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Report 5

Results of a Social Survey of Water [illegible]

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Prepared for:

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Prepared by: [illegible]

GHANA UPPER REGION WATER PROGRAMME EVALUATION PROJECT

REPORT 5

RESULTS OF A SOCIAL SURVEY OF WATER DRAWERS

FEBRUARY, 1986

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GHANA UPPER REGION WATER PROGRAMME EVALUATION PROJECT
The Six Evaluation Reports of the Project are as Follows:

REPORT 1	Technological Evaluation of Urban and Rural Water Supply Systems
REPORT 2	Part I: Political and Economic Context Part II: Project Expenditures and Economic Issues
REPORT 3	Review of Programme Organization and Management
REPORT 4	Evaluation of the Education and Participation Components
REPORT 5	Results of a Social Survey of Water Drawers
Technical Appendix One:	Survey Methodology
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LIST OF ABBREVIATIONS

CE	Community Education
CHC	Canadian High Commission
CIDA	Canadian International Development Agency
CPP	The Convention Peoples' Party
CSM	Cerebrospinal Meningitis
CUSO	Canadian University Students Overseas
FHIG	Family Health in Ghana
GOG	Government of Ghana
GRAAP	Groupe de Recherche et d'Appui pour l'Autopromotion Paysanne (Group for Research and Support to Peasant Self Development)
GWSC	Ghana Water and Sewerage Corporation
ISSER	Institute of Statistical, Social and Economic Research
MFEP	Ministry of Finance and Economic Planning
MOU	Memorandum of Understanding
N	No Pump Sample
NGO	Non-Governmental Organization
NLC	National Liberation Council - First Military Government formed after the overthrow of Nkrumah in 1966
NPP	The Northern Peoples' Party
NRC	National Redemption Council - Second Military Government formed after the overthrow of the Busia government in 1972
ORT	Oral Rehydration Treatment
P	Pump Sample
PCV	Peace Corp Volunteer
PNDC	Provisional National Defense Council - the Military government instituted after the overthrow of Limman's government in 1981
PNP	Peoples' National Party
POP	Plan of Operation
PP	Progress Party
RWSU	Rural Water Supply Unit
SMC	Supreme Military Council - new name of the NRC after a reshuffle
SPSS	Statistical Package for the Social Sciences
URs	Upper Regions
URADEP	Upper Region Agricultural Development Project
URPE	Upper Region Programme Evaluation
URWSP	Upper Region Water Supply Programme
V	VEW and Pump Sample
VEW	Village Education Worker
VHWs	Village Health Workers
W	Wet Season Survey
WHO	World Health Organization
WSA	Water Storage Area
WUCs	Water Users Committees
WUP	Water Utilization Project

EXECUTIVE SUMMARY

SURVEY OBJECTIVES AND DESIGN

The social survey of women drawers of water was designed to investigate the impact of two inputs - the hand-pumps provided by the Upper Region Water Supply Programme (URWSP) and water utilization eduation organised through the Water Utilization Project (WUP). A variety of water related behaviours were investigated in two seasons - during the wet season when there is a significant number of alternative sources of water and during the dry season - seven months when no rain falls. The design of the social research is summarised below:

Major Variables of the Social Research

Independent Variables	Intervening Variables	Dependent Variables
-access to hand-pumps -access to utilization education -dry and wet season	-distance to water sources -size of household	-water usage -water volume collected -source choice -reasons for source choice -collection cycle -frequency and method of cleaning collecting containers -bathing -washing clothes -economic activities -contamination of drinking water -observed compound conditions -incidence of diarrhoea among young children -prevalence of guinea worm

Three independent samples of women drawers of water were selected in 31 different areas of Bolgatanga District of Upper East Region and interviewed about their water-related behaviours in both seasons between July 1984 and March 1985.

Sample	Code	No. of Areas	No. of respondents	
			Wet	Dry
No access to pump	N	10	117	113
Access to pump	P	11	130	121
Access to pump and education	V	10	117	111
TOTAL		31	364	345

Some 34 people were directly involved in the different components of the survey and associated research - 16 of them from Ghana-for a total of about 20 person - years.

MAJOR FINDINGS OF THE SOCIAL SURVEY

Major Conclusions

1) Hand-pumps provide a closer source of water, particularly in the dry season, and reduce the energy utilised in transporting water to the compound. On average, those with access to a hand-pump walk about 700m less per collection than those without access to a pump in the dry season.

2) Of those with access to pumps, almost two-thirds (63%) use them in the wet season and almost three-quarters (72%) in the dry season.

3) On average a pump is used by 215 drawers per day in the dry season and 142 drawers per day in the wet season.

4) There is approximately one pump per 400 rurual residents (about 36 compounds) of whom about 60% reside within 800 metres.

5) Hand-pumps have not increased water consumption.

6) Hand-pumps have probably reduced the prevalence of guinea-worm.

7) Hand-pumps have possibly reduced the incidence of diarrhoea in young children.

8) The water at 40 to 50% of hand-pumps was found to be slightly contaminated.

9) The water quality of almost all non-pump sources used for drinking water (principally dug-outs) was found to be as good as, or better than, hand-pumps.

10) The drinking water at 30% (dry) and 38% (wet) of compounds with access to pumps was contaminated.

11) Average total daily discharge for a Moyno is about 6,000 l/day (1,300 gals/day) with peak discharge of up to 16,000 l/day (3,500 gals/day).

The Impact of Pumps

It is estimated that the 2,650 hand-pumps installed under the URWSP provided one pump per 400 rural residents of whom about 60% reside within 800 metres.

The major impact of the pump has been to provide a closer source of water. As the volume of water collected has increased only slightly with the pumps the major inferred impacts have been a decrease in energy expended by women in water collection and a reduction in body stress resulting from water transportation. Where pumps are relatively uncrowded and waiting time at the pump is low, time spent on water collection has also decreased.

Pumps are more heavily used in the dry season when overcrowding is seen by collectors as more significant, particularly in the peak drawing periods during the morning and late afternoon.

Every respondent who drew water from a hand-pump reported using it for drinking and cooking and almost all for bathing and washing clothes. Only a minority used hand-pump water for their animals in the wet season although most used it in the dry season for this purpose.

Although males in all areas prefer to bathe in their compound with water brought to the water storage area, more of those in areas with access to a pump appear to collect their own bathing water than males without access to a pump.

Young children whose families have access to hand-pumps were reported to have a lower rate of diarrhoea. This finding was also confirmed by comparing rates of presentation of diarrhoea at clinics whose catchment areas include many pumps with one clinic located in an area with no pumps.

Respondents from samples with access to pumps reported significantly lower rates of guinea-worm within the last year than those without access to hand-pumps. However they also reported lower historical rates which suggests the lower prevalence may pre-date the pump installation.

Pump water was tested for faecal coliform contamination in both seasons. Half (7/14) were found to be slightly contaminated in the wet season and 41% (9/22) in the dry.

The Impact of Education

The major medium of water utilization education was through volunteer Village Education Workers (VEWs). Each was expected to utilise a standard set of visuals to give three talks at each of 10 pumps each year. During 1984 about a quarter of all pumps should have been covered. The Water Utilization Education aimed to improve practices involved in the collection, transport, storage and distribution of water, and other aspects of domestic hygiene.

For the VEW and pump sample, 10% (wet) and 13% (dry) of respondents reported that they or someone else from their yard had attended a VEW presentation. There are also other sources of health related non-formal education in the area, particularly through clinics. Reported total exposure to education through all means by all samples varied between 5% and 28%.

Total Exposure to Health Education from All Sources

	No Pump	Pump	VEW and Pump
Wet	23%	10%	22%
Dry	15%	5%	28%

Statistically significant differences between the VEW and Pump and Pump samples were found with respect to the higher rate of pump usage by the VEW and Pump samples and by that sample's reference to selecting a source because of its "good or clean" water.

Given the relatively low exposure to any form of eduation by the VEW and Pump sample, it is not clear that these differences have been caused by the education and it is speculated that they pre-date the education or arise from other factors.

The evaluation investigated fifteen indicators of water handling on domestic hygiene through interview or observation. Among the eight indicators below, most of which were measured in both seasons, there is only one statistically significant result.

<u>Selected Indicators of domestic Hygiene</u>

	Season	Sample		
		N	P	V
Collecting containers reported cleaned every trip/once per day or more	(D)	59.0	62.8	57.8
Observed dipper/ladle/cup for distribution	(W)	23.5	23.8	28.2
	(D)	19.6*	31.7	27.0
Observed drinking pots covered	(W)	88.5	89.8	88.9
	(D)	93.7	94.2	92.8
Other Domestic hygiene taught by WUP				
Observed bath-houses in compounds	(W)	49.6	54.8	62.1
	(D)	54.5	50.8	60.4
Observed bathouses with soakaway pit	(D)	1.9	8.2	7.7
Observed latrine in compound	(W)	0.9	2.4	0
	(D)	4.5	3.5	0
Observed or reported line or stick for drying clothes	(W)	44.7	44.9	47.4
	(D)	54.0	61.7	55.5
Observed drying area located off the ground for utensils	(D)	5.4	3.3	6.3

* N-P difference is significant at 5%

PROFILES OF THE DIFFERENT SAMPLES

Common Characteristics Among all Samples

Respondents across all three samples shared certain general characteristics. They were:

- mostly aged between 25-39
- had never attended school
- practiced the traditional religion

A typical respondent lived in a compound with two yards, usually an indication that her husband had a second wife, and between eight and ten people. In her yard there were between five and six people.

For all samples, source choice is based mainly on proximity especially in the wet season, when 90% (all samples combined) gave distance as a factor in selecion of water source (dry season - 72%). Hand-pumps are the preferred source of water when within a reasonable distance. Where pumps are not accessible then water is drawn from dug-outs in river beds or by dams. These vary in depth from a few inches to several feet and are filled by seepage. Such filtration appears to provide water of a comparable bacteriological quality as the pumps.

Although alternative sources may be nearer in the wet season, reported collection is lower, measured in both trips per capita and volume collected per capita.

	Actual trips per person	Usual litres collected per person
Wet	0.7	22
Dry	0.9	25

Across all samples, more water is collected on average in the dry season and more is estimated to be consumed on drinking and cooking in the dry season with more water consumed on bathing in the wet season.

Per Capita collection and consumption by sample and season (litres/person/day)

Sample Season	No Pump		Pump		VEW and Pump	
	W	D	W	D	W	D
Total collection	22.5	24.2	21.6	26.2	22.0	25.1
Consumption						
- drinking and cooking	12.1	14.2	13.2	15.1	13.0	14.0
- bathing	17.3	13.9	17.8	15.0	16.5	14.5
Consumption less collection	6.9	3.9	9.4	3.9	7.5	3.0

The difference between consumption and collection arises from the fact that water consumed on bathing includes water from all sources (and not just water from the water storage area) and probably from overestimates of bathing consumption.

Higher bathing in the wet season reflects the greater availability of water and the need to bathe after agricultural labour. The slightly higher consumption on drinking and cooking in the dry season may arise from the lower humidity.

The No Pump Sample

This sample was designed to include only those 1.3 kms or further from a hand-pump. Although some of the compounds in six of the ten survey areas were closer than this, only a minority ever utilized hand-pumps.

Current Source in Different Seasons			
	Wet		Dry
	%		%
Dug-out	66	Dug-out	75
Well	25	Hand-pump	12
Dam	5	Dam	8
River/stream	3	Well	5
Hand-pump	1		
TOTAL	100		100

Distance was the most commonly reported factor in selection of current source in both seasons, with the reliability of the source also of importance in the dry season.

The average distance to the sources used by this sample changed considerably between seasons.

	Wet	Dry
Mean distance(m) from compound to:		
Current Source	391	734
Alternative Source	819	953

A large majority (wet-100%, dry-88%) agreed the nearest hand-pump was too far away. About one respondent in ten reported a market-based cycle of water collection in both seasons, significantly lower than the samples with access to pumps in the dry season.

Sixty per cent of the males in the wet season and three-quarters in the dry bathed in the compound with water from the water storage area. This was significantly higher than males from the pump samples who were relatively more likely to fetch their own water to bathe.

The Pump Sample

This sample was designed to include those with access to a hand-pump but who lived at least 1km away from any VEW presentation.

A hand-pump was the major source reported utilized in both seasons.

Current Source in Different Seasons

	Wet		Dry
	%		%
Hand-pump	52	Hand-pump	68
Dug-out	36	Dug-out	25
Well	11	Well	8
River/stream	2		
TOTAL	101		101

Distance was reported to be the major factor in source selection.

Reasons for Selection of Current Source

	Wet	Dry
	%	%
Proximity	92	70
Good/clean water	17	25
Reliability	5	24
other	6	13

The average distance to the current source was between 55%-66% of the average distance to the alternative source.

	Wet	Dry
Mean distance(m) from compound to:		
Current source	336	395
Alternative source	610	595

The VEW and Pump Sample

This sample was designed to include those who lived near the 139 pumps that had received one or more VEW presentations in the last twelve months in the Bolgatanga district.

Only 10% (wet) and 13% (dry) reported that they or anyone in their yard had attended a VEW presentation, and 22% (wet) and 28% (dry) had attended any form of health education.

Hand-pumps were the dominant sources in both seasons.

Current Source in different Seasons

	Wet		Dry
	%		%
Hand-pump	74	Hand-pump	87
Dug-out	21	Dug-out	11
Well	3	Well	1
River/stream	1	Dam	1
TOTAL	99	TOTAL	100

Distance to source was again the major reason for source selection combined with a relatively high emphasis upon water cleanliness.

Reasons for source selection

	Wet	Dry
	%	%
Proximity	86	75
Good/clean water	31	41
Reliability	7	15
Other	1	8

Average distance to current source was between 55% (wet) and 66% (dry) of the average distance to the alternative source.

	Wet	Dry
Distance(m) from Compound to:		
Current Source	337	363
Alternative Source	612	551

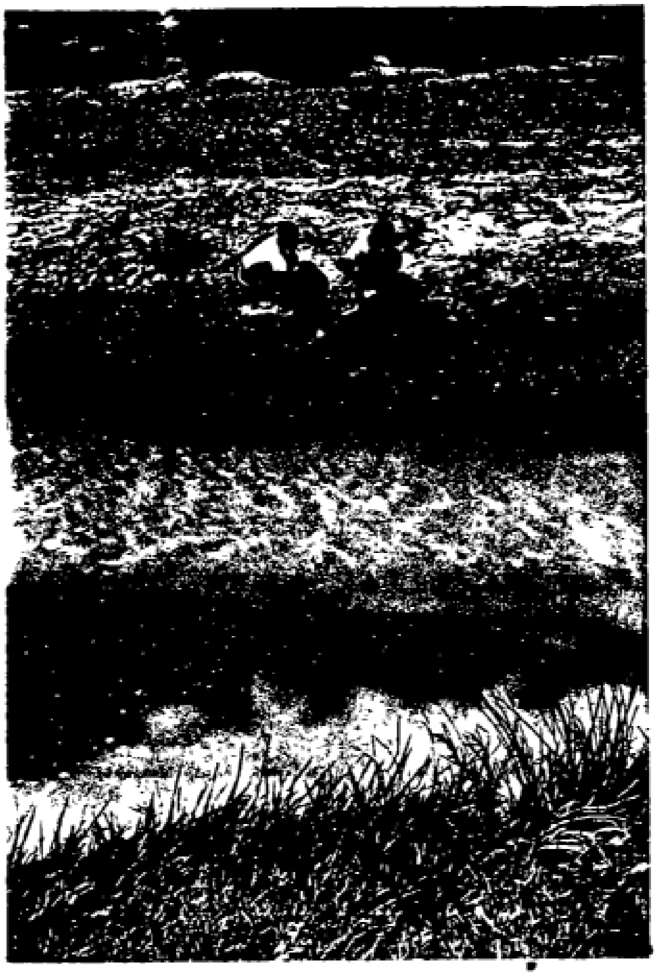
There was a higher extent of development at the hand-pump site among the V sample sites than among the P sample sites.

1. CONDUCTING AN INTERVIEW

2. SOURCE MEASUREMENT IN A RIVER BED

One research worker records the womans's drawing while the others rest until time to do the three visits

RIVER BED DUG-OUTS



3.Wet Season

Even when the river is flowing women take from a dugout

4.Dry Season

5.

BUCKETS, HEAD BASINS AND POTS

6.

COLLECTING WATER FROM A POND IN TENGO ZUUK

7. First the calabash is washed

8. Then the bucket is washed

9. Then the drawer washes herself

10. Finally, she collects water from the pond (not the stream in foreground), where sediment has settled

USING THE MOYNO PUMP

Most drawers prefer to work in pairs

Note the undeveloped site

11. Two boys-both using two hands

12.Two women-both using their right hands

USING A MONARCH PUMP

13. To obtain enough leverage the girl must jump off the ground

14. DRY SEASON GARDENING NEAR A HAND PUMP

1.0 INTRODUCTION

This volume reports the results of a social survey of water related behaviours of a sample of women water drawers in the Bolgatanga District of Upper East Region, Ghana. The report may be viewed as less analytical and more descriptive than initially proposed. This situation arose from the realization that patterns of water-related behaviours and the distribution of these patterns were not well enough known beforehand for the survey to confidently select a limited number of appropriate indicators and measures for analysis of the impact of the improved water supply or village education. The report's primary aim is to describe the main results of the survey a basis upon which future evaluation, research and programming may build. A comprehensive listing of results from all questions of all research instruments is included in the appendicies.

The social survey was the largest component of the Evaluation Project. Fieldwork spanned from February 1984 to May 1985 and utilized the work of no less than 34 people (Figure 1). Total labour inputs to the social survey are estimated at around 18-20 person years.

The following acknowledgements are made:

1. to the women respondents and other residents of the 360 compounds for their patience, grace and hospitality to the researchers;

2. to the Chiefs, headmen, and elders for their permission to conduct the research in all 31 survey areas;

3. to the Upper Region Regional Administrative Officer, Mr. E. Kotei for his support;

4. to all GWSC staff, and in particular Mr. J. Nunoo, Upper Region Regional Manager for support to all aspects of the research;

5. the Ministry of Finance and Economic Planning, Ministry of Health, Department of Social Welfare, and URADEP for the release of staff on secondment;

6. to the Peace Corps, Ghana for their allocation of 4 volunteers

7. to CUSO, Ghana for their allocation of 2 cooperants; and

8. to the Ghanaian research workers for a magnificant effort over a sustained period.

Figure 1 Survey Personnel

		Affiliation
Feasibility Study (October 1982)	L. Lee Parsons	Malone Given Parsons
	Ruth Milner	McMaster University
	Rose Mae Harkness	Consultant
Methodology Design	Jane Campbell	Malone Given Parsons
Survey Managers in Ghana (February 1984-April 1985)	Alan Etherington	Malone Given Parsons
	Francis Awindaogo	Ministry of Finance and Economic Planning
Survey Researchers	Clement Addo	Ministry of Health
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	Linda Becker	U.S. Peace Corps
	Clement Chabot	CUSO
	Peggy Ellis-Green	U.S. Peace Corps
	Sulley Gariba	CUSO
	Alice Larson	U.S. Peace Corps
	Cindy Scott	U.S. Peace Corps
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	James Agambila	Department of Social Welfare
	Margaret Akolgo-Ayanga	GWSC
	Cletus Akurugu	Department of Social Welfare
	Joseph Awuni	GWSC
	Muhamadu Bagnaba	GWSC
	Juliana Lamisi	GWSC
	Seraphine Morgan	URADEP, Home Extension
	Paul Nsoh	GWSC
	Martin Pederson	Christian Youth Exchange (Denmark)
	Rose Teni Awuni	GWSC
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	Shiela Hewson	McMaster University
	Carol Rand	McMaster University
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Additional Data Compilation	Linda Becker	Malone Given Parsons
	Andrew Manahan	Malone Given Parsons
Graphics	Joan MacIntyre	Malone Given Parsons
	Diane Hayes	Malone Given Parsons
Word Processing	Mary Lou Montgomery	Malone Given Parsons
	Marie Chin	Malone Given Parsons

2.0 DETAILS OF THE SOCIAL SURVEY

2.1 Respondent Selection Procedure

This survey was located within the Bolgatanga district of the Upper East Region of Ghana (Figure 2). The Frafra tribe reside in this area - one of seven major language groups of the Upper Region (Figure 3).

The social survey of water drawers was designed to compare the water related behaviors of three randomly selected independent samples of women drawers in wet and dry seasons:

1. those with no access to a pump (called the N sample);
2. those with access to a pump (the P sample); and
3. those with access to a pump and VEW presentation(s) (the V sample).

The sample frame from which the N sample was drawn was compiled on the basis of field visits to all areas in the district thought by GWSC personnel to contain a community living far from a pump and who regularly used non-pump sources. These field visits to the 45 suggested areas produced a sketch map of water sources, compounds and the nearest hand-pump. The N sample was chosen to include the ten areas that appeared to be 1.3 kms or further from the nearest pump. In the case of N-10, an area to the south of the intended area was inadvertently included as the survey area and some compounds selected were well within 800m of the pump. In another five areas there were also respondents closer than intended (Table 1).

TABLE 1 Approximate Range of Distances to the Nearest Hand-Pump for Each N Sample Survey Area

Survey Area	Range of Distances for Survey Respondents to the Nearest Hand-Pump (metres)
N1	600-2000
N2	375-1490
N3	10 kms
N4	1470-3000
N5	440-1000
N6	440-2200
N7	4200-5300
N8	700-1400
N9	1700-2600
N10	260-1300

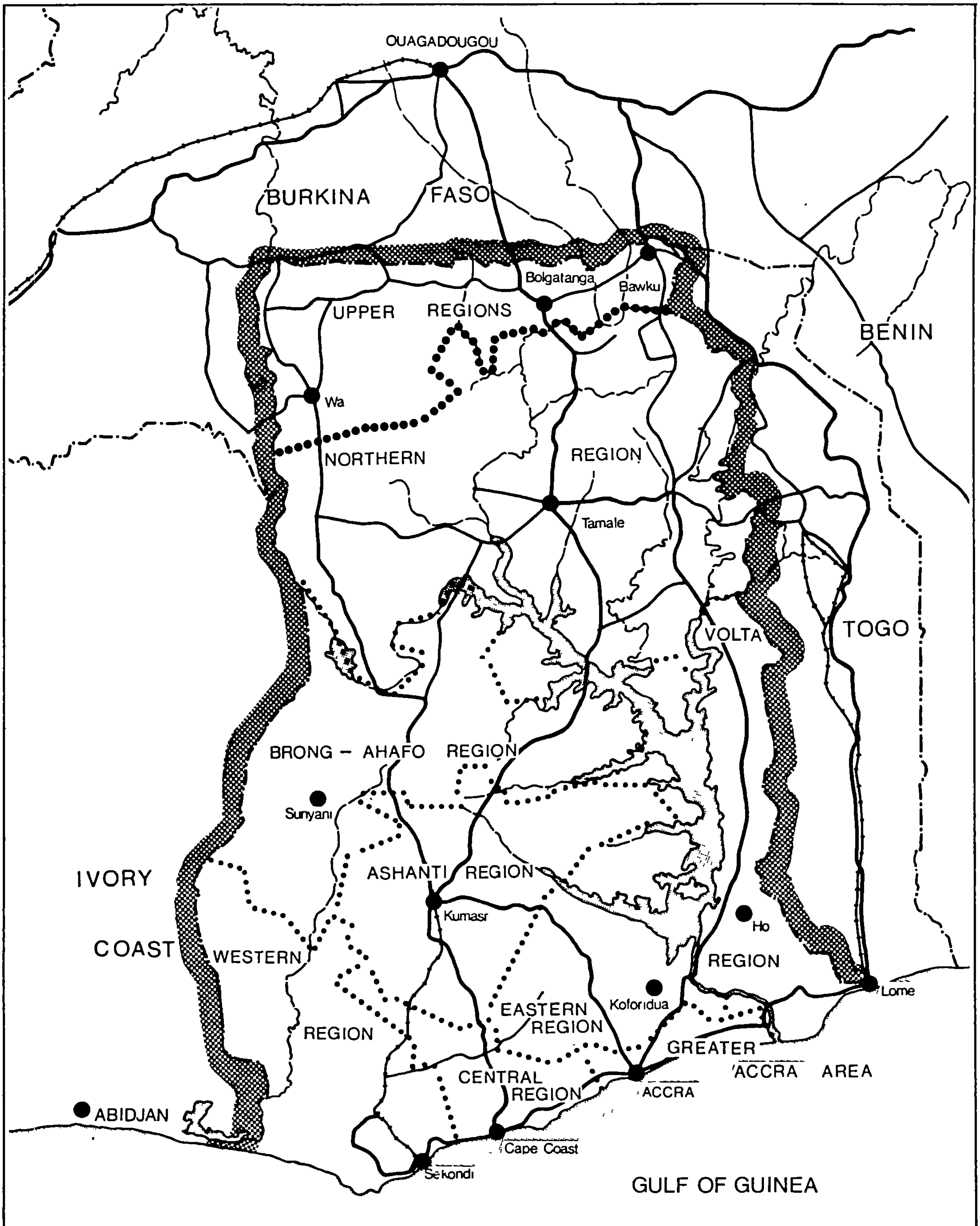


Figure 2. Map of Ghana

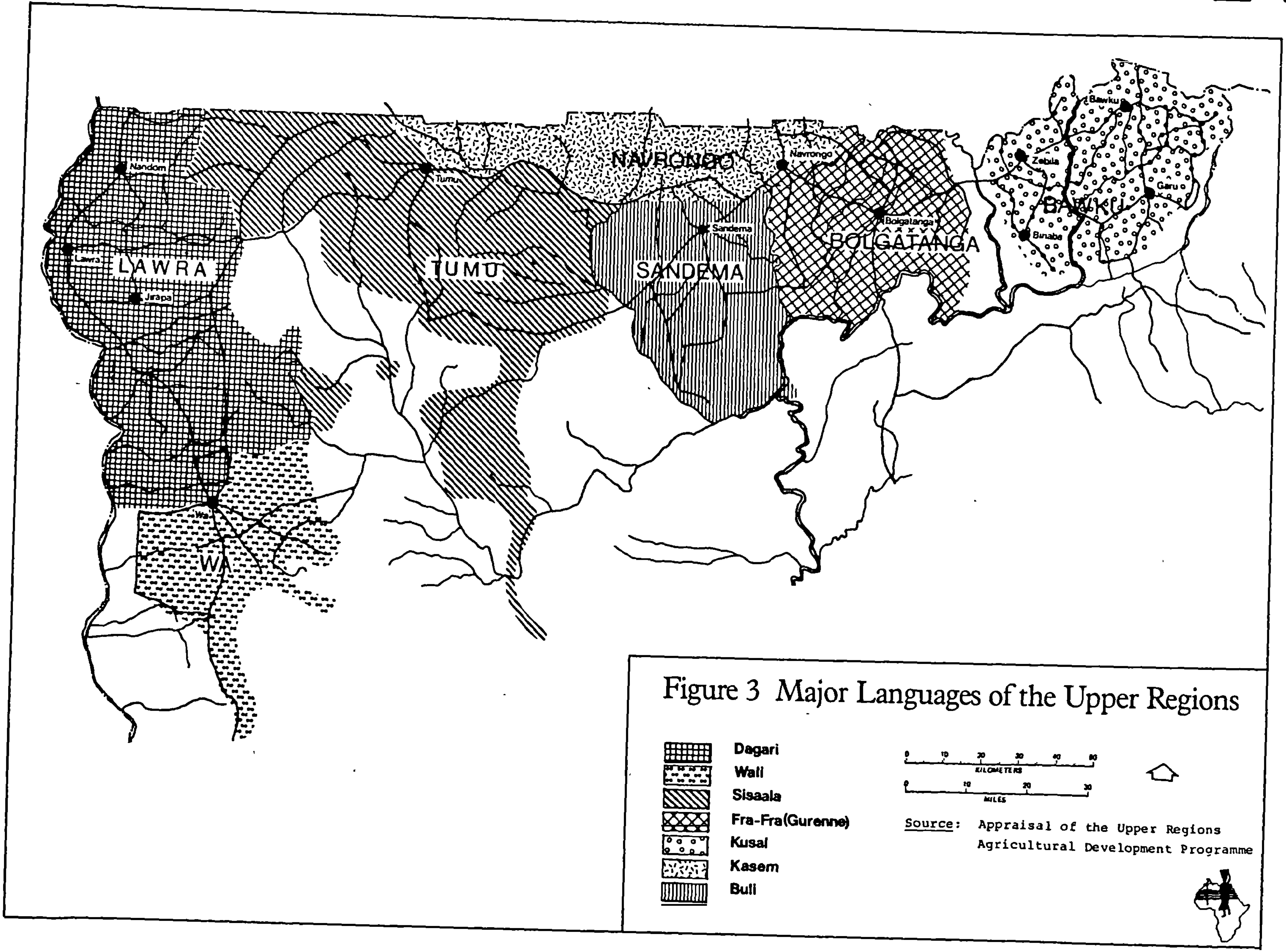


Figure 3 Major Languages of the Upper Regions

Source: Appraisal of the Upper Regions Agricultural Development Programme

The VEW-pump sample was a simple random selection of ten of the 139 locations in Bolgatanga district at which VEWs reported having made presentations in the period between January 1983 and February 1984. The eight VEWs and ten locations of VEW presentations selected for the V sample were slightly different from the total population of VEWs and locations of VEW presentations. The sample VEWs had given slightly more presentations per VEW (16.1) than all VEWs taken together (12.2) and the number of presentations at each of the ten sample locations were slightly more on average (2.50) than at all locations taken together (2.34) (1, pp.23 to 26).

The final sample of pump without VEW was randomly selected from a listing of all 514 pumps in the Frafra District. Each selected pump was located on the map with VEW presentations and areas and was included only if it lay outside all VEW areas and was at least one kilometre away from any VEW presentation (Figure 4).

Within each of these 31 locations (N-10, P-11, and V-10) a survey area was selected from which a random sample of 12 compounds was drawn.

The first tasks before beginning the research, were to explain the research to the Chief or headman and his elders and obtain their permission to proceed. Then, a general reconnaissance was made of the area around the pump or presentations, or within the control area. A survey area was then selected to provide 30-35 compounds, an adequate size to yield 12 appropriate respondents. In larger villages or sections, selection of a survey area was done by starting from the water source and moving out in two directions between 90 degrees and 180 degrees apart until the section boundary was encountered (Figure 5, method 1). In smaller communities, particularly some of the no-pump survey areas, it was possible to include the complete section (Figure 5, method 2). A final model was used in a handful of survey areas where a hand-pump and major dug-out were only a moderate distance apart. The path between the two sources were taken as the centre of the survey area which was extended out on both sides by 100-200metres until enough households were included. Such a survey area allowed source choice boundaries to be investigated.

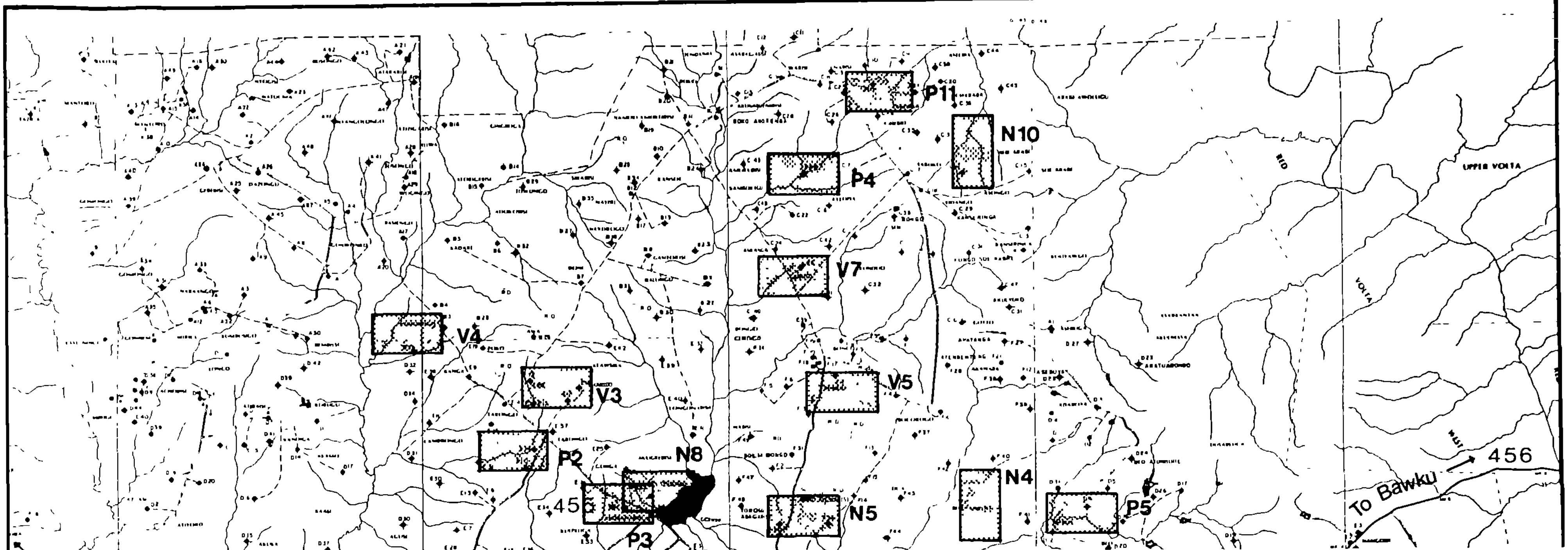


Figure 4 Survey Area Locations

NO-PUMP VILLAGES

N1 Agıadone
N2 Anatım Kulbıa
N3 Bıung
N4 Beo Tankoo
N5 Bongo-Ayeskabisı
N6 Guose and Nkunze
N7 Pwalugu
N8 Vea Tendongo
N9 Tengzug
N10 Soe Arabe

PUMP VILLAGES

P1 Wınkogo-Akonkongbisı, 453B-8
P2 Zoko Tarongo, 455E-14
P3 Vea Tendongo, 455E-22
P4 Amanga, 455C-49
P5 Sapero, 456D-4
P6 Kumbelingu-Yıpala, 455G-21
P7 Dachiu-Tenganore, 455I-57
P8 Dachiu-Nabisı, 455F-24
P9 Bosiyar-Yarikabısi, 455I-54
P10 Damulgo-Dazamdabo, 456G-23
P11 Feo-Soboko, 455C-27

VEW AND PUMP VILLAGES

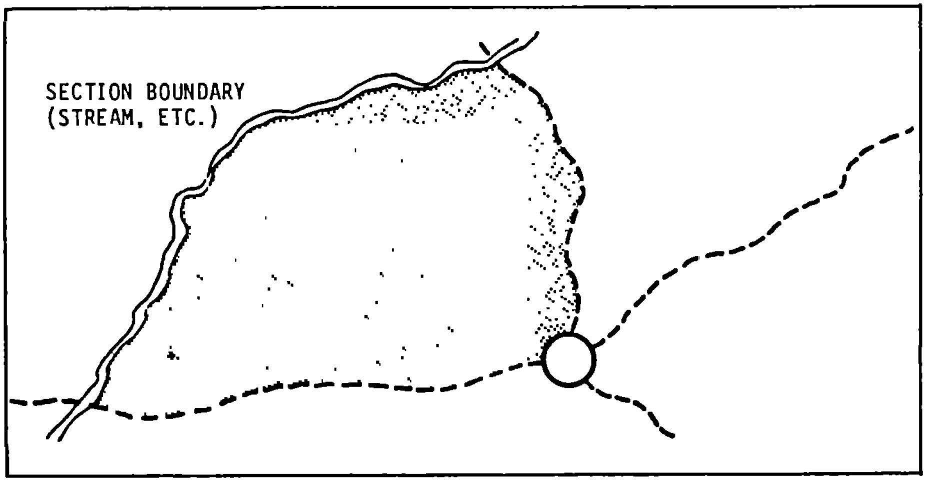
V1 Amogrebisi, 455G-9
V2 Kologo, 455G-11
V3 Atanseka, 455E-18
V4 Kodorogo (Zoko) 455B-3
V5 Bongo-Bonzue, 455F-7
V7 Gorigo Atanzore, 455C-23
V8 Zuarungu-Moshıe, 456D-29
V9 Gari, 456G-9
V10 Ghambie Bombea, 453C-28
V11 Nyogbare, 456H-13

SCALE:

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 Kilometres

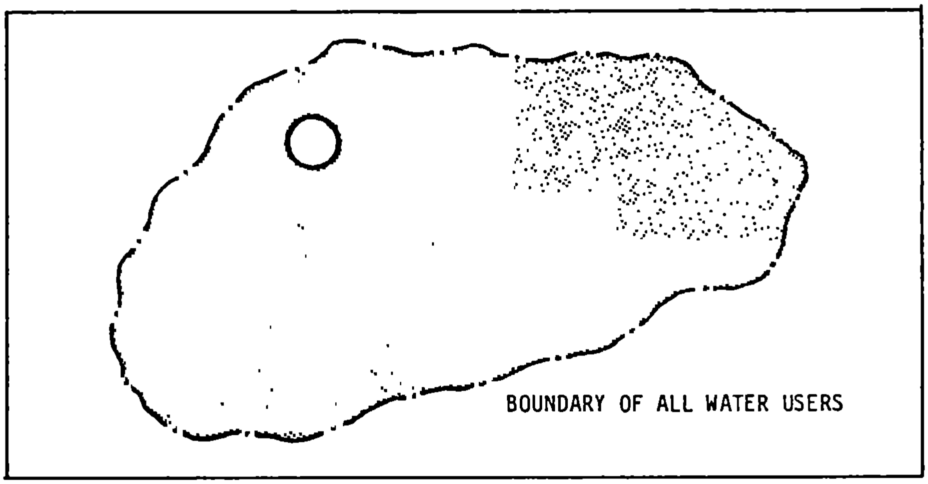
METHOD 1

SAMPLE SELECTION FOR LARGER VILLAGES USING PART OF A SECTION



METHOD 2

SAMPLE SELECTION FOR SMALLER VILLAGES USING ENTIRE SECTION



METHOD 3

SAMPLE SELECTION WHERE HAND-PUMP AND DUGOUT ARE IN CLOSE PROXIMITY

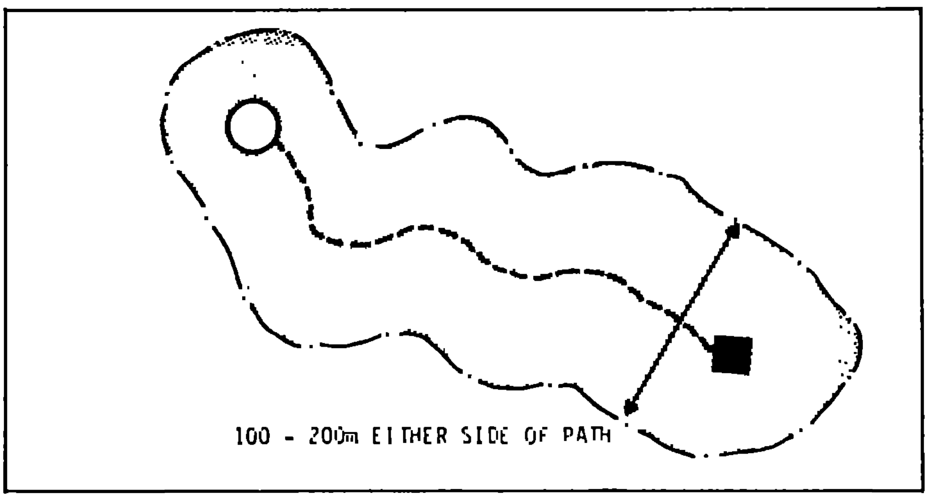


Figure 5 Methods of Defining Sampling Areas

SAMPLE AREA FROM WHICH COMPOUNDS ARE CHOSEN

TRADITIONAL WATER SOURCE

PATHS

HAND-PUMPS

AREA BOUNDARY

2.2 Research Instruments

The basic research tool was a questionnaire (Photo #1) that collected information on a variety of water-related behaviours (Figure 6 and Appendix A). A final component of the questionnaire was a dozen observations made by the interviewer of selected compound conditions.

The data from the questionnaire was supplemented by:

1. Source measurement - a dawn to dusk surveillance of the major water source in each survey area to record all water collected for each of the respondents' yards covered in the household survey (Photo #2);
2. Source observation - providing a record of the number of drawers per hour, the number waiting at each ten-minute interval, total waiting time for selected drawers and data on other activities at the source during the day of source measurement; and
3. The three-visit form - a series of three visits to each compound, in the early morning and early evening of the day of the source measurement and again in the early morning of the next day. At each visit the respondent or another resident was asked how many trips have been made with which container since she woke up, since the first visit and between the second visit and retiring to bed. This involved shorter periods of recall than the interview and by referring to specific journeys allowed different collectors and different sources to be identified.

Figure 6 Summary of the Content of the Questionnaire

- sources used
- reasons for use
- uses of water
- market - based water collecting cycles
- collectors, names and numbers
- number of trips
- containers
- sizes of containers
- number of people who use the water in the yard
- water used at the source
- frequency and method of cleaning collection and storage containers
- bathing
- soap for bathing
- clothes washing
- soap for clothes washing
- building and plastering
- animal ownership
- gardening
- pito brewing
- preparing food for sale
- water for clothes washing, animals, pito, gardening, etc.
- VEW presentations
- other educational presentations
- access to radio
- recall of water education presentations
- practice of items included in the education presentations
- guinea-worm incidence
- children's current health
- sources of income for respondent and husband
- relationship of pump to income earning activities
- ownership of the source
- opinions about distance to water source, its yield, extent of overcrowding, etc.
- opinions about water sufficiency
- pump breakdowns

2.3 Methodology for the Analysis of Survey Results

The following extract is taken from the URPE Preliminary Mobilization Report prepared in mid January 1984. It describes the proposed procedure for the analysis of the survey results.

> "The primary intent of this evaluation is to highlight any major differences which may occur in the lifestyle of villages with and without a pumped water supply. A secondary evaluation is an examination of the impact of the water utilization education programme which has been implemented in only some villages with water. In these villages with the education programme some have received a more intensive programme than others depending on the time at which the programme was implemented and the number of villagers who attended the educational session.
>
> Several other topics included in the evalation are directed towards the pump and the water supply provided by the pump. This does not involve direct comparison with villages without the pump and leads to a descriptive analysis.
>
> 1 Primary Evaluation
>
> To maximize the differences between villages with and without a pumped water supply, data is to be collected during two seasons - dry and wet. The hypothesis is that, in the dry season maximum differences between the villages will be observed which will lessen or even disappear in the wet season when a plentiful water supply is available to all villages.
>
> Several indicators have been chosen to highlight water supply. These are:
>
> 1. Choice of water supply.
> 2. Consumption patterns.
> 3. Distance to water supply.
> 4. Domestic hygiene.
> 5. Personal hygiene.
>
> The primary analysis will then concentrate on establishing the size and significance of the differences between two sets of villages. The sample size was calculated originally based on health outcomes and these are no longer being ascertained. However, since this sample size was estimated on infant mortality which was considered the extreme outcome, the sample size chosen should be adequate for detecting differences in the use of water and domestic hygiene practices. The specific analysis used for each indicator follows:

1.1 Source Choice

In the household survey the first questions determine which sources are used for water and asks for the source used most frequently. The analysis will look at the proportion of people in each village who used the pump in the pumped water villages and a distribution of proportions for each villages will be constructed with a mean and variation determined for that distribution. This will then be compared with the control villages for whom no pump should be available although in fact some may use pumps belonging to other villages. It is anticipated that the mean for this group will be zero or very close to zero. Two analyses will be undertaken. The first is an analysis of variance of experimental and control villages at Season 1 and Season 2. The secondary analysis will be to compare villages within each season.

1.2 Consumption Patterns

In an attempt to determine consumption patterns several questions in the household survey are used to determine the number of trips made; the size of container used each trip; and outside use of water for washing clothes and watering animals. The analysis of this information will require an estimate of the amount of water brought to the household based on the size of container and the number of trips, and also the amount of water used at the water source or outside of the household. To distinguish between villages in the experimental and control group the water use will be averaged per household and in a similar analysis to that for water choice, comparisons will be made across and within seasons.

1.3 Distance to Water Supply

The distance for sample households to the water supply most frequently used will be determined by measuring from a central point where compounds are closely clustered and individually determined using a pedometer or motorcycle odometer where dispersed. Since these distances differ from village to village, they will be analysed using distribution across villages and experimental and control villages will be compared using t-test statistics. Comparisons will be made in both seasons.

1.4 Domestic Hygiene

Domestic hygiene is tapped in a variety of questions in the household survey. Two questions will

be targetted for analysis since others are likely to produce similar results and multiple testing is inappropriate and likely to lead to spurious results. The first is the frequency of cleaning containers. The appropriate analysis will be a Mentel-Haenszel chi-square for the first question and descriptive analysis for the second.

1.5 Personal Hygiene

As with the personal hygiene questions, the most reliable answers are likely to come from the respondents themselves and the contrasts will be analysed on these. The frequency of bathing will be analysed as in the domestic hygiene section and the other details of bathing will be analysed descriptively.

2 Comment

Since the above tests are being conducted on the same set of data, an alpha level of .01 will be accepted as being statistically significant. To accept a less stringent standard would be to increase the risk of accepting a difference as being real when, in fact, it is spurious.

3 Power Analysis

Because of the danger that a smaller number of villages than desired might be surveyed because of logistical problems, it is possible that the opposite concern to the above might arise. That is, it might be concluded that no differences are apparent when, in fact, real differences exist. To examine this problem, a power analysis of each result will be done to estimate the probability that the conclusion is erroneous.

4 Water Utilization Education

Because the education component of the water utilization programme has not been consistently organized thoughout all villages with pumped water, it is anticipated that the effect of the educational material will differ according to the number of times the education has been presented to the villages and to the proportion of villagers who have attended these sessions.

Since there are no specific hypotheses posed for the education, the questions which are being asked to tap this component will be analysed descriptively and no tests of statistical differences will be undertaken. However, it would be important to look for a gradient from no education

to the highest involvement in education. No prior estimates exist to categorize these villages and this will be done post hoc.

5 <u>Water Supply</u>

Pump function and pump water usage patterns will be analysed descriptively giving details of the usage; quantity; timing and access. These data will be obtained from the water source observation grid.

6 <u>General Analysis</u>

All other data will be displayed in tabular or graphic form. They will be descriptive in nature and hypothesis generating not hypothesis testing. This will allow some general statements to be made concerning progress made in the water project and areas which might require consideration for change or increased enhancement.

This general analysis will also search for comparibility between the experimental villages and the control villages to ensure that all above analyses have produced valid results." (2, pp. 15 to 20)

A fuller description of the survey methodology and issues encountered in its implementation is to be found in Technical Appendix One to this report. A description and map of each of the 31 Survey Areas is included in Technical Appendix Two.

3.0 SURVEY RESULTS

3.1 A Profile of Survey Respondents

The typical respondent was in her thirties, an animist and had never attended school (Tables 2, 3, and 4).

TABLE 2 Reported or Estimated Age of Respondent*

Sample	N		P		V	
Season	W	D	W	D	W	D
n	115	113	130	120	117	111
Age	%	%	%	%	%	%
Under 20	2.6	2.7	1.5	3.3	1.7	2.7
20-24	7.0	8.0	16.2	6.6	7.7	7.2
25-29	29.6	19.5	14.6	25.0	35.0	33.3
30-34	13.9	16.8	16.2	15.8	15.4	9.9
35-39	26.1	31.9	32.3	34.2	21.4	34.2
40-44	12.2	7.1	13.1	10.8	14.5	8.1
45-49	7.0	11.5	4.6	4.2	3.4	4.5
50-59	1.7	0.9	1.5	0	1	0
60+	0	1.8	0	0	0	0
TOTAL	100.0	100.2	100.0	99.9	100.1	99.9

* All tables are by Sample and Season unless otherwise noted.

N = No Pump
P = Pump
V = Village Education Worker Presentation and Pump

W = Wet (July-September, 1984)
D = Dry (January-March, 1985)

TABLE 3 Reported or Estimated Schooling of Respondent

Sample	N		P		V	
Season	W	D	W	D	W	D
n	115	91	129	101	117	80
Years of schooling	%	%	%	%	%	%
0	88.7	87.9	94.6	93.1	88.0	87.5
1-5	7.0	6.6	4.7	4.0	9.5	6.3
6-9	3.5	3.3	0.8	0	2.6	2.5
10 or more	0.9	2.2	0	3.0	0	3.8
TOTAL	100.1	100.0	100.1	100.1	100.0	100.1

TABLE 4 Reported Religion of Respondent

Sample	N		P		V	
Season	W	D	W	D	W	D
n	117	113	129	119	117	110
Religion	%	%	%	%	%	%
Animist/ Traditional	96.6	93.8	95.3	97.5	94.9	96.4
Catholic	3.4	2.7	3.1	0.8	4.3	3.6
Other Christian	0	2.7	0	0	0	0
Muslin	0	0	1.6	1.7	0.9	0
TOTAL	100.0	100.2	100.0	100.0	100.1	100.0

A further analysis of the wet season data, with all samples combined indicates a possible association between schooling and Catholicism.

TABLE 5 Religion and Schooling

Religion	Animist	Catholic	Muslim
n	344	13	3
% attending any school	7.8	53.8	0

Compounds of the area are organized into gates and yards. Each married male adult has his own gate with one or more yards, organized so that each wife has her own yard for herself and her children. A majority of all compounds consisted of one or two yards. A majority of respondents live in compounds in which four to ten people live in two or three yards. The typical respondent's yard had four or five residents.

TABLE 6 Total Reported Number of Yards in the Respondent's Compound

Sample	N		P		V	
Season	W	D	W	D	W	D
n	115	114	129	121	117	111
Number of yards	%	%	%	%	%	%
1	43.5	42.1	41.1	36.4	26.5	26.1
2	21.7	23.7	32.6	34.7	30.8	30.6
3	11.3	10.5	13.2	14.9	22.2	19.8
4	11.3	9.6	7.0	5.8	7.7	12.6
5-6	6.1	8.8	5.4	6.6	7.7	6.3
7-10	3.5	2.6	0.8	0.8	5.1	3.6
11 or more	2.6	2.6	0	0.8	0	0.9
TOTAL	100.0	100.1	100.1	100.0	100.0	99.9
MEDIAN	2	2	2	2	2	2

TABLE 7 Total Reported Number of People per Compound

Sample	N		P		V	
Season	W	D	W	D	W	D
n	114	110	127	119	112	110
Number of people	%	%	%	%	%	%
1-4	14.9	20.0	18.9	16.0	7.1	6.4
5-9	43.9	32.7	44.9	47.1	41.1	40.1
10-14	20.2	27.3	22.8	22.7	26.8	30.9
15-19	9.6	9.1	6.3	5.0	11.6	11.8
20-29	7.9	8.2	3.9	5.0	8.0	3.6
30-39	1.8	1.8	3.1	4.2	4.5	4.5
60-129	1.8	0.9	0	0	0.9	1.8
TOTAL	100.1	100.0	99.9	100.0	100.0	100.1
MEDIAN	8	8	8	8	10	10

TABLE 8 Total Reported Number of People in Respondent's Yard

Sample	N		P		V	
Season	W	D	W	D	W	D
n	117	113	130	121	117	111
Number of people	%	%	%	%	%	%
1	1.7	1.8	0.8	1.6	0.9	0.9
2-4	29.9	35.4	32.3	31.4	28.2	24.3
5-9	59.8	53.1	59.2	60.3	68.4	68.5
10-14	5.1	7.1	7.7	6.6	0.9	6.3
15-19	1.7	2.7	0	0	1.7	0
20-29	0.9	0	0	0	0	0
40-49	0.9	0	0	0	0	0
TOTAL	100.0	100.1	100.0	99.9	100.1	100.0
MEDIAN	5	5	5	5	6	5

3.2 Source Choice

3.2.1 Introduction

The most basic evaluation question is to investigate if people use the pumps throughout the year. This is of particular interest in the wet season when there are more alternative sources of water than in the dry. As high an incidence of pump usage in the wet as in the dry would suggest an attachment to the value of the pump water that made it worthwhile for drawers to select the pump over closer surface sources.

In this section this question will be discussed by reviewing 1) the variety of sources that respondents see as available for them to use; 2) their selection of sources in the different seasons and the uses to which their main or current sources is put; 3) the reasons that respondents report for selecting their current source; and 4) an analysis of the impact of distance upon source choice, both in general and by reference to specific survey areas.

3.2.2 The Range of Sources

A minority (0.8% - 14.2%) of respondents reported using only one source at the time of the interview. The great majority of respondents see that they have a choice of sources from which to draw water (Table 9). While there was no statistically significant difference between the wet and dry season (chi square = 1.91 NS) there was a statistically significant difference among the samples (chi square = 17.80 sig. at 0.1%) indicating that those with access to pumps report having more sources available from which to choose.

TABLE 9 Reported Total Number of Water Sources Available by Sample and Season

Sample	N		P		V	
Season	W	D	W	D	W	D
n	116	113	130	119	116	111
Number of sources	%	%	%	%	%	%
1	10.3	14.2	0.8	5.0	4.3	4.5
2	48.3	41.6	57.7	54.6	62.1	54.1
3 or more	41.4	44.2	41.5	40.3	33.6	41.4
TOTAL	100.0	100.0	100.0	99.9	100.0	100.0

3.2.3 Selection of Current Water Source

The significant aspects of the reported choice of current sources (Table 10) are as follows.

1. The hand-pump is the dominant source in both seasons for those with access to a pump, peaking for both P and V samples in the dry;

2. The next most important sources are dug-outs in river and stream beds; for the N sample these are the most popular sources in both seasons and the second most popular for the P and V samples. Dug-outs extend from a few inches to a few feet into the river bed and are filled by seepage (Photographs 3 and 4);

3. Wells, usually hand-dug with a brick and/or concrete lining and around 15-40 feet deep, have some importance, especially as a wet season source for the N sample;

4. Ponds and field dug-outs usually tap groundwater. Depending on the topography of the land and depth of the aquifer, pond water can collect and stand. They may allow access to animals. In other cases ponds or field dug-outs fill by seepage, and thus contain filtered water;

5. Some people who use ponds or dams will collect from a dug-out ear the dam or pond. This kind of dug-out will contain water that has been filtered laterally; and

6. The use of any surface water that has been neither filtered through a dug-out, nor protected against animal use, is a least preferred source.

TABLE 10 Reported or Current Source Selection

Sample	N		P		V	
Season	W	D	W	D	W	D
n	117	110	129	120	116	111
Source	%	%	%	%	%	%
Hand-pump	0.9	11.8	51.9	67.5	74.1	87.4
Well	24.8	4.5	10.9	7.5	3.4	0.9
Dam	5.1	8.2	0	0	0	0.9
Pond/field dug-out	15.4	22.7	8.5	6.7	5.2	0
River/stream	2.6	0	1.6	0	0.9	0
Dug-out in dam/pond	13.7	14.5	3.1	0	3.4	0
Dug-out in river/ stream	37.6	38.2	24.0	18.3	12.9	10.8
TOTAL	100.1	99.9	100.0	100.0	99.9	100.0

3.2.4 Selection of the Hand-Pump as a Current Source

All samples reported a higher use of the pump in the dry season over the wet. There was a higher reported use of the hand-pump as current source by the V sample over the P sample in both seasons (Table 10). These results were statistically significant at a 1% level (chi square wet season = 12.8, chi square dry season = 12.9).

The basic pattern of source selection among the 21 survey areas with access to a pump is one of decreased use during the wet season; this occurs in 13 areas. In four areas pump use is higher in the wet season and in the remaining four areas the reported usage rate did not change between seasons.

For the no-pump sample, only one yard reported pump use in the wet season, and yards in five areas reported usage in the dry, indicating the value of the pumps to this sample at this time of year.

In all cases where the pump is the current source, pump water is used for cooking and drinking, almost always for bathing and, to a slightly lower extent, for washing clothes (Table 11).

TABLE 11 Reported Range and Mean of Selection of Hand-Pump as Current Source and Reported Uses of Hand-Pump Water by Sample and Season

Sample	Season	Range of Yards Within survey Areas Selecting Pump as Current Source	Overall Sample Mean	Overall sample percentage of yards reporting the use of hand-pump water for the following activities			
				Drinking	Bathing	Washing Clothes	Watering Animals
		%	%	%	%	%	%
No pump	Wet	0- 7.7	0.9	0.9	0.9	0.9	0
	Dry	0-61.5	11.8	11.8	11.8	11.8	11.8
Pump	Wet	8.3- 83.3	51.9	51.9	48.8	48.1	9.3
	Dry	18.2-100.0	67.5	67.5	67.5	67.5	56.7
VEW and Pump	Wet	45.5-100.0	74.1	74.1	74.1	71.6	4.3
	Dry	54.5-100.0	87.4	87.4	87.4	80.2	67.6

3.2.5 Reasons for Source Selection

In the survey, respondents were asked why they chose to go to their water source(s). An examination of their replies (Table 12) reveals:

1. The primary importance of distance; with the current source described as the nearest or only source by 86.2% to 92.3% in the wet season, and 70.0% to 74.7% in the dry;

2. The value attached to a source providing clean or good water varies between Samples, with pump Samples attaching more weight to this than the non-pump Sample and the V Sample placing more value than the P Sample. This latter result was significant at a 1% level in both seasons (chi square = 6.94 in the wet and 7.06 in the dry).

3. An increased importance attached to reliability in the dry season.

4. The relative insignificance of volume discharged or other "user friendly" factors as a reason for selecting a source.

TABLE 12 Reported Reason(s) for Respondents to Select Current Source

Sample	N		P		V	
Season	W	D	W	D	W	D
n	117	110	129	120	116	111
	%	%	%	%	%	%
Nearest Source/ Only Source	92.3	70.0	91.5	70.0	86.2	74.7
Reliability	7.7	30.8	4.7	24.1	6.9	15.3
Good/clean water	12.0	12.0	17.1	25.0	31.0	41.4
Plenty of water	2.6	1.7	3.1	6.7	0	1.8
Less crowded/easy to use/easy access/ convenient location	1.8	2.6	3.1	6.6	0.8	6.3
TOTAL	116.4	117.1	119.5	132.4	124.9	139.5

Note: Totals exceed 100% because of multiple responses.

3.2.6 Source Choice and Distance

In attempting to explain why a drawer of water selects one source of water rather than another, two distances must be considered. The first of these is the *absolute distance* from the compound to a particular source; sec~~ondly the distanc~~e of one source *relative* to another may also be important.

In the survey, information on the following was collected:

1. distance to current source in the wet season;
2. distance to current source in the dry season;
3. distance to alternative source #1 in the wet season;
4. distance to alternative source #1 in the dry season;
5. distance to current source according to the survey area map; and
6. where neither the CS or AS1 was a pump, distance to the nearest hand-pump.

Items 1 to 4 were measured by having interviewers pace the distance and converting their paces to metres. Where the distance was greater than 500m, a motorcycle odometer was used.

The distance from one compound to a particular source may be significantly greater in the wet season than dry because the water collector must walk around fields and muddy patches rather than through them.

Mean distances to current sources for all samples is greater in the dry than the wet. For those with access to pumps the average distance to current source increases by 8-17 percent between seasons while the no-pump sample walks about 88 percent further. The difference in distance to current source between the P and V samples- about 32m on average - in the dry season is not statistically significant (t = 0.86 NS).

For all samples and seasons the mean distance to the major alternative source is greater than to the current source (Table 13).

TABLE 13 Mean Distance to Current and Alternative Water Sources by Sample and Season (metres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Distance to current source n	117	113	129	120	108	111
Mean Range	391 30-1200	734 113-4000	336 32-1330	395 32-3000	337 55-1400	363 86-1400
Distance to alternative source n	95	93	126	108	102	107
Mean Range	819 10-5500	953 69-5000	610 37-3030	595 60-2350	612 31-2500	551 19-1500

3.2.7 Source Choice Boundaries

Another way of investigating source choice is the use of selected maps of the survey areas. On each of the following maps the wet and dry season boundaries of respondents using the pump demonstrate the more extensive boundaries in the dry season (Figure 7).

In Amanga, P-4, all respondents, with the exception of HH13 and HH14, reported using the hand-pump during the dry season. During the wet season everyone in Amanga reported going to their closest water source. Only for HH2 is the nearest source the hand-pump.

In Yipala, P-6, wet and dry source choice boundaries for pump users substantially coincide because of the absence of any reliable alternative source. Only two respondents report using a dug-out during the wet season.

At Nyogabre, V-11, some respondents to the north of the pump appear to have made a conscious decision to utilize the pump water in the wet season when some of their neighbours are using much nearer dug-outs.

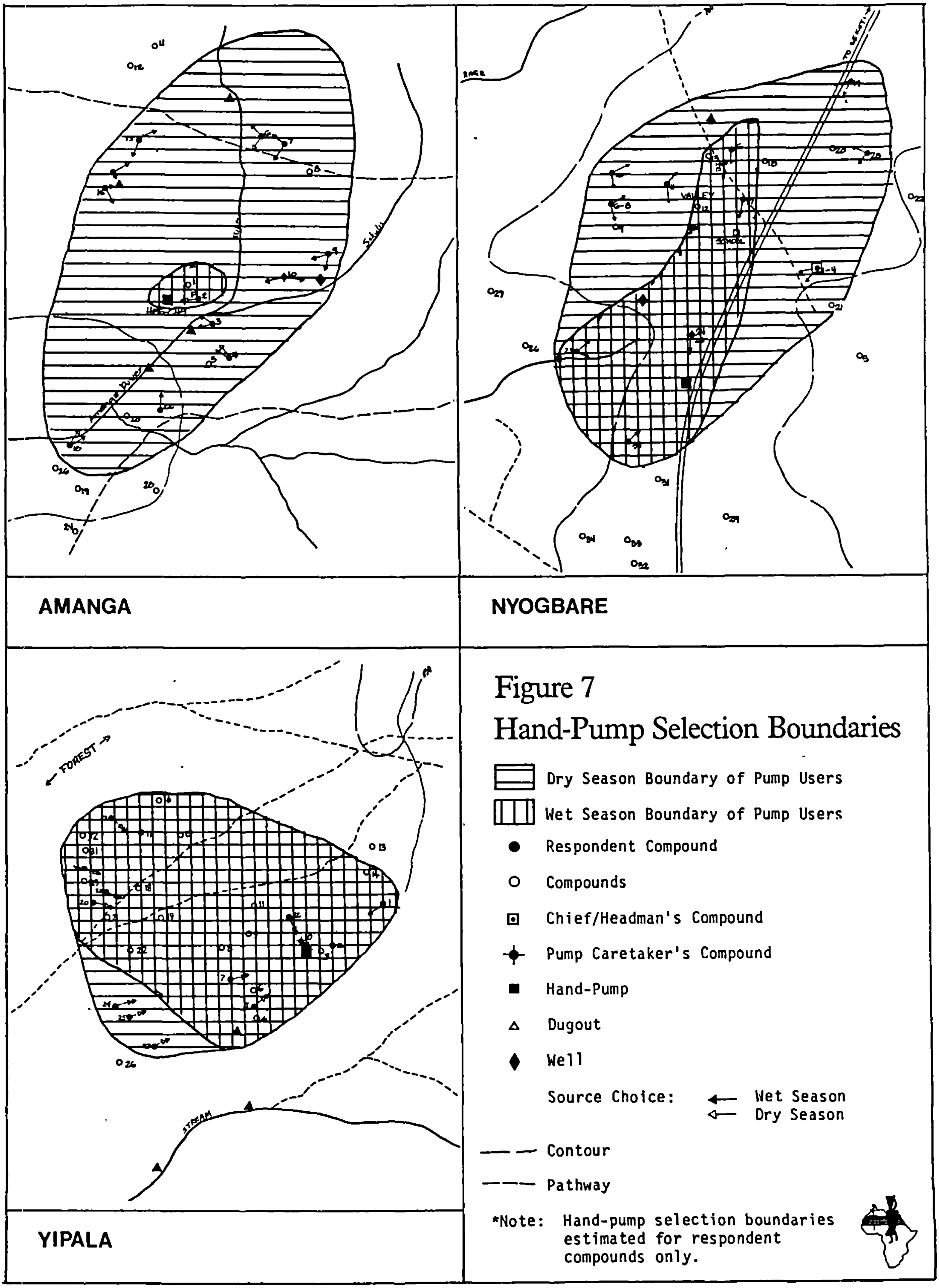


Figure 7
Hand-Pump Selection Boundaries

3.3 Water Collection and Consumption

3.3.1 Introduction

The basic patterns of water collection and use are displayed in Figure 8. The most common practice is for female drawers of water to collect water from the source and store it in their yard in the water storage area (WSA). From here it is taken as needed for the four daily activities of drinking, cooking, bathing and watering animals.

A less common bathing practice is to draw water from the source and bathe nearby. Another practice for a small minority is to take water from the source and return with it to the compound to bathe. The final practices displayed in Figure 8 are those of herding animals to a water source, and taking clothes to a source for washing.

In the survey of drawers of water an attempt to measure and describe most of these patterns was made by collecting information on the following items:

1. usual volume collected by the yard
2. volume drawn from the WSA for bathing
3. volume drawn from the WSA for animals
4. volume drawn for bathing from a source for use near the source
5. volume drawn for bathing from a source for use at the yard

This information was collected by asking the respondent, usually aided by others present at the interview, to describe: 1) who usually collected water, how many trips each collector usually made, and with which containers; 2) who bathed, how many times a day, where, with which container, and from which source of water; 3) who watered the animals, where, and if at the compound, from which source of water with which container. All containers were also identified and measured so that the volume of each could be estimated. Containers include buckets, head-basins, pots, drums and others (Photographs 5 and 6).

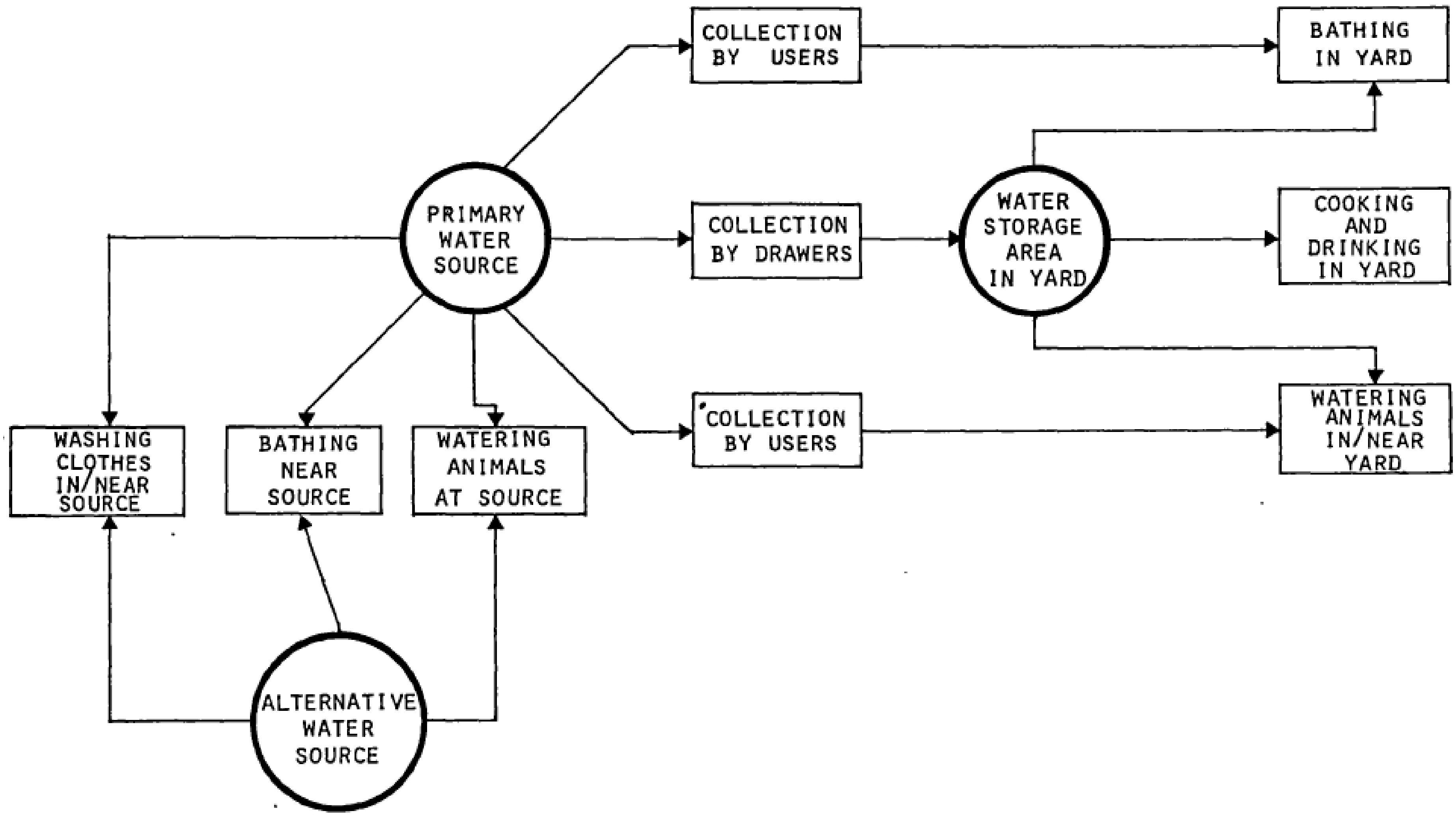


Figure 8 Basic Patterns of Water Collection and Usage

These basic patterns and items suggest a number of different ways of measuring water consumption, of which two are utilized:

1. water for drinking and cooking = usual volume collected by the yard less water taken from the WSA for bathing and for animals

2. domestic water consumption = usual volume collected by the yard plus volume collected from a source for bathing less water from the WSA for animals.

3.3.2 Water Collection Cycles

Markets are held every three days in this area. Participation by the woman or women of a compound in market-based activities, such as brewing pito or preparing food for sale at the market or to people on their way to or from the market often requires a particular cycle of water collection. Typically, water is collected on the day after the last market and on the day before the next market rather than on the day of the market itself. Higher collection on these two days is necessary to meet the water requirements of the activity and to store water for use by the yard on market day when there may be less time to collect water.

Market activity can be observed to be higher in the dry season than the wet, when there are more agricultural requirements. For the P and V samples, more respondents reported a market based cycle in the dry than the wet. For the N sample there appeared to be no difference between seasons (Table 14).

The presence of any collection cycle required the survey interviewer to record the number of trips made by each collector in the yard on all three days of the cycle so that an average daily collection could be estimated for the yard.

TABLE 14 Water Collection Cycles

Sample	N		P		V	
Season	W	D	W	D	W	D
n	116	112	129	120	117	110
No cycle-same amount collected each day	87.1	89.3	80.6	77.5	88.9	80.0
Market-based cycle	9.5	10.7	16.3	20.0	6.0	17.3
Other cycle (rotates with other collectors/ every second day/for income activities only/occassionally	3.4	0	3.1	2.5	5.1	2.7
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

3.3.3 Collection Trips

1. Trips by the Respondent

Two estimates of water collection trips made by the respondent were attempted in the survey. In the early part of the questionnaire respondents were asked how many trips they usually made at this time of the year. At the mid point of the interview, they were asked how many trips they had made yesterday. In both cases, they were asked to give the number of trips they had made in the morning, afternoon and evening.

Respondents reported that they usually made an average of 3.7 trips per day but only 2.9 trips yesterday. Both sets of data show a 3:1:2 ratio of trips by different times of the day - that is 50 percent of the trips are made in the morning, 17 percent in the afternoon and about 33 percent in the evening.

TABLE 15 Mean Number of Water Collection Trips Made by the Respondent - Usual Number and Trips Made Yesterday

Sample	N		P		V	
Season	W	D	W	D	W	D
Mean usual no. of trips						
morning	1.69	1.92	1.62	2.03	1.69	1.71
afternoon	0.71	0.59	0.76	0.74	0.70	0.79
evening	1.29	1.19	1.20	1.21	1.24	1.20
TOTAL	3.69	3.70	3.58	3.98	3.63	3.70
Mean no. of trips yesterday						
morning	1.42	1.81	1.26	1.39	1.40	1.30
afternoon	0.45	0.44	0.53	0.41	0.57	0.55
evening	1.19	0.76	0.96	0.97	0.89	0.92
TOTAL	3.06	3.01	2.78	2.77	2.86	2.77

There appear to be no significant differences by sample or season with the possible exception of the reported trips made yesterday by the no-pump Sample. They report 9% and 6% respectively more trips than respondents in the P and V Samples and a different pattern of daily collection between seasons. In the wet season their morning/afternoon/evening ratio is 46/15/39 and 60/15/25 in the dry.

2. Collection Trips and Yard Size

As expected, the total number of collection trips made by yards increases with yard size. This increase is not directly proportional to the number of people in the yard as indicated by a lower mean number of trips per person in the larger yards. At its extreme, the per capita number of trips per person for a small (1-2 people) yard is double that of a large (11 or more people) yard in the wet season, with three times as many trips in the dry season (Table 16).

3. Collection Trips and Distance

Although there are substantial variations in the number of trips made by different yards, this did not appear to be related to the distance between compound and source, for distances of up to 1.5km. Past this point (and it is only in the dry season that collection

TABLE 16 Collection Trips per Yard and per Person by Yard Size - Wet and Dry Seasons, All Samples Combined

	Yard Size (no. of people)						
	1-2	3-4	5-6	7-8	9-10	11 or more	Total
<u>Wet Season</u>							
No. of yards	25	89	153	65	15	17	364
Mean trips/yard	2.2	3.1	3.6	4.3	5.9	9.2	3.9
Mean trips per capita	1.20	0.84	0.66	0.59	0.63	0.60	0.68
<u>Dry Season</u>							
No. of yards	11	69	107	52	16	13	268
Mean trips/yard	3.6	3.7	4.6	5.9	11.3	7.8	5.1
Mean trips per capita	2.11	1.01	0.84	0.80	1.21	0.65	0.89

Note: Collection data from the 3-Visits form.

trips are further than this) the number of trips made by a yard begins to decline. Multiple regression analysis of the number of collection trips made by a yard suggest that differences in yard size explained about 27% of the variation in trips; after entering the variable of distance to source the additional explanatory power was negligable.

3.3.4 Total Water Collection

Mean reported per capita volume collected is calculated by dividing the total volume collected by a yard by the total number of residents in the yard.

For the majority of survey areas (7/10 - N Sample, 9/11 - P Sample and 8/10 - V Sample) more water is reported collected in the dry season than the wet.

Given the greater availability of water in the wet season, this appears to be a surprising result that may be explained by one or more of the following factors:

1. Less time is available for women to collect water because of the agricultural duties in the wet season;

2. During the wet season when most goats are tethered (and therefore must be watered) and the work-load for women is increased due to farming, men may make more collecting trips to water their animals. During the dry season animals that stay in or around the compound are more likely to be watered by the usual water collectors. As men are rarely recorded as collectors these trips may be under-recorded;

3. More bathing is done near water sources in wet season due to the privacy allowed by vegetation;

4. Some collecting trips to the nearer sources of the wet season are overlooked because they require less effort and time.

5. In the lean season, the first part of the wet season until the first harvest, there is less food available and collectors have less energy for collection.

TABLE 17 Mean and Range of Reported Daily per Capita Volume Collected by Survey Area (litres)

Sample	Season	Range of per Capita Collections by Each Survey Area	Sample Mean
No Pump	Wet Dry	16.4-31.0 16.9-33.6	22.5 24.2
Pump	Wet Dry	13.6-36.3 18.0-34.2	21.6 26.2
VEW and Pump	Wet Dry	15.3-30.1 19.6-31.1	22.0 25.1

A comparison of daily per capita collection across season and sample suggests that access to a pump increases water collection by 1-2 litres in the dry season.

3.3.5 Water for Cooking and Drinking

Water used for cooking and drinking is calculated by subtracting any volume taken from the water storage area for bathing or watering animals from the total volume collected. In some cases this produced a negative value, either arising from an under-estimate of volume collected, or more probably, an over-estimate of volume consumed by bathing.

For all samples and most survey areas, collection for drinking and cooking increased in the dry season (Table 18).

TABLE 18 Mean and Range of Reported Daily Volume Collected per Yard for Drinking and Cooking by Survey Area (litres)

Sample	Season	Range of Volume Collected per Yard For Drinking and Cooking by each Survey Area	Sample Mean
No Pump	Wet Dry	41.3-126.8 46.2-199.3	66.5 84.0
Pump	Wet Dry	49.1-182.6 59.2-142.9	73.8 83.3
VEW and Pump	Wet Dry	43.2-104.2 52.3-177.4	68.5 81.0

TABLE 19 Mean and Range of Daily Volume Collected per Capita for Drinking and Cooking by Survey Area (litres)

Sample	Season	Range of Volume Collected per Capita For Drinking and Cooking by each Survey Area	Sample Mean
No Pump	Wet Dry	8.6-20.9 9.2-23.8	12.1 14.2
Pump	Wet Dry	8.7-23.1 9.5-21.4	13.2 15.1
VEW and Pump	Wet Dry	9.1-18.9 9.9-21.9	13.0 14.0

3.3.6 Water Consumed for Bathing

Water consumed for bathing was calculated by summing the estimated volumes used by all bathers in a yard, irrespective of where the bathing was performed or from where the water was taken. These varieties are described in Section 3.5.1.

The per capita consumption for bathing in each sample is higher in the wet season (Table 20).

TABLE 20 Per Capita Daily Consumption of Water for Bathing - All Sources Combined

Sample	Season	Range of Volume Collected per Capita For bathing by each Survey Area	Sample Mean
No Pump	Wet Dry	10.2-25.3 10.0-22.8	17.3 13.9
Pump	Wet Dry	13.2-30.2 11.3-18.2	17.8 15.0
VEW and Pump	Wet Dry	8.7-23.1 11.8-16.8	16.5 14.1

3.3.7 Building and Plastering

In the rural Upper Regions, houses are made of mud and wood frame with an exterior coating of plaster made of fine sand, cattle dung and water. Building tends to be done towards the end of the wet season before surface sources dry up, to facilitate water collection near the compound, and when there is judged to be a low probability of any heavy rains to erode the new construction. After some weeks of allowing the sun to dry the building, it is plastered, often utilizing water from a more distant source, as by now the surface sources have disappeared.

Both activities require substantial water over a short period of a few days. As the work is often carried out by a group of relatives or neighbours, additional water is required to provide them with food and drink.

About 80 to 60% of yards report carrying out building and plastering activities each dry season, with those samples with access to a pump reporting more building and plastering activities in both seasons than the N sample.

TABLE 21 Reported Building and Plastering in Last Dry Season or this Dry Season

Sample	N		P		V	
Season	W	D	W	D	W	D
n	114	110	127	119	112	110
	%	%	%	%	%	%
Buildering and plastering	36.8	48.2	46.9	54.5	50.4	51.4
Plastering only	20.5	23.2	30.8	22.3	17.1	22.9
Building only	1.7	2.7	0.8	2.5	0	0.9
Neither building or plastering	41.0	25.9	21.5	20.7	32.5	24.8

3.4 Domestic Hygiene

The feasibility study for the evaluation proposed that two main indicators of domestic hygiene would be used -- the frequency of cleaning water containers and the method of cleaning containers. These data were collected during the interview by listing and describing each container and then asking how each was cleaned and how often.

As with all questions involving time this presented some difficulties. For approximately three-quarters of all containers the respondent was able to define a frequency of a certain number of items within a certain period of hours or days. For the remaining containers, replies were given as "every trip", "when dirty" or "when empty", which are not as suitable for analysis.

The pattern of cleaning containers was thought to partially vary with its use. Collection containers may be cleaned at the source while storage containers, which in some villages are considerably larger, cannot easily be moved from the compound and must be cleaned there.

Container use was classified into three categories - collection, storage and other (animals and bathing). Where a container was used for collection and storage, then it was classified as a collecting container.

A majority of respondents in all samples reported cleaning their collecting containers every trip or every day usually with water and sand. Most containers are rinsed every trip, and then more thoroughly cleaned once a day.

Basically, container cleaning appears to be guided by traditional expectations and taught to all water drawers. This socialization appears to apply to all samples and is not associated with access to a hand-pump or VEW presentation. Such widespread behaviour does not appear to make it an appropriate indicator of improved domestic hygiene.

TABLE 22 Reported Frequency of Cleaning Collecting Containers - Dry Season

Sample	N	P	V
No. of containers	295	338	306
	%	%	%
Every trip	12.9	7.4	12.7
2 per day or more	7.8	9.5	8.5
Once a day	38.3	45.9	36.6
Once every 2-3 days	27.5	18.9	26.1
Once every 4 or more days	10.5	12.4	12.4
When dirty	3.1	4.7	2.9
When empty	0	1.2	0.7
TOTAL	100.1	100.0	99.9

TABLE 23 Reported Method of Cleaning Collecting Containers - Dry Season

Sample	N	P	V
No. of containers	278	329	293
	%	%	%
Water only	6.5	10.6	11.3
Water and sand	64.0	59.9	53.2
Water and sponge	14.0	7.6	7.5
Water and vegetation	5.0	8.8	2.7
Water and ash	0.4	1.5	2.4
Water and vegetation and sand	3.2	2.7	7.2
Water and soap	6.8	8.8	15.7
TOTAL	99.9	99.9	100.0

3.5 Personal Hygiene

3.5.1 Bathing

1. Frequency of Bathing

Respondents were asked about the frequency of bathing for all those residing in her yard. It is hard to know how much credibility to give to these responses because of the normative nature of the issue. Probably all cultures have certain social expectations about how frequently people should bathe and responses are likely to be influenced by these expectations.

For all samples in both seasons, the great majority of bathers (90% or more) reported taking one or two baths per day, with slightly more baths taken in the wet season than the dry (Table 24).

TABLE 24 Reported Frequency of Bathing by Season and Sample

Sample	N		P		V	
Season	W	D	W	D	W	D
No. of bathers	615	620	698	665	632	646
	%	%	%	%	%	%
Less than daily	1.8	0.6	1.0	1.5	2.1	0
1/ day	51.2	57.6	46.6	57.4	49.4	59.6
2/ day	47.0	37.9	51.3	38.6	46.8	39.8
3 or more/ day	7.9	3.9	1.1	2.4	1.7	0.6
TOTAL	99.9	100.0	100.0	99.9	100.0	100.0
MEAN	1.57	1.45	1.53	1.42	1.48	1.41

With each respondent it was possible to investigate both her usual bathing frequency and ask her about her actual bathing yesterday (Photograph #9). The usual number was between 6-15% higher than baths yesterday (Table 25).

TABLE 25 Mean Reported Number of Baths Taken by the Respondent - Usual Number and Baths Taken Yesterday

Sample	N		P		V	
Season	W	D	W	D	W	D
Usual number	1.70	1.55	1.67	1.57	1.63	1.56
Taken yesterday	1.48	1.45	1.58	1.45	1.54	1.45

2. Location and Source of Water for Bathing

In selecting where to bathe and the water to use, a bather has three choices:

1. In the compound with water from the water storage area (WSA);
2. In or near the source, using water from the source; or
3. In the compound with water carried by the bather from the source.

Patterns two and three are characterized by the bather's self sufficiency - the bather provides his or her bath water. Pattern one means that those who do not participate in water collection for the yard bathe with water carried by others. Because the single largest usage of water carried to the compound is for bathing, trying to reduce this pattern through bathhouses at the source represents an effective way of saving the time and energy of women.

In general, pattern one increases in the dry season for both genders. For males, the presence of a pump may reduce the percentage of pattern one behaviour in both seasons, particularly in the dry. During this season, approximately 63-65% of males in the P and V samples bathe in the compound with water from the WSA compared to 75% of males of the N sample (Table 26).

TABLE 26 Location and Source of Water for Bathing by Gender

Sample	N		P		V	
Season	W	D	W	D	W	D
FEMALES Number of Females	321	331	381	365	327	348
Location/source	%	%	%	%	%	%
1. Compound/WSA	66.4	65.3	57.2	64.9	57.8	76.7
2. Source/source	29.0	30.5	23.4	23.0	28.7	14.9
3. Compound/source	4.7	4.2	19.4	12.1	13.5	8.3
TOTAL	100.1	100.0	100.0	100.0	100.0	99.9
MALES Number of Males	306	305	329	312	312	296
Location/source	%	%	%	%	%	%
1. Compound/WSA	59.5	74.8	45.3	62.8	54.3	64.5
2. Source/source	32.7	20.3	36.5	23.1	28.1	25.3
3. Compound/source	7.8	4.9	18.2	14.1	17.6	10.1
TOTAL	100.0	100.0	100.0	100.0	100.0	100.0

3.5.2 Washing Clothes

For most yards, clothes are washed by one woman near a water source. Four yards in five (82%) reported only one washer, 15% reported two washers and only 3% reported three washers.

Of all reported clothes washers, between 88.2% and 96.2% are women, with male washers tending to wash more of their own clothes in the wet season particularly in the P and V samples (Table 27).

TABLE 27 Reported Washers of Clothes

Sample	N		P		V	
Season	W	D	W	D	W	D
No. of yards	115	113	124	119	116	111
No. of washers	131	134	144	146	140	130
Mean washers/yard	1.14	1.19	1.16	1.23	1.21	1.17
<u>Age and Sex</u>	%	%	%	%	%	%
Respondents	71.0	67.9	69.4	65.8	65.0	64.6
Other female adults	13.7	17.2	9.0	17.1	6.4	13.8
Female youths	7.6	9.7	8.3	8.9	14.3	16.2
Female children	2.3	0.7	1.4	1.4	2.9	1.5
Husbands	0.8	0	4.9	0.7	2.9	0
Other male adults	1.5	3.0	2.8	2.1	4.3	2.3
Male youths	3.1	0.7	3.5	3.4	3.6	0.8
Male children	0	0.7	0.7	0.7	0.7	0.8
TOTALS	100.0	99.9	100.0	100.1	100.1	100.0

Between 77% and 88% wash clothes near the water source. All samples showed a slight (2-5%) increase in the percentage washing clothes at the compound in the dry season (Table 28).

TABLE 28 Reported Location of Washing Clothes

Sample	N		P		V	
Season	W	D	W	D	W	D
No. of washers	130	135	150	148	140	131
% at compound	13.1	16.3	18.0	23.0	12.1	14.5
% near water source	86.9	83.7	82.0	77.0	87.9	85.5

Most washers select their current source for washing clothes; between 13.8% and 24.3% select an alternative source. The use of water from water storage areas occurs almost only in the dry season by approximately 5% of washers (Table 29).

TABLE 29 Water Source for Washing Clothes by Sample and Season

Sample	N		P		V	
Season	W	D	W	D	W	D
n	131	132	149	147	141	131
	%	%	%	%	%	%
Current Source	81.7	70.5	75.2	76.9	85.8	81.7
Alternate Source	18.3	24.3	24.2	17.7	14.2	13.8
Water Storage Area	0	5.3	0.7	5.4	0	4.6
TOTAL	100.0	100.1	100.1	100.0	100.0	100.1

In almost all cases, those who select a hand-pump as their current source report using the hand-pump for washing clothes (Table 30).

TABLE 30 Selection of the Hand-Pump for Washing Clothes

Sample	N		P		V	
Season	W	D	W	D	W	D
No. of yards choosing hand-pump as current source	1	13	67	81	86	97
% of whom use the hand-pump for washing clothes	100	100	92.5	100	96.5	91.8

In trying to estimate the frequency of washing clothes, the problem of having respondents estimate periods of days was again encountered. In the wet season, interviewers were instructed to assist the respondent by helping her estimate how many days since she had last washed clothes and how many days it was likely to be until she washed again. By reference to the cycles of the moon, to market days and, sometimes in areas near towns, to weekends, these could be estimated. In the dry season the interviewers were told to record the respondents reply; the frequency of the response "whenever clothes are dirty" increased from an average of around 2% to 25%, making inter-season comparisons difficult. If such responses are excluded, then in most cases the median washer of clothes (i.e. the 50th percentile) reports washing every two weeks (Table 31).

TABLE 31 Reported Frequency of Washing Clothes by Sample and Season

Sample	N		P		V	
Season	W	D	W	D	W	D
n	131	132	149	147	141	131
	%	%	%	%	%	%
Every six days or less	9.2	6.7	5.6	10.5	8.7	6.3
About once a week	36.9	23.0	24.6	21.7	28.3	26.0
Every 8-13 days	5.4	4.4	4.9	1.4	4.3	2.4
Every 17-28 days	1.5	2.2	9.2	4.9	9.4	0
About once every 2 weeks	29.2	15.6	28.2	15.4	28.3	16.5
About once a month	13.1	20.7	23.2	13.3	15.9	12.6
Less frequently than once a month	0.8	2.2	0	0.7	1.4	0
"Whenever dirty"	0.8	17.8	2.8	25.9	2.2	30.7
Whenever soap is available	3.1	7.4	1.4	6.3	1.4	5.5
TOTAL	100.0	100.0	99.9	100.1	99.9	100.0

Where clothes were washed in the compound, the respondent was asked which container was used and how many times it was filled. By measuring the container, its volume could be estimated and used to calculate the total volume used for washing. In all cases the median volume is located in the 41-60 litres grouping, (Table 32) about two to three large sized buckets.

TABLE 32 Estimated Volume of Water Used for Washing Clothes at the Yard

Sample	N		P		V	
Season	W	D	W	D	W	D
n	19	18	22	34	15	16
	%	%	%	%	%	%
20 litres or less	10.5	22.2	9.1	5.9	26.7	18.8
21 - 40	36.8	22.2	13.6	20.6	13.3	18.8
41 - 60	15.8	16.7	31.8	38.2	33.3	18.8
61 - 80	15.8	27.8	18.2	14.7	13.3	25.0
81 - 95	5.3	5.6	22.7	11.8	6.7	0
96 or more	15.8	5.6	4.5	8.8	6.7	18.8
TOTAL	100.0	100.1	99.9	100.0	100.0	100.2

3.6 Programme Impacts Upon Health

The fundamental goal of the Upper Region Water Programme has been to improve the health of the Upper Region through the provision of clean water supply (Report 2, Appendix A). The health status of a community is extremely difficult and costly to measure. The original Logical Framework Analysis for the programme proposed that its impact be measured with reference to health records. This method suffers from various drawbacks. Most importantly, only clinics and hospitals issue health records and these records only cover those who present themselves for health services - in other words the records cover a self-selected sample, the results of which cannot legitimately be used to make inferences about the health status of the whole community. Within the particular context of the Upper Region there are additional problems: (1) many health records are kept by the patient or, in the case of children, by their parents and are only available for analysis when patients have presented themselves for treatment (2) where records are stored centrally there is inadequate information on the location of the individual's residence to confidently assess whether the family has access to pumps or VEW presentations. Inspections of local health data by both the feasibility study and the evaluation staff also revealed problems with the presentation of information which was inappropriate for our purposes and unexplainable aberrations in the information.

The feasibility mission initially proposed a major health study utilizing qualified medical personnel. This was subsequently changed to an investigation of water-related behaviours on the argument that no changes in health could occur without changes in behaviour. Any such behavioural changes could not of course guarantee that improvements in health had occurred.

When the evaluation team was in the field, this question of measuring direct indicators of health was reviewed resulting in the inclusion of two sets of indicators - guinea worm incidence and selected measures of the health status of young children in the yard. Utilizing a research procedure attempted elsewhere in Africa with non-health workers, the survey interviewers were instructed to ask about any diarrhoea, fever, skin or eye problems and cough that the children were currently experiencing. Of these, diarrhoea is of

most interest as an indicator of the health impact of improved water supply because of the significance of diarrhoea dehydration as a cause of infant and child mortality. For control purposes this is usually compared with the incidence of a non water-related disease, such as respiratory infection.

3.6.1 The Incidence of Diarrhoea

The incidence of diarrhoea among young children was significantly higher in the wet season within the no-pump sample than for those with access to pumps (chi-square = 8.33, significant at 5%).

With one child in seven reported to be suffering from diarrhoea at the time of the interview, the no-pump sample children had about two and one half times more diarrhoea than those with access to the pumps (Table 33). The incidence of diarrhoea in the dry season showed no significant differences among the samples. The incidence of coughs, a non-water-related disease, showed no signifiant differences among the samples in either season.

TABLE 33 Reported Incidence of Diarrhoea and Cough in Young Children

Sample	N		P		V	
Season	W	D	W	D	W	D
No. of children under 6	114	118	133	131	136	117
With Diarrhoea	14.9	5.9	5.3	2.3	6.6	6.0
With Cough	5.3	8.5	5.3	11.5	5.9	14.5

A second set of data is provided from clinic records. The Presbyterian Sisters operate a mobile clinic in six villages around Bolgatanga district. For five of these clinics pumps are scattered throughout their catchment areas. The sixth, at Pwalagu, is located in an area in which no successful boreholes were drilled and water is collected from sources that are entirely unprotected (dams) or only

partially protected (wells, dugouts). The nearest hand-pump is about six kilometres from the clinic. The proportion of all children and sick children with diarrhoea is higher at the Pwalagu clinic than at any and all other clinics. As a comparison the incidence of respiratory diseases is also given, which shows no difference.

TABLE 34 Incidence of Diarrhoea and Respiratory Infections Among Children at Presbyterian Mission Clinics, 1984

	5 Clinics in Pump Areas	1 Clinic in no Pump Area
Total Patient Visits	26,939	5,639
Number of Sick Babies	9,664	2,005
Percent Sick	35.9	35.6
Number Cases Diarrhoea	549	148
Percent of Total with Diarrhoea	2.0	2.6
Percent of Sick Babies with Diarrhoea	5.7	7.4
Number of Cases Respiratory Infection	889	180
Percent of Total with Respiratory Infection	3.3	3.2
Percent of Sick Babies with Respiratory Infection	9.2	9.0

Source: Presbyterian Mission Annual Report, 1984, Bolgatanga

While both sets of data suggest that the provision of hand-pumps has reduced the incidence of infant and child diarrhoea, this result should be used with caution as other survey data indicates that pumps have made no significant difference to the volume of water consumed. Without an increase in domestic hygiene, particularly hand-washing and an associated increase in water consumption, it is unlikely that diarrhoea would be lower.

3.6.2 The Prevalence of Guinea Worm

Guinea worm (dracunculiasis) is a parastic worm that usually lies under the skin, often of people's legs. The female worm produces a blister on the leg which bursts and releases larvae. If this occurs so that the larvae can enter the water, the larvae may pass through "cyclops", a tiny aquatic crustacean. People are infected if they drink water containing the cyclops. Guinea worm causes intense pain and results in a significant loss of labour. It may be eradicated by improved water supply.

Guinea worm is an important water-based indicator of the impact of improved water supply. Because of its associated pain and scar, reporting of its incidence is likely to be both reliable and valid. Only three respondents reported suffering from guinea worm at the time of interview (Table 35) and another 13 within the last year.

Respondents with access to pumps reported a statistically significant lower incidence of guinea worm within themselves over the previous year compared to those without access to pumps. However, some of the data on the historical prevalence of guinea worm also showed statistically significant differences. As all respondents were born before the pumps were installed this may indicate that the lower prevalence pre-dates the pumps. There was a statistically significant difference in the dry season in the reported prevalence of guinea worm within others in the compound associated with access to a pump (chi square dry = 5.29, sig. at 5%) (Table 35); however this did not hold in the wet season.

TABLE 35 Reported Prevalence of Guinea Worm

Sample	N		P		V	
Season	W	D	W	D	W	D
n	117	113	130	121	117	111
Respondent:	%	%	%	%	%	%
Guinea-Worm now	0	1.8	0.8	0	0	0
Guinea-worm within the last year but not now	6.0	2.7	0	0	1.7	0.9
Guinea-worm ever, but not in the last year	15.4	23.0	13.8	12.3	5.1	9.0
Anyone (else) in this compound with guinea-worm now	2.6	8.0	1.6	2.5	4.3	2.8

3.7 Source and Site Conditions and Perceived Ownership of the Source

3.7.1 Site Development

When the boreholes were first drilled, a small concrete pad was constructed around them (Photograph #11). After the hand-pump was installed, the local community was expected to organize the construction of a larger pad, backfill (a bed of stones) around the pad, an animal trough and a gutter from the pad to the trough.

There were considerable variations between the P and V samples in the extent of site development that suggest the favourable impact of VEWs in promoting this activity (Table 36).

TABLE 36 Evaluation Project's Assessment of Extent of Pump Site Development in Early 1985

Sample	P	V
n	11	10
	%	%
EP, G, T	18.2	70.0
EP, G	18.2	0
nil	63.6	30.0
TOTAL	100.0	100.0

Note: EP = extended pad, G = gutter, T = trough

3.7.2 User Attitudes Towards Water Sources

The survey explored respondent's attitudes to both their water sources and conditions around the source. User attitudes towards the pumps are generally positive or very positive with the exception of:

1. Overcrowding in the mornings during the dry season;
2. Overcrowding in the evenings during both seasons; and
3. to a lesser extent, distance from the compound.

On criteria of water cleanliness, taste and frequency of pump breakdown, pumps receive affirmative ratings by 80% or more of the P and V samples.

The criteria of adequacy, ease of use, speed of repair, site cleanliness and discharge rate received affirmative ratings that averaged 60-80% among P and V samples.

In Table 35 the criteria are arranged in descending order based on an average of P and V ratings.

TABLE 37 Perceptions of the Hand-Pumps

Sample	N		P		V	
Season	W	D	W	D	W	D
range of responses	8-14	19-25	57-114	89-104	70-107	88-104
Respondent agrees that:	%	%	%	%	%	%
The water is clean	85.7	96.0	92.9	97.1	95.3	98.1
The water tastes good	75.0	96.0	87.2	87.4	96.2	98.1
The pump breaks down too often	54.6	20.0	8.7	11.5	18.6	16.5
The family obtains enough water from this source	37.5	60.0	68.4	73.8	82.9	84.6
The pump takes too long to be repaired	63.6	31.6	25.5	28.1	19.2	20.5
The pump is overcrowded in the afternoon	50.0	40.0	12.6	29.1	19.1	36.5
The site is too dirty	14.3	8.0	35.1	30.1	18.3	13.9
The yield is too low	35.7	36.0	33.3	33.0	25.7	21.4
The pump is too difficult to use	69.2	56.0	33.9	36.9	26.7	21.2
The pump is too far away	100.0	88.0	60.5	61.5	50.5	49.0
The pump is overcrowded in the morning	71.4	76.0	34.2	71.8	41.5	71.2
The pump is overcrowded in the evening	78.6	96.0	65.8	93.2	80.2	95.2

Other points of interest in Table 37 include:

1. The greater extent of perceived overcrowding at all times of the day in the dry season compared to the wet season; this is compatible with the earlier result of increased pump use in the dry season.

2. The high ratings given to the taste of hand-pump water; experience in pump projects elsewhere has found user resistance to pump water taste.

3. Considerably different perceptions of site cleanliness between P and V samples; on average about twice the proportion of P respondents judged their site to be dirty than did V respondents, probably reflecting the different extent of site development (Table 36).

4. A slightly higher percentage of respondents in the P sample judging the yield of their pumps to be low and difficult to use than in the V sample. This does not appear to be associated with

the proportion of the slower yielding Moynos in each sample. At Moyno pumps, 50 RPMs produce approximately one third the water of the Monarch pumps at 50 SPMs. Moyno pumps were present at four sites in both of the P and V samples.

An analysis of a similar set of questions asked of all respondents whose current or alternative source was any non-pump source suggests that users also view many aspects of non-pump sources favourably (Table 38).

TABLE 38 Perceptions of the Non Hand-Pump Sources

Sample	N		P		V	
Season	W	D	W	D	W	D
n	72-117	107-110	49-110	87-89	53-76	69-72
Respondent agrees that:	%	%	%	%	%	%
The source is over-crowded in the afternoon	16.2	33.9	11.9	19.5	7.9	17.4
The water tastes good	75.9	72.7	78.7	80.7	81.3	70.0
The water is clean	65.8	69.1	79.6	83.0	77.3	70.0
The site is too dirty	38.5	47.3	19.4	21.8	17.1	22.5
Her family obtains enough water from this source	77.8	50.0	81.6	63.6	83.0	65.7
The source is over-crowded in the morning	22.2	68.2	21.1	43.2	15.8	33.3
The yield is too low	25.6	61.7	26.4	44.8	19.7	38.6
The water is too difficult to collect	28.2	59.1	22.9	53.4	14.5	43.7
The source is over-crowded in the evening	41.4	78.2	26.6	58.0	19.7	39.1
The source is too far away	51.3	74.6	43.6	57.3	35.5	47.2

A comparison of both sets of ratings suggests:

1. Both types of sources have high ratings for water taste and cleanliness, with the pump being rated somewhat higher;

2. On the criteria of ease of use, adequacy and yield, all samples rate non-pump sources higher in the wet season and pumps higher in the dry;

3. On the criteria of distance and overcrowding at all times of the day, all samples rate pump sources as being further away and more overcrowded than non-pump sources in both seasons;

4. With respect to site cleanliness, the P sample judges non-pump sources to be cleaner in both seasons and the N sample judges pump sites to be cleaner.

3.7.3 Pump Breakdowns

For all samples, 80% or more of respondents who use a pump as a current or alternative source reported a breakdown in their pump within the last year or so (Table 39).

TABLE 39 Most Recent Pump Breakdown as Recalled by Respondents

Sample	N		P		V	
Season	W	D	W	D	W	D
n	8	21	80	82	83	96
Last Breakdown	%	%	%	%	%	%
Within the last month	0	4.8	2.5	13.4	20.5	17.7
More than 1 month, less than 6	75.0	57.1	45.0	9.8	15.7	21.9
About 6 months ago	0	9.5	18.8	7.3	12.0	12.5
More than 6 months, less than 12	12.5	0	3.8	4.9	7.2	5.2
About 1 year ago	12.5	23.8	20.0	50.0	25.3	24.0
More than 1 year, but less than 4	0	0	6.3	12.2	8.4	7.3
Never broken	0	4.8	3.8	2.4	10.8	11.5
TOTAL	100.0	100.0	100.2	100.0	99.9	100.1

3.7.4 Perceived Pump Ownership

The respondents were asked who they thought owned the hand-pump. The majority of women responded that the pump was owned by the chief, the pumpman, or the government. A significant number of people in the pump sample thought the owner was the section or village in which the hand-pump is located.

TABLE 40 Perceived Ownership of Hand-Pump

Sample	N	P	V
n	19	82	79
	%	%	%
Chief	15.8	18.3	29.1
Pumpman	21.1	23.2	27.8
Government	10.5	23.2	22.8
Village/Section	10.5	15.9	5.1
GWSC	0	4.9	2.5
Landlord of near-by compound	15.8	3.7	2.5
Sub-headman, section head, elder	15.8	4.9	6.3
White people	5.3	2.4	3.8
Unidentified person	5.3	1.2	0
Tingdana	0	1.2	0
No one	0	1.2	0
TOTAL	100.1	100.1	99.9

Note: Dry season data only.

3.7.5 Perceived Ownership of Non-Pump Sources

When asked about ownership of non-hand-pump sources the majority thought it belonged to the chief, the tingdana, the landlord of a nearby compound or the headman or elder (Table 40).

TABLE 41 Perceived Ownership of Non-Pump Sources

Sample	N	P	V
n	19	82	79
	%	%	%
Chief	16.2	5.8	15.7
Tingdana (landlord)	13.3	21.0	12.9
Headman/elder	6.7	5.8	5.7
Landlord of near by compound	10.5	20.9	21.4
Village/section/ people	12.4	11.6	11.4
Pumpman	3.8	0	0
Ancestors	1.0	2.3	5.7
God	3.8	2.3	1.4
No one	5.7	5.8	0
Don't know	26.7	24.4	25.7
TOTAL	100.1	99.9	99.9

Note: Dry season data only.

3.8 Compound Conditions

Differences in reported activities have been discussed in previous sections. The survey included an attempt to observe differences of hygiene and sanitation among households. Tables 42 and 43 display the results of the three samples in wet and dry seasons. Two comparisons have been made in each season. The first is between the N and P samples, to investigate any differences associated with access to a pump; the second is between the P and V samples to investigate any differences associated with access to VEW presentations.

For the N and P comparison only two differences are statistically significant at a 5% level or higher - the wet season behaviour of preventing livestock from entering the living area (chi-square = 12.85, sig. at 1%) and the dry season practice of using a dipper, ladle or cup for transferring water from the drinking containers (chi square = 4.37, sig. at 5%).

For the dry season P and V samples, only one indicator, the presence of a cleared path through the animal yard (which reduces the possibility of the transmission of animal faeces from the animal yard to the living quarters) has a statistically significant difference (chi square = 6.61, sig. at 1%). It is important to note that the difference in latrines is almost statistically significant at a 5% level (chi square = 3.80, chi square 95% = 3.84), with more latrines in villages without a VEW presentation.

The wet season comparison reveals no statistically significant differences between the P and V samples. The only statistically significant observation of the dry season (the presence of a cleared path through the animal yard) is not only not significant in the wet season, but its direction has reversed.

Comparing these results between wet 1984 and dry 1985 indicates some apparent anomalies. These include:

1. a substantial decline in the number of compounds with a raised drying area for utensils;

2. a substantial decline in the percentage of bathhouses with soakaway pits; and

TABLE 42 Comparison of Observed Conditions of Compounds by Sample - Wet Season 1984

Sample	N	P	V
	%	%	%
No place where used water from the compound collects	72.6	69.8	78.6
No fowl faeces and/or fowl present in the living area	73.2	66.9	74.4
Bathhouse in the compound	49.6	54.8	62.1
Dipper, ladle, or cup for transferring water from the drinking water containers	23.5	23.8	28.2
Percentage of bathhouses with a soakaway pit	28.6	36.2	40.3
Livestock prevented from entering the living area	75.0	92.4	95.7
Line or stick for drying clothes	44.7	44.9	47.4
Entrance other than through the animal yard	23.9	32.0	32.5
No human or livestock faeces in the living area	84.8	90.2	90.6
Pots with drinking water are covered	88.5	89.8	88.9
Compound has a latrine	0.9	2.4	0
Drying area located off the ground for utensils	8.8	17.1	14.5
Cleared path through the animal yard	38.4	47.6	40.2

3. a substantial rise in the number of compounds with a line or stick for drying clothes.

Some of these may be the result of more training of the interviewers between the two seasons and increased emphasis upon observation (for instance, of the soakaway) rather than simply asking the respondent in yards where an observation was not easily made.

TABLE 43 Comparison of Observed Conditions of Compounds by Sample - Dry Season 1985

Sample	N	P	V
	%	%	%
Cleared path through the animal yard	18.2	16.0	30.3
Bathhouse in the compound	54.5	50.8	60.4
Drying area located off the ground for utensils	5.4	3.3	6.3
No human or livestock faeces in the living area	86.7	91.7	91.9
Percentage of bathhouses with a soakaway pit	1.9	8.2	7.7
No place where used water from the compound collects	86.5	87.4	88.3
Pots with drinking water are covered	93.7	94.2	92.8
Compound has a latrine	4.5	3.5	0
Livestock prevented from entering the living area	86.6	90.8	86.5
Dipper, ladle or cup for transferring water from the drinking water containers	19.6	31.7	27.0
Entrance other than through the animal yard	31.3	35.8	30.6
Line or stick for drying clothes	54.0	61.7	55.5
No fowl faeces and/or fowl present in the living area	52.7	60.0	68.4

3.9 The Availability of Soap

To remove any significant amount of bacteria from hands through water alone requires thoroughness - time and attention to all parts of the hands. Using soap increases the ability of water to remove dirt from clothes and bacteria from the body. Washing hands, preferably with soap, before the preparation of food is probably the single most important intervention to break the faeces-fingers-food contamination route.

Reported access to soap for bathing ranged from 9.4% to 30.0%. Access to soap for the less frequent activity of washing clothes was much higher -- 43% to 54.2% (Table 44).

TABLE 44 Reported Availability of Soap for Bathing and Washing Clothes

Sample	N		P		V	
Season	W	D	W	D	W	D
	%	%	%	%	%	%
soap available						
for bathing	20.9	20.7	9.4	18.3	20.4	30.0
for washing clothes	53.4	51.8	50.0	44.2	48.3	54.2

An analysis of the reported types of soap shows the importance of the Volta brand imported from neighbouring Burkina Faso and sold by small traders in markets throughout the Upper Regions. Over 60% of those compounds with soap reported using Volta. Other commercially produced soaps from Ghana accounted for almost 30% of the bathing soap and almost 13% of soap for washing clothes. Traditional soaps made from local oils such as shea butter account for 8% of the bathing and 20.6% of the clothes washing (Table 45).

TABLE 45 Reported Types of Soap -- All Respondents With Soap by Bathing and Washing Clothes

Type	Bathing	Washing Clothes
n	137	350
	%	%
Volta	62.8	66.6
Guardian	20.4	9.4
Local	8.0	20.6
Other (Lux, Risto, Omo, Sunlite, Not Specified)	8.8	3.4
TOTAL	100.0	100.0

In 1981, WUP investigated ways of promoting the availability and effectiveness of soap by arranging for local soap to be chemically analyzed and attempting to discover low technology methods of soap manufacture. The local soap was not found to be an effective cleaner and a critical omission of caustic soda was identified. This cannot be manufactured locally and must be imported.

The results of Table 44 suggest that the availability of soap for both bathing and washing clothes was a problem and an impediment to realizing the full health impact of improved water supply.

3.10 <u>Education</u>

3.10.1 Access and Exposure to Water Utilization Education

WUP chose volunteer village education workers as its main medium of providing water utilization education. Each VEW is expected to make three presentations at each of 10 pumps each year. Within both Upper Regions this implies a current coverage by the present 60 or so VEWs of about 23% of all pumps.

At the time the social survey began, VEWs reported having worked at about 27% of pumps in the Bolgatanga district; at each of the ten selected survey areas they reported an average of 2.5 presentations.

Respondents reported on the attendance by themselves and others in their yard at VEW presentations and their exposure to health education, through other means, particularly clinics. Within the V sample, between one yard in ten and one in eight reported having attended a VEW presentation.

TABLE 46 Reported Attendance at, and Knowledge of VEW Talks by Sample and Season

Sample	N		P		V	
Season	W	D	W	D	W	D
n	115	109	128	117	112	109
	%	%	%	%	%	%
No knowledge of VEW talk ever in the Village	95.7	99.1	98.4	99.2	74.1	67.3
Knew of VEW talk but did not attend	4.3	0	0.8	0	16.1	20.0
Attended VEW talk	0	0.9	0.8	0.8	9.8	12.7

Education concerning water utilization has also been offered by WUP through concerts, puppet shows and drama.

Few respondents reported having attended a water concert in the district. Slightly more respondents had attended water concerts elsewhere; these were distributed among all samples (Table 47).

TABLE 47 Reported Attendance at Concerts by Sample and Season

Sample	N		P		V	
Season	W	D	W	D	W	D
n	110	107	128	119	114	109
	%	%	%	%	%	%
Attended concert in district	0.9	0	0.8	0	3.5	3.7
Attended concert in Kumasi of Accra	1.8	2.8	1.6	1.7	1.8	2.8

The most frequent exposure to health-related education, however, comes from talks at clinics. This was particularly true for the N and V samples (Table 48) where between one respondent in seven and one in five reported that she or someone else from her yard had attended a talk at a clinic.

TABLE 48 Reported Clinic Attendance and Exposure to Clinic Talks on Water by Sample and Season

Sample	N		P		V	
Season	W	D	W	D	W	D
n	117	109	130	117	117	109
	%	%	%	%	%	%
Attended in last month	27.4	27.5	13.8	16.2	36.8	33.9
Attended in last year	46.2	61.5	33.8	44.4	52.1	55.0
Ever attended	74.4	83.5	63.8	75.2	82.1	84.4
Listened to talk on water at clinic						
- all respondents	21.4	12.8	6.9	3.4	15.4	13.8
- all who ever attended a clinic	28.8	15.3	10.8	4.5	18.8	16.4

Total reported exposure to health education in one form or another ranged from 5% to almost 28% (Table 49).

TABLE 49 Reported Exposure to Education by VEWs, Other Means and Total

Sample	N		P		V	
Season	W	D	W	D	W	D
n	117	113	130	121	117	111
	%	%	%	%	%	%
% attending VEW presentation	0	0.9	0.9	01.8	9.4	12.6
% attending other health education	23.1	14.2	9.2	5.0	18.8	18.0
TOTAL % attending any health education	23.1	15.0	10.0	5.0	22.2	27.9

3.10.2 The Impact of Education

Significant differences between the P and V samples have been reported with respect to the reported selection of a hand-pump as a current source (3.2.4) and the citing of "good" or "clean" water as a factor in source selection (3.2.5).

Given the relatively low exposure to any form of education - VEW or clinic - by the V sample, it is difficult to argue that these differences have arisen from the education. A rigorous evaluation of the impact of the education, or indeed any intervention, ideally requires the collection of baseline data, a random allocation of the intervention and before-after and control - intervention comparisons. Without these, it is impossible to tell whether those differences pre-dated the education intervention or arose from other factors. The education programme is discussed further in Report 4.

4.0 WATER CONTAMINATION

4.1 Introduction

At the most utilized water sources within the survey area, and at about one respondent's yard in five, samples of water were collected and tested for faecal contamination with a membrane filtration process. Samples were collected in plastic sample bags, stored in a dark cooler and transported to arrive at the laboratory within two hours of collection. The laboratory procedure laid out by the manufacturer was closely followed and supplemented by the inclusion of control samples of known faecal matter and distilled water. Results were only utilized if these controls responded appropriately.

4.2 Contamination at Water Sources

In the wet season contamination was identified in about half the pumps and none of the other sources. In the dry season, about 40 percent of the pumps were contaminated (9/22 = 40.9%) and about 20% of the non-pump sources (3/14 = 21.4%). (Table 50). The one serious case of faecal contamination occurred in the dry season at a pond in area C8 (Vea Tendongo).

TABLE 50 Faecal Coliform Contamination at Pump and Non-Pump Water Sources by Season

Season	Wet		Dry	
Source	Pump	Other	Pump	Other
No. of colonies per 100 mls.				
TNTC	0	0	0	1
11-100	1	0	0	1
1-10	6	0	9	1
0	7	14	13	11
TOTAL	14	14	22	14

These results do not agree with earlier data collected within the programme, particularly the relatively low contamination of non-pump sources. This may arise from the selection by the evaluation project of only those non-pump sources that woman select for their drinking water. Some of the earlier results appear to have tested surface sources which were not always those used for drinking water. This implies that some women drawers do discriminate between sources and particularly prefer to use sources which have been filled by seepage and thus exposed to some sand filtration (see Section 3.2.3).

For the 14 pumps whose water was tested in both seasons, just over a third (5/14 = 35.7%) had a low coliform count in both seasons (Table 4.2). These were the pumps at P7 (445-I57), P8 (445-F24), P9 (445-I54), V7 (445-C23) and V9 (456-G9). Only three (3/14 = 21.4%) had no contamination in either season.

TABLE 51 Contamination at 14 Pumps, Wet and Dry Seasons (FC Count/100mls)

		Wet Season Count			
		0	1-10	11-100	TOTAL PUMPS
Dry Season Count	0	3	1	1	5
	1-10	4	5	0	9
	TOTAL	7	6	1	14

4.3 Contamination of Drinking Water in Compounds

Between 26.8% and 42.9% of yards had contaminated drinking water. For the V and P samples this was higher in the wet season.

TABLE 52 Contamination of Drinking Water in Compounds

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of yards tested	43	34	34	41	42	33
% of yards with any Contaminated Water	32.6	38.2	32.4	26.8	42.9	33.3

The data in Table 50 thus suggest that of the pumps in the survey, 50% in the wet season and 41% in the dry had water with some contamination; while 0% and 21% of non-pump sources were contaminated in the wet and dry seasons respectively. A simple comparison of the overall levels of contamination at the sources and at the compounds suggest that contamination at the compounds within the P and V samples may be lower than would be expected, while the N sample data suggests particularly poor protection of water purity in the wet season.

5.0 PUMP LOCATION AND ALLOCATION

5.1 Introduction

The decision to draw water from one particular source rather than another is determined by a number of factors, chief among which is accessibility which may be considered to be composed of distance, time and ease of use.

The location of pumps with respect to the drawers of water and the ratio of pumps to people are factors that are under the control of the water programme donors, planners and drillers. In the case of the URWSP the targets were that pumps should be located within half a mile (800m) of drawers and allocated on a ratio of one pump per 300-350 people. The evaluation data sheds some light on the degree of success of the programme in meeting these targets.

5.2 Pump Location

Within the 21 evaluation project survey areas with pumps there were a total of 500 compounds -- 202 respondents and 298 non-respondents. An analysis of the map distance between compound and pump for these two samples reveals that nine percent resided futher than 800m from a pump (Table 53).

TABLE 53 Distance from a Hand-Pump for 500 Compounds in Bolgatanga District

Distance (metres)	% of compounds	Cumulative %
1-100	6.6	6.6
101-200	11.8	18.4
201-300	17.0	35.4
301-400	14.8	50.2
401-500	16.4	66.6
501-600	11.8	78.4
601-700	7.0	85.4
701-800	5.6	91.0
801-900	3.8	94.8
901-1000	1.4	96.2
1001-1100	1.8	98.0
1101 or more	2.0	100.0
TOTAL	100.0	

Note: P and V Samples Only.

To obtain a distribution of distances to the hand-pump for the complete population, the No-Pump sample, selected on the basis of being at least 1.3 km from the nearest hand-pump, must be included.

The actual allocation of pumps to be within 800m of UR rural residents can now be estimated using the following procedure.

From the overall statistics of the URWP:

1. total no. of pumps = 2,650;

2. total rural population in the URs = 90% of 1.2m = 1.08m;

3. overall pump/rural population ratio = 1.08m/2,650 = 1 pump per 408 people.

From the Social Survey:

4. no. of compounds within 800m of pump at 21 pumps = 91% of 500 = 455;

5. average compound size = 11 people;

6. mean no. of people within 800m of a pump in each survey area = 445x11/21 = 238; and

7. percentage of people for whom mean pump is further than 800 m. = 408-238/408 = 42%.

It can therefore be estimated that in 1984 the programme provided about one pump per 400 rural people of whom, reflecting a highly dispersed settlement pattern, about 60 percent reside within 800 metres.

6.0 SOURCE USAGE

6.1 Introduction

As a by-product of the source measurement activity, the recording of water actually drawn by respondents through placing observers at the water source, it was possible to have these observers also collect information on:

1) the total number of drawers leaving with water each hour;
2) the waiting period between arrival at the source and departure with water; and
3) other water-related activities at the source such as washing clothes, bathing and animal watering.

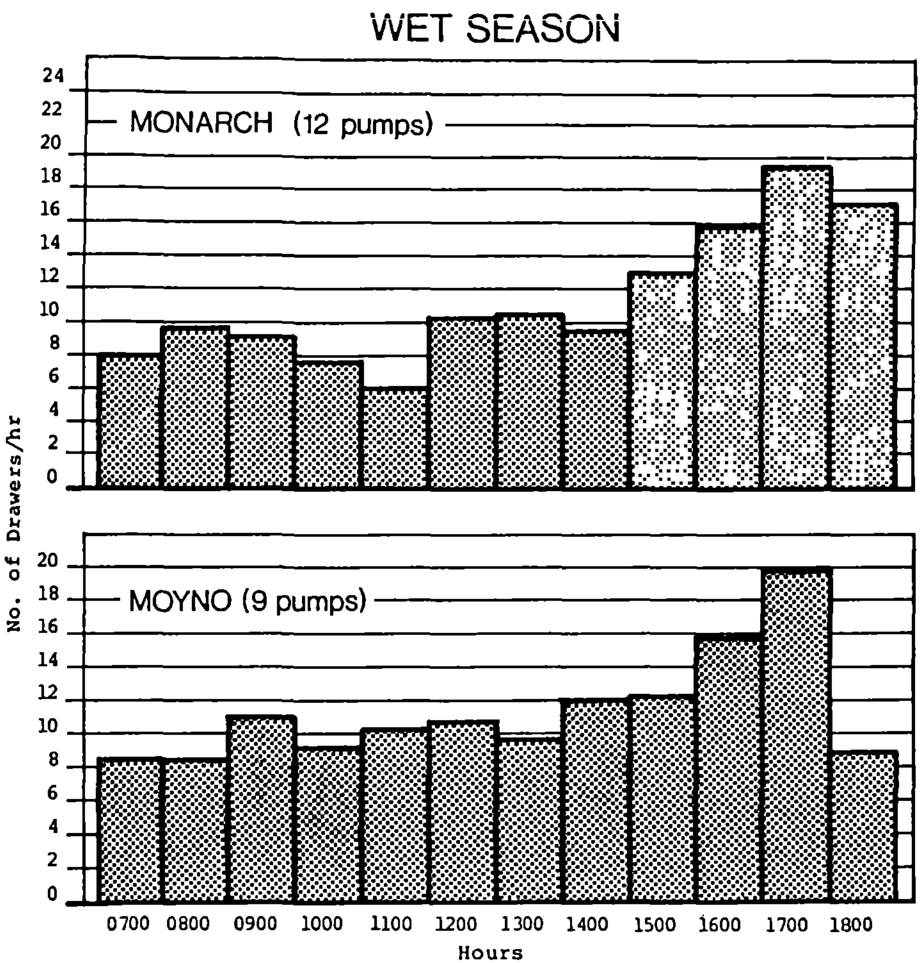
6.2 Total Daily Drawers

Overall, the total number of people drawing water from a pump during the 12 hour period between 7 a.m. and 7 p.m. averaged 158. This showed a significant difference between the two seasons with the number of drawers being 38% higher in the dry than the wet. A pump by pump comparison (Table 54) shows tremendous individual differences to this overall pattern; of 19 pumps, six had an increase exceeding 100% and another six showed a decrease between the seasons.

TABLE 54 Total Number of Drawers in One Day between 0700-1859 for 19 Pumps Wet and Dry Season

Season	W	D	% Difference $\frac{D-W}{W}$
Survey area			
P1	172	168	-2
P2	107	285	+166
P3	181	138	-31
P4	14	149	+964
P5	216	149	-31
P6	157	257	+64
P7	58	95	+64
P8	45	66	+47
P9	72	179	+149
P10	96	35*	--
P11	55	173	+215
V1	227	182	-20
V2	212	248	+17
V3	100	204	+104
V4	175	301	+76
V7	149	212	+42
V8	82	221	+170
V9	133	154	+16
V10	163	122	-25
V11	192	172	-10
MEAN	132.2	182.9	+38

Note: (1) This pump was shorting in the dry season; both data excluded in the calculation of means



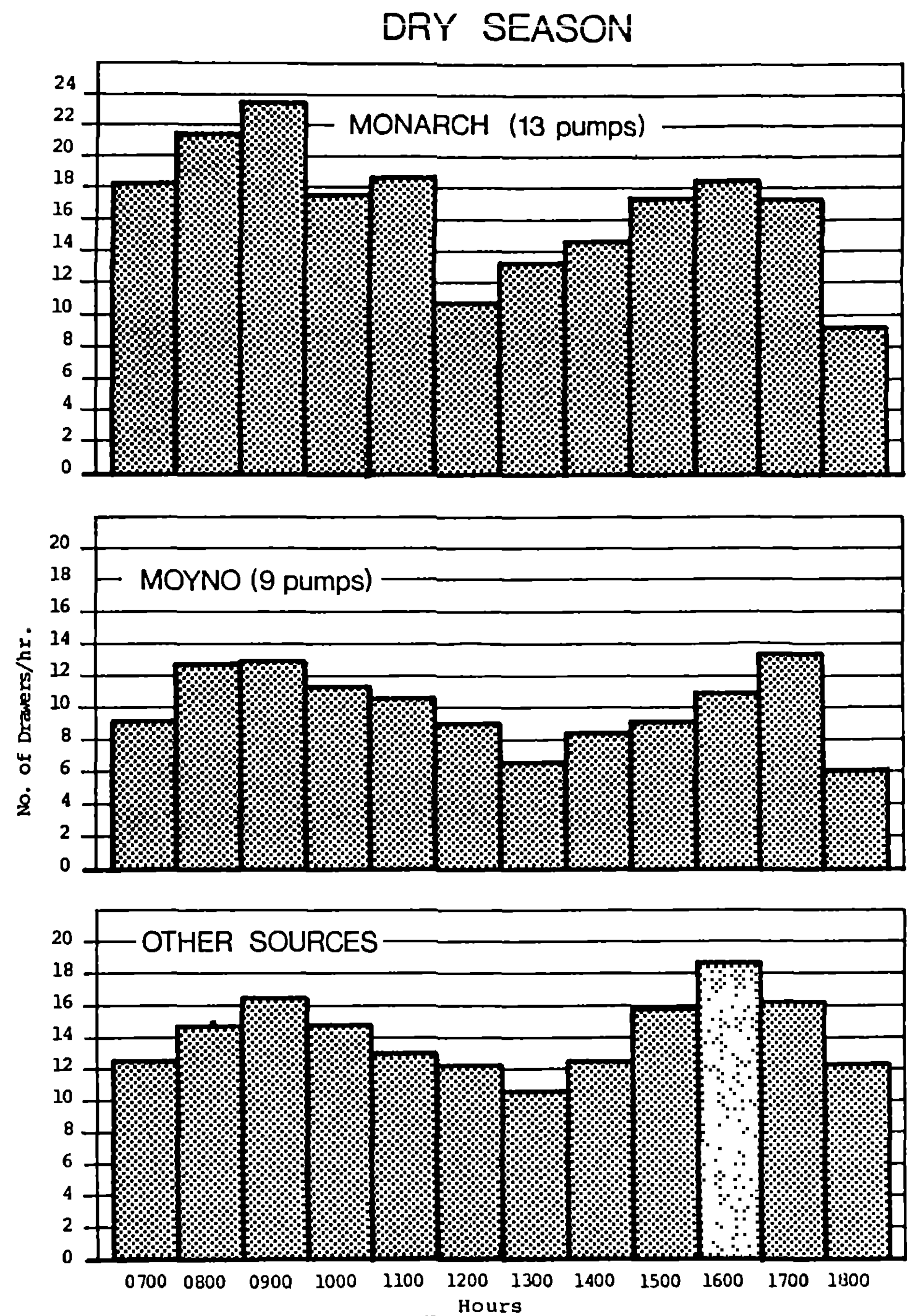


Figure 9 Average Number of Drawers per Hour Between 0700–1859 hrs. by Water Source Type and Season

The general inter-season increase is particularly marked for Moyno (Photographs 11 and 12) pumps. Because of their manufacturer's claims of high durability these have tended to be placed in areas of high population. Mean drawers per pump per day for both the Moynos and Monarchs (Photograph #13) were around 130 in the wet but 221 and 157 respectively in the dry (Table 55). The Moynos showed three times greater an inter-season difference than shown by the Monarchs.

TABLE 55 Range and Mean of Total Drawers between 0700-1859 Hours by Source Type and Season

Water Source	Moyno		Monarch		Non-Pump
Season	W	D	W	D	D
n	7	8	12	12	10
Total daily drawers					
Maximum	218	301	227	221	319
Minimum	55	149	14	66	26
Mean	134.4	221.4	130.9	156.9	120.0
Inter-season % difference In mean	+65%		+20%		

The highest number of users in any hour, the peak, is also of interest to designers of water supply systems. Demand is not constant throughout the day and most pumps had a bi-modal distribution with peaks in the morning and late afternoon (Figure 9).

Peak traffic for both types of pumps was recorded at around 50 drawers per hour at the very busiest pumps. At the other end of the scale the minimum peaks dropped to a range of 5-22 drawers per hour. The mean peak for all sources ranged between 20 and 35 drawers per hour. On average the peak rate was slightly more than double the mean rate (Table 56).

TABLE 56 Peak Number of Drawers in any one Hour Between 0700-1859hrs by Source type and Season

Water Source	Moyno		Monarch		Non-Pump
Season	W	D	W	D	D
No. of pumps	9	9	12	13	10
Maximum peak	39	50	49	44	35
Minimum peak	11	22	5	11	5
Mean peak	23.4	34.5	22.3	27.4	20.8
Mean drawers per hour	11.2	18.5	10.9	13.1	10.0
Ratio of mean peak/mean drawers per hour	2.1	1.9	2.1	2.1	2.1

One final point to consider in estimating daily usage of the pumps is the usage outside the hours of observation i.e. between 1900-0559 hours. In nine cases the observers also recorded the complete hour between 0600-0659. On average, this increased the daily total of drawers by 10.8%; 14.1% in the dry and 4.8% in the wet season.

The period 1900-0559, mostly hours of darkness, also have drawing activities. On the basis of a small amount of data from the water meters installed at four Moyno pumps, it is estimated that about 3% of water is drawn during these hours (Section 7.0).

When both of these corrections are added to the results of Table 55 the total number of drawers of water per 24 hour day is estimated at 142 (wet) and 215 (dry).

6.3 Waiting Time at the Source

Waiting time is important to measure as a component of source accessibility. It is hypothesized that a combination of waiting time, distance from compound to source and ease of use will influence source choice.

Two measures of waiting for water were collected. The most important was the total waiting time for every tenth collector. In addition, at every ten minute interval the observers were instructed to record how many people were waiting for water.

These two measures are related to each other; the more people already waiting when any one collector arrives, the longer she is likely to have to wait for her turn. The speed with which each drawer is satisfied would in turn appear to depend upon the discharge rate of the pump. Given that the Monarch has approximately three times the yield of the Moyno and its allocation to less populated areas, it is hypothesized that in general, waiting time at Monarch pumps should be shorter than at Moynos.

In the wet season all average waiting times at all hours of the day are single figures, with waiting times for the Monarch exceeding those for the Moyno in the early morning and during the end of the day.

In the dry season, average waiting periods at the same time of day are almost always longer, by a magnitude of up to sevenfold. During ten of the observed 12 hours, waiting time for the Moyno is longer than for the Monarch, with an average duration about 40% longer.

TABLE 57 Average Waiting Periods by Hour of the Day, Source Type and Season (Minutes)

Season	Wet		Dry		Other
Source No. of pumps	Moyno 8	Monarch 11	Moyno 8	Monarch 10	Sources 7
Hours					
7-759	3	5	13	21	19
8-859	5	6	14	11	22
9-959	3	6	22	12	21
10-1059	5	4	27	14	17
11-1159	8	2	21	12	21
12-1259	8	2	8	11	20
13-1357	5	4	18	8	22
14-1459	8	3	28	16	21
15-1559	9	6	15	14	27
16-1659	7	9	21	17	26
17-1759	9	8	13	10	24
18-1859	2	8	13	10	4

For each day at the pump a profile can be prepared that charts average waiting time, the number waiting and departures each hour.

At Bongo Bonzoe, just 10km north of Bolgatanga, the pump 445-F7 was included as a VEW and pump sample. It is within the relatively large village of Bongo with an allocation of a half a dozen pumps.

TABLE 58 Profile of Pump Usage at Bongo-Bonzoe, March 12, 1985

Time	Average No. Waiting at 10 minute intervals during each hour	Average Waiting Time for 10% sample who arrived during this hour (no. sampled)	No. departing with water
0512-0559	32	123 (7)	35
0600-0659	55	208 (2)	32
0700-0759	55	180 (2)	28
0800-0859	50	133 (2)	29
0900-0959	52	124 (1)	13
1000-1059	47		15
1100-1159	54	161 (2)	7
1200-1259	43	28 (1)	7
1300-1359	37	32 (1)	15
1400-1459	33	32 (2)	16
1500-1559	31		5
1600-1659	27	38 (2)	10
1700-1759	22	32 (2)	22
1800-1830	25		6

Those who use F7 tend to come early in the morning. If there is a large crowd waiting to use the pump, they leave their collecting container to record their place in the line-up and return later. For some of those who arrive around 0600 and 0700 there is a wait of no less than three hours!

Despite the heavy pressure on the pump the hourly rate of departures between 1100 and 1659 falls to only 10 per hour; in the first four hours of the day it was three times as great.

On average, those who collected water had to wait 109 minutes; those who came before noon waited 147 minutes while those who came later waited only 33 minutes.

7.0 COMPARISON OF DATA FROM DIFFERENT RESEARCH INSTRUMENTS

7.1 Introduction

For a few variables it was possible to obtain similar information from a variety of different research instruments. The characteristics and intended outputs of each of the three research instruments may be summarized as:

Instrument	Characteristics	Comparable Outputs
Questionnaire	one interview with each respondent each season	. usual source and alternative source(s) . usual number of trips . usual collectors . usual containers . usual number of baths each day . trips yesterday by respondent . baths yesterday by respondent
Source Measurement	one dawn to dusk observation of who draws water, how many times, with which container for each respondent and her yard	. observed collectors . observed number of trips . observed volumes taken at the current source of most respondents yards
Three Visits	three visits to each yard during the day of source measurement and the next morning to ask who has collected water, from which source and with which container and who has bathed since wake-up or last visit	. reported collectors . reported trips . reported containers . reported baths over the last 2-12 hours to provide a complete record between wake-up and sleep

The questionnaire and source measurement may be considered standard components of social research on water-related behaviours (3, pp.49-53). The addition of the three-visits data collection arose as an attempt to solve a number of problems. Firstly, during the wet season in the no-pump villages the variety of current sources among

the twelve or so respondents was too great to mount a dawn to dusk source measurement at each source. Secondly, in the pre-test there appeared to be a large discrepency between the "usual" number of trips reported on the questionnaire and the significantly lower number of trips recorded during the source measurement. It was unclear if this arose from over-reporting the usual number of trips or omissions during the source measurement arising from the exclusion of trips made by some members of the yard, such as small girls and males, or from trips made before dawn or after dusk. Thirdly, there was some anecdotal evidence that during any one day, one yard's members would go to more than one water source - selected on the basis of use, accessibility and quality. As the source measurement was located at only one water source, visits to other sources were not recorded. Moreover, as the source measurement was conducted at one source for one day, some yards were totally omitted in the source measurement, either because this was not their current source or because they had not made any trips that day. Finally, there was some suspicion by the evaluation staff that daily bathing was subject to social expectations and thus had a tendency to be over-reported in the interview.

A series of three visits to the yard during mid morning, late afternoon and early the next morning to ask about collection trips and bathing was judged to be one solution to some of these problems. While the visits still relied upon reported information rather than observed, it offered the advantages of asking for the recall of two specific activities - collecting water and bathing - over relatively short periods of approximately 2-4 hours (wake-up to first visit) 5-8 hours (between first visit and second visit) and of 4-6 hours (between second visit and going to bed) some 12 hours later (next morning). This system allowed the use of all water sources to be investigated and let an estimate of daily bathing for each yard member be made from three separate periods rather than considered as the usual number of baths per day.

7.2 Comparison of Data

As a preliminary analysis of the results from these different sources, data on source choice and estimates on water collection are reported below.

Data from the survey and source measurement on selection of hand-pump as current source produce two remarkably similar patterns for the P and V samples; there is an identical order of magnitude between the four results and in three of the four cases the difference between comparable survey and Source Measurement result is between 8.1% and 8.3%. The higher results from the survey are to be expected as the survey asked about usual behaviour while source measurement recorded actual behaviour on one particular day (Table 59).

TABLE 59 Selection of Hand-Pump as Current Source - Comparison of Survey and Source Measurement Results

Sample	P		V	
Season	W	D	W	D
% reporting hand-pump as current source in survey	51.9	67.5	74.1	87.4
% drawing water from hand-pump on day of source measurement	43.8	64.5	65.8	79.3

A review of estimates of total volume collected arising from the three visits and source measurement (lines 9 and 10 in Table 60) yields the following comparisons:

1. in all cases the survey estimate is greater than the three visit estimate; this difference ranges from about 25 l. to 54 l. and by between about 22% and 78%;

2. for both estimates of the N sample, there is no significant difference between seasons;

3. for the P and V samples both sets of data indicate significant differences in the mean total volume collected between seasons but not between samples.

While there are considerable differences in the magnitude of the data yielded by each method and differences in their ordering, the underlying patterns are similar.

TABLE 60 Comparison of Water Collection Data from Source Measurement, Three Visits and Survey

Sample	N		P		V	
Season	W	D	W	D	W	D
n	117	113	130	121	117	111
<u>Source measurement data:</u> <u>(at current source only)</u>						
1) no. of yards making trip to CS on day of SM	ND	66	57	78	77	88
2) estimated number of collectors from Rs' yards	ND	119	88	137	140	150
3) estimated mean total volume collected per collector (1)	ND	44.6	31.6	43.9	35.0	47.8
4) estimated total volume collected per collecting yard from CS (1)	ND	80.4	48.5	77.1	63.6	81.5
<u>Three Visits data:</u> <u>(all sources)</u>						
5) no. of yards making any collecting trip	113	106	96	116	104	106
6) estimated number of collectors from Rs' yards	172	201	165	182	169	178
7) estimated mean total volume collected per collector (1)	76.8	66.7	60.5	67.9	48.8	70.2
8) estimated total volume collected per collecting yard (1)	108.1	121.4	105.3	113.0	78.8	121.9
9) estimated total volume collected all yards (1)	104.4	113.9	77.7	108.3	70.1	116.4
<u>Survey data:</u> <u>("usual" collection)</u>						
10) estimated total volume usually collected - all yards (1)	135.7	138.7	121.4	149.1	124.5	148.6

8.0 PUMP DISCHARGE DATA

In cooperation with the UN Hand-Pump Test Programme the evaluation project was able to arrange for the installation of water metres at four of its survey area pumps during the latter half of 1984. Because these meters require a horizontal mounting it was only possible to install them at Moyno pumps. At each site the evaluation arranged for a villager from a nearby compound to record the meter reading every 24 hours. Regular readings allow the daily mean to be calculated while the daily monitoring of the meter allows daily fluctuations to be recorded and the peak daily discharge identified.

The calibration of all meters was regularly checked and found to be accurate within 5% or so - a tolerable margin of error requiring no correction.

A review of the monthly data (Table 61) suggests the following points of importance:

1) pump usage is lowest in September, at the end of the wet season and peaks around March or April when intermittent rains begin;

2) a high variation in usage among these four pumps with the most used pump (455 B3) discharging more than twice the volume of 456 G9 over the period November 1984 - March 1985;

3) a peak daily discharge of 16030 litres (455 G11 in April) that is nothing less than astonishing as it represents an average yield of 11 litres/min for the complete 24 hour period!

4) the need for an upward revision of the present guidelines of Moyno discharging around 5,000 l/day. The mean for 34 pump-months is 5,970 l/day with monthly daily means for individual pumps ranging from 1,204 l/day to 13,194 l/day; and

5) for the four months for which complete data sets are available the peak/mean ratio averages out at 1.37, but for any individual month ranges between 1.17 and 1.93.

At pump 456-G9 the data for December 1984 included readings twice a day at 0600 and 1800 hours. This yields an estimate of the mean overnight discharge of 224 l/night - about 6% the total daily discharge.

TABLE 61 Pump Discharge - Peak and Mean Discharge per Day by Month - 4 Moyno Pumps August 1984-May 1985

Pump No.	Survey Area	Daily Discharge	1984 Aug.	Sept.	Oct.	Nov.	Dec.	1985 Jan.	Feb.	March	April	May
455 B3	V4	Peak Mean Peak/Mean			5,578	12,370 7,358 1.68	12,893 7,432 1.74	11,455 9,148 1.25	14,508 11,978 1.21	15,394 13,194 1.17		
455 G11	V2	Peak Mean Peak/Mean		4,085	5,355	10,215 7,285 1.40	13,257 7,251 1.83	12,207 8,687 1.41	13,865 9,785 1.42	12,774 10,695 1.19	16,030 9,558 1.68	14,917 7,938 1.88
456 G9	V9	Peak Mean Peak/Mean	4,555 3,657 1.25	4,062 3,130 1.30	7,515 3,979 1.89	6,115 4,561 1.34	6,110 4,082 1.50	5,006 4,103 1.22	5,660 4,618 1.23	9,218 5,959 1.55	7,167 6,113 1.17	8,690 5,543 1.57
455 D4	P5	Peak Mean Peak/Mean	1,456	1,204	2,794 2,144 1.37	3,600 1.14	5,191 3,757 1.38	5,528 4,459 1.24	8,586 4,444 1.93		9,277 6,377 1.46	6,404 4,499 1.42
TOTAL		Peak Mean	2,557*	2,806*	4,264	5,701	9,363 5,631	8,549 6,599	10,655 7,706	12,462 9,949*	7,349*	5,993*

*Calculated on an incomplete set of data.

REFERENCES

1. Evaluation of the Education and Participation Components, 1986, Malone Given Parsons Ltd.

2. Upper Region Evaluation Programme, Phase 1, Feasibility Study, 1983, Malone Given Parsons Ltd.

3. Evaluation for Village Water Supply Planning, S. Cairncross et al.

Appendices

Appendix A Questionnaire

GURUP EVALUATION - WATER SURVEY (REVISED NOVEMBER 1984)

Village Name ID HH ID

Date Interviewer

R's Markets 1. day M A B 2. day MAB

Time In: Time Out: Total (mins)

Names (PRINT): R________________ H.________________

C.________________ L.________________

SECTION A. SOURCES OF WATER

1. From what source are you getting your water today?
   (CS - Current Source)

2. Are there any other sources that you sometimes use?
   (AS - Alternative sources 1 - 4)

Source Type and name Number	What do you use this water for? drinking	cooking	bathing	washing clothes	animals	building	plastering	other	Why do you use this source? (IF SOME USES ONLY) Probe, why not other uses?
CS									
AS1									
AS2									
AS3									
AS4									

SECTION B. COLLECTION OF WATER FOR DOMESTIC USES

3. Who collects water for your family (yard) ?

4. Is there anyone else who also collects water for your family (yard)?

5. How many trips do you (R only) usually make in the morning__________ in the afternoon____________ in the evening________ so, total is usually________

6. Is the same amount collected on each day? Yes No
(No) Market cycle cooking cycle other (describe__________

		1		2		3		4		5	
Coll. Name											
Coll. Type		Cont.	Trips	Cont.	Trips	Cont.	Trips	Cont.	Trips	Cont.	Trips
Daily BMD	CS										
	AS										
MD	CS										
	AS										
AMD	CS										
	AS										

8. What containers do you have? How are they used? How are they cleaned?

	1	2	3	4	5	6	7	8	9	10
Type										
Uses Collecting/bathing/ animals/Storage										
Size: Internal Diameter										
Circumference										
Height										
(Volume (litres)										
Cleaning: frequency										
Method										

10. How many people live in this compound? No. yards______ Total No. people________

11. How many people usually use the water that you and (other collectors above) collect? ____________________

SO, THESE PEOPLE USUALLY CONSUME ABOUT ____________________ OF WATER EACH DAY.

SECTION C. BATHING

FILL IN CHART BELOW FOR PEOPLE IN Q.11.

12. a. Where do you bathe?

b. Where do you get water for bathing (if bathe at compound - WSA or special trip to source?)

c. Which container do you use? d. How many times is it filled?

e. How often do you bathe? How many baths taken since this time yesterday?

REPEAT QUESTIONS FOR HUSBAND, CHILDREN AND ALL OTHERS LIVING IN YARD.

Bather type	Location	Source (WSA/actual)	Cont. No	X filled/bath	No. baths last 24 hrs.	Bather type	location	source	Cont. No	X filled/bath	No. baths last 24 hrs.

13. Do you have soap for bathing now? Yes/No. (Yes) What kind?

SECTION D: OTHER USES OF WATER

14. Who washes clothes? Where? With water from what source? About how frequently?

Washer	Location	Source	Frequency	IF LOCATION IS COMPOUND Container	X Filled
1.					
2.					
3.					

15. Do you have soap for washing clothes now? Yes/No. (Yes) What kind?

16. a. Have you done/will you do any building this dry season? Yes No

b. Have you done/will you do any plastering this dry season? Yes No.

(ASK ALL) c. Where do you obtain water for building

d. Where do you obtain water for plastering?

17. Animals drink a lot of water, so we would like to know about the animals cared for by the people in this yard.

How many goats/sheep/pigs/donkeys/cattle are cared for by the yard?
Where do animals obtain water?

ANS	NO	SRCE	IF WATER CARRIED IN CONTAINER CONT.	X FILLED	FREQ.	(DAILY VOL)
Goats						
Sheep						
Pigs						
Donkeys						
Cattle						

18. Does anyone in your yard brew pito? Yes/No. (Yes) Who?
(Yes) How much water is used? (below)

19. Does anyone in your yard prepare food for sale? Yes/No. (Yes) Who?
(Yes) How much water is used each time? (below)

20. Does anyone in your yard have a garden now? Yes/No.
(Yes) Who?______________ Where is it?____________________
How much water is used for gardening? (below)

WATER FOR PITO AND FOOD USED AT THE COMPOUND, AND GARDENING

ACTIVITY	PERSON	LOCATION	SOURCE	CONT NUMBER	X FILLED	FREQUENCY OF ACTIVITY

21. a. How (else) do you earn income? b. How does your husband earn income?

items	P	W	R	items	P	W	R

22. (a) What were your 2 (two) main activities yesterday?

(b) How many trips did you (R only) make to collect water yesterday?
morning ________ afternoon________ evening__________ total______________

CHECK No trips in Q.6 =
Reasons for any difference between Q.6 and Q.22b

(c) How many baths did you (R only) take yesterday?_______________

CHECK No. baths in table P.3 =
Reasons for any difference between P.3 and Q.22C

23. a. What market did you last go to?____________ b. About how long ago was that ?

SECTION E: EDUCATION ABOUT WATER

Ask this page to All present (No. women______ No.Men______ No Children__________)

24. Has anyone ever come to your village (or HP) to talk about water? No/Yes
(No) prompt with details of VEW/HP mechanic names, pictures etc No/Yes.
(Yes) Who?
Did you attend? No/Yes

25. Have you ever seen a concert about water? No/Yes
(YES) Where

26. Have you (R only) ever attended a Clinic or hospital? No/Yes
(YES) Where?
when was your last visit?
Has a nurse or doctor ever talked to you about water?
No Yes - Nurse Yes - Doctor Yes - VHW/other Clinic Yes - DK WHO

27. Do you have a wireless in this compound? Yes/No
(YES) Have you ever listened to any radio talks about water? No/Yes

28. (IF ANY EXPOSURE TO EDUCATION)

(ASK OF EACH THING)

a. What things can you remember from these talks?
b. Do you do this now?
c. Did you do this before?
d. Did you know this before?

A. Things remembered from the education	b. do this now?	c. did this before?	d. knew this before?

SECTION F: OPINIONS ABOUT YOUR WATER SOURCES

Q. 29 IS FOR THOSE WHO USE A PUMP (CS OR AS) Pump No.__________

29. a. When did the handpump last break down?__________
b. For how long was it broken?__________
c. What water source did you use while it was broken?
d. What happened to your income activities?
e. What happened to your husband's income activities?
f. Where did the people in this compound get water before the handpump was here?
g. What is the condition of that source now?

H. Do you think that:

f. the pump is too far away Yes/No

d. the site is too dirty? Yes/No

y. the yield is too low? Yes/No

m. the pump is over-crowded in the morning? Yes/No

a. the pump is over-crowded in the afternoon? Yes/No

e. the pump is over-crowded in the evening? Yes/No

b. the pump breaks down too often? Yes/No

f. the pump takes too long to be fixed? Yes/No

d. the pump is too difficult to use? Yes/No

t. the water tastes good? Yes/No

c. the water is clean? Yes/No.

e. your family obtains enough water from this source to meet its needs? Yes/No

i. Do strangers, or people from other sections or villages sometimes use your pump? Yes/No

(Yes) Do you approve of that? Yes/No

j. Are there any other problems with the pump? Yes/No

(Yes) What are they?

k. Who do you think owns the pump?

QUESTION 30 IS FOR THOSE WHO USE A NON-PUMP SOURCE (CS OR AS) SOURCE =

30. a. Do you think that: f. the source is too far away Yes/No

d. the site too dirty? Yes/No

y. the yield is too low? Yes/No

m. the source is over-crowded in the morning? Yes/No

a. the source is over-crowded in the afternoon? Yes/No

e. the source is over-crowded in the evening? Yes/No

d. the water is too difficult to collect? Yes/No

f. the water tastes good? Yes/No

c. the water is clean? Yes/No.

e. your family obtains enough water from this source to meet its needs? Yes/No

b Do strangers, or people from other sections or villages sometimes use this source? Yes/No

c. (Yes) Do you approve of that?

d. Are there any other problems with the source? Yes/No

(Yes) what afe they?

e. Who do you think owns the source?

QUESTIONS FOR THOSE WHERE NEITHER CS NOR AS ARE PUMPS

31. a. Where are the nearest handpumps? (directions, names)

b. When did you last use any of these?

c. Which one did you use?

d. Why did you use it?

e. Did you have any problems using it? (YES, Explain)

SECTION G: YOUR CHILDREN'S HEALTH

32. Our health is affected by water. So now we would like to see your young (6 and under) children and check their health. Does she/he have diarrhoea?

Whose child? (R/other)	Age (months)	Sex	Diarrhoea	Frequency (times/day)	No. of days	Fever	Skin irritation	Eye problem	Coughing	runny nose	guinea worm	OTHER	Refererral

b. Have you ever had guinea-worm? Yes No (Go to e)

c. Have you had guinea-worm in the last year? Yes No

d. Do you have guinea-worm now? Yes No

e. Does anyone in this compound have guinea-worm now? Yes No.

SECTION H: FINAL QUESTIONS

33. What season do you think it is now? Wet dry other ____________

34. Where did you obtain water in the last wet season?

Source (type and name)	Uses: dr	ck	ba	wc	an	other
1						
2						
3						
4						

35. R details: age Schooling (yrs) religon

36. Do you have any questions or comments?

Access to water and water quality testing

CS	Paces/ft	metres	AS2	Paces/ft	metres
AS1	Paces/ft	metres	VEW prestn	paces/ft	metres

WQT bag No.					
result					

SECTION 1: OBSERVATIONS

		YES	NO
1.	Are livestock prevented from entering the living area?		
2.	Is there an entrance other than through the animal yard?		
3.	Is there a cleared path through the animal yard?		
4.	Is there human or livestock faeces in the living area?		
5.	Is there fowl faeces and/or fowl present in the living area?		
6.	Are the pots with drinking water covered?		
7.	Is there a dipper, ladle or cup for transferring water from the drinking water containers?		
8.	In the place where cooking and eating utensils are washed, is there a drying area located off the ground?		
9.	Is there a line or stick for drying clothes? (IF NOT OBSERVED, ASK RESPONDENT		
10.	Is there a place where used water from the compound collects?		
11.	Is there a bathhouse in the compound? (NO - 13)		
12.	Does the bathhouse have a soakaway pit? (LOOK OUTSIDE WALL)		
13.	Does the compound have a latrine?		

Appendix B Survey Results by Individual Question

TABLE 1 Number of Respondents by Strata, Season and Survey Area Identification Number

Sample	N		P		V	
Season	W	D	W	D	W	D
Survey Area						
1	10	10	12	11	11	11
2	11	11	12	11	12	11
3	8	7	12	11	12	12
4	14	14	12	11	12	11
5	9	9	11	11	10	10
6	11	11	12	11	--	--
7	16	14	12	12	12	11
8	16	15	12	12	12	12
9	9	9	12	9	12	11
10	13	13	11	12	12	11
11	--	--	12	10	12	11
TOTAL	117	113	130	121	117	111

TABLE 2 Month of Interview by Season

Season	W	D
Month		
1	0	126
2	0	126
3	0	81
4	0	11
5	0	1
6	10	0
7	161	0
8	117	0
9	67	0
10	9	0
TOTAL	364	345

TABLE 3 Principal Interviewers by Season

Season	W	D
Celestina	34	28
Felicia	51	31
Maggie	35	49
Juliana	31	32
Seraphine	41	26
Rose	35	31
James	45	35
Cletus	33	22
Muhamadu	36	28
Joe	11	0
Clement	10	2
Peggy	1	0
Patricia	1	27
Edmund	0	1
Paul	0	32
Martin	0	1
TOTAL	364	345

TABLE 4 Coders and Verifiers

	Coders		Verifiers	
Season	W	D	W	D
Celestina	23	0	16	0
Felicia	25	6	28	0
Maggie	20	0	0	0
Juliana	31	0	1	0
Seraphine	31	93	23	1
Rose	7	0	0	0
James	19	0	2	0
Cletus	18	9	8	16
Muhamadu	14	15	16	0
Clement	25	0	0	0
Linda	79	4	73	155
Cindy	1	0	46	0
Francis	5	0	0	0
Alan	3	0	0	0
Patricia	41	0	22	0
Edmund	6	1	0	0
Alice	16	0	127	186
Paul	0	95	0	1
Martin	0	122	0	0
No Verifier	-	-	2	1
TOTAL	364	345	364	365

TABLE 5 Day of Interview as it Relates to Respondent's Day of Market Cycle

Sample	N		P		V	
Season	W	D	W	D	W	D
Market day	18	23	27	14	68	43
Before market	60	47	55	49	21	25
After market	39	43	48	57	28	41
TOTAL	117	113	130	120	117	109

TABLE 6 Length of Interview

Season	W	D
Minutes		
18-39	90	70
40-49	121	102
50-59	88	7
60-79	54	68
80-107	8	9
No Data	3	19
TOTAL	364	345

Q 1 and 2 SOURCES OF WATER

TABLE 7 Current Source

Sample	N		P		V	
Season	W	D	W	D	W	D
Hand-pump	1	13	67	81	86	97
Well	29	5	14	9	4	1
Dam	6	9	0	0	0	0
Pond/field dug-out	18	25	11	8	6	0
River/stream	3	0	2	0	1	0
Dug-out in dam/pond	16	16	4	0	4	0
Dug-out in river/stream	44	42	31	22	15	12
No. CS reported	0	3	1	1	1	0
TOTAL	117	113	130	121	117	111

TABLE 8 Alternative Source One

Sample	N		P		V	
Season	W	D	W	D	W	D
Hand-pump	16	19	58	53	51	46
Well	3	3	6	6	12	6
Dam	18	16	0	4	11	9
Pond/field dug-out	21	26	20	10	13	15
Undentified dug-out	0	0	1	0	0	0
River/stream	15	9	11	7	6	4
DO in dam/pond	9	5	9	3	2	1
DO in river/stream	24	18	23	31	18	26
No Alternative Source 1	11	17	2	7	4	4
TOTAL	117	113	130	121	117	111

Q 1 and 2 SOURCES OF WATER (cont'd)

TABLE 9 Alternative Source Two

Sample	N		P		V	
Season	W	D	W	D	W	D
Hand-pump	15	6	9	8	7	14
Well	1	0	1	4	2	6
Dam	3	19	7	16	16	17
Pond/field dug-out	15	10	10	12	3	4
Unidentified dug-out	1	0	0	0	1	0
River/stream	7	0	1	4	5	3
dug-out in dam/pond	2	5	5	0	1	2
dug-out in river/stream	5	13	9	9	6	3
No Alternative Source 2	68	60	77	68	76	62
TOTAL	117	113	130	121	117	111

TABLE 10 Alternative Source Three

Sample	N		P		V	
Season	W	D	W	D	W	D
Hand-pump	3	2	0	2	3	1
Well	0	1	0	0	1	2
Dam	1	4	5	3	1	3
Pond/field dug-out	0	4	2	3	1	5
Unidentified Dug-out	0	0	0	0	0	0
River/stream	4	1	4	0	2	0
dug-out in dam/pond	0	0	0	0	0	0
dug-out in river/stream	3	1	0	0	0	0
No Alternative Source 3	105	100	119	113	109	100
TOTAL	117	113	130	121	117	111

Q 1 and 2 SOURCES OF WATER (cont'd)

TABLE 11 Reported Reasons for Selecting Current Source

Sample	N		P		V	
Season	W	D	W	D	W	D
Nearest source	55	39	73	49	57	41
Nearest source plus other reason	34	24	35	34	34	39
Only source	32	21	13	2	14	3
Good water for drinking	12	5	10	9	15	18
Good taste	0	0	0	0	1	1
Less crowded	1	3	3	7	0	5
Plenty of water	3	2	4	8	0	2
Easy to use/easy access	1	0	0	1	1	0
When hand-pump breaks down	0	0	2	0	1	0
When surface sources dry up	0	0	0	0	1	0
Cleanest source in wet season	0	0	1	0	0	0
Clean water	2	9	12	21	21	28
Only in wet season	4	0	11	0	2	0
When usual source is flooded/caved in	1	0	0	0	1	0
Reliable	14	9	6	19	8	13
Only in dry season	0	22	0	10	0	4
Convenient location	0	0	1	0	0	2
Only in the morning	0	2	0	2	0	0
TOTAL	154	141	171	162	156	156
Number of Respondents	113	117	121	130	111	117

TABLE 12 Total Number of Reported Current and Alternative Source

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Sources						
1	12	16	1	6	5	5
2	56	47	75	65	72	60
3	40	38	43	41	31	33
4	8	12	10	6	7	12
5	0	0	1	1	0	1
6	0	0	0	0	1	0
TOTAL	116	113	130	119	116	111
MEAN	2.4	2.4	2.5	2.4	2.4	2.5

Q 1 and 2 SOURCES OF WATER (cont'd)

TABLE 13 Uses for Water from Current Source

Sample	N		P		V	
Season	W	D	W	D	W	D
*All uses	82	0	103	1	85	0
Drinking	36	113	26	121	32	110
Cooking	36	112	24	121	32	111
Bathing	33	113	22	121	28	111
Washing clothes	29	101	21	116	23	102
Animals	21	83	10	99	11	88
Building	3	70	8	90	6	73
Plastering	0	71	1	93	1	72
Pito	0	2	0	9	1	8
Food	0	0	0	1	0	0
Funerals	0	0	0	6	0	2
TOTAL	240	665	215	899	219	677
Number of Respondents	113	117	121	130	111	117

TABLE 14 Uses for Water from Alternative Source 1 (AS1)

Sample	N		P		V	
Season	W	D	W	D	W	D
*All	54	2	92	2	68	0
Drinking	17	70	17	101	26	77
Cooking	17	69	20	100	27	76
Bathing	33	68	21	101	32	79
Washing clothes	33	75	16	98	30	81
Animals	39	73	19	94	26	91
Building	18	62	10	82	17	82
Plastering	2	62	2	81	1	81
Gardening	0	1	0	1	0	0
Pito (wet)	0	1	1	1	0	2
Pito and funerals	0	0	0	1	0	1
Funerals	0	0	1	0	0	0
TOTAL	211	483	197	662	227	570
Number of AS1's	104	97	129	113	111	106

*Note: the response "all uses" was not employed in the dry season survey.

Q 1 and 2 SOURCES OF WATER (cont'd)

TABLE 15 Uses for Water from Alternative Source 2

Sample	N		P		V	
Season	W	D	W	D	W	D
All	25	3	17	1	11	0
Drinking	4	21	6	18	3	23
Cooking	4	21	6	18	3	23
Bathing	16	26	28	20	8	26
Washing clothes	9	29	12	21	9	20
Animals	10	41	12	38	22	35
Building	12	35	13	32	12	16
Plastering (dry)	0	34	0	30	0	16
Gardening	0	1	0	1	0	0
Food	0	1	0	0	0	0
Plastering (wet)	1	0	1	0	0	0
Pito (dry)	0	1	0	0	0	0
Miscellaneous	0	1	0	0	0	0
TOTAL	81	214	95	179	68	159
Number of AS 2's	48	50	54	48	39	46

TABLE 16 Uses for Water from Alternative Source 3

Sample	N		P		V	
Season	W	D	W	D	W	D
All	3	1	0	1	3	0
Drinking	0	3	0	3	0	8
Cooking	0	3	0	3	0	8
Bathing	6	3	8	3	2	11
Washing clothes	0	4	3	3	0	10
Animals	1	11	4	5	2	8
Building	1	6	2	2	3	3
Plastering (dry)	0	6	0	2	0	3
Gardening	0	0	0	0	0	1
TOTAL	11	37	17	22	10	52
Number of AS 3's	8	12	11	7	8	16

Q 3 and 4 WATER DRAWERS IN RESPONDENT'S YARD

TABLE 17 Reported Types of Water Collectors

Sample	N		P		V	
Season	W	D	W	D	W	D
Respondent	114	111	128	118	114	108
Female adult	32	35	27	43	24	38
Female youth	21	31	18	27	27	37
Female child	13	14	13	17	13	19
Male adult	0	2	0	1	1	0
Male youth	1	2	1	3	1	1
Male child	3	3	1	7	2	3
TOTAL	184	198	188	216	189	206

TABLE 18 Total Number of Collectors per Yard

Sample	N		P		V	
Season	W	D	W	D	W	D
# of Collectors						
1	55	47	57	51	55	41
2	44	51	56	47	48	48
3	5	8	7	15	12	15
4	3	5	6	6	1	5
5	0	1	0	2	0	1
6	0	0	0	0	1	1
TOTAL	107	112	126	121	117	111
Mean Collectors per yard	1.6	1.8	1.7	1.9	1.7	1.9

Q 5 REPORTED USUAL NUMBER OF COLLECTING TRIPS BY RESPONDENT

Table 19 Number of Collecting Trips - Morning

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Trips						
0	7	6	16	6	9	9
1	33	37	45	28	37	32
2	62	41	46	54	52	53
3	9	18	16	26	12	16
4	0	6	4	3	4	1
5	1	2	0	1	0	0
6	0	1	1	2	0	0
TOTAL	112	111	128	120	114	111
MEAN	1.69	1.92	1.62	2.03	1.69	1.71

Table 20 Number of Collecting Trips - Afternoon

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Trips						
0	63	69	68	62	59	50
1	31	23	32	31	36	38
2	14	15	22	24	14	20
3	2	3	4	2	5	2
4	1	1	1	1	0	1
5	1	0	1	0	0	0
6	1	0	0	0	0	0
TOTAL	113	111	128	120	114	111
MEAN	0.71	0.59	0.76	0.74	0.70	0.79

Q 5 REPORTED USUAL NUMBER OF COLLECTING TRIPS BY RESPONDENT (cont'd)

Table 21 Number of Collecting Trips - Evening

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Trips						
0	14	26	22	24	15	24
1	58	49	72	57	69	51
2	35	29	26	30	21	26
3	4	5	5	8	6	10
4	0	1	2	1	3	0
5	1	0	0	0	0	0
6	0	1	0	0	0	0
7	0	0	1	0	0	0
TOTAL	112	111	128	120	114	111
MEAN	1.29	1.19	1.20	1.21	1.24	1.20
SUM OF MEANS	3.69	3.70	3.58	3.98	3.63	3.70

Table 22 Number of Collecting Trips by respondent

Sample	N		P		V	
Season	W	D	W	D	W	D
0	0	1	0	0	0	2
1	6	4	6	3	1	0
2	20	30	37	16	33	16
3	32	18	36	34	31	41
4	32	27	15	27	21	21
5	12	16	19	17	12	13
6	6	7	8	16	9	12
7	4	4	2	2	4	2
8	0	1	1	1	1	1
9	0	0	2	1	1	0
10	0	0	1	1	1	1
11	0	1	1	0	0	0
13	0	1	0	0	0	0
16	1	2	2	1	3	1
20	0	1	0	0	0	0
23	1	0	0	0	0	0
31	0	0	0	0	0	1
40	0	0	0	1	0	0
42	0	0	0	1	0	0
TOTAL	114	111	128	120	114	110
MEAN	3.80	4.14	3.89	4.71	4.04	4.14

Q 6 WATER COLLECTION CYCLE BY SAMPLE AND SEASON

TABLE 23 Respondents' Cycles of Water Collecting

Sample	N		P		V	
Season	W	D	W	D	W	D
Same amount each day	101	100	104	93	104	88
Market cycle	8	11	20	22	6	16
Cooking Cycle	1	0	1	0	1	3
Market and Cooking	2	1	0	2	0	0
Rotates	2	0	1	1	3	0
Every second day	0	0	1	1	0	2
Collects occassionally	1	0	1	1	3	1
Collects for income	1	0	0	0	0	0
TOTAL	116	112	129	120	117	110

Q 8 WATER CONTAINERS

TABLE 24 Types of Containers

Sample	N		P		V	
Season	W	D	W	D	W	D
Clay pot	123	259	134	306	85	265
Bucket	174	167	199	190	199	191
Head basin	59	70	73	81	69	89
Drum	24	28	21	24	10	14
Can	2	1	2	0	0	1
Calabash	14	12	15	3	18	6
Bowl/basin	6	8	9	11	8	6
Other	0	0	10	0	5	0
TOTAL	402	545	463	615	394	572

Q 8 WATER CONTAINERS (cont'd)

TABLE 25 Reported Uses of Containers

Sample	N		P		V	
Season	W	D	W	D	W	D
Collecting only	221	178	237	197	197	205
Bathing only	55	56	63	48	59	55
Animals	10	13	21	15	16	5
Storage*	31	146	36	180	29	164
Washing clothes	1	0	1	1	0	0
B and A	27	26	28	26	32	24
C, B and A	14	14	13	15	23	14
C and B	22	36	38	44	17	24
C and S	14	69	31	81	21	69
C and A	12	10	11	13	16	16
TOTAL	407	548	479	620	410	576

Note: In wet season no accounting of "storage only" containers.
C = Collecting, B = Bathing, A = Animals, S = Storage

TABLE 26 Reported Frequency of Cleaning Containers

Sample	N		P		V	
Season	W	D	W	D	W	D
Every trip	109	67	103	55	120	60
2/ day	57	27	83	43	64	37
1/ day	193	222	254	240	219	192
1/ 2-3 days	15	139	13	156	9	154
1/ 4 or more days	2	51	4	55	1	64
When dirty	3	17	4	39	2	26
When empty	9	6	4	9	5	15
Other	5	3	2	2	2	0
TOTAL	393	532	477	599	422	548

Q 8 WATER CONTAINERS (cont'd)

TABLE 27 Reported Method of Cleaning Containers

Sample	N		P		V	
Season	W	D	W	D	W	D
Water and sand	182	263	266	318	199	252
Water and sponge	53	86	67	63	76	63
Water only	54	60	71	95	77	80
Water and soap	8	4	3	7	1	8
Water and vegetation	40	35	19	50	22	25
Water and ash	1	1	2	6	8	8
Water, vegetation and sand	7	25	8	19	15	29
Water, sponge and soap	21	26	14	24	13	52
Other	26	31	11	20	10	25
TOTAL	392	531	461	602	421	542

TABLE 28 Container Volumes (litres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Litres						
0-9	16	16	13	19	12	20
10-14	102	134	111	85	96	99
15-19	70	96	73	90	130	94
20-24	105	114	109	131	174	167
25-29	38	34	23	71	74	65
30-34	50	48	48	71	75	74
35-39	7	11	7	28	29	33
40-49	8	6	1	9	6	3
50-59	1	0	15	6	9	
60-69	0	0	0	10	7	9
70-79	1	0	0	3	4	2
80-89	1	0	2	1	4	1
90-96	0	0	1	5	1	
97 or more	2	1	0	5	3	1
TOTAL	401	460	388	543	621	577

Q 10 SIZE OF RESPONDENT'S COMPOUND

TABLE 29 Number of Yards per Compound

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Yards						
1	50	48	53	44	31	29
2	25	27	42	42	36	34
3	13	12	17	18	26	22
4	13	11	9	7	9	14
5	4	5	4	5	8	5
6	3	5	3	3	1	2
7	1	1	1	1	3	1
8	1	0	0	0	0	0
9	2	0	0	0	2	2
10	0	2	0	0	1	1
11	0	0	1	0	0	0
12	0	1	0	1	0	1
13	1	0	0	0	0	0
20-29	1	0	0	0	0	0
30-39	0	1	0	0	0	0
40-49	1	0	0	0	0	0
TOTAL	115	113	130	121	117	111
MEAN	2.91	2.75	2.08	2.25	2.67	2.73

Q 10 SIZE OF RESPONDENT'S COMPOUND (cont'd)

TABLE 30 Number of People Per Compound

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of People						
1	2	1	1	2	1	1
2	2	3	6	2	3	1
3	4	4	5	4	3	4
4	9	14	12	11	1	1
5	13	9	12	11	8	10
6	14	9	11	12	10	7
7	10	7	10	8	10	12
8	6	7	14	16	11	12
9	7	4	10	9	7	4
10	5	9	10	9	9	14
11	3	7	5	7	8	5
12	3	6	9	4	6	7
13	6	4	2	3	4	5
14	6	4	3	4	3	3
15-19	11	10	8	6	13	13
20-29	9	9	5	6	9	4
30-39	0	1	2	3	3	4
40-49	1	0	1	2	1	1
50-59	1	1	1	0	1	0
60-90	0	1	0	0	1	2
120-129	2	0	0	0	0	0
TOTAL	114	110	127	119	112	110
MEAN	12.04	10.93	9.53	9.88	12.37	12.40

Q 10 SIZE OF RESPONDENT'S COMPOUND (cont'd)

TABLE 31 Number of People in Respondent's Yard

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of People						
1	2	2	1	2	1	1
2	7	6	10	5	4	2
3	7	8	6	12	10	9
4	21	26	26	21	19	16
5	28	18	28	26	24	28
6	25	23	23	18	25	16
7	11	11	13	11	15	19
8	3	6	9	13	14	7
9	3	2	4	5	2	6
10	1	3	4	1	1	3
11	2	3	2	5	0	0
12	2	1	3	0	0	2
13	0	0	1	1	0	0
14	1	1	0	1	0	2
15-19	2	3	0	0	2	0
20-29	1	0	0	0	0	0
40-49	1	0	0	0	0	0
TOTAL	117	113	130	121	117	111
MEAN	6.03	5.73	5.62	5.69	5.66	5.92

Q 11 VOLUME COLLECTED FOR RESPONDENT'S YARD

TABLE 32 Total Daily Volume Collected Per Yard

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Litres						
-50	10	9	17	6	12	7
51-100	51	40	62	38	46	31
101-150	35	34	21	34	34	31
151-200	9	15	11	13	15	17
201-300	8	10	8	24	7	20
301-400	2	2	5	3	1	2
401-500	1	1	2	3	0	2
501-600	0	0	1	0	1	0
601-700	0	1	0	0	0	1
801-900	1	0	0	0	0	0
TOTAL	117	111	129	121	116	111

Q 12 BATHING HABITS OF RESPONDENT AND YARD

TABLE 33 Bather Type

Sample	N		P		V	
Season	W	D	W	D	W	D
Respondent	117	114	130	121	116	111
Female adult	68	74	77	81	63	87
Female youth	30	34	35	38	45	46
Female child	103	111	136	126	102	104
Husband	94	95	103	81	94	84
Male adult	50	57	62	53	55	45
Male youth	40	31	30	34	40	35
Male child	122	123	133	146	126	136
TOTAL	624	639	706	680	641	648

Q 12 BATHING HABITS OF RESPONDENT AND YARD (cont'd)

TABLE 34 Location of Bathing

Sample	N		P		V	
Season	W	D	W	D	W	D
Bathhouse in compound	254	241	313	261	294	332
Animal yard	134	170	154	207	134	171
Bathhouse at hand-pump	0	4	11	0	57	26
Near water source	191	159	207	156	129	106
Court yard	24	46	23	48	17	14
In the bush	15	8	8	7	17	0
Kitchen or other room	4	3	3	0	1	0
TOTAL	622	631	719	680	649	647

TABLE 35 Source of Bath Water

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	122	154	225	222	236	180
Alternative source 1	43	15	38	12	23	5
Alternative source 2	33	16	32	2	10	1
Alternative source 3	15	2	35	0	0	0
Alternative source 4	1	1	2	0	0	0
Water storage area	391	439	369	435	363	461
Different source	0	0	2	1	1	0
In the bush	15	5	15	5	19	0
TOTAL	620	633	718	664	652	647

Q 12 BATHING HABITS OF RESPONDENT AND YARD (cont'd)

TABLE 36 Number of Baths per Bather per Day

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of baths						
less than daily	10	4	7	10	13	0
1/day	292	357	325	382	312	385
2/day	268	235	358	257	296	257
3/day or more	45	24	8	16	11	4
TOTAL	615	620	698	665	632	646

TABLE 37 Volume per Bath

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of litres						
0	0	1	0	0	2	0
1	0	1	0	0	1	0
2	3	1	1	0	0	7
3	33	25	11	21	33	19
4	22	28	38	47	22	20
5	43	81	44	44	59	48
6	27	54	27	59	44	79
7	65	84	103	95	64	77
8	18	46	23	50	9	25
9	18	57	28	36	20	42
10	69	67	81	70	110	86
11	10	12	8	15	17	8
12	38	20	37	15	43	68
13	10	12	38	16	17	26
14	65	43	119	66	62	79
15	10	9	15	33	10	12
16	4	4	0	8	0	0
17	3	0	2	10	0	2
18	32	29	48	43	25	18
19	1	5	0	0	6	0
20	41	20	10	25	27	20
21	0	0	0	5	0	3
22	2	2	4	2	6	0
25	0	0	4	0	0	0
28	3	0	0	0	0	0
33	0	0	1	0	0	0
36	0	1	0	0	0	0
TOTAL	487	602	642	660	580	639
MEAN	11.2	9.1	10.8	10.0	9.9	9.7

Q 12 BATHING HABITS OF RESPONDENT AND YARD (cont'd)

TABLE 38 Total Volume of Bathing Water

Sample	N		P		V	
Season	W	D	W	D	W	D
Total volume of water (litres)						
1	0	0	0	0	3	0
2	1	1	0	2	0	7
3	24	27	7	16	18	17
4	11	29	20	31	10	14
5	34	65	16	37	48	39
6	20	44	14	35	31	53
7	30	60	50	57	43	51
8	21	35	12	40	15	18
9	17	46	25	25	15	28
10	51	55	74	53	65	69
11	6	8	1	4	11	1
12	21	26	33	34	37	56
13	7	6	29	5	4	14
14	55	55	99	73	47	61
15	8	10	10	25	11	6
16	6	11	12	12	1	6
17	1	0	1	14	0	2
18	18	26	12	26	23	27
19	0	2	0	1	3	0
20	47	28	41	32	59	34
21	1	0	1	12	3	9
22	4	5	9	5	7	39
23	0	0	0	0	0	18
24	26	15	20	9	23	44
25	0	6	9	0	0	7
26	5	20	6	12	14	0
27	0	0	0	2	0	2
28	32	5	57	28	37	7
30	8	5	10	15	6	0
32	3	3	0	6	0	8
33	0	0	1	0	0	0
34	0	0	0	2	0	1
36	17	7	11	11	11	0
38	0	3	0	0	0	0
39	0	1	0	2	1	0
40	28	18	5	12	25	0
42	6	4	3	3	0	0
44	1	1	0	0	1	0
45	1	0	0	0	1	0
46	0	0	1	0	0	0
48	0	1	0	0	0	0
52	3	0	0	0	0	0
54	3	3	0	6	0	1

(cont'd)

Q 12 BATHING HABITS OF RESPONDENT AND YARD (cont'd)

TABLE 38 Total Volume of Bathing Water (cont'd)

Sample	N		P		V	
Season	W	D	W	D	W	D
Total volume of water						
56	5	0	0	0	0	0
58	0	0	0	1	0	0
60	1	2	1	0	3	0
72	0	1	0	0	0	0
88	0	0	0	0	3	0
98	0	0	1	0	0	0
100	0	2	0	0	4	1
101	0	0	0	0	1	0
114	0	0	3	0	0	0
TOTAL	522	636	593	655	570	640

Q 13 SOAP FOR BATHING

Table 39 Kinds of Bath Soap

Sample	N		P		V	
Season	W	D	W	D	W	D
No Soap	91	88	115	98	91	77
Guardian	9	2	4	3	6	4
Volta	9	13	8	17	14	25
Local	4	2	0	2	2	1
Lux	0	1	0	0	0	1
Risto	1	2	0	0	0	2
Sunlite	1	3	0	0	0	0
TOTAL	115	111	127	120	112	110

Q 14 WASHING CLOTHES

Table 40 Who Washes Clothes?

Sample	N		P		V	
Season	W	D	W	D	W	D
Respondent	93	91	100	96	91	84
Female Adult	18	23	13	25	9	18
Female Youth	10	13	12	13	20	21
Female Child	3	1	2	2	4	2
Husband	1	0	7	1	4	0
Male Adult	2	4	4	3	6	3
Male Youth	4	1	5	5	5	1
Male Child	0	1	1	1	1	1
TOTAL	131	134	144	146	140	130

Table 41 Where (Location #1)
are clothes washed?

Sample	N		P		V	
Season	W	D	W	D	W	D
In compound	17	22	27	34	17	19
At water source	113	113	123	114	123	112
TOTAL	130	135	150	148	140	131

Q 14 WASHING CLOTHES (cont'd)

Table 42 Source of Water for Washing Clothes (Location #1)

Sample	N		P		V	
Season	W	D	W	D	W	D
Current Source	107	93	112	113	121	107
Alternative Source 1	20	22	20	19	14	14
Alternative Source 2	3	10	11	7	6	3
Alternative Source 3	1	0	5	0	0	1
Water Storage Area	0	7	1	8	0	6
TOTAL	131	132	149	147	141	131

Table 43 Alternative Locations for Washing Clothes (Location #2)

Sample	N		P		V	
Season	W	D	W	D	W	D
In compound	0	1	0	1	0	0
At water source	0	1	0	0	0	0
TOTAL	0	2	0	1	0	0

Table 44 Source of Water for Washing Clothes (Location #2)

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	0	0	0	1	0	0
In the bush	0	2	0	0	0	0
TOTAL	0	2	0	1	0	0

Q 14 WASHING CLOTHES (cont'd)

Table 45 Frequency of Washing Clothes

Sample	N		P		V	
Season	W	D	W	D	W	D
Every day	1	0	1	0	0	1
Every other day	0	0	0	1	0	2
1/ 3 days	1	3	3	7	2	1
1/ 4 days	7	3	4	3	6	3
1/ 5 days	2	1	0	1	3	1
1/ 6 days	1	2	0	3	1	0
1/ week	48	31	35	31	39	33
1/ 8 days	0	1	0	0	0	0
1/ 9 days	0	0	0	1	0	0
1/ 10 days	7	5	6	1	4	3
1/ 12 days	0	0	1	0	2	0
1/ 2 weeks	28	16	32	13	32	20
Twice a month	10	5	8	9	7	1
1/ 17 days	0	0	2	0	0	0
1/ 19 days	0	1	0	1	0	0
1/ 20 days	0	1	1	0	2	0
1/ 3 weeks	1	1	10	6	11	0
1/ 25 days	1	0	0	0	0	0
1/ 4 weeks	0	1	2	2	2	0
Once a month	17	27	31	17	20	16
>1/month <1/2 months	0	1	0	0	0	0
1/ 2 months	0	0	0	1	2	0
A long time	1	2	0	0	0	0
Whenever dirty	1	24	4	37	3	39
When soap is available	4	10	2	9	2	7
TOTAL	130	135	142	143	138	127

Q 14 WASHING CLOTHES (cont'd)

Table 46 Volume of Water Used by People Who Collect Water for Washing Clothes in the Compound

Sample	N		P		V	
Season	W	D	W	D	W	D
1-20	2	4	2	2	4	3
21-40	7	4	3	7	2	3
41-60	3	3	7	13	5	3
61-80	3	5	4	5	2	4
81-95	1	1	5	4	1	0
96 or more	3	1	1	3	1	3
TOTAL	19	18	22	34	15	16

Q 15 SOAP FOR WASHING CLOTHES

Table 47 Kinds of Soap for Washing Clothes

Sample	N		P		V	
Season	W	D	W	D	W	D
No Soap	54	53	64	67	60	49
Guardian	10	2	7	1	8	5
Volta	25	44	30	48	38	48
Local	22	8	27	3	8	4
Omo	0	1	0	0	1	0
Risto	2	0	0	0	0	0
Sunlite	2	1	0	0	1	0
Not Specified	1	1	0	1	0	1
TOTAL	115	109	128	119	116	106

Q 16 BUILDING AND PLASTERING

TABLE 48 Building and/or Plastering this Season

Sample	N		P		V	
Season	W	D	W	D	W	D
No building, no plastering	48	29	28	25	38	27
Building, no plastering	2	3	1	3	0	1
Plastering, no building	24	26	40	27	20	25
Building and plastering	43	54	61	66	59	56
TOTAL	117	112	130	121	117	109

TABLE 49 Water Source, Building

Sample	N		P		V	
Season	W	D	W	D	W	D
Bush	8	0	6	0	2	0
Current source	19	54	36	73	35	60
Alternative source 1	19	29	17	20	16	31
Alternative source 2	7	14	6	19	7	10
Alternative source 3	1	2	2	1	3	1
Alternative source 4	0	0	0	1	0	0
Water storage area	0	0	1	0	0	0
Different source	0	2	1	1	0	0
TOTAL	54	101	69	115	63	102

Q 16 BUILDING AND PLASTERING (cont'd)

TABLE 50 Water Source, Plastering

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	28	53	55	70	49	59
Alternative source 1	30	29	33	26	19	34
Alternative source 2	8	16	8	19	8	11
Alternative source 3	1	2	2	1	3	2
Alternative source 4	0	0	0	1	0	0
Water storage area	0	0	1	0	0	0
Difference source	0	2	1	1	0	0
TOTAL	67	102	100	118	79	106

Q 17 WATER FOR ANIMALS KEPT IN RESPONDENT'S YARD

TABLE 51 Number of Goats

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of goats						
0	13	14	9	12	5	6
1	3	8	10	6	6	9
2	9	7	21	21	19	16
3	12	10	15	17	9	14
4	14	22	13	20	15	16
5	16	12	13	6	10	14
6	14	13	9	8	15	9
7	6	7	11	8	7	6
8	7	3	5	8	6	3
9	1	3	2	1	3	1
10	10	8	12	4	4	4
11-15	10	5	4	7	11	6
16-20	0	1	5	2	4	2
21-25	1	0	1	0	0	0
26-30	0	0	0	1	0	0
31-35	0	0	0	0	0	1
36-40	0	0	0	0	1	0
TOTAL	636	542	688	587	695	538
NO. REPLIES	116	113	130	121	115	107
MEAN	5.48	4.80	5.29	4.85	6.04	5.03

Q 17 WATER FOR ANIMALS KEPT IN RESPONDENT'S YARD

TABLE 52 Water Source for Goats

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	55	37	65	60	69	53
Alternative source 1	21	17	20	13	12	21
Alternative source 2	10	9	11	7	10	6
Alternative source 3	3	1	6		1	1
Water storage area	12	32	16	29	18	19
TOTAL	101	96	118	109	110	100

TABLE 53 Volume of Water Collected for Goats (litres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of litres						
0-10	15	6	24	10	22	7
11-20	25	14	29	15	43	13
21-30	20	8	22	17	17	11
31-40	10	13	9	9	11	7
41-50	2	4	3	3	2	5
51-60	4	4	5	3	3	4
61-70	2	3	1	1	0	0
71-80	4	2	1	2	3	2
81-90	1	1	1	2	1	1
91-100	0	1	0	3	0	2
101-110	0	0	2	1	0	0
111-120	0	0	0	2	1	0
121-130	0	0	0	1	0	0
181-190	0	1	0	0	0	0
200+	0	0	0	1	0	0
TOTAL	83	57	97	70	103	52

Q 17 WATER FOR ANIMALS BY SAMPLE AND SEASON (cont'd)

TABLE 54 Number of Sheep

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of sheep						
0	54	53	51	47	44	46
1	5	3	7	7	7	4
2	8	8	22	13	17	11
3	4	5	5	5	2	9
4	10	7	8	9	11	8
5	6	6	6	10	6	5
6	4	6	8	3	5	6
7	3	8	2	6	3	4
8	4	7	4	4	3	4
9	1	1	2	0	2	0
10	9	3	6	6	6	1
11-15	6	3	5	5	3	4
16-20	0	1	1	1	4	2
21-25	1	1	1	1	1	0
26-30	0	0	1	1	0	0
31-35	0	0	1	0	0	0
49	0	0	0	0	0	1
TOTAL	378	354	475	420	410	361
NO. REPLIES	115	112	130	118	114	105
MEAN	3.29	3.16	3.65	3.56	3.60	3.44

TABLE 55 Water Source for Sheep

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	34	24	41	37	38	30
Alternative source 1	9	9	16	8	11	16
Alternative source 2	6	8	9	10	9	2
Alternative source 3	1	2	3	0	1	1
Water storage area	1	9	3	15	2	9
TOTAL	51	52	72	70	61	58

Q 17 WATER FOR ANIMALS (cont'd)

TABLE 56 Volumes of Water Collected for Sheep (litres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of litres						
1-10	5	4	16	13	12	6
11-20	8	6	6	4	6	6
21-30	5	2	2	3	3	4
31-40	2	5	2	4	0	5
41-50	2	2	0	4	0	0
51-60	0	2	1	6	0	1
61-70	0	0	0	1	0	0
71-80	0	0	0	1	0	1
81-90	0	0	2	0	0	1
91-100	0	0	0	0	0	1
121-130	0	1	1	0	0	0
131+	0	1	0	0	0	0
TOTAL	22	22	30	36	21	25

TABLE 57 Number of Pigs

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of pigs						
0	114	108	123	113	108	102
1	1	1	3	1	2	0
2	0	1	0	2	0	0
3	0	0	0	2	0	0
4	0	1	1	0	0	1
5	1	0	1	0	0	0
6	0	0	1	0	1	0
7	0	0	0	0	1	1
8	0	0	0	0	0	1
10	0	0	0	0	1	0
11-15	0	0	1	0	2	1
TOTAL	6	7	29	17	45	40
NO. REPLIES	116	111	130	119	115	107
MEAN	0.05	0.06	0.22	0.14	0.39	0.37

Q 17 WATER FOR ANIMALS (cont'd)

TABLE 58 Water Source for Pigs

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	1	2	5	3	5	2
Alternative source 1	0	0	0	0	0	1
Alternative source 2	0	0	1	1	0	1
Alternative source 3	0	0	1	0	0	0
Water storage area	0	1	0	2	2	0
TOTAL	1	3	7	6	7	4

TABLE 59 Volume of Water Collected for Pigs (litres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of litres						
1-10	0	0	1	0	0	0
11-20	0	1	1	1	2	0
21-30	0	0	0	0	1	0
31-40	0	0	1	2	1	1
41-50	0	0	1	0	0	0
51-60	0	0	0	1	0	0
101-110	0	0	0	0	1	1
TOTAL	0	1	4	4	5	2

Q 17 WATER FOR ANIMALS (cont'd)

TABLE 60 Number of Donkeys

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of donkeys						
0	93	96	117	106	100	93
1	5	7	6	3	8	10
2	15	5	2	6	4	3
3	1	1	4	4	0	0
4	0	1	1	0	1	0
5	0	0	0	0	1	0
6	1	0	0	0	1	0
8	0	1	0	1	0	0
9	1	0	0	0	1	0
11-15	0	0	0	0	0	1
TOTAL	53	28	26	35	40	27
NO. REPLIES	116	111	130	120	116	107
MEAN	0.46	0.25	0.20	0.29	0.34	0.25

TABLE 61 Water Source for Donkeys

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	5	1	8	6	5	6
Alternative source 1	7	5	0	2	4	6
Alternative source 2	4	4	3	1	2	1
Alternative source 3	1	2	1	2	0	0
Water storage area	0	0	0	1	0	1
Different source	0	1	0	2	0	0
TOTAL	17	13	12	14	11	14

Q 17 WATER FOR ANIMALS (cont'd)

TABLE 62 Volumes of Water Collected for Donkeys (litres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of litres						
11-20	0	0	1	1	1	2
21-30	0	0	0	0	0	1
31-40	0	0	0	1	0	0
101-110	0	0	0	1	0	0
TOTAL	1	0	1	3	1	3

TABLE 63 Number of Cattle

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of cattle						
0	49	41	61	54	45	43
1	2	4	10	9	8	9
2	11	9	10	12	9	8
3	6	7	12	9	6	7
4	7	10	11	10	11	7
5	6	6	5	7	8	13
6	9	7	7	7	4	7
7	4	5	1	3	9	0
8	4	3	4	2	2	3
9	1	1	1	1	0	0
10	4	4	6	3	5	1
11-15	7	8	0	1	3	3
16-20	0	3	0	3	4	3
21-25	2	0	0	0	0	1
26-30	1	0	0	0	0	0
31-35	1	1	0	0	0	1
36-40	0	0	1	0	0	0
52	0	0	0	0	1	1
TOTAL	467	454	321	321	445	430
NO. REPLIES	114	109	129	121	115	107
MEAN	4.10	4.17	2.49	2.65	3.87	4.02

Q 17 WATER FOR ANIMALS (cont'd)

TABLE 64 Water Source for Cattle

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	22	18	29	24	28	27
Alternative source 1	16	14	9	11	13	18
Alternative source 2	7	17	9	16	11	9
Alternative source 3	0	6	3	2	0	2
Alternative source 4	0	0	0	1	0	0
Water storage area	0	0	2	2	0	0
Different source	0	1	0	3	0	1
TOTAL	45	56	52	59	52	57

TABLE 65 Volume of Water Collected for Cattle (litres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of litres						
1-10	0	1	0	1	0	0
11-20	0	1	0	0	0	0
21-30	0	0	1	1	0	0
31-40	0	0	0	1	0	0
71-80	0	0	0	1	0	0
91-100	0	0	0	1	0	0
TOTAL	0	2	1	5	0	0

Q 18 PITO BREWING

TABLE 66 People from Respondent's Yard Who Brew Pito

Sample	N		P		V	
Season	W	D	W	D	W	D
Respondent	4	3	0	1	1	3
Not respondent but others	2	0	1	1	1	3
Respondent and others	0	0	0	1	0	0
Yes, not specified	0	0	1	0	2	0
TOTAL	6	3	2	3	4	6

TABLE 67 Frequency of Pito Brewing

Sample	N		P		V	
Season	W	D	W	D	W	D
1/ 1-2 days	0	1	0	0	0	1
1/ 3 days	1	0	0	2	1	3
1/ 4-6 days	0	2	0	0	0	1
1/ 7-14 days	3	0	0	0	0	1
Other	0	0	2	0	0	0
TOTAL	4	3	2	2	1	6

TABLE 68 Water Source for Pito Brewing

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	3	1	0	2	1	6
Alternative source 1	1	1	0	0	0	0
Water storage area	0	1	0	0	0	0
TOTAL	4	3	0	2	1	6

Q 18 PITO BREWING (cont'd)

TABLE 69 Volume of Water Used Per Day of Pito Brewing (litres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of litres						
31-40	0	0	0	0	0	1
61-70	0	0	0	0	0	1
131-140	0	1	0	0	0	0
141-150	1	0	0	0	0	1
151-160	1	0	0	0	0	0
161-170	0	1	0	0	0	0
201-300	0	0	0	1	1	0
301-400	2	0	0	0	0	1
401-500	0	1	0	1	0	0
501-600	0	0	0	0	0	1
TOTAL	4	3	0	2	1	6

Q 19 PREPARED FOOD FOR SALE

TABLE 70 People in Respondent's Yard Who Prepare Food for Sale

Sample	N		P		V	
Season	W	D	W	D	W	D
Respondent	4	4	4	8	5	5
Not respondent but others	1	1	0	0	1	1
Respondent and others	1	0	0	0	0	0
TOTAL	6	5	4	8	6	6

Q 19 PREPARED FOOD FOR SALE

TABLE 71 Frequency of Commercial Food Production

Sample	N		P		V	
Season	W	D	W	D	W	D
1/ 1-2 days	1	1	0	1	0	2
1/ 3 days	5	2	2	5	4	4
1/ 4-6 days	0	0	1	0	1	0
1/ 7-14 days	0	1	0	0	0	0
Others	0	0	1	0	0	0
TOTAL	6	4	4	6	5	6

TABLE 72 Water Source for Commercial Food Production

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	6	2	4	3	5	6
Alternative source 1	0	1	0	0	0	0
Alternative source 3	0	0	0	0	1	0
Water storage area	0	1	0	3	0	0
Different source	0	0	0	1	0	0
TOTAL	6	4	4	7	6	6

Q 19 FOOD (cont'd)

TABLE 73 Volume of Water Collected for Commercial Food Production

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of litres						
11-20	0	0	0	2	1	1
31-40	0	1	1	0	0	1
41-50	1	1	0	0	0	0
51-60	1	0	0	1	2	0
61-70	0	0	0	1	0	1
71-80	2	0	0	1	0	0
91-100	0	0	0	0	1	0
101-110	0	0	1	0	0	1
111-120	1	0	1	0	1	0
131-140	0	0	1	0	0	1
151-160	0	0	0	0	0	1
161-170	0	1	0	0	0	0
171-180	0	1	0	0	0	0
231-140	1	0	0	0	0	0
TOTAL	6	4	4	5	5	6

Q 20 GARDEN

TABLE 74 People from Respondent's Yard Who Have a Garden

Sample	N		P		V	
Season	W	D	W	D	W	D
No one	111	109	130	113	116	95
Respondent	0	0	0	1	0	0
Not respondent but others	4	0	0	2	1	9
Rand other(s)	0	0	0	0	0	1
Yes, not specified	0	0	0	3	0	2
Husband	0	3	0	2	0	4
	0	1	0	0	0	0
TOTAL	115	113	130	121	117	111

Q 20 GARDEN

TABLE 75 Water Source for Garden

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	2	3	0	0	0	11
Alternative Source 1	2	1	0	2	0	2
Alternative Source 2	1	0	0	4	0	0
Alternative Source 3	0	0	0	0	0	1
Water storage area	0	0	0	0	0	1
TOTAL	5	4	0	6	0	15

TABLE 76 Location of Garden

Sample	N		P		V	
Season	W	D	W	D	W	D
By water source	4	4	0	5	0	15
At compound	0	0	0	1	0	0
In the fields	0	0	0	1	1	1
No response	1	0	0	1	0	0
TOTAL	5	4	0	8	1	16

Q 20 GARDEN (cont'd)

TABLE 77 Volume of Water Collected for Gardening

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Litres						
1-10	0	0	0	1	0	0
31-40	0	0	0	1	0	0
51-60	0	0	0	0	0	1
61-70	0	0	0	0	0	1
71-80	0	0	0	0	0	1
131-140	0	0	0	0	0	1
151-160	0	0	0	0	0	1
171-180	0	0	0	0	0	1
191-200	0	0	0	0	0	1
211-220	0	0	0	0	0	1
221-230	0	0	0	0	0	1
271-280	0	0	0	1	0	0
351-360	0	0	0	1	0	0
431-440	0	0	0	0	0	1
471-480	0	0	0	1	0	0
531-540	0	0	0	1	0	0
711-720	1	0	0	0	0	0
TOTAL	2	1	0	6	0	10

Q 21 INCOME ACTIVITIES

Table 78 Respondent's Income Activities

Sample	N		P		V	
Season	W	D	W	D	W	D
Brews pito, or malt	2	5	0	2	1	2
Commercial food producer	4	3	1	3	0	2
Kola	5	5	6	6	4	8
Weaves Hats	8	14	13	10	4	5
Weaves Baskets	1	0	6	3	1	0
Akpeteshie	1	1	2	2	0	3
Firewood	4	6	7	5	2	5
Fowls	0	0	2	1	1	0
Teachers	0	1	0	0	0	0
Government Employee	0	0	0	0	2	2
Other Non-Farm Wage Earner	0	1	0	0	0	0
Local Agriculturial Labour	3	0	0	0	0	0
Gardening	0	1	0	0	0	1
Shea Butter, Nuts	3	1	2	1	1	1
Cakes	1	0	1	1	3	1
Rice	0	0	1	5	1	1
Millet	0	2	1	3	2	5
Groundnuts, Beans	0	4	1	13	0	7
Tobacco, Cigarettes	2	6	2	1	1	3
Sells Farm Produce	1	1	3	0	4	3
Sells Non-Farm Produce	0	2	0	1	1	0
Kenke and Akpeteshie	0	0	0	0	1	0
Seamstress, Tailor	0	0	0	0	2	1
Drumming	0	0	2	0	0	0
Pottery	2	5	0	0	0	0
Non-Specified Trader	2	3	2	0	5	3
Weaves Rope	0	1	0	0	3	6
Maize	1	3	3	4	3	4
Baobob Leaves	1	0	0	0	0	0
Yam	0	1	1	3	0	1
Gari	0	1	0	2	0	0
Millet or Guinea Corn	0	1	0	1	0	0
Weaves Fans	0	0	0	1	0	0
Sells clothes	0	0	0	0	0	1
Sells sugar	0	1	0	0	0	0

(cont'd)

Q 21 INCOME ACTIVITIES (cont'd)

Table 78 Respondent Income Activities (cont'd)

Sample	N		P		V	
Season	W	D	W	D	W	D
Fishmonger			1	1	0	0
Leather Crafts				3	0	2
Tabani						
Decorated Calabash			1			
Weaving Mats				1		1
Kuli-Kuli				2		
Grass		1				
Sells Water				1		
TOTAL	41	65	57	75	42	68

Table 79 Respondent Role In Income

Sample	N		P		V	
Season	W	D	W	D	W	D
Producer (P)		1		4		3
Wholesaler (W)		1				2
Retailer (R)		22		31		29
Producer & Wholesaler		9		7		6
Wholesaler & Retailer		6		6		3
Producer & Retailer		2		6		1
Wage Earner		2		2		3
Only When in Need		2		2		1
Other		1				
TOTAL		46		51		48

Q 21 INCOME (cont'd)

Table 80 Husband's Income

Sample	N		P		V	
Season	W	D	W	D	W	D
Kola	0	0	3	3	0	1
Weaves Hats	2	6	6	8	1	2
Weaves Baskets	0		1	0	0	1
Drumming	0	1	0	0	0	0
Firewood	0	0	0	2	0	0
Fowls	2	2	3	1	4	3
Teacher	0	0	0	1	1	0
Gov't Employee	9	8	4	2	9	10
Other Non-Farm Wage Employee	0	2	0	0	1	1
Agricultural Labour, South	2	0	1	0	0	0
Gardening	1	3	0	2	0	0
Soothsayer	1	1	2	3	2	1
Rice	1	1	0	0	0	0
Millet	0	0	0	0	0	2
Groundnuts, Beans	0	4	1	3	0	0
Tabacco, Cigarettes	7	7	8	2	5	5
Tomatoes	0	0	0	0	1	1
Non-Specified Trader	1	1	1	0	0	0
Sells Farm Produce	1	1	2	0	5	1
Chief	3	3	0	1	2	1
Tailor	0	0	1	0	1	1
Sells Clothes	0	0	0	0	0	1
Weaves Rope	1	1	0	0	0	3
Maize	0	0	0	0	0	1
Musician	0	3	0	1	0	0
Millet, Guinea Corn	0	0	0	0	0	1
Building	0	0	0	11	0	0
Blacksmith	0	0	1	0	1	1
Fish Monger	0	0	0	0	0	1
Carpenter	1	2	0	0	0	0
Livestock	3	1	2	2	5	2
Leather Crafts	0	0	1	0	0	0
Calabashes	0	0	1	0	0	0
Crafts	0	0	0	3	0	2
Mason	0	0	0	0	0	1
Fishing, Hunting	0	0	0	1	0	0
TOTAL	35	47	39	46	38	44

Q 21 INCOME (cont'd)

Table 81 Husband's Role In Income

Sample	N		P		V	
Season	W	D	W	D	W	D
Producer		12		13		11
Wholesaler		0		1		2
Retailer		4		8		9
Producer and Wholesaler		10		12		4
Wholesaler and Retailer		1		0		2
Producer and Retailer		12		10		10
P and R and W		0		4		2
Wage Earner		10		4		12
TOTAL		49		52		52

Q 22 YESTERDAY'S ACTIVITIES, INCLUDING TRIPS FOR WATER

Table 82 Respondent's Activities Yesterday, #1

Sample	N		P		V	
Season	W	D	W	D	W	D
Nothing	0	0	6	1	5	0
Brewing Pito	0	2	3	2	1	0
Prepared Food for Sale	0	0	1	0	0	1
Weaving Hats	2	2	3	4	1	0
Weaving Baskets	3	0	8	0	3	0
Firewood	2	9	4	1	1	4
Gov't Employ	0	0	0	0	1	0
Local Agricultural Labour	1	0	0	0	0	0
Shea Butter	0	0	0	1	1	0
Millet	0	0	1	0	0	0
Tobacco, Cigarettes	0	2	0	0	0	0
Went to Hospital	2	1	1	0	3	2
Kenke and Akpeteshie	0	0	0	0	0	1
Pottery	1	1	0	0	1	0
Church	1	2	0	0	0	0
Farming	49	1	59	2	35	0
Domestic	23	43	14	54	36	43
Market	3	9	6	24	11	17
Sick	1	4	3	3	4	2
Cared for Child	1	1	5	3	1	4
Building	0	5	0	1	0	3
Plastering	6	7	0	11	1	9
Visiting	4	11	2	4	2	3
Flooring	0	1	1	0	1	0
Cooked for Farmers or Builders	3	1	7	0	4	0
Income Activity	2	1	2	0	1	1
Went for Local Treatment	1	0	0	0	0	0
Travelled	2	0	0	0	1	1
Grinding Mill	0	1	1	1	0	0
Funeral	1	7	1	8	1	12
Weaving Mats	0	0	1	0	2	0
Performed Rite or Ceremony	0	1	1	0	0	0
Festival, Party, Meeting	0	0	0	0	0	4
TOTAL	108	112	130	120	117	107

Q 22 YESTERDAY'S ACTIVITIES, INCLUDING TRIPS FOR WATER (cont'd)

Table 83 Respondent's Activities Yesterday, #2

Sample	N		P		V	
Season	W	D	W	D	W	D
Brew Pito	0	1	0	0	0	0
Weaves Hats	0	2	0	0	0	0
Firewood	0	2	1	0	0	1
Fowls	0	0	1	0	0	0
Shea Butter	0	0	1	0	0	0
Groundnuts, Beans	0	0	0	1	0	0
Tobacco, Cigarettes	0	1	0	0	0	0
Farming	0	0	1	0	0	0
Domestic	4	42	6	31	8	37
Went to Market	1	5	0	4	0	4
Sick	0	0	0	2	0	0
Cared for Child or Adult	0	1	0	1	0	2
Plastering	0	3	0	0	0	0
Visiting	1	0	0	1	1	1
Flooring	0	1	0	1	0	0
Cooked for Farmers or Builders	1	0	0	2	0	0
Income Activity	0	0	0	1	1	0
Grinding Mill	0	0	0	1	0	0
Funeral	0	2	0	1	0	4
Social Gathering	0	0	0	1	0	0
TOTAL	7	60	10	47	10	49

Table 84 Collecting Trips Yesterday Morning

Sample	N		P		V	
Season	W	D	W	D	W	D
No of Trips						
0	26	19	41	39	26	40
1	36	28	40	22	39	21
2	44	32	30	38	39	31
3	8	20	14	14	8	13
4	0	9	1	2	3	4
5	1	1	2	2	1	1
6	1	1	1	1	1	0
7	1	0	0	0	0	0
TOTAL	117	110	129	118	117	110
MEAN	1.42	1.81	1.26	1.39	1.40	1.30

Q 22 YESTERDAY'S ACTIVITIES, INCLUDING TRIPS FOR WATER (cont'd)

Table 85 Collecting Trips Yesterday Afternoon

Sample	N		P		V	
Season	W	D	W	D	W	D
# of Trips						
0	85	82	84	88	75	76
1	16	14	27	13	22	16
2	13	11	15	11	11	12
3	2	1	4	3	7	5
4	0	1	0	1	1	0
5	1	1	0	0	0	1
6	0	0	0	0	1	0
TOTAL	117	110	130	116	117	110
MEAN	.45	.44	.53	.41	.57	.55

Table 86 Collecting Trips Yesterday Evening

Sample	N		P		V	
Season	W	D	W	D	W	D
# of Trips						
0	31	53	47	50	47	48
1	47	34	55	35	45	37
2	28	19	20	21	20	17
3	7	4	3	9	3	5
4	1	0	4	1	1	1
5	2	0	1	1	0	1
6	0	0	0	0	1	1
TOTAL	116	110	130	117	117	110
MEAN	1.19	.76	.96	.97	.89	.92
SUM OF MEANS	3.06	3.01	2.75	2.77	2.86	2.77

Q 22 YESTERDAY'S ACTIVITIES, INCLUDING TRIPS FOR WATER (cont'd)

Table 87 Collecting Trips Total

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Trips						
0	9	8	13	20	17	16
1	13	15	22	14	9	12
2	28	28	40	20	34	26
3	32	17	19	25	21	27
4	15	21	10	14	12	15
5	8	9	11	14	13	5
6	3	1	2	1	3	3
8	1	1	3	0	0	2
9	0	0	2	1	1	1
10	1	2	2	1	0	0
11	0	0	0	0	1	0
12	0	0	1	0	0	0
14	0	0	0	1	0	0
16	1	0	0	0	0	0
TOTAL	116	109	129	117	116	110
MEAN	3.07	3.01	2.84	2.83	2.79	2.67

Q 22 YESTERDAY'S ACTIVITIES, INCLUDING TRIPS FOR WATER (cont'd)

Table 88 Reasons for Difference from Usual Number of Collecting Trips

Sample	N		P		V	
Season	W	D	W	D	W	D
No Difference	55	58	58	58	59	47
Brewing	0	3	3	0	1	0
Kola	0	0	1	0	1	0
Weaving Hats	0	1	1	0	1	0
Weaving Baskets	0	0	2	0	0	0
Firewood	0	3	2	1	0	2
Work (Gov't)	0	0	0	0	1	0
Local Agriculture Labour	1	0	0	0	0	0
Shea Butter	0	0	1	1	0	0
Rice	0	0	0	1	0	0
Went to Hospital	0	1	1	0	3	1
Seamstress, Tailor	0	0	1	0	0	0
Weaving Hats and Drumming	0	0	0	0	1	0
Pottery	0	0	0	0	1	0
Farming	13	0	22	1	14	2
Domestic	9	5	9	5	5	8
Market	3	6	5	16	8	14
Sick	2	3	4	3	3	3
Cared for Child or Adult	1	1	3	1	0	1
Building	1	3	0	0	0	0
Plastering	2	3	0	2	1	4
Visiting	2	7	2	5	1	3
Rain	9	0	1	0	5	0
Flooring	0	0	1	1	0	0
Cooked for Farmers or Builders	2	0	4	1	3	0
Feeling Cold	1	0	0	0	0	0
Other Collectors Trips Changed	6	2	5	3	4	3
Feeling Lazy	1	1	0	4	1	0
Income Activity	0	0	1	0	0	0
Went for Local Treatment	1	0	0	0	0	0
Travelled	0	0	0	0	0	1
Stored Water Sufficient	5	0	2	2	2	4
Enemas	1	0	0	0	0	0
Grinding Mill	0	1	0	1	0	0
Funeral	0	3	1	8	1	11
Not Enough Water in WSA or WS	0	4	0	1	0	0

(cont'd...)

Q 22 YESTERDAY'S ACTIVITIES, INCLUDING TRIPS FOR WATER (cont'd)

Table 88 Reasons for Difference from Usual Number of Collecting Trips (cont'd)

Sample	N		P		V	
Season	W	D	W	D	W	D
Received Visitors						
Weaving Mats	0	0	1	0	0	0
Performed rite or ceremony	0	1	0	0	0	0
Source too crowded	1	2	0	1	0	2
Source Less crowded	0	0	0	0	0	1
Social Gathering	0	1	0	0	0	2
TOTAL	116	109	130	116	115	109

Table 89 Baths Yesterday

Sample		N		P		V	
Season		W	D	W	D	W	D
# of Baths	0	3	7	4	2	5	3
	1	62	53	49	64	49	55
	2	45	47	74	53	58	50
	3	7	5	3	2	5	1
TOTAL		117	112	130	121	117	109
MEAN		1.48	1.45	1.58	1.45	1.54	1.45

Q 22 YESTERDAY'S ACTIVITIES, INCLUDING TRIPS FOR WATER (cont'd)

Table 90 Reasons for Difference from Reported Usual Number of Baths

Sample	N		P		V	
Season	W	D	W	D	W	D
No difference	90	76	109	84	100	70
Brewing pito	0	1	0	0	0	0
Firewood	0	0	1	0	0	0
Millet	0	0	1	0	0	0
Went to hospital/clinic	0	0	0	0	2	0
Church	0	1	0	0	0	0
Weaving fans	0	0	0	1	0	0
Farming	6	0	7	0	3	0
Domestic	0	2	2	1	2	0
Went to market	0	0	1	2	3	3
Sick	3	2	2	1	3	0
Cared for child or adult	1	0	1	0	0	0
Plastering	0	0	0	2	0	1
Visiting	2	1	1	0	0	1
Rain	1	0	0	0	1	0
Cooked for farmers or builders	1	0	1	0	0	0
Feeling cold	7	2	1	2	2	1
Feeling lazy	1	1	0	0	0	0
Travelled	1	0	0	0	0	1
Funeral	0	0	1	2	0	2
Not enough water in (WSA or WS)	1	3	0	1	0	2
Received visitors	0	0	0	1	0	0
Performed rite or ceremony	0	1	0	0	0	0
Source too crowded	0	2	0	0	0	0
TOTAL	114	92	128	97	116	82

Q 23 LAST MARKET ATTENDED

Table 91 Last Market Attended

Sample	N		P		V	
Season	W	D	W	D	W	D
Bolgatanga	41	34	67	60	26	35
Bongo	5	9	1		11	12
Bongo Soe	13	11	19	18	5	2
Duusi	0	1	1	0	0	0
Gari	0	0	0	0	9	8
Gowrie	0	1	0	0	0	1
Kayonga	13	12	9	9	9	9
Kongo	0	1	0	0	0	0
Nangodi	6	6	1	0	0	0
Pelungu	4	3	10	11	13	12
Sekoti	1	1	0	0	1	0
Tongo	7	3	0	0	10	6
Zoko	0	2	14	9	23	16
Kandiga	2	3	0	0	0	0
Zebilla	0	0	1	0	0	0
Kologo	0	1	0	0	2	0
Vea	4	3	5	2	0	0
Kantia	0	0	1	0	0	0
Kulipeliga	1	0	0	0	0	0
Datoko	6	6	0	1	0	0
Sherigu	0	0	0	0	0	1
Namoo	0	0	0	0	0	2
Zuarungu	0	0	0	1	0	0
Yelwongo	0	1	0	6	0	4
Techiman	0	0	0	1	0	0
Sunyani	0	0	0	1	0	0
Balunga	0	0	0	0	1	0
Never been to market	2	1	1	1	2	3
TOTAL	105	97	130	114	113	107

Q 23 LAST MARKET ATTENDED (cont'd)

Table 92 Time Since Last Visit to Market

Sample	N		P		V	
Season	W	D	W	D	W	D
Yesterday	7	24	13	34	14	30
No. of days 2	17	8	7	10	3	3
3	8	10	20	9	23	15
4	3	8	6	6	4	7
5	5	1	1	2	1	2
6	5	8	7	4	6	4
7	3	7	7	5	7	5
8	4	0	0	0	1	0
9	6	8	6	7	2	9
10	3	2	4	2	3	0
11	0	2	1	0	1	0
12	3	4	8	3	5	2
13	0	0	0	0	0	1
14	3	3	5	2	5	1
15	4	1	0	3	1	1
18	0	1	0	0	0	0
19	1	0	0	0	0	0
20	1	0	0	0	1	1
21	4	0	3	3	0	2
22	0	0	0	0	0	1
30	18	10	14	7	11	9
More than 1 month, less than 2	0	1	0	2	1	2
About: 2 months	2	2	9	3	4	4
3 months	2	2	9	3	4	4
4 months	4	1	1	1	4	0
5 months	0	0	1	3	0	0
6 months	0	1	3	1	1	0
Last dry season	0	0	0	0	1	0
More than 6 months, less than 12	3	0	1	0	0	1
About 1 year	5	2	2	2	3	4
1-2 years	2	0	2	1	1	0
About 2 years	0	0	0	0	2	1
2-3 years	1	0	0	0	1	0
About 3 years	0	0	1	0	0	0
More than 10 years	0	1	0	0	0	0
Never been to market	0	0	0	0	1	0
TOTAL	114	109	129	116	112	107

Q 24 EDUCATIONAL PRESENTATIONS

Table 93 Attendance at and Knowledge of VEW Talks

Sample	N		P		V	
Season	W	D	W	D	W	D
No knowledge of VEW talk ever in village	110	107	126	120	83	74
Knew of VEW talk but did not attend	5	0	1	0	18	22
Attended VEW talk	0	1	1	1	11	14
No reply	2	5	2	0	5	1
TOTAL	117	113	130	121	117	111

Q 25 ATTENDANCE AT CONCERTS

Table 94 Reported Attendance at Concerts

Sample	N		P		V	
Season	W	D	W	D	W	D
Never attended	107	104	125	117	108	102
Attended concert in district	1	0	1	0	4	4
Attended concert in Kumasi or Accra	2	3	2	2	2	3
No reply	7	6	2	2	3	2
TOTAL	117	113	130	121	117	111

Q 26 ATTENDANCE AT CLINIC

Table 95 Attendance at Clinic or Hospital

Sample	N		P		V	
Season	W	D	W	D	W	D
Have attended	90	91	90	88	99	92
Never attended	21	18	35	29	17	17
No reply	6	4	5	4	1	2
TOTAL	117	113	130	121	117	111

Table 96 Last Visit to Clinic or Hospital

Sample	N		P		V	
Season	W	D	W	D	W	D
Attended in last month	32	30	18	19	43	37
Attended in last year but not last month	35	37	37	33	33	33
Attended over a year ago	22	21	29	31	22	21
No reply	28	25	46	38	19	20
TOTAL	117	113	130	121	117	111

Q 27 EDUCATIONAL PRESENTATIONS

Table 97 Reported Clinic Attendance and Exposure to Clinic Talks on Water

Sample	N		P		V	
Season	W	D	W	D	W	D
Attended but no talk	61	74	73	78	71	75
Talk	25	14	9	4	18	16
No reply	31	25	48	39	28	20
TOTAL	117	113	130	121	117	111

Table 98 Reported Radio Ownership and Exposure to Broadcasts on Water

Sample	N		P		V	
Season	W	D	W	D	W	D
No radio ownership	111	93	123	110	106	91
Radio owned, but does not work	2	3	1	1	1	1
Radio owner never heard talks on water	2	7	1	0	7	5
Heard radio talk on water	0	0	1	0	0	0
No radio talks in local language	0	5	1	4	2	8
No reply	2	5	3	6	1	6
TOTAL	117	113	130	121	117	111

Q 28 EDUCATIONAL PRESENTATIONS

Table 99 Items Recalled by Audience Members from Talks by Nurses, VEWs and Concerts

Sample	N		P		V	
Season	W	D	W	D	W	D
Boil water	16	2	1	0	4	1
Keep water pots covered	2	1	1	0	10	9
Oral rehydration	4	3	4	1	1	6
Boil non hand-pump water	2	6	0	0	3	5
Keep water containers clean	5	1	1	0	2	6
Bathe children/keep children clean	1	0	4	0	3	6
Reduce fever by bathing/sponging	6	0	3	0	3	3
Keep hand-pump site clean	0	0	0	0	3	6
Cover left-over food	0	2	0	0	2	1
Good diet/food	2	1	1	0	1	1
Self-cleanliness	0	3	0	1	1	1
Don't play on hand-pump	0	0	0	0	1	3
Keep clothes clean	0	1	0	0	3	2
Keep compound clean	1	0	0	0	3	1
How to use hand-pump	0	1	0	0	2	1
Keep water clean	1	0	0	0	2	1
Boil water when sick	1	0	0	0	0	1
Send sick children to clinic	1	0	0	0	1	1
Bathing at pump comtaminates the well	0	0	1	0	2	0
Prevent stagnant water	0	0	0	1	1	0
Wash utensils	0	0	0	0	2	0
Do not give enemas	1	0	0	0	1	0
Use dipper, cup or ladle	1	0	0	0	1	0
TOTAL	43	21	16	3	52	55
Nothing Remembered	3	2	3	2	2	3

All of the following items were each recalled by one person in one season only: avoid dirt; bathe in bath house; bathe children in warm water during cold weather; feed children when hungry; do not

drink dug-out water; do not let more than two children sleep together; bathe child with cold water (even if he/she has a cold); give more water to children with measles; give children clean water; boil water because you may get illness and guinea worm; do not bathe in the open; cover faeces; keep animals away from utensils; do not store water for long; backfilling; keep animal trough clean; wash hands before cooking; site development; allow water to settle; give more water to children with diarrhoea; store water for children in bottles.

Table 100 Reported Prior Knowledge, Prior and Current Implementation of All Items Recalled from Any Educational Presentation

Sample		N		P		V	
Season		W	D	W	D	W	D
Current Implementation	Yes	31	15	14	4	52	47
	No	5	9	1	0	3	10
Prior Implementation	Yes	8	13	4	2	36	28
	No	31	12	10	2	19	29
Prior Knowledge	Yes	9	10	7	2	33	34
	No	21	25	8	2	22	23
TOTAL		105	59	44	12	165	171

Q 29 HAND-PUMP CONDITIONS

TABLE 101 Time Since last Hand-Pump Breakdown

Sample	N		P		V	
Season	W	D	W	D	W	D
5 days	0	0	0	0	1	0
1 weeks	0	0	1	0	0	1
2 weeks	0	0	0	0	5	0
days	0	0	0	0	2	0
20 days	0	0	0	2	0	0
3 weeks	0	0	0	0	3	3
1 month	0	1	0	9	6	13
More than 1 month, less than 2	0	0	0	2	0	1
2 months	1	6	10	0	4	3
3 months	3	5	13	2	5	6
4 months	1	0	6	3	1	4
6 months	0	1	5	3	4	5
Last dry season	0	0	10	1	6	0
Last wet season	0	1	0	3	0	7
More than 6 months less than 12	1	0	3	4	6	5
Last year	0	2	2	17	3	11
About one year	1	3	14	23	18	12
1-2 years	0	0	2	3	4	1
About 2 years	0	0	2	3	0	2
2-3 years	0	0	0	0	1	0
About 3 years	0	0	1	4	1	4
(Not broken but yield low)	0	0	0	0	0	7
Never broken	0	1	3	2	9	11
Don't know	4	4	0	18	20	9
TOTAL	12	25	80	100	102	105

Q 29 HAND-PUMP CONDITIONS (cont'd)

TABLE 102 Duration of Hand-Pump Breakdown

Sample	N		P		V	
Season	W	D	W	D	W	D
Days 1	1	0	0	0	0	0
2	0	0	1	0	0	0
3	0	2	5	5	6	4
4	0	0	3	4	11	3
5	0	1	3	4	4	1
6	0	1	0	5	2	5
7	1	2	15	17	16	20
8	0	0	0	0	0	1
10	1	3	4	6	4	6
11	0	0	0	0	1	0
13	1	0	0	0	0	0
14	0	4	11	5	15	11
15	0	0	1	3	1	0
20	0	1	0	0	0	0
21	0	1	3	3	2	3
30	4	0	22	6	5	7
More than one month	0	0	2	0	0	1
2 months	0	1	2	4	0	2
3 months	1	0	0	1	0	0
A long time	0	0	0	2	0	0
Still broken	0	0	3	0	0	1
Don't know	5	8	5	36	26	27
TOTAL	14	24	75	101	93	92

TABLE 103 Water Source Used During Breakdown Period

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	4	11	15	15	9	12
Alternative source 1	2	6	53	65	57	56
Alternative source 2	2	1	12	5	6	12
Alternative source 3	0	2	0	1	2	1
Water storage area	0	0	2	0	0	0
Not one of the usual sources	3	4	18	9	12	4
TOTAL	11	24	100	95	86	85

Q 29 HAND-PUMP CONDITIONS (cont'd)

TABLE 104 Details of the Non-Usual Water Source

Sample	N		P		V	
Season	W	D	W	D	W	D
Hand-pumps	3	3	15	2	8	1
Well	0	0	0	0	1	0
Dam	0	0	1	0	0	0
Pond, field dug-out	0	0	0	1	0	0
River stream	0	0	2	0	1	0
Dug-out in dam, pond	0	0	1	1	0	1
Dug-out in river, stream	0	1	2	5	2	2
TOTAL	3	4	21	9	12	4

TABLE 105 Effect of Hand-Pump Breakdown on Respondent's Income

Sample	N		P		V	
Season	W	D	W	D	W	D
No effect	8	16	52	58	47	49
Income declined	0	1	8	7	6	8
Disrupted work	0	1	8	1	4	7
TOTAL	8	18	68	66	57	64

TABLE 106 Effect of Hand-Pump Breakdown on Husband's Income

Sample	N		P		V	
Season	W	D	W	D	W	D
No effect	8	14	49	49	46	50
Income declined	0	0	1	1	0	2
Disrupted work	0	0	2	0	0	2
TOTAL	8	14	52	50	46	54

Q 29 HAND-PUMP CONDITIONS (cont'd)

TABLE 107 Water Source Before Hand-Pump

Sample	N		P		V	
Season	W	D	W	D	W	D
Hand-pump	3	2	1	0	1	0
Well	0	1	11	6	10	7
Dam	0	0	2	0	11	4
Pond/field dug-out	0	8	7	23	6	15
Unidentified dug-out						
River/stream	1	0	36	8	20	11
Dugout in dam or pond	2	1	9	1	8	14
Dugout in river, stream	3	11	35	61	32	48
TOTAL	9	23	101	99	88	99

TABLE 108 Condition of Pre-Hand-Pump Source

Sample	N		P		V	
Season	W	D	W	D	W	D
Still has water	8	20	95	67	80	62
Dried-up, or spoiled in some way	1	2	10	27	10	28
Flooded						
Not good	0	3	4	4	2	8
Water only in wet season	1	0	2	2	6	0
Over-grown	1	0			2	0
TOTAL	11	25	111	100	100	98

Q 29 HAND-PUMP CONDITIONS (cont'd)

TABLE 109 Respondent's Perceptions of Hand-Pump Conditions

Sample	N		P		V	
Season	W	D	W	D	W	D
n	14	25	114	104	107	104
No. agreeing with each statement:						
The pump is too far	14	22	69	64	54	51
The site is too dirty	2	2	39	31	19	14
The yield is too low	5	9	38	34	27	22
The pump is overcrowded in the morning	10	19	38	74	44	74
The pump is overcrowded in the afternoon	7	10	14	30	20	38
The pump is overcrowded in the evening	11	24	73	96	85	99
The pump breaks down too often	6	4	9	11	18	15
The pump takes too long to be fixed	7	6	25	25	18	18
The pump is too difficult to use	9	14	38	38	28	22
The water taste good	9	24	95	90	102	102
The water is clean	12	24	104	101	101	102
Your family obtain enough water from this source	3	15	39	76	58	88

Q 29 HAND-PUMP CONDITIONS (cont'd)

TABLE 110 Do People Who Are Not From Your Village Use Your Pump? Do you Approve?

Sample	N		P		V	
Season	W	D	W	D	W	D
Strangers use, respondent approves	6	13	78	61	72	73
Strangers use, respondent does not approve	1	0	2	2	3	7
Strangers do not use	1	2	25	31	26	18
Other	1	0	0	0	0	0
Respondent herself is a stranger	4	10	6	7	3	3
TOTAL	13	25	111	103	104	101

Q 29 HAND-PUMP CONDITIONS (cont'd)

TABLE 111 What are Other Problems With Pump?

Sample	N		P		V	
Season	W	D	W	D	W	D
No other problems	17	12	92	56	77	57
Pump flooded when it rains	0	0	0	0	1	0
Fighting among women	4	9	8	19	8	18
We ourselves are strangers	0	1	1	0	3	0
Particles in water	1	0	2	0	4	0
Worms/living organism	0	0	1	0	3	1
Skin problems/rashes	0	0	0	0	1	0
Over-crowded in dry season	0	0	1	0	2	0
Source needs maintenance	0	0	1	1	1	2
Not good for health	0	0	0	1	0	0
Queue long since we're strangers	2	1	0	1	0	0
Difficult to use	2	0	2	1	2	0
Pump-man/people don't want us to use it	3	0	0	0	0	0
Over-crowded	1	3	2	2	1	3
Too far	1	0	0	0	0	0
People drive us away	0	0	1	0	0	0
Water bad in morning/ first drawing	0	1	0	1	1	1
Crowded so men cannot collect	0	0	0	0	1	0
Should have a bathhouse	0	0	0	0	1	0
Difficult for animals to use	0	0	0	0	1	0
Have to wait too long	0	0	1	0	0	0
Sometimes pumping for animals before people	0	2	0	0	0	0
Low yield	0	0	0	3	0	0
It will break down if too much use(pumping)	0	0	0	1	0	0
TOTAL	31	29	112	86	107	82

Q 29 HAND-PUMP CONDITIONS (cont'd)

TABLE 112 Who Owns the Hand-Pump (Dry Season only)

Sample	N	P	V
Season	D	D	D
No one	0	1	0
Chief	3	15	23
Tingdana	0	1	0
Pumpman	4	19	22
Government	2	19	18
GWSC	0	4	2
Village/section	2	13	4
Landlord	3	3	2
Unidentifiable person	1	1	0
Whites	1	2	3
Sub-headman/section head/elder	3	4	5
TOTAL	19	82	79

Q 30 NON-HAND-PUMP WATER SOURCES, CURRENT OR ALTERNATIVE SOURCE

TABLE 113 Conditions at (non-Hand-Pump) Water Source

Sample	N		P		V	
Season	W	D	W	D	W	D
n	117	110	110	89	76	72
No. agreeing with each statement:						
The source is too far away	60	82	48	51	27	34
The site is too dirty	45	52	21	19	13	16
The yield is too low	30	66	29	39	15	27
The source is over-crowded in the morning	26	75	23	38	12	23
The source is over-crowded in the afternoon	19	37	13	17	6	12
The source is over-crowded in the evening	48	86	29	51	15	27
The water is too difficult to collect	33	65	25	47	11	31
The water tastes good	88	80	85	71	61	49
The water is clean	77	76	86	73	58	49
Your family obtains enough water from this source	56	55	40	56	44	46

Q 30 NON-HAND-PUMP WATER SOURCES, CURRENT OR ALTERNATIVE SOURCE (cont'd)

TABLE 114 Do Strangers (People not from your Village) Use This Source? Do you Approve?

Sample	N		P		V	
Season	W	D	W	D	W	D
Strangers use, respondent approves	63	48	52	39	28	33
Strangers use, respondent does not approve	3	6	1	1	1	2
Strangers do not use	51	52	51	41	44	34
Other	0	0	1	0	0	0
Respondent herself is a stranger	0	3	1	3	3	1
TOTAL	117	109	110	84	76	69

[redacted]

Q 30 NON-HAND-PUMP WATER SOURCES, CURRENT OR ALTERNATE SOURCE (cont'd)

TABLE 115 What are the Other Problems With the Source?

Sample	N		P		V	
Season	W	D	W	D	W	D
No problems	88	49	91	50	65	0
Fighting among women	3	25	2	12	0	9
We ourselves are strangers	1	0	0	0	0	0
Rain turns water red/ bad	1	0	0	0	1	0
Worms	2	1	1	1	1	0
Animals contaminate water	2	3	0	0	0	1
Dries up	5	1	4	4	5	1
Floods in wet season	2	0	1	0	0	0
Dries up in dry season	3	0	4	0	1	0
Source needs maintenance	0	0	0	0	1	1
Water smells bad	4	0	2	0	0	0
Over-grown, weedy	2	0	0	0	0	0
Not good for health	0	0	0	0	1	0
Witches, spirits	1	0	0	0	0	0
Difficult to use	1	0	0	0	0	0
Over-crowded	0	4	1	0	0	0
Too far	0	0	1	0	0	0
Have to wait too long	0	1	0	0	0	0
Undertakers bathe there	0	0	0	1	0	0
Crocodiles	0	2	0	0	0	0
Has to be dug out often	0	1	0	0	0	0
Frogs in the water	0	0	0	1	0	0
Low yield	0	3	0	0	0	0
Dam receding so dug-outs dry	0	1	0	0	0	0
Body pains from carrying water	0	1	0	0	0	0
TOTAL	115	90	107	69	75	14

Q 30 NON-HAND-PUMP WATER SOURCES, SOURCE OR ALTERNATE SOURCE (cont'd)

TABLE 116 Who Owns the Source? (Dry Season Only)

Sample	N	P	V
Season	D	D	D
No one	6	5	0
Chief	17	5	11
Tingdana	14	18	9
Pumpman	4	0	0
Village or section	12	7	8
Landlord of near-by compound	11	17	15
God	4	2	1
Unidentified person	0	1	1
Headman or elder	7	5	4
Ancestors	1	0	1
Person who is now dead	0	2	3
The people	3	2	0
Person from near-by farm	0	1	0
For everyone in the area	0	1	0
Don't know	28	21	18
TOTAL	107	87	71

Q 31 NEAREST HAND-PUMPS

TABLE 117 Where is the Nearest Hand-Pump? (asked only of people who do not use a Hand-Pump)

Sample	N		P		V	
Season	W	D	W	D	W	D
Doesn't know	14	3	0	0	1	0
Knows	54	80	0	0	8	5
TOTAL	68	83	0	0	9	5

Q 13 NEAREST HAND-PUMPS

TABLE 118 When Did You Last Use it?

Sample	N		P		V	
Season	W	D	W	D	W	D
Last dry season	10	4	0	0	1	1
Last year	2	12	0	0	0	1
Never used it	35	46	0	0	5	3
Last rainy season	4	4	0	0	0	0
When passing by	13	9	0	0	0	0
More than one year	2	5	0	0	0	0
Earlier this season		1	0	0	0	0
TOTAL	66	81	0	0	6	5

TABLE 119 Why Did You Use it?

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source dried up	7	15	0	0	1	0
Current source flooded	1	3	0	0	0	0
Current source too crowded	2	2	0	0	0	0
Dug-out collapsed	1	0	0	0	0	0
Passing by	20	10	0	0	0	0
For use there, near the hand-pump	0	5	0	0	0	0
TOTAL	31	35	0	0	1	0

Q 31 NEAREST HAND-PUMPS (cont'd)

TABLE 120 Any Problems Using it?

Sample	N		P		V	
Season	W	D	W	D	W	D
No problems	26	22	0	0	0	2
Not welcome	0	5	0	0	0	0
Quarrelling						
Pump belongs to other section	1	0	0	0	1	0
Difficult to use	4	0	0	0	0	0
Crowded	1	0	0	0	0	0
TOTAL	32	27	0	0	1	2

Q 32 CHILDREN'S HEALTH

TABLE 121 Ages of Respondent's Children (months)

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Months						
1-6	10	14	8	18	11	14
7-12	23	13	18	15	28	20
13-18	7	8	11	17	2	9
19-24	5	13	23	12	18	7
25-30	0	4	4	6	4	10
31-36	30	22	27	24	23	17
37-42	0	5	1	5	0	3
43-48	14	18	20	12	14	15
49-54	1	2	1	0	2	2
55-60	15	9	9	14	18	18
61-66	2	0	1	1	2	0
67-72	6	9	11	3	18	4
TOTAL	113	117	134	128	140	119

Q 32 CHILDREN'S HEALTH (cont'd)

TABLE 122 Child's Sex

Sample	N		P		V	
Season	W	D	W	D	W	D
Male	51	57	64	57	71	62
Female	63	61	69	74	65	55
TOTAL	114	118	133	131	136	117

TABLE 123 Children with Diarrhoea

Sample	N		P		V	
Season	W	D	W	D	W	D
Child has diarrhoea	17	7	7	3	9	7

TABLE 124 Frequency of Diarrhoea

Sample	N		P		V	
Season	W	D	W	D	W	D
Times Per day						
2	3	0	2	1	0	1
3	4	0	2	0	1	1
4	6	4	1	2	1	1
5	3	2	1	0	1	4
6	0	0	0	1	1	1
7	0	1	0	0	3	0
TOTAL	16	7	6	4	7	8

Q 32 CHILDREN'S HEALTH (cont'd)

TABLE 125 Number of Days with Diarrhoea

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of days						
2	3	1	1	2	0	1
3	4	1	3	3	2	1
4	2	3	1	0	1	0
5	1	0	0	0	2	1
6	1	0	1	0	2	2
7	1	0	0	0	0	1
8-14	1	0	2	0	0	1
TOTAL	13	5	8	5	7	7

TABLE 126 Children's Health Problems

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of children with:						
Fever	15	4	13	10	10	7
Skin irritation	6	7	7	7	12	7
Eye problem	2	5	4	13	3	4
Coughing	6	10	7	15	8	17
Running nose	9	9	8	19	12	11
Vomitting	4	2	1	1	1	3
Headache	0	1	0	0	0	0
Stiff neck	1	0	0	0	0	0
Sore ears/nose/anus mouth/hands/face/ throat, etc.	1	1	2	1	1	6
Thin with bloated stomach/malnourished	1	1	3	0	0	2
Bilharzia	0	0	1	0	0	0
Combinations	1	1	2	0	0	1
TOTAL	46	41	48	66	47	58

Q 32 CHILDREN'S HEALTH (cont'd)

TABLE 127 Referral Regarding Children's Health Matters

Sample	N		P		V	
Season	W	D	W	D	W	D
Other	0	1	1	2	0	0
Oral rehydration	2	0	2	0	1	1
Sponging	3	0	0	0	0	0
Food and water	1	0	0	0	0	1
Clinic	4	7	1	2	7	9
Hospital/Doctor	13	12	16	13	13	19
Combinations	2	0	0	2	2	0
TOTAL	25	20	20	19	23	30

TABLE 128 Guinea Worm

Sample	N		P		V	
Season	W	D	W	D	W	D
Does respondent have guinea worm now?	0	2	1	0	0	0
Has respondent had guinea worm in the last year?	7	5	1	0	2	1
Has respondent ever had guinea worm	18	26	18	16	6	10
Does anyone else in in compound have guinea worm now?	3	9	2	3	5	3

Q 33 WHAT SEASON IS IT NOW?

TABLE 129 Current Season

Sample	N		P		V	
Season	W	D	W	D	W	D
Wet	114	0	124	2	115	6
Dry	1	113	1	118	0	105
Between	0	0	2	0	1	0
TOTAL	115	113	127	120	116	111

Q 34 ALTERNATE SEASON SOURCES OF WATER

TABLE 130 What Water Source was Used in the Alternate Season

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	47	5	78	58	100	77
Alternative source 1	51	23	45	13	14	2
Alternative source 2	11	5	1	0	3	0
Alternative source 3	0	31	0	14	0	12
Water Storage Area	0	3	0	4	0	0
*Different source	6	15	1	1	0	0
TOTAL	115	82	125	90	117	93

Q 34 ALTERNATE SEASON SOURCES OF WATER (cont'd)

TABLE 131 *Different Source of Water (Wet Season)

Sample	N	P	V
Season	W	W	W
Hand-pump	2	1	0
Well	0	1	1
Pond/field dug-out	2	0	0
Dug-out in dam/pond	2	0	0
Dug-out in river/stream	2		
TOTAL	8	2	1

TABLE 132 What was the Water Source used for?

Sample	N	P	V
Season	D	D	D
Drinking	111	121	111
Cooking	111	121	111
Bathing	105	120	109
Washing clothes	105	115	104
Animals	97	98	80
Other			
- Pito	6	7	3
- Funerals	0	4	0
- Building and/or plastering	6	9	3

Note: Question asked only in dry season.

Q 34 ALTERNATE SEASON SOURCES OF WATER (cont'd)

TABLE 133 What Other Source of Water did the Respondent Use in the Alternate Season?

Sample	N	P	V
Season	D	D	D
Current source	5	18	15
Alternative source 1	3	8	6
Alternative source 2	4	2	2
Alternative source 3	15	13	18
Water storage area	3	7	7
Different source	2	1	0
TOTAL	32	49	48

TABLE 134 What was the Water Source used for?

Sample	N	P	V
Season	D	D	D
Drinking	32	46	39
Cooking	31	45	38
Bathing	31	47	45
Washing clothes	31	45	45
Animals	30	51	51
Other			
- Pito	0	4	1
- Funerals	0	1	0
- Building and/or plastering	5	6	1
- Traditional	0	1	0

Q 34 ALTERNATE SEASON SOURCES OF WATER (cont'd)

TABLE 135 What Other Sources Were used in the Last Alternate Season?

Sample	N	P	V
Season	D	D	D
Current source	0	1	0
Alternative source 1	3	0	2
Alternative source 2	1	2	2
Alternative source 3	1	2	0
Water storage area	0	1	1
Different source	0	1	0
TOTAL	5	7	5

TABLE 136 What was this Water used for?

Sample	N	P	V
Season	D	D	D
Drinking	4	4	0
Cooking	4	4	0
Bathing	4	4	2
Washing clothes	4	4	2
Animals	5	4	5
Other			
- Building and/or plastering	2	2	1
TOTAL	23	22	10

Q 35 DETAILS OF RESPONDENTS

TABLE 137 Respondent's Age (in years)

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Years						
Under 20	3	3	2	4	2	3
20-24	8	9	21	8	9	8
25-29	34	22	19	30	41	37
30-34	16	19	21	19	18	11
35-39	30	36	42	41	25	38
40-41	14	8	17	13	17	9
45-49	8	13	6	5	4	5
50-54	1	1	2	0	1	0
55-59	1	0	0	0	0	0
60-64	0	1	0	0	0	0
65-69						
70+	0	1	0	0	0	0
TOTAL	115	113	130	120	117	111

TABLE 138 Respondent's Years in School

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Years						
0	102	80	122	94	103	70
1	2	1	2	1	1	3
2	2	2	1	2	3	2
3	2	2	1	0	0	0
4	1	0	1	1	4	0
5	1	1	1	0	1	0
6	2	2	0	0	1	1
7	2	1	0	0	0	0
8	0	0	0	0	1	1
9	0	0	1	0	0	0
10+	1	2	0	3	3	3
TOTAL	115	91	129	101	117	80

Q 35 DETAILS OF RESPONDENTS (cont'd)

TABLE 139 Respondent's Religion

Sample	N		P		V	
Season	W	D	W	D	W	D
Traditional	113	106	123	116	111	106
Catholic	4	3	4	1	5	4
Muslim	0	0	2	2	1	0
Anglican						
Christian	0	2	0	0	0	0
Protestant	0	1	0	0	0	0
TOTAL	117	113	129	119	117	110

Q 36 OTHER QUESTIONS OR COMMENTS

TABLE 140 Questions/Comments

Sample	N		P		V	
Season	W	D	W	D	W	D
Need hand-pump and/or water	26	45	5	12	6	11
Another hand-pump/ water Source	3	4	24	23	17	24
Why doing evaluation	2	4	7	8	6	6
Request for aid	1	2	2	1	5	5
Animals die, lack of water	0	0	0	0	1	1
Pay basic rate but no water; need in dry season	2	0	1	0	1	0
Water source should be treated	0	0	1	3	1	2
Access to hand-pump difficult	0	0	0	0	0	1
TOTAL	34	55	40	47	37	50

Q 37 DISTANCES TO WATER SOURCE

TABLE 141 Distance to Current Source (metres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Metres						
1-100	11	0	26	14	8	2
101-200	15	8	25	15	26	29
201-300	27	7	18	24	28	27
301-400	14	20	19	16	17	16
401-500	19	16	14	19	10	11
501-600	11	17	11	12	7	12
601-700	6	14	6	7	5	7
701-800	6	7	4	9	1	3
801-900	5	5	1	2	2	2
901-1000	2	7	0	0	2	2
1001-1100	0	1	1	0	0	0
1101-1200	1	2	2	1	1	0
1201-1300	0	0	1	0	0	1
1301-1400	0	1	1	0	1	1
1401+	0	8	0	1	0	0
TOTAL	117	113	129	120	106	111

TABLE 142 Distance to Alternative Source 1 (metres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Metres						
1-100	4	1	9	6	5	2
101-200	3	3	7	6	13	16
201-300	15	7	18	12	12	15
301-400	16	13	15	15	11	12
401-500	10	15	15	15	6	8
501-600	14	10	15	14	14	12
601-700	6	5	16	11	7	9
701-800	2	6	6	5	8	9
801-900	6	6	4	4	8	7
901-1000	1	3	1	2	3	5
1001-1100	3	4	3	4	2	6
1101-1200	1	3	5	6	2	3
1201-1300	3	4	2	2	3	1
1301-1400	1	1	0	0	1	0
1401+	10	12	10	6	7	2
TOTAL	95	93	126	108	102	107

Q 37 DISTANCES TO WATER SOURCE (cont'd)

TABLE 143 Distance to Alternative Source 2 (metres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Metres						
1-100	0	2	1	11	0	5
101-200	0	5	3	12	1	20
201-300	1	15	1	20	1	25
301-400	1	10	3	19	2	14
401-500	1	12	0	22	1	15
501-600	0	12	0	16	0	13
601-700	1	11	1	6	1	5
701-800	0	20	1	4	1	4
801-900	0	9	0	3	0	2
901-1000	3	3	1	1	0	0
1001-1100	1	5	0	2	0	0
1101-1200	0	0	2	0	0	0
1201-1300	2	0	0	0	0	0
1301-1400	1	0	1	0	0	0
1401+	5	0	1	0	0	0
TOTAL	16	104	15	116	7	103

TABLE 144 Distance from Hand-Pump (where no other source is a hand-pump; metres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Metres						
1-100	0	0	0	0	0	0
101-200	0	0	0	0	0	0
201-300	0	0	0	0	1	0
301-400	0	0	4	1	1	1
401-500	0	0	1	2	0	1
501-600	2	3	1	3	0	2
601-700	3	6	3	3	0	0
701-800	2	7	3	4	1	1
801-900	2	0	1	1	1	2
901-1000	0	3	1	0	0	0
1001-1100	6	6	2	2	0	0
1101-1200	4	3	0	0	0	0
1201-1300	4	5	0	0	0	0
1301-1400	8	6	0	0	0	0
1401+	51	36	1	0	0	0
TOTAL	82	75	17	16	4	7

Q 37 DISTANCES TO WATER SOURCE (cont'd)

TABLE 145 Distance from VEW Presentation (metres), (VEW Sample only)

Sample	V	
Season	W	D
Metres		
1-100	9	5
101-200	23	27
201-300	19	18
301-400	13	16
401-500	8	6
501-600	3	9
601-700	13	7
701-800	6	9
801-900	8	8
901-1000	1	2
1001-1100	1	1
1101-1200	1	
TOTAL	105	108

WATER QUALITY TESTING RESULTS

TABLE 146 Water Quality Testing Results

Sample	N		P		V	
Season	W	D	W	D	W	D
Faecal Coliform Counts						
0	65	56	99	66	73	77
1	1	1	4	4	2	2
2	2	1	3	0	3	1
3	3	0	1	0	2	0
4	0	1	1	3	2	0
5	1	1	1	1	1	1
6	0	2	3	0	1	0
8	0	0	0	0	2	0
9	0	0	0	1	0	1
10	0	1	1	3	2	0
11-15	0	2	0	1	3	5
16-20	0	2	0	5	0	2
21-25	1	0	0	0	0	0
26-30	0	0	1	0	0	0
31-35	0	0	1	0	2	0
36-40	0	1	1	0	0	2
41-45	0	0	1	0	0	0
56-60	0	1	0	0	1	0
66-70	1	0	1	0	0	0
76-80	1	0	0	0	0	0
96-100	1	0	0	0	1	1
101+	5	2	0	2	0	0
TOTAL	81	71	118	86	95	92

OBSERVATIONS OF COMPOUND CONDITIONS

TABLE 147 Observations of Compound Conditions

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of Respondents	112-115	110-113	119-130	117-121	114-117	109-111
Livestocks are prevented from entering the living area	84	97	109	109	110	96
There is an entrance other than through the animal yard	27	35	39	43	38	34
There is a cleared path through the animal yard	43	20	59	19	47	33
There is human or livestock faeces in the living area	17	15	12	10	11	9
There is fowl faeces and/or fowl present in the living area	30	53	41	37	30	44
The drinking water pots are covered	100	104	114	113	104	103
There is a dipper, ladle or cup for transferring water from the drinking water container	27	22	30	38	33	30
Where cooking utensils are washed, there is a drying area located off the ground	10	6	22	4	17	7
There is a line or stick for drying clothes	51	61	57	74	55	61
There is a place where used water from the compound collects	31	15	38	14	25	0
There is a bathhouse in the compound	57	51	69	61	72	67
Where there is a bathhouse, it has a soakaway pit	20	1	25	5	29	5
The compound has a latrine	1	5	3	4	0	0
Mozambique slab latrine	1	1	0	0	0	0
Multi-hole slab latrine	0	0	0	5	0	0

Appendix C Source Measurement Results

SOURCE MEASUREMENT AT MOST COMMON CURRENT SOURCE

TABLE 148 Types of Collectors (Note: no Wet Season Source Measurements for N Villages)

Sample	N		P		V	
Season	W	D	W	D	W	D
No. of yards making one trip or more		66	57	78	77	88
Respondent		57	51	66	62	67
Female adult		37	25	41	47	36
Female youth		24	10	21	29	22
Female child		9	18	15	24	18
Husband		1	0	3	0	0
Male adult		0	4	5	3	2
Male youth		3	1	2	4	2
Male child		6	2	3	3	8
TOTAL		137	111	156	172	155

TABLE 149 Whether or Not from Respondent's Yard

Sample	N		P		V	
Season	W	D	W	D	W	D
Yes		115	87	142	135	140
No		30	35	42	54	30
TOTAL		145	122	184	189	170

SOURCE MEASUREMENT (cont'd)

TABLE 150 Total Number of Trips per Collector

Sample	N		P		V	
Season	W	D	W	D	W	D
# of trips						
1		71	63	83	104	72
2		37	41	53	48	51
3		25	11	23	19	29
4		8	5	7	11	9
5		5	4	3	8	5
6		2	0	3	4	8
7		1	0	1	0	0
8		0	0	2	0	2
9		0	0	2	0	1
10 or more		1	0	1	2	5
TOTAL		150	124	178	196	182
MEAN		2.04	1.75	2.08	1.96	2.45

TABLE 151 Total Volume (litres) Carried per Collector

Sample	N		P		V	
Season	W	D	W	D	W	D
Litres						
1-10		2	7	3	8	4
11-20		38	50	48	65	37
21-30		21	11	23	37	20
31-40		20	28	29	28	35
41-50		13	8	13	12	11
51-60		17	10	12	17	18
61-70		8	4	13	7	12
71-80		8	2	13	6	12
81-90		6	5	2	6	8
91-100		6	0	3	3	5
100 or more		10	1	17	6	18
TOTAL		149	126	176	195	180
MEAN		44.6	31.4	43.9	35.0	47.8

Appendix D Three Visits Results

THREE-VISITS, WATER COLLECTION

TABLE 152 Collectors

Sample	N		P		V	
Season	W	D	W	D	W	D
Respondent	104	105	85	111	92	99
Female adults	29	37	22	44	23	33
Female youth	15	26	15	19	25	27
Female child	18	12	15	16	17	21
Husband	0	1	0	1	0	0
Male adult	0	0	0	1	0	1
Male youth	1	2	0	1	0	2
Male child	2	4	0	9	0	4
TOTAL	169	187	137	202	157	187

TABLE 153 Water Source

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	143	167	119	175	150	179
Alternative source 1	14	21	28	20	10	11
Alternative source 2	5	6	7	5	6	2
Alternative source 3-4	0	2	0	1	4	0
Different source	0	0	3	3	0	1
TOTAL	162	196	157	204	170	193

THREE-VISITS, WATER COLLECTION (cont'd)

TABLE 154 Number of Collecting Trips per Collector

Sample	N		P		V	
Season	W	D	W	D	W	D
Trips						
1	33	51	39	34	62	60
2	46	66	48	68	52	44
3	33	34	36	45	23	40
4	23	20	20	27	16	10
5	14	8	9	11	9	7
6	11	8	6	11	1	9
7	3	4	1	5	3	4
8	4	2	6	3	2	1
9	0	0	0	0	1	0
10	2	1	0	0	0	2
11	0	1	0	0	0	1
12	1	0	0	0	0	0
13	1	1	0	0	0	0
15	1	0	0	0	0	0
TOTAL COLLECTORS	172	201	165	182	169	178
MEAN	3.28	2.71	2.78	3.25	2.34	2.61

THREE-VISITS, WATER COLLECTION (cont'd)

TABLE 155 Total Volume Collected per Collector (litres)

Sample	N		P		V	
Season	W	D	W	D	W	D
Total Volume						
1-5	0	1	0	0	0	2
6-10	0	0	1	1	0	1
11-15	1	11	9	5	10	11
16-20	13	18	18	11	27	15
21-25	5	9	5	6	15	12
26-30	14	8	11	7	15	12
31-35	9	13	5	9	8	11
36-40	16	16	25	22	24	17
41-45	7	11	8	10	6	2
46-50	4	10	5	11	3	6
51-55	5	6	2	5	9	4
56-60	16	13	15	14	11	20
61-65	3	4	5	15	5	5
66-70	6	11	7	4	4	10
71-75	5	9	6	11	2	9
76-80	11	9	5	10	6	4
81-85	4	4	3	5	0	2
86-90	2	2	3	5	4	6
91-95	2	0	3	3	4	4
96-100	9	4	7	11	2	8
101-150	13	25	15	31	11	21
151-200	11	8	6	2	0	5
201-250	3	0	2	1	1	3
251-300	2	1	1	0	1	1
301-400	0	4	0	0	0	1
TOTAL	159	193	167	193	168	184
MEAN	76.8	66.7	60.5	67.9	48.8	70.2

THREE-VISITS, BATHING

TABLE 156 Bather Types

Sample	N		P		V	
Season	W	D	W	D	W	D
Respondent	1	108	123	118	114	106
Female adult	70	66	59	77	64	79
Female youth	27	34	30	40	31	42
Female child	108	95	105	121	120	98
Husband	89	85	88	82	96	79
Male adult	47	49	49	52	53	50
Male youth	39	31	27	32	36	36
Male child	122	121	112	135	141	125
All other/No reply	115	0	0	1	0	3
TOTAL	618	589	593	658	655	618

TABLE 157 Source of Bath Water

Sample	N		P		V	
Season	W	D	W	D	W	D
Current source	187	135	206	157	157	142
Alternative source 1	45	33	58	21	32	2
Alternative source 2	18	11	63	7	17	0
Alternative source 3	24	5	10	18	7	0
Alternative source 4	1	3	0	8	1	0
Water storage area	300	363	223	373	353	428
Bush	1	1	4	2	3	4
TOTAL	576	551	564	586	570	576

THREE-VISITS, BATHING (cont'd)

TABLE 158 Location of Bathing

Sample	N		P		V	
Season	W	D	W	D	W	D
Bathhouse in compound	192	220	162	260	222	301
Animal yard	104	125	63	185	113	163
Bathhouse at hand-pump	0	0	6	4	25	25
Near water source	197	167	203	91	136	44
Courtyard	11	18	7	26	7	28
Bush	1	12	1	14	0	1
Kitchen/other room	2	6	1	0	0	0
TOTAL	507	548	443	580	503	562

TABLE 159 Total Number of Baths

Sample	N		P		V	
Season	W	D	W	D	W	D
Number of baths						
0	32	36	27	63	35	37
1	420	404	450	490	451	469
2	119	136	130	95	133	97
3	8	1	3	3	2	5
4	0	3	4	2	0	0
5	0	1	1	0	1	1
TOTAL	580	581	615	653	622	609
MEAN	1.18	1.20	1.20	1.07	1.17	1.12