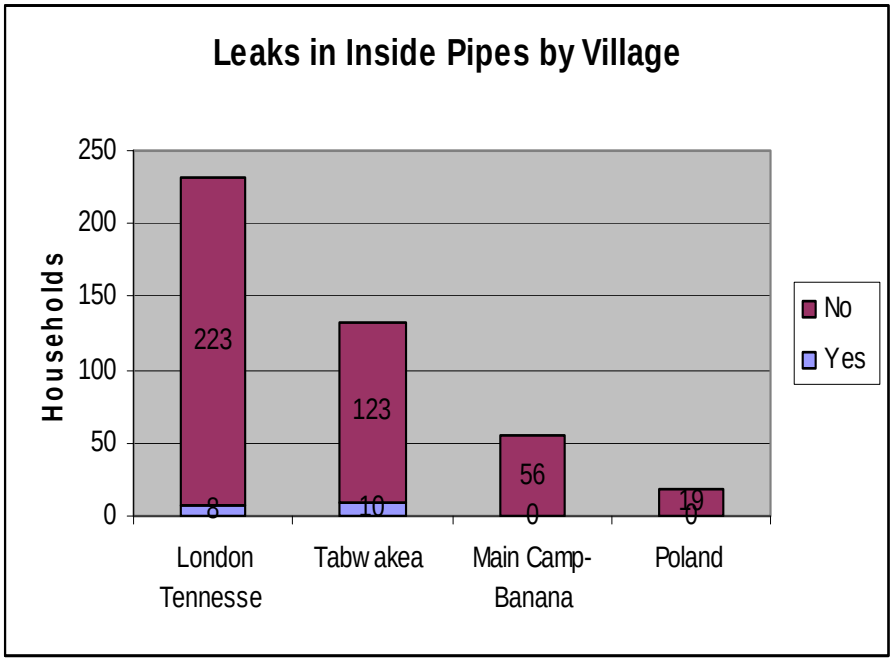


Figure 34 Leaks from Taps and Showers

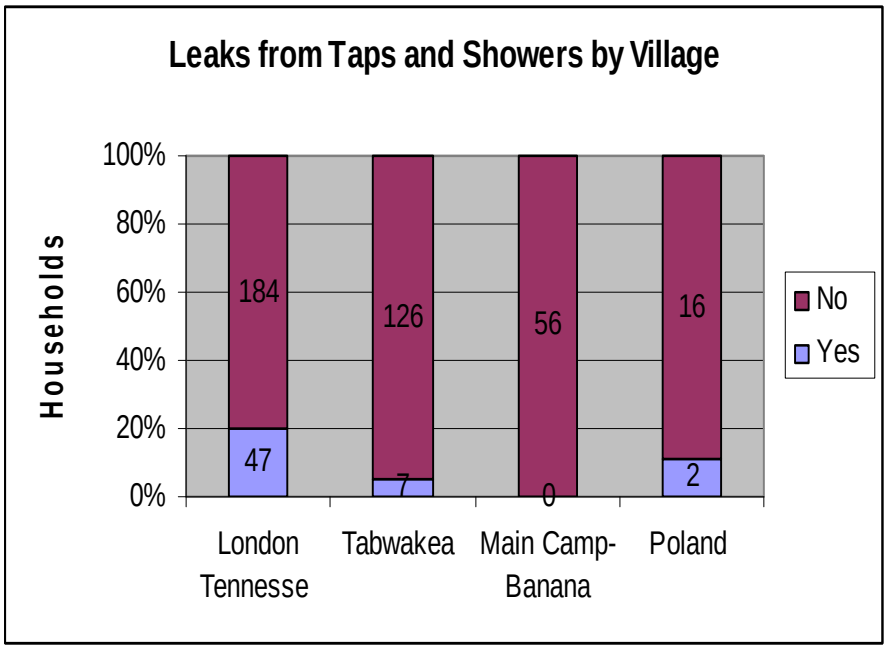


Figure 35 Leaks from Taps and Showers by Village

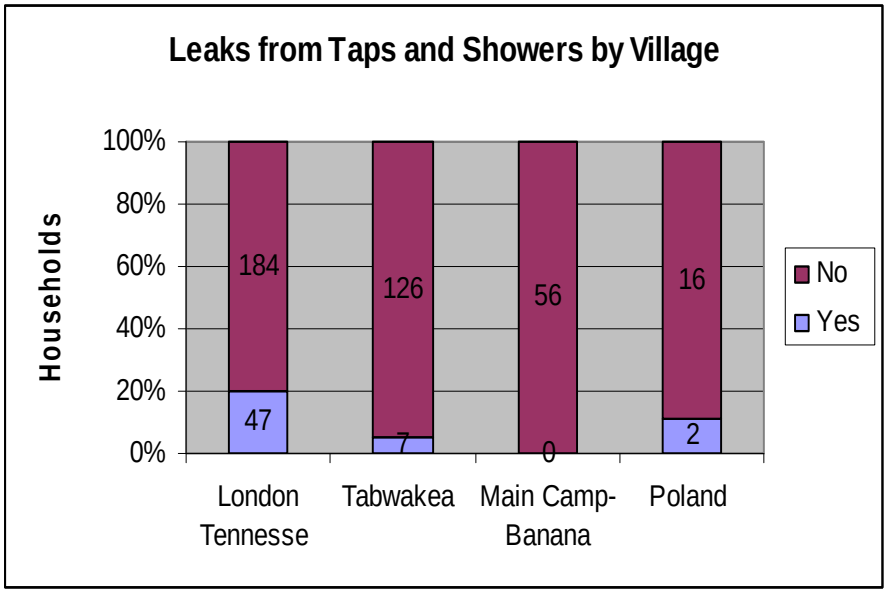


Figure 36 Cracks in KWASP Supply Tank by Village

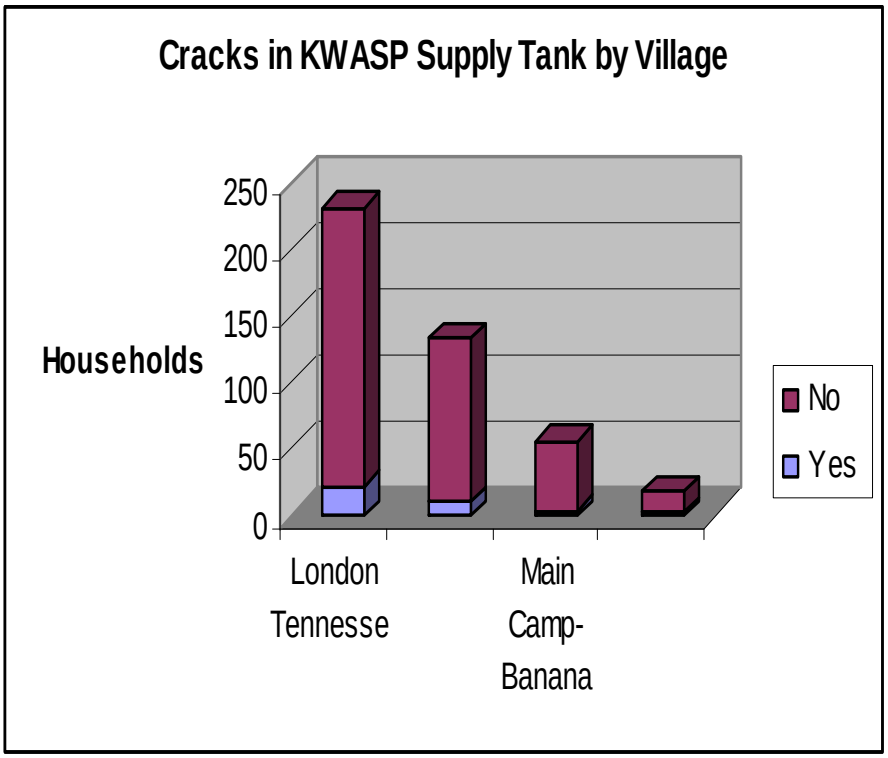


Figure 37 Household with Rainwater Tank

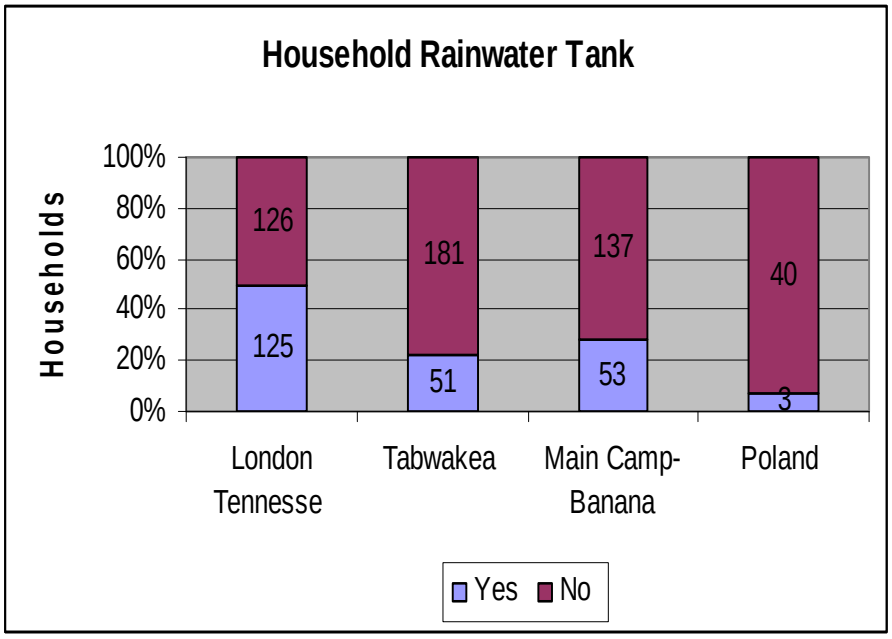


Figure 38 Construction Type of Rain Water Tank

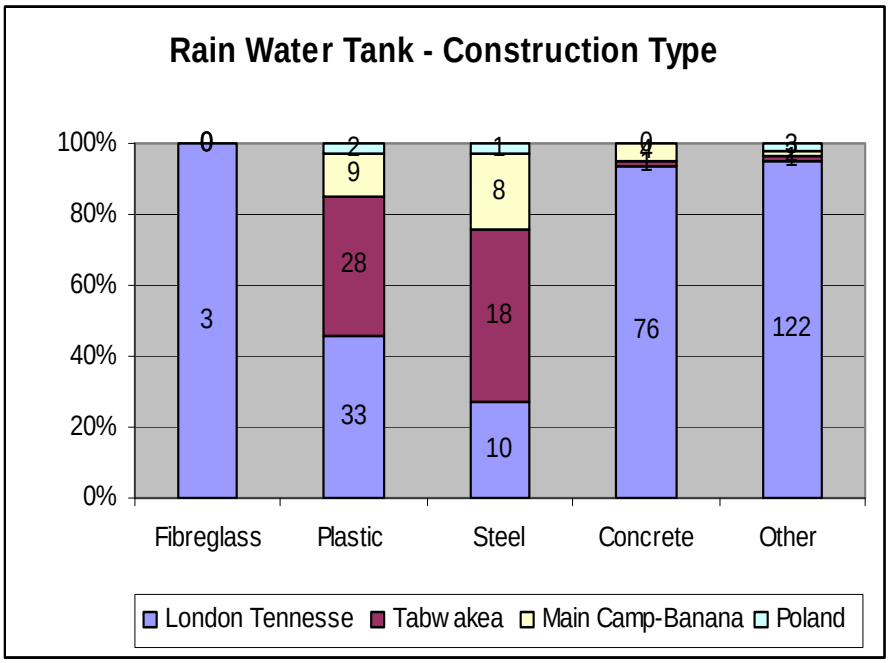


Figure 39 Leaks in Outside Pipes by Village

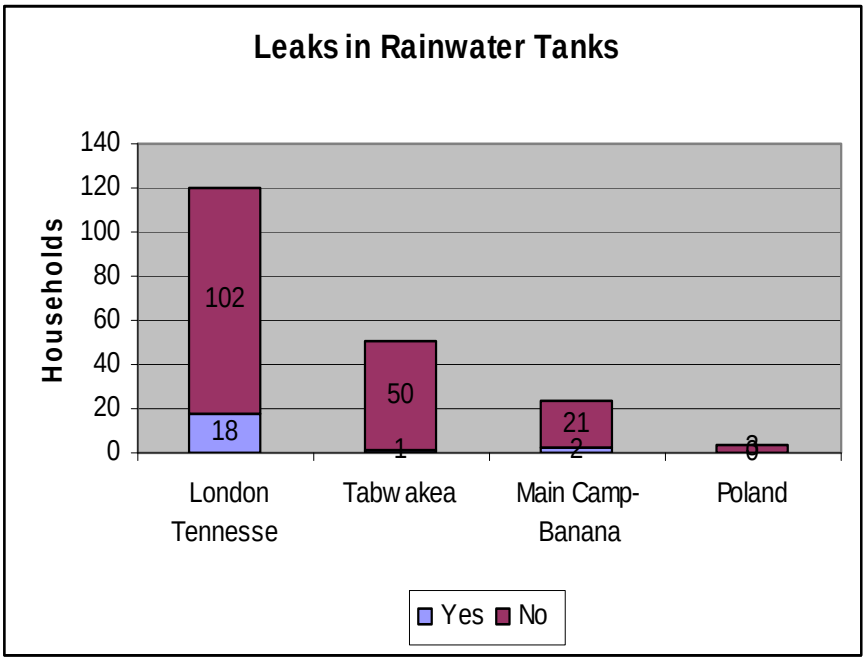


Figure 40 Broken Tap Fittings on Rainwater Tank

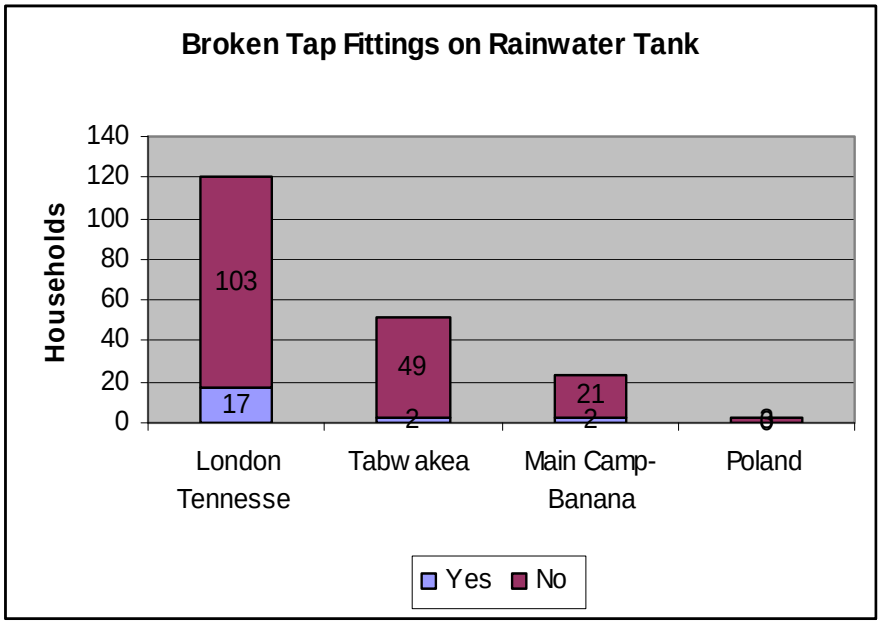


Figure 41 Households with Wells

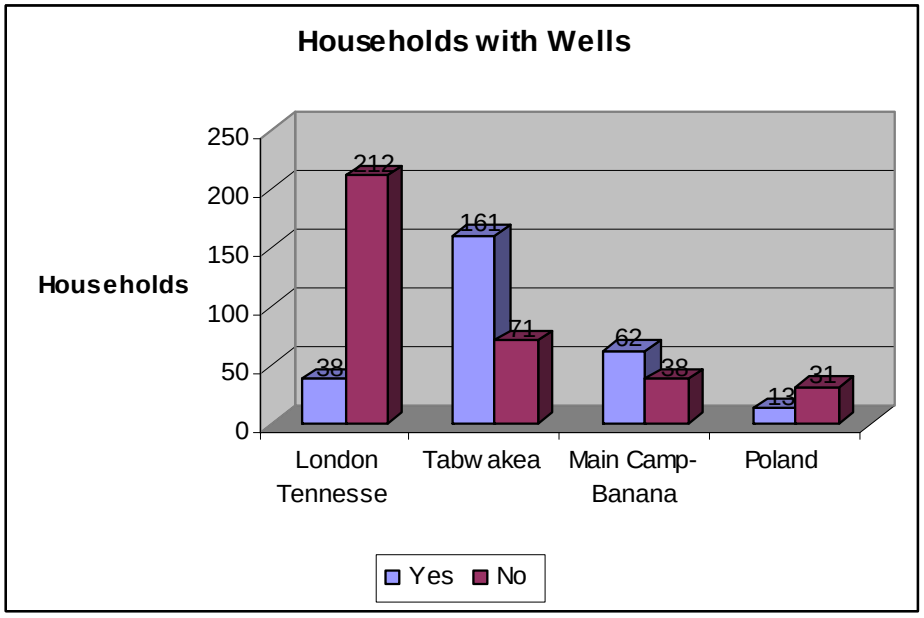


Figure 42 Household Wells - Covered or Uncovered

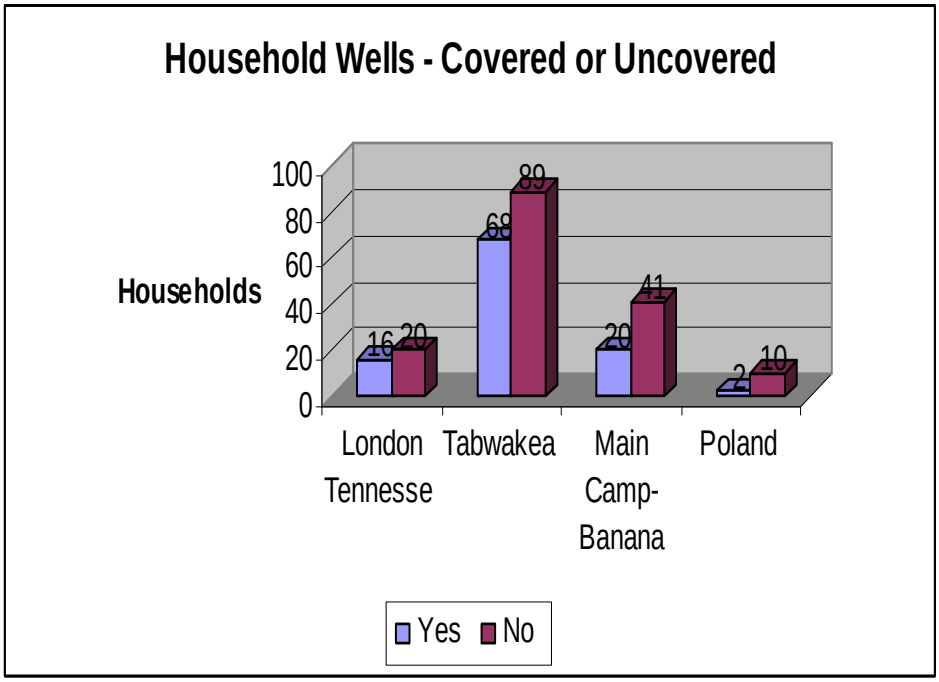


Figure 43 Household Wells – Raised Walls?

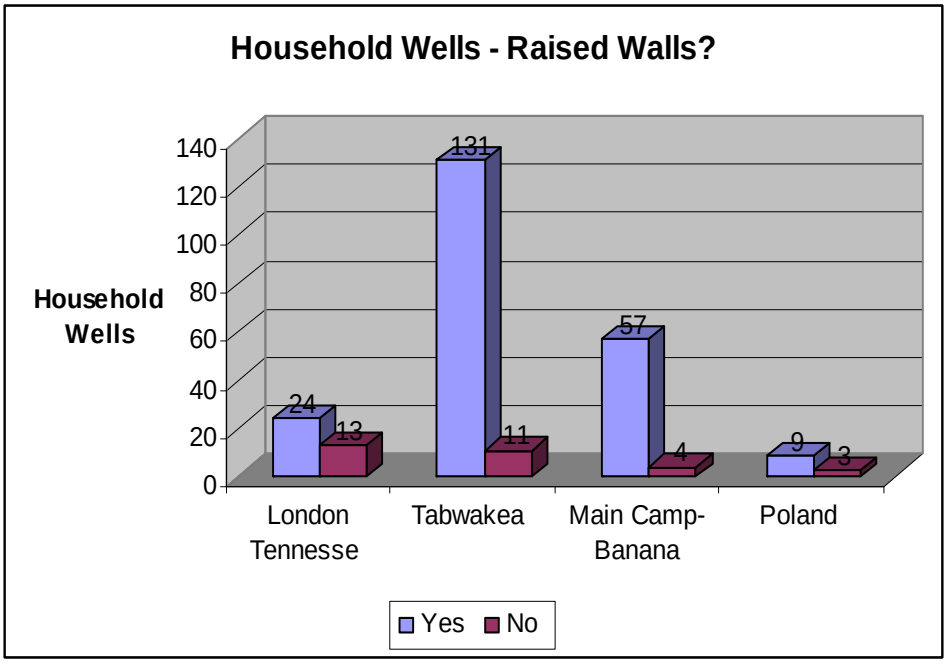


Figure 44 Water Supply - Other Methods (such as drums, buckets etc)

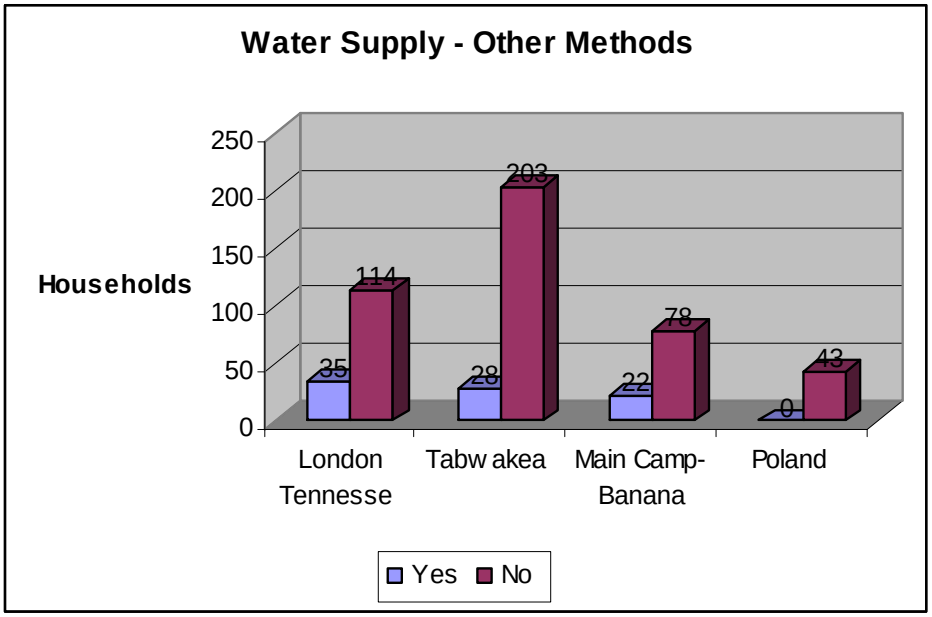


Figure 45 Sanitation System - Use of Septic

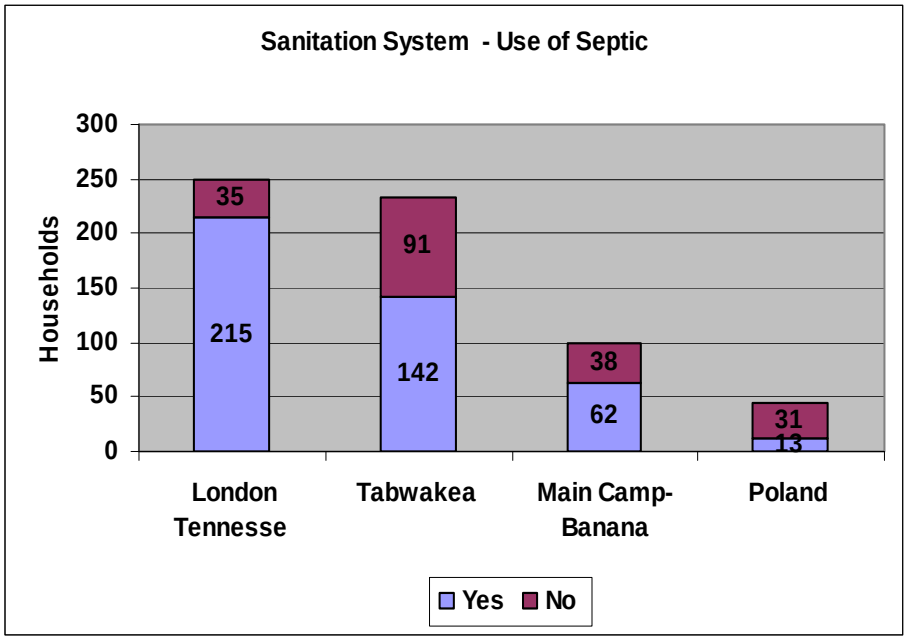


Figure 46 Type of Household Toilet

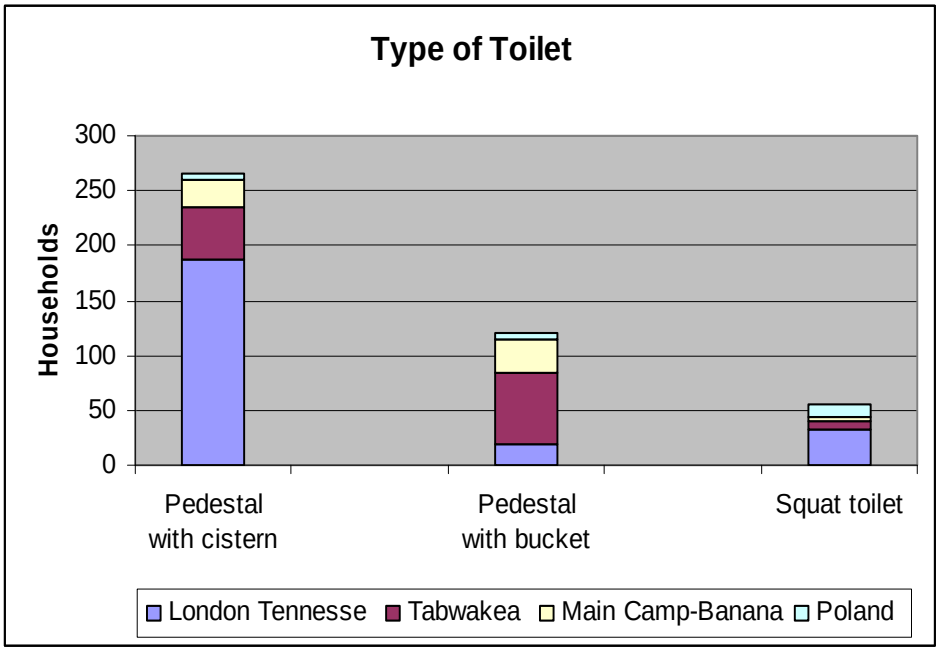


Figure 47 Type of Flush Water

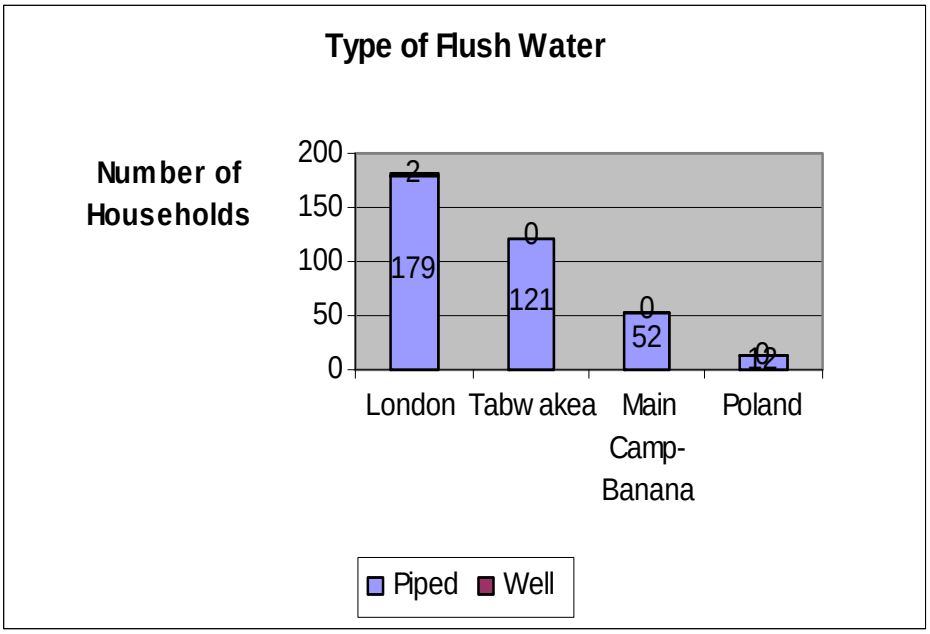


Figure 48 Leaks in Toilet Pipes

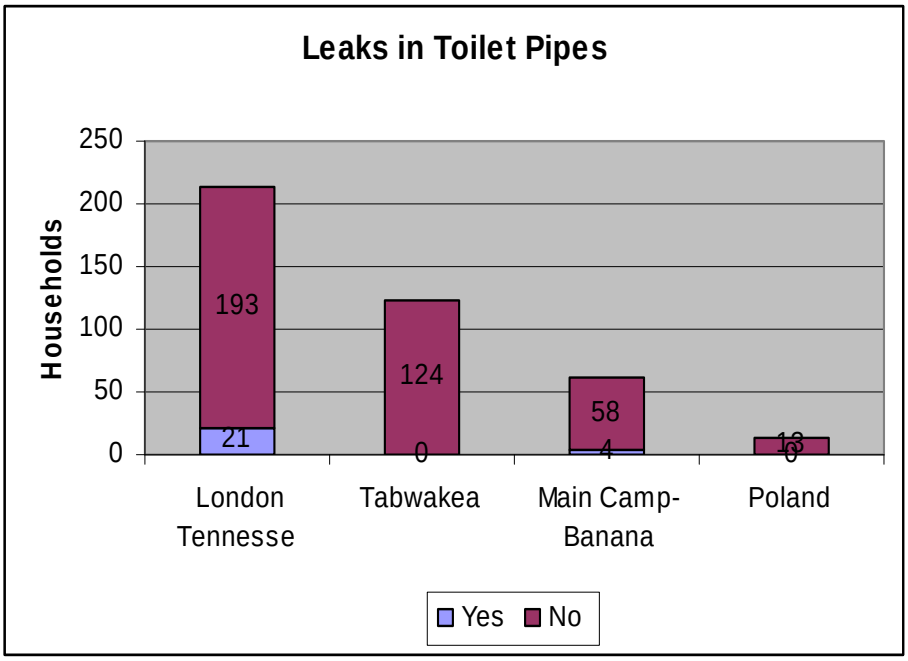


Figure 49 Leaks in Cistern

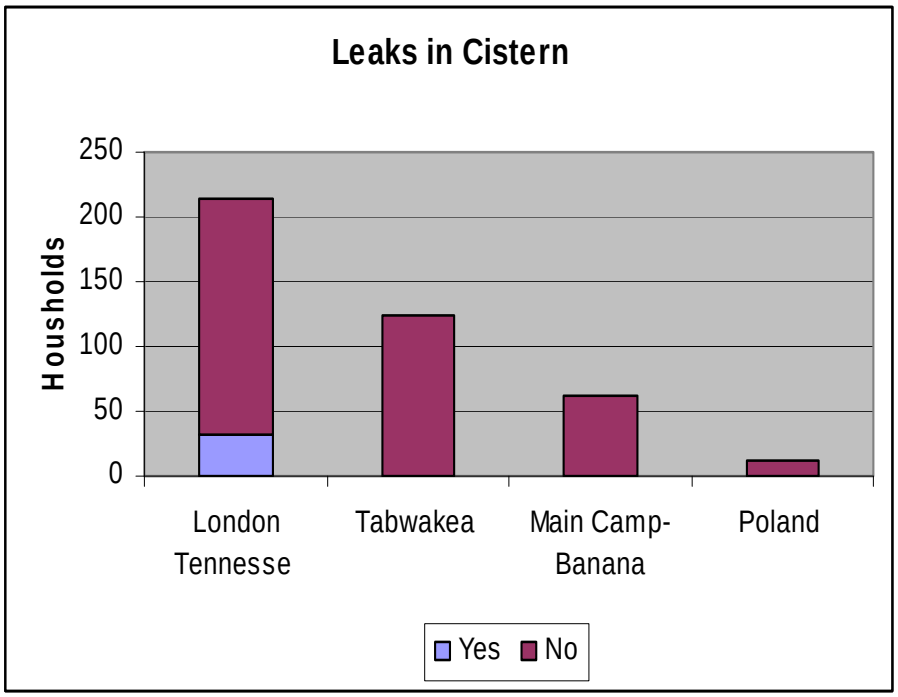


Figure 50 Toilet - Broken Tap Fittings

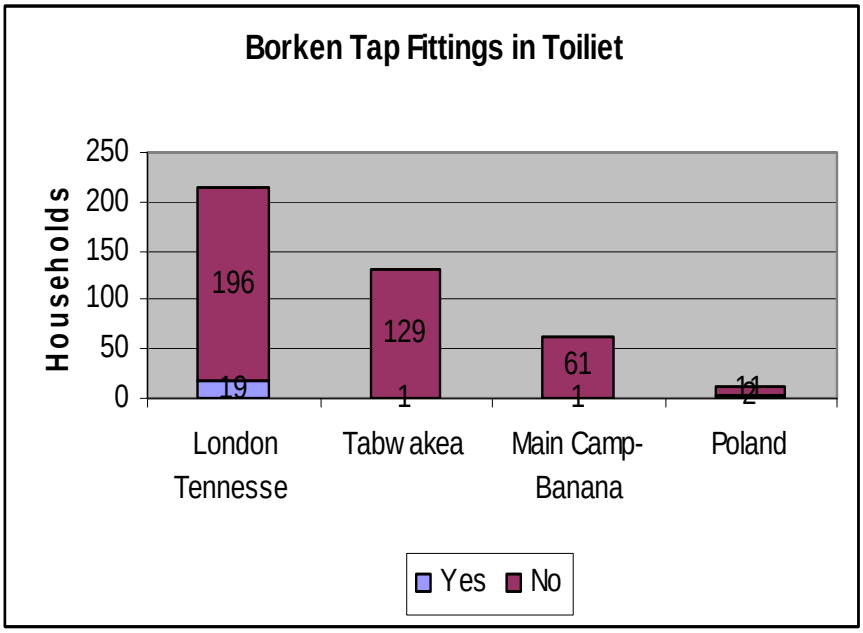


Figure 51 Septic Disposal by Soak Pit

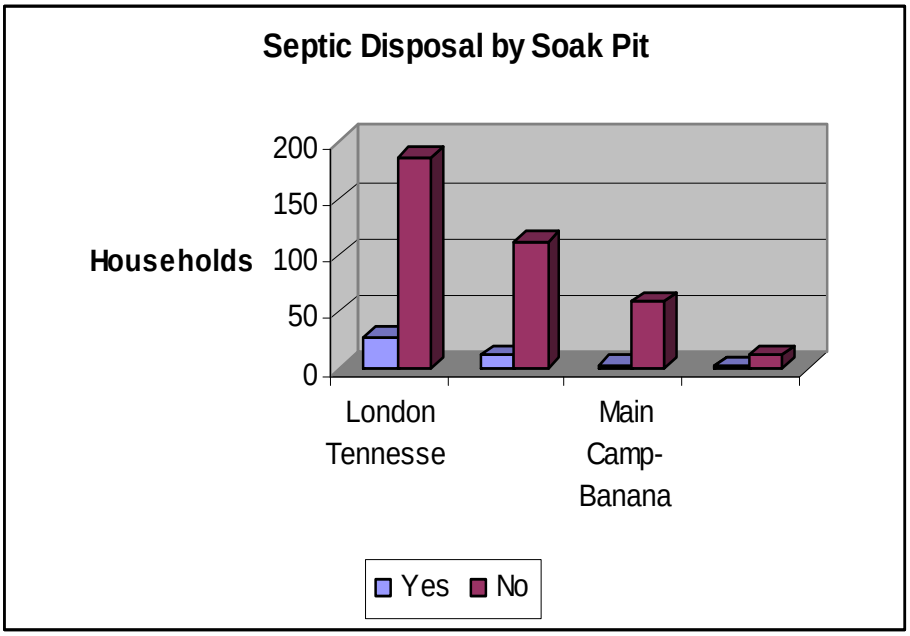


Figure 52 Septic Disposal by Evaporation Basin

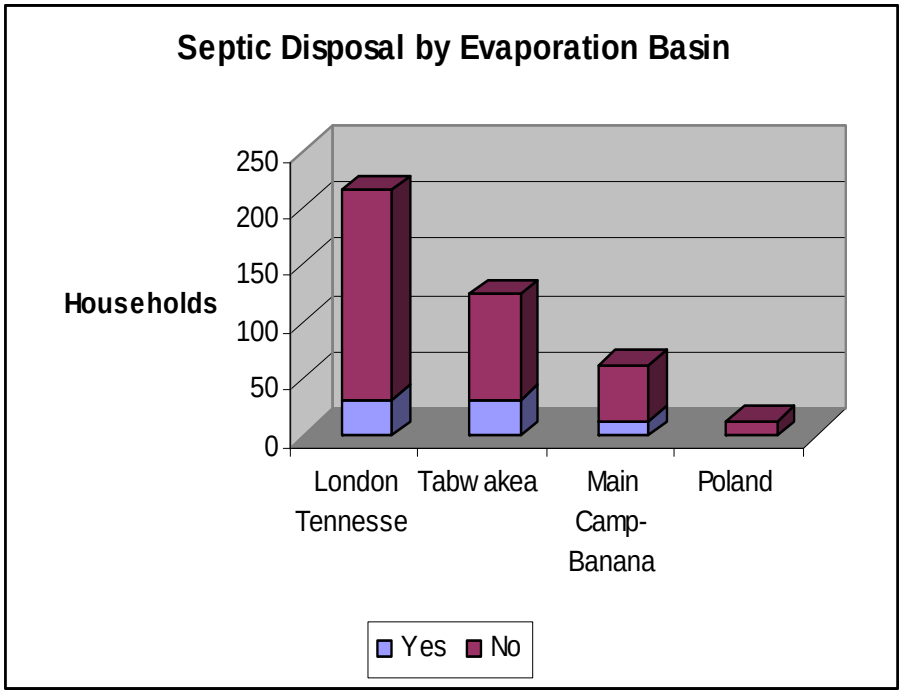


Figure 53 Compost Toilet at House[3]

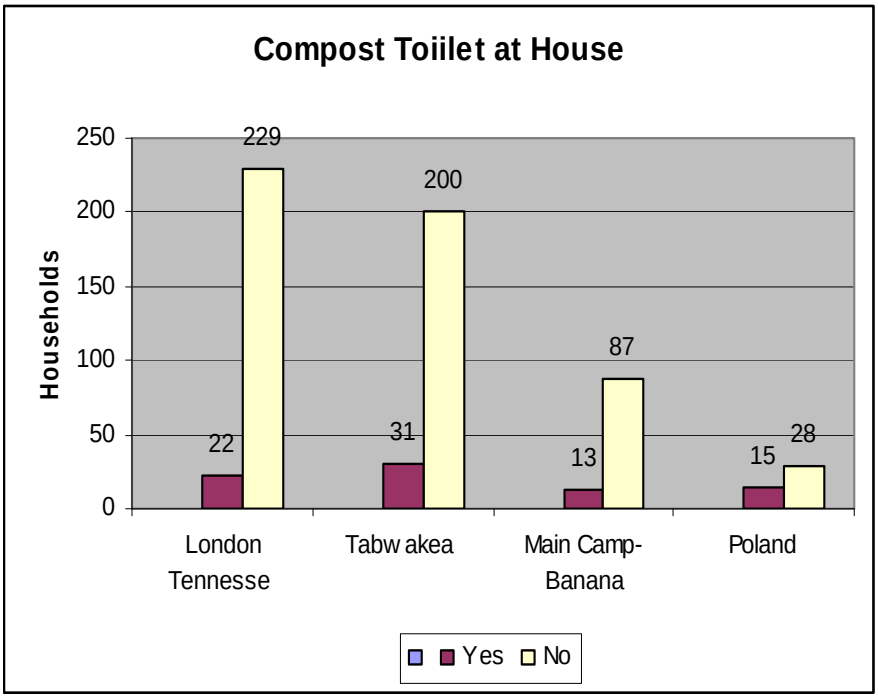
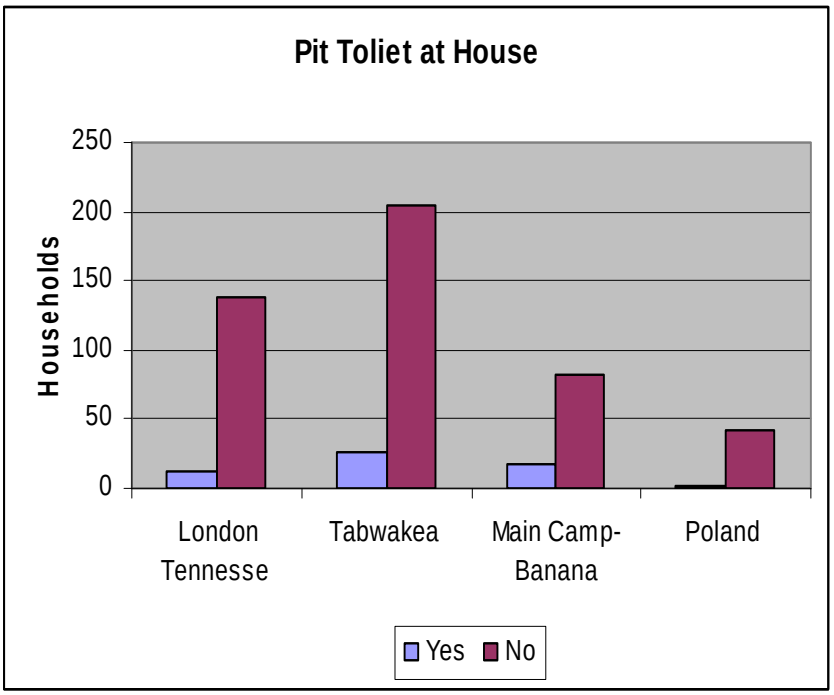
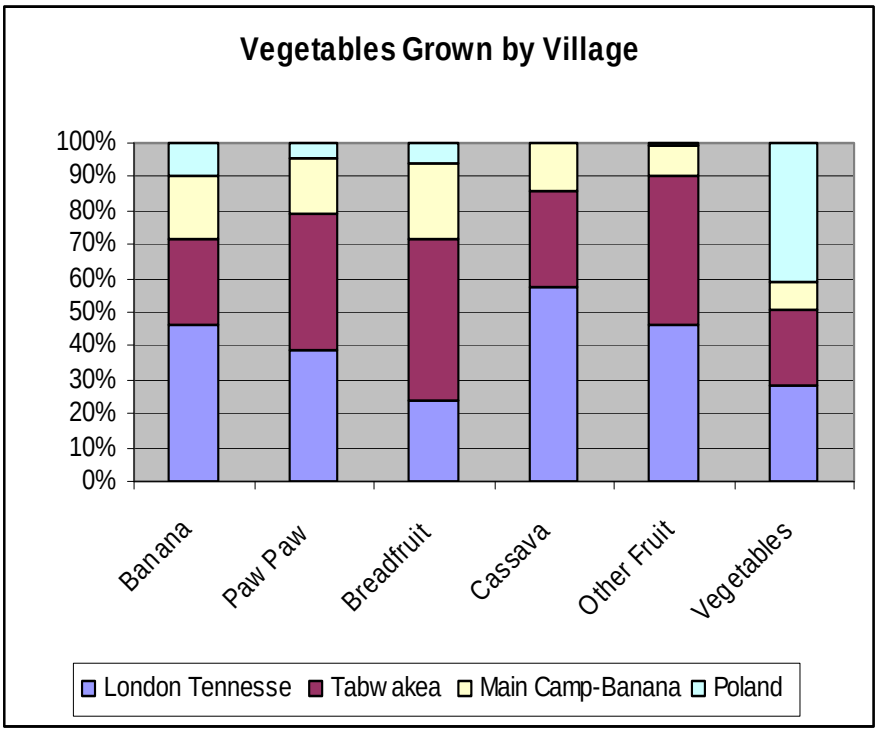


Figure 54 Sanitation System - Pit Toilet



[3] Interpret with care as this does not reflect household usage.

Figure 55 Vegetables Grown by Village



Annex A

English Questionnaire

Village: London ☐ Tabwakea ☐ Banana ☐ Poland ☐

1. Date:
2. Name of Surveyor:
3. Description of Water Supply
   a) Piped water into house ☐ Yes ☐ No
      (i) Condition
      - Any leaks in outside pipes? ☐ Comment: _____
      - Any leaks in inside pipes? ☐ Comment: _____
      - Any leaks from taps/shower? ☐ Comment: _____
      - Any broken taps/fittings? ☐ Comment: _____
      - Any cracks in low-flow tank? ☐ Comment: _____

   b) Rainwater tank ☐ Yes ☐ No
      (i) What is the tank made of? ☐ Fibreglass ☐ Plastic ☐ Steel ☐ Concrete ☐ Other
      (ii) Tank Dimensions
      - What is the tank's height? _____ m
      - If round, what is the tank diameter? _____ m
      - If square/rectangular, what are the tank widths? _____ m **x** _____ m
      (iii) Estimate current water level (as a %) _____ %
      (iv) Condition
      - Any leaks? ☐ Comment: _____
      - Any broken taps/fittings? ☐ Comment: _____

   c) Well ☐ Yes ☐ No

(i) Is the well: ☐ Covered ☐ Open

(ii) Does the well have a raised edge/wall? ☐ Yes ☐ No

(iii) Distance from house? _____ m

(iv) Distance from nearest septic tank or pit toilet? _____ m

d) Other Collection Methods Present (i.e. large drums): ☐ Yes ☐ No

If yes, comment:

_____

4. Description of Sanitation System

a) Septic system ☐ Yes ☐ No

(i) Location:

- Distance from house: _____ m

(ii) Type of toilet

- Pedestal toilet with flush cistern ☐
- Pedestal toilet with bucket flush ☐
- Squat toilet with bucket flush ☐
- Which type of water to flush? ☐ Piped ☐ Well

(iii) Condition of toilet

- Any leaks in pipes? ☐ Comment: _____
- Any leaks in cistern (if fitted)? ☐ Comment: _____
- Any broken taps/fittings? ☐ Comment: _____

(iv) Disposal Method

- Soak pit (with coral rocks) ☐ Condition: _____
- Evaporation basin (with coral rocks) ☐ Condition: _____

b) Compost toilet ☐ Yes ☐ No

(i) Location:

- Distance from house: _____ m

(ii) Condition of toilet

- Any damage/breakages? ☐ Comment: _____

- Any problems? ☐ Comment:
_____

c) Pit Toilet ☐ Yes ☐ No

(i) Location:

- Distance from house: _____ m

(ii) Condition of latrine

- Any damage/breakages? ☐ Comment:
_____

- Any other problems? ☐ Comment:
_____

d) No sanitation system ☐

ANNEX – I-Kiribati Questionnaire

1. Kawa: London ☐ Tabwakea ☐ Banana ☐ Poland ☐
2. Tai:
3. Te tia kaira te kakae:
4. Kab'arab'ran rokon am ran

e) Katikan b'aibu n ran nakon am auti ☐ Eng ☐ Tiaki

(i) Raoiroina

- Iai te raran itinanukin te b'aibu? ☐ Kab'arab'ara: _____
- Iai te raran inanon te baibu? ☐ Kab'arab'ara: _____
- Iai te raran n am taps/shower? ☐ Kab'arab'ara: _____
- Iai uruakin am taps/fittings? ☐ Kab'arab'ara: _____
- Iai te uruaki n am tangke n ran? ☐ Kab'arab'ara: _____

f) Tangke ni karau ☐ Eng ☐ Tiaki

(i) E karaoaki man tera? ☐ Kirati ☐ Rab'a ☐ Biti ☐ Timanti ☐ Tabeua riki

(ii) Ab'akin am tangke

- Ab'ab'akin am tangke? _____ m
- Ngkana e mronron iraua ana diameter? _____ m
- Ngkana e bwaoki, rababara? _____ m **x** _____ m

(iii) Ab'akin kanoana (as a %) _____ %

(iv) Raoiroina

- Iai te raran? ☐ Kab'arab'ara: _____
- Iai te uruaki n taps/fittings? ☐ Kab'arab'ara: _____

g) M'anib'a ☐ Eng ☐ Tiaki

Kawaina.: _____

(i) Te m'anib'a anne : ☐ Rabunaki ☐ Uki

(ii) Iai oona? ☐ Iai ☐ Akea

(iii) Raroana man te auti? _____ m

(iv) Raroana man nen ran ke tabo aika buakaka (septic tank)? _____ m

h) Anga riki tabeua aika a kabonganaki (i.e. large drums): ☐ Iai ☐ Akea

Ngkana,iai,:

_____

5. Kab'arab'aran te kain-nakotari

e) Kabonganan te tabo ibukin nnen ran aika a buakaka ☐ Eng ☐ Tiaki

(i) Nnena:

- Kawaina: _____
- Raroana man te auti: _____ m

(ii) Aekakin te kain-nakotari

- Te kai are iai tangkena ☐
- Te kai are akea tangkena ☐
- Te kai are e nim ma aontano ☐
- Te ran mai ia ae ko kabongana ? ☐ Man baibu n ran ☐ M'aniba

(iii) Nakoraoin am kai-nakotari

- Iai te raran n te b'aibu? ☐ Kab'arab'ara _____
- Iai te raran n tangkena (if fitted)? ☐ Kab'arab'ara _____
- Iai uruaki te taps/fittings? ☐ Kab'arab'ara: _____

(iv) Anga ni Kaikan nnen te ran are e buakaka

- Karanga nakon te marua (Soak pit) ☐ Raoiroina: _____
- Karanga (Evaporation basin) (with coral rocks) ☐ Raoiroina: _____

f) Kamkamka ☐ Eng ☐ Tiaki

(i) Nnena:

- Kawaina: _____
- Raroana man te auti: _____ m

(ii) Nakoraoin am kai-nakotari

- Iai te uruaki? ☐ Kab'arab'ara: _____
- Iai te kanganga? ☐ Kab'arab'ara: _____

g) Maruarua (Pit Toilet) ☐ Eng ☐ Tiaki

(i) Nnena:

- Kawaina: _____

- Raroana man te auti: _____ m

(ii) Raoiroina

- Iai te uruaki? ☐ Kab'arab'ara: _____

- Iai te kangakanga? ☐ Kab'arab'ara: _____

h) Akea n nen te ran are e buakaka (No sanitation system) ☐