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AND DEVELOPMENT IN SOUTHERN AFRICA

Basic Needs and Health in the Valley of a Thousand Hills

by

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BASIC NEEDS AND HEALTH IN THE VALLEY OF A THOUSAND HILLS

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Valley Trust, 1983

INTRODUCTION

This paper describes the basic health-related needs ofthe Zulu population in a portion of the Valley of a Thousand Hills in the Ndwedwe District of KwaZulu. The date was obtinaed in a prevalence survey conducted on 384 households selected in random cluster samples during 1980. Particularly in relation to water, it was possible to show a direct relationship between unfulfilled basic needs and the health of the population. Four principle areas dealt with are the following:-

A. WATER
B. FOOD
C. SHELTER
D. SANITATION

A. WATER

Domestic water is a precious commodity in the Valley of a Thousand Hills, KwaZulu. While there is a moderately good summer rainfall in the areas, water is often difficult to obtain from the springs, rivers and streams located far down in the valleys between the hills. The task of fetching water is left to women and children who have modified ancient traditions by using 25 litre polypropylene water containers to carry water to their homesteads. The most usual method of collecting the water is to scoop it in a shallow bowl, usually a plastic or enamel dish and ladle it into the 25 litre carrying container. The expenditure of human time and energy in omving these heavy loads of water is considerable [1].

Adult men are very rarely responsible for carrying water, yet make all decisions regarding the siting of homesteads. The homesteads are predominantly located on plateaus above the valleys, sited for ease of access to the roads. They are poorly sited with regard to water supply. One of the factors militating against improvement in the supply and distribution of water is this relative priority placed by the men, as decision makers, on access to transport and work rather than water supply.

Water Usage

The number of 25 litre containers used by the average household is 3.98 containers. (SD=1.67 SEM=0.09 95%CL=3.8 to 4.2). This is the equivalent of approximately 99.5 litres per household per day. The per capita comsumption of water carried to the household is estimated to be 10.88 litres/person/day.

Distribution of water usage by zone

Litres/person	Number of zones
7	2
8	5
9	8
10	8
11	3
12	3
13	3
14	1
15	1
16	1
17	1

In estimating total water consumption account has also to be taken of the fact that the washing of clohtes and a certain amount of personal hygiene occurs at the water source, particularly in the rural households. The amount of water used in this situation cannot be easily be emasured or estimated.

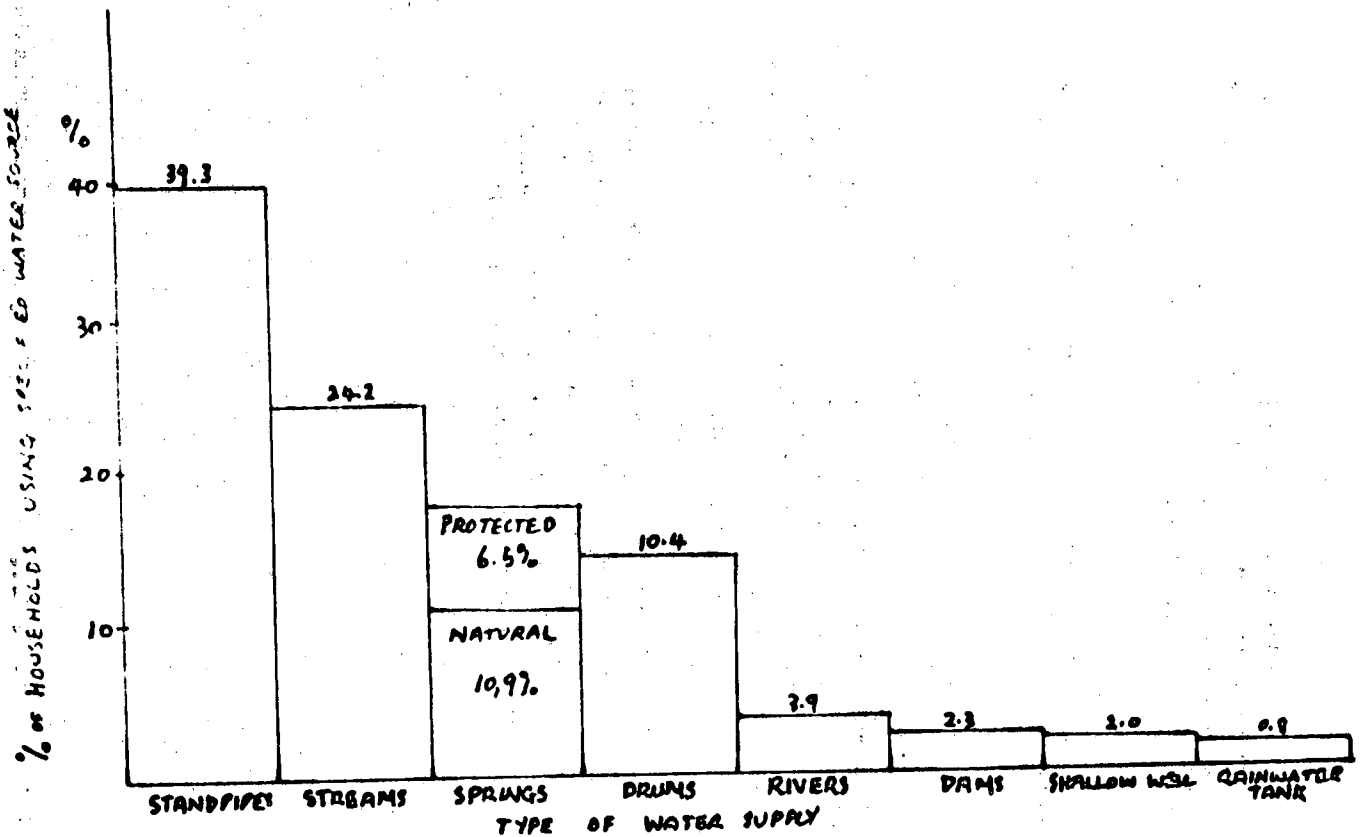
The goal set by the UN Water and Sanitation Decade 1981-1990 is for every person to have reasonable access to 50 litres/day.

Water Quality

The origin of water supply is shown in fig.(1). Community standpipes account for the largest supply to the area as a whole, but still leave some 60% of the population depending on a local water supply. Piped water supplies are drawn principally from

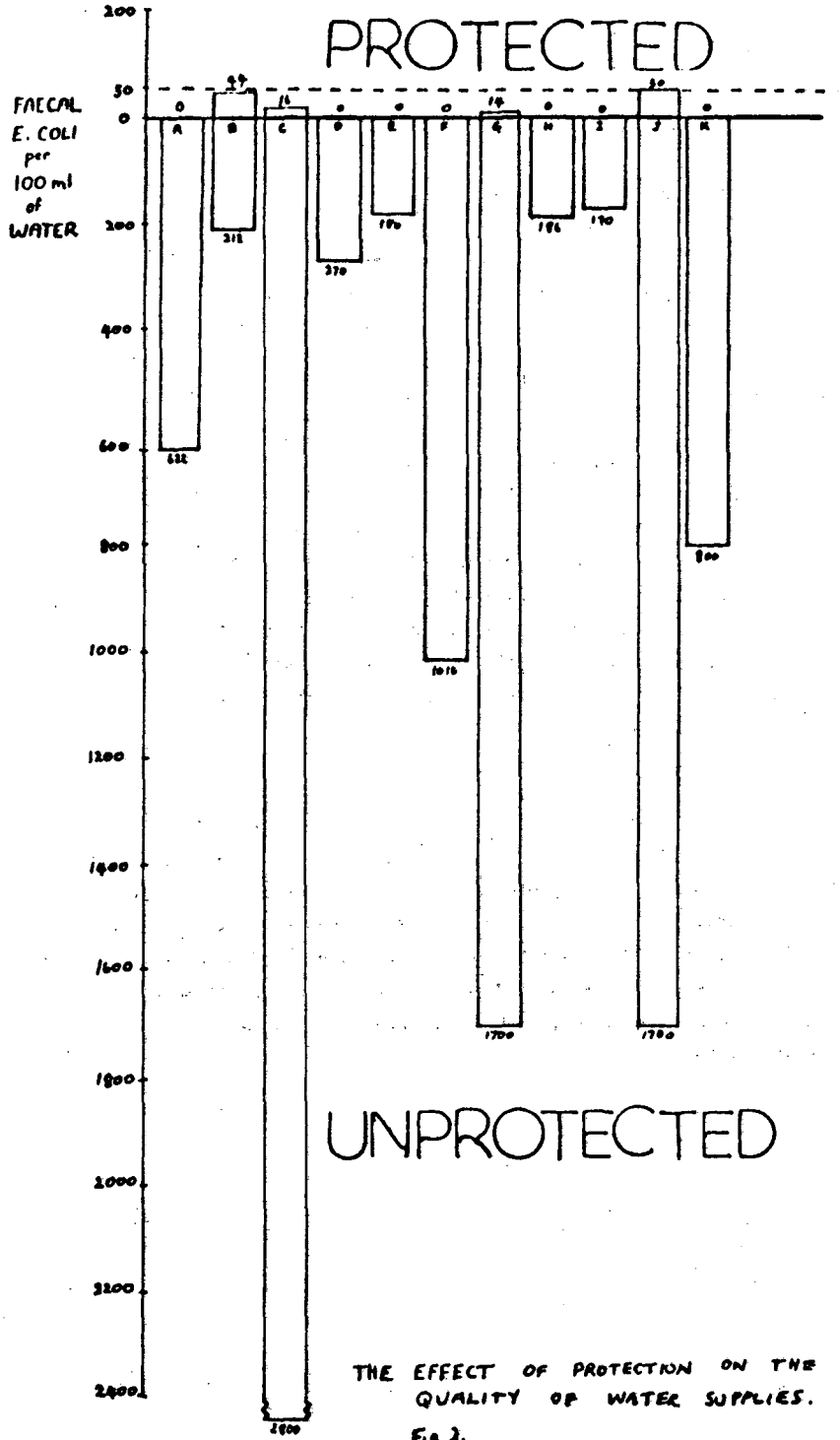
a) the major Durban aqueduct which is a raw water source that happens to pass obliquely through the area

b) newly installed community standpipes in the Embo, Ngcolosi and Molweni areas closest to the urban white aeras of Hillcrest. The quality of this water is the highest in the Valley as the water is drawn from the Pinetown Regional Water Supplies Corporation, and free of contamination.



TYPE OF WATER SUPPLY

Fig. 1.



THE EFFECT OF PROTECTION ON THE QUALITY OF WATER SUPPLIES.

Fig. 2.

In the areas where water from standpipes is available, however, it is only obtainable in narrow zones close to these sources. The only other major source of water supply that can be considered reasonably safe for human consumption are Protested Springs (used by 6.5% of Households). These are the result of a recent water improvement programme undertaken by the Valley Trust. The majority of the population are therefore drinking unsafe water. There are 30.4% drawing water from rivers, streams and dams; water sources that are usually considered as most unsatisfactory, partucluarly when water is not disinfected.

Fig (2) compares faecal contamination in unprotected water sources to that of springs protected by the Valley Trust's method of spring protection. It is notable that 64% of the Protected Springs showed no faecal contamination and of the remainder none showed more than 50E. Coli per 100ml of water. It has been suggested (2) that a level of 50 E. Coli per 100 ml of water. is not an unreasonable standard for a rural unchlorinated water supply. What is of striking significance is that the protected water sources are approximately toen-fold less contaminated than alernative water supplies used for water consumption.

Fig (3) is a diagramatic representation of a Protected Spring. Two important points should be noted about the importance of spring protection. The first is that there is an improvement in water quality, and the second possibly more significant point is that the total quantity of water available is increased. This is achieved by the building of a reservoir, usually of ferro-cement, which is used to store water during off-peak periods, and especially at night. The importance of this fact to health is demonstrated later.

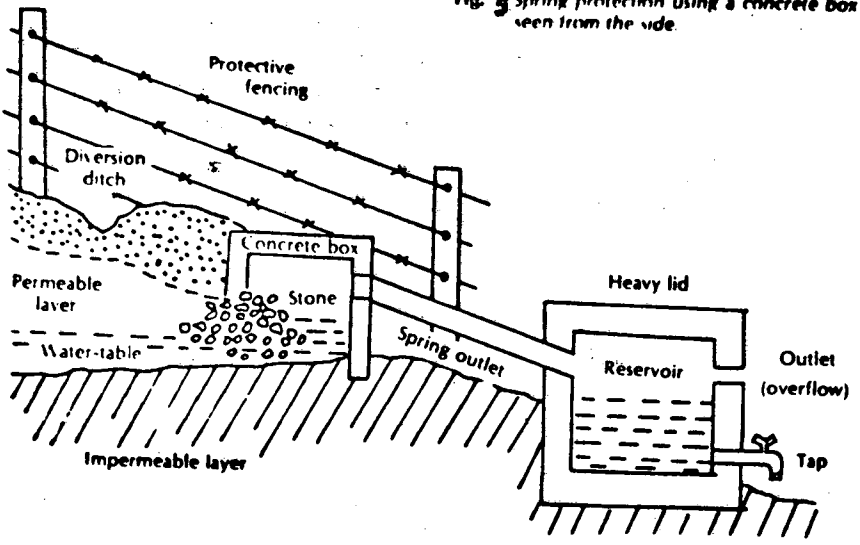
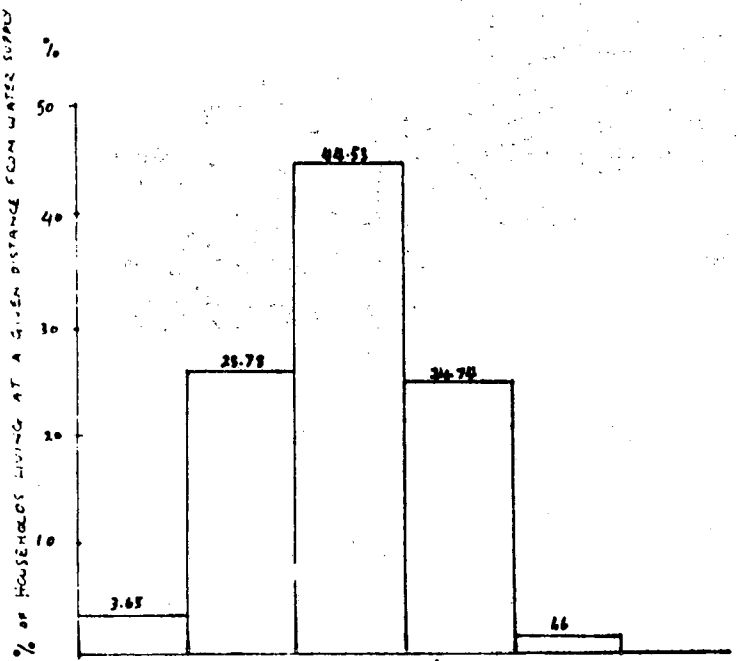


Fig. 3 *Spring protection using a concrete box seen from the side.*

Access to water :

The median distance to the usual source of water supply is between 101 and 500 meters. Approximastely a quarter of the households have to travel more than 1/2 kilometer. Only 3.65% had water within 10m of their household, which is readily understood since very few households have an individual water supply, although many do collect rainwater in 40 gallon drums. A summary of the access to water supply is shown in the histogram in fig. (4). Using the UN Water Conference criteria for urban areas of "reasonable" access being within 200m of public standpipe, it appears that approximately half of the population do not have reasonable access to drinking water.



ACCESS TO WATER SUPPLY

Fig. 4

The Effect of Water in Relation to Health

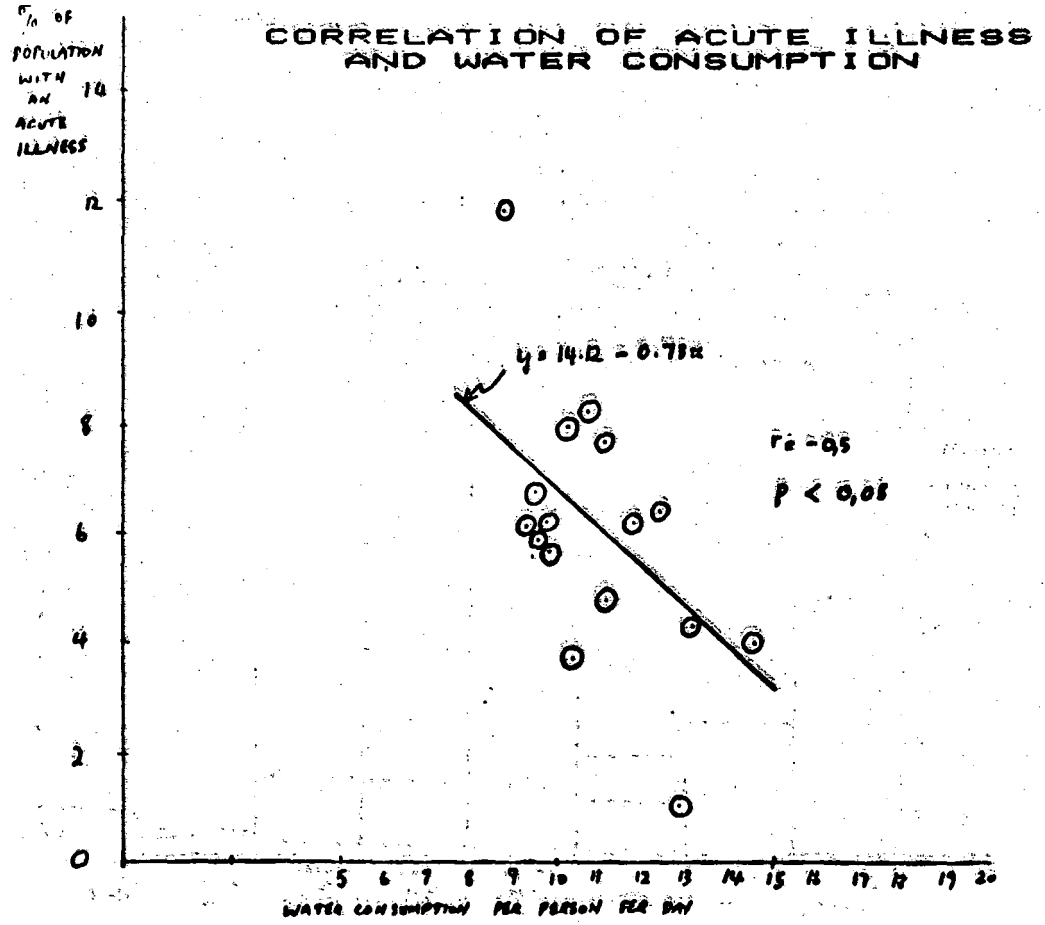
Correlation between the volume of water used per person in each of the zones of the study area and the prevalence of acute illness in that zone revealed a statistically significant association Fig (5).

The correlatin coefficient (r) was -0.5 and is significant for p 0.05.

The slope of the regression curve is

$$y = 14.1 - 0.73x$$

This tends to confrims findings reported by Feachem et al (5) that the volume of water used by a household has significant effect on its morbidity. Households consuming more water per person tend to have less acute illness.



The association between the volume of water used by a household and acute illness can be explored further.

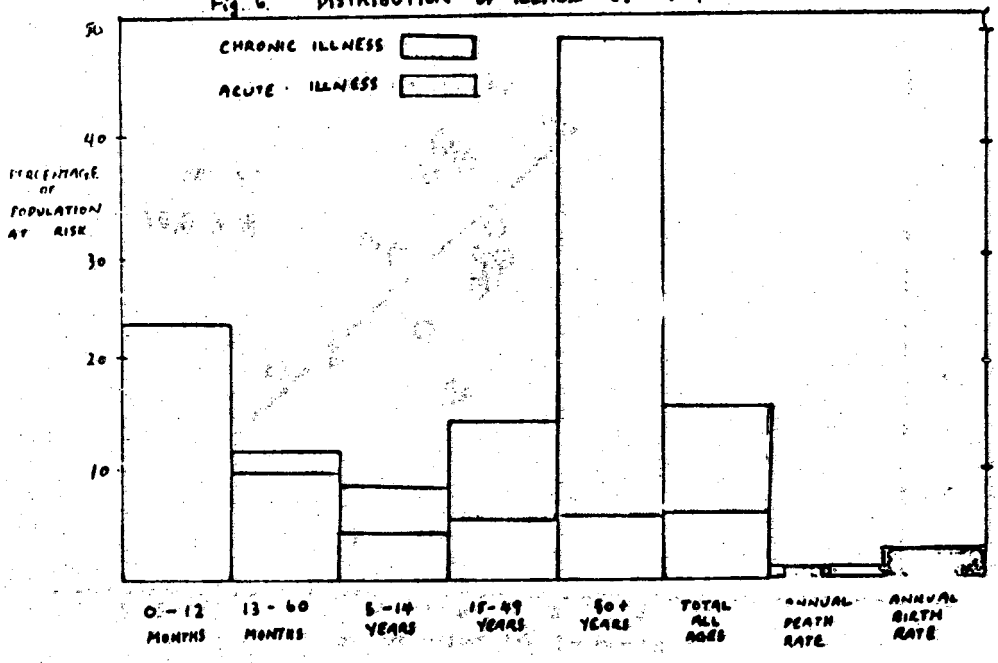
Fig (6) shows the distribution of acute illness by age group. It will be noted that young children and in particular infants below the age of one year, are particularly vulnerable to acute illness. Almost a quarter of infants are acutely ill at any one time; a prevalence two and a half times as large as the next age group the 1-4's.

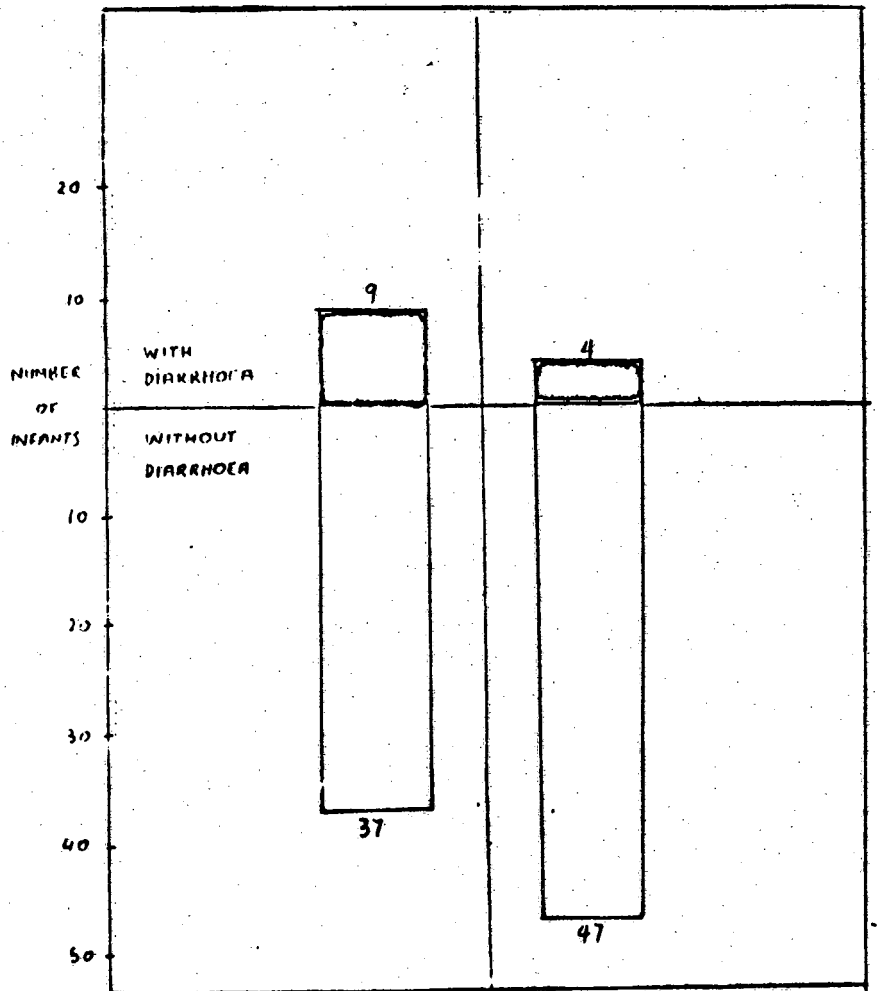
If one examines the actual sypmomatology associated with the acute illness in infants one is hardly surprised to discover that Diarrhoea is the leading symptom. The five most important symptoms are:

Diarrhoea	52.2%
Dry Cough	30.4%
Fever	30.4%
Vomiting	26.1%
Poor Appetite	17.4%

It is therefore reasonable to infer that it is mainly the diarrhoea in infants that leads to the finding of a positive correlation between water volume and acute illness

Fig. 6. DISTRIBUTION OF ILLNESS BY AGE.





CONSUMPTION PER CAPITA	LOW ≤9 LITRES	HIGHER >10 LITRES
DIARRHOEA RATE	19.6 %	7.8 %
$\chi^2 = 2.9$	$0,05 < p < 0,1$	

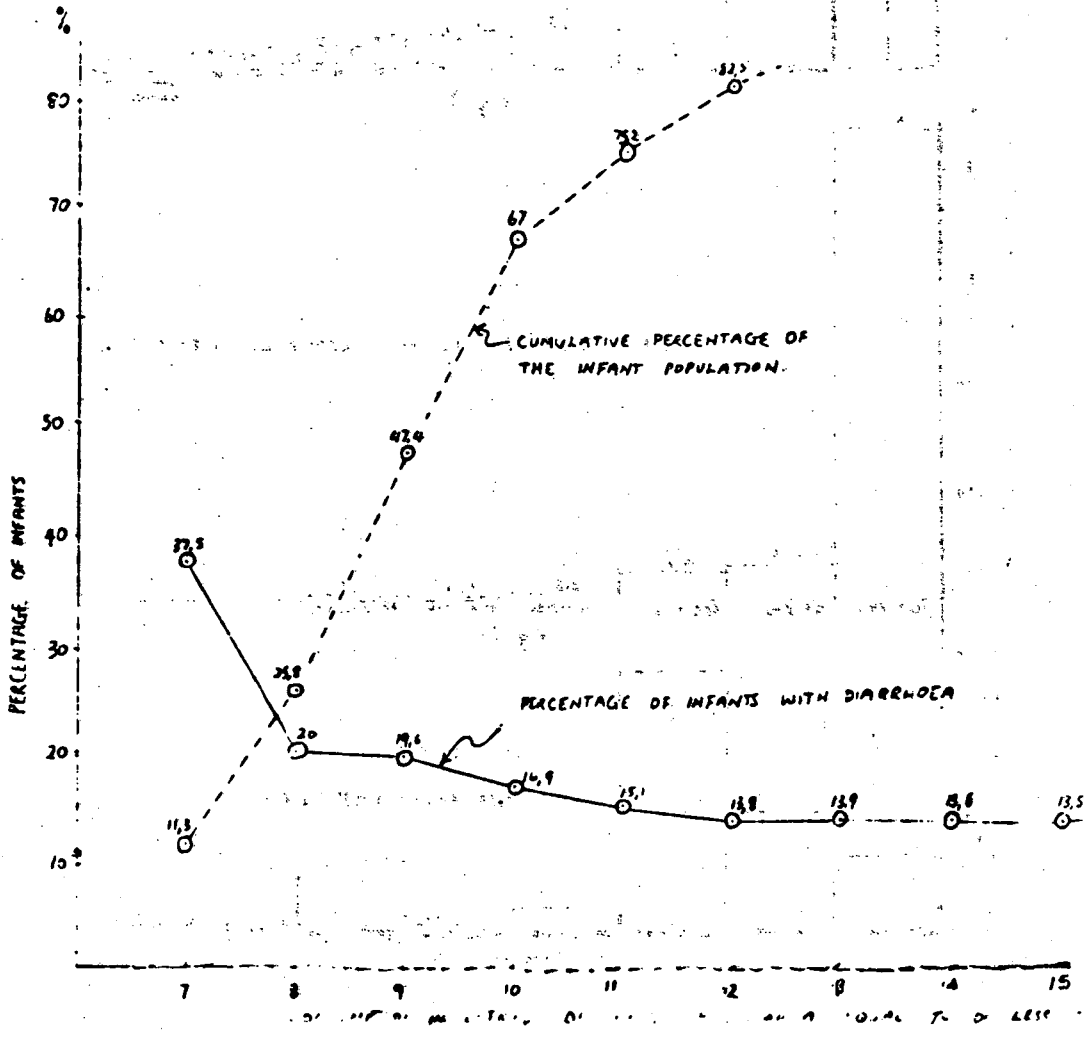
THE EFFECT OF WATER CONSUMPTION ON DIARRHOEA RATES

Fig. 7.

Based on the probable casuative linkage between infantile diarrhoea and water volume used in the household, the hypothesis was tested that a statistically significant relationship existed.

Fig (7) which indicates diagrammatically the results of a chi-squared test on the proportions of infants with or without diarrhoea, depending on whether these infants came from households with a relatively low (9 litres or less) compared to a relatively higher (19 litres or more) per capita water consumption. The difference in diarrhoea rates is fairly marked :- 19.6% for the low consumption group compared to 7.8% for the higher comsumption group. This difference is just significant mainly because of the low percentage of infants in relation to the rest of the population and the effect that this has on the number of infants included in the study.

Further graphic evidence of this relatiioship is demonstrated in a cumulative frequency curve Fig (8), which shows the percentage of infants with diarrhoea in households where the per capita water consumption figure is less than the given amount. At lower consumptions the percentage of infants with diarrhoea is relatively high, but this drops rapidly with an increase in the water supply. Regretably, the bulk of infants come from households that have low comsumption, nad this adds additional significance to the finding. It can be seen for example that about 50% of the infants come from a household comsuming 10 litres or less. These infants are prone to develop diarrhoea at a greater rate.



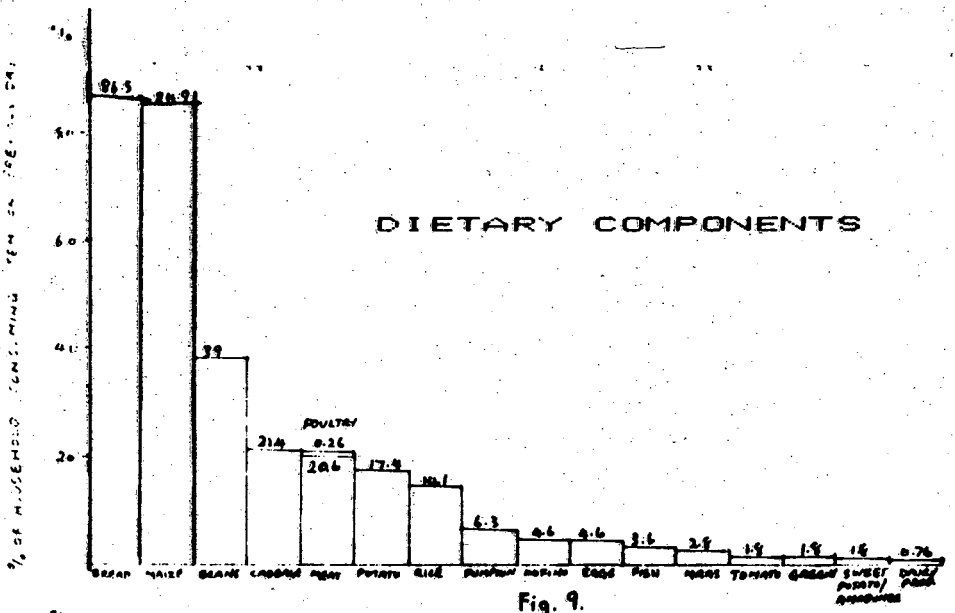


Fig. 9.

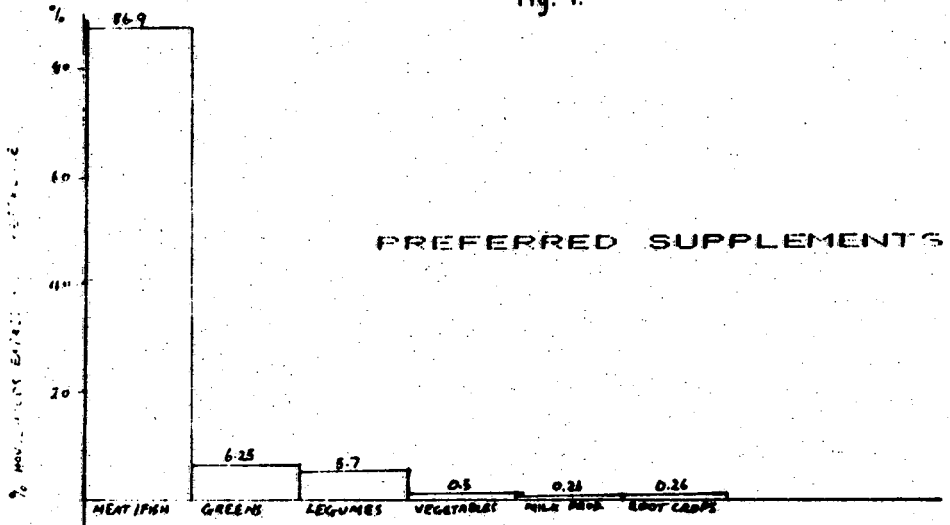


Fig. 10.

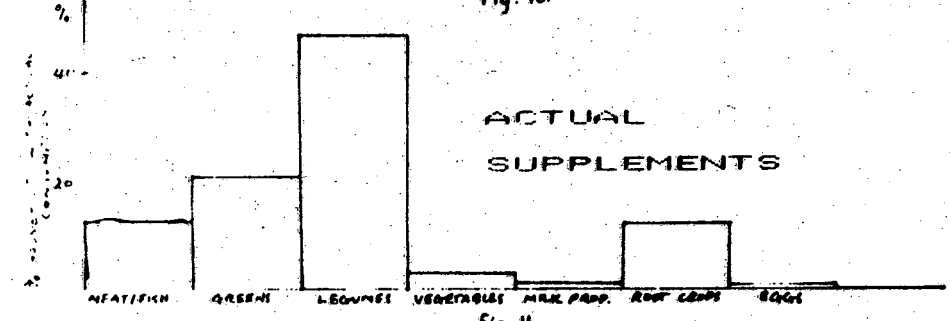


Fig. 11.

B. FOOD

Diet

The staple foods eaten by the population are bread and maizemeal. Both of these staples had been eaten by about 85% of the households on the day preceding the interview. Beans, the major supplement to these cereals had been eaten by 39% of households, with the next most commonly eaten food being cabbage (21.4%). Fig (9) shows the fdistribution of consumption of the various items in the households' diets.

The mean number of these foods consumed by each household was 2.3 items (SD=0.67 SEM=0.03 95% Confidence Interval = 2.2 to 2.4).

It is interesting to note that while the preferred supplements to cereals were meat, green vegetables and legumes, in that order, while the supplements actually consumed were in the reverse order of legumes, greeen vegetables, and meat indicative probably of the cost of meat and vegetables. The preferred actual supplements to the diet are shown in the histograms Figures 10 and 11.

In summary, the diet can be descrjibed as being poorly balanced consisting primarily of bread, maize, beans and cabbage. Meat, potatoes and rice are eaten in smaller amounts. Other foods were eaten by fewer than 10% of households. As the survey was done towards the end of the winter it is likely that some of the other foods, notably pumpkin and wild green vegetables, were consumed to a far smaller extent than they would be during the summer months when they are more easily available.

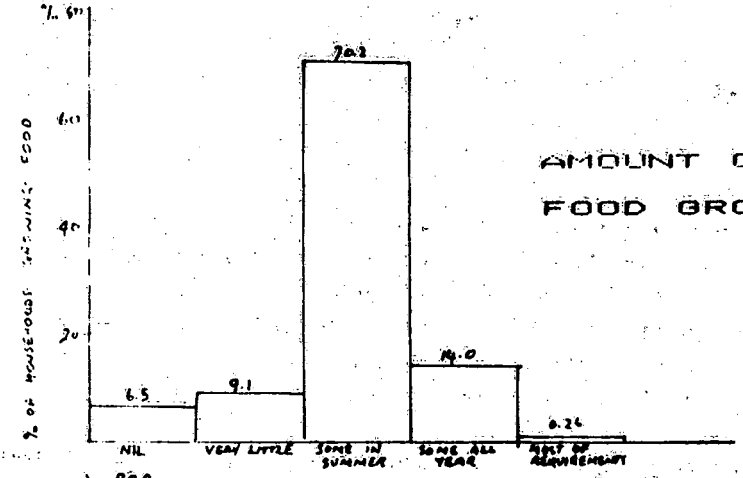


Fig. 12.

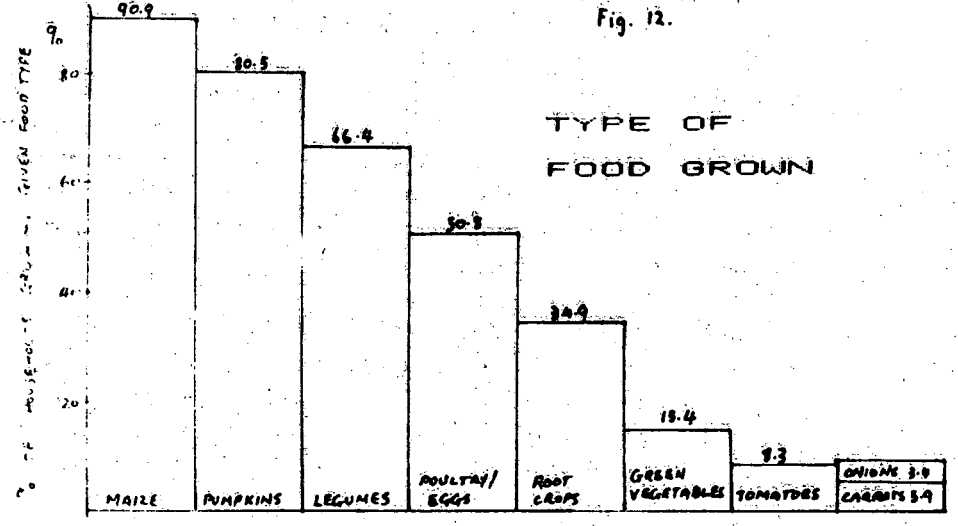


Fig. 13.

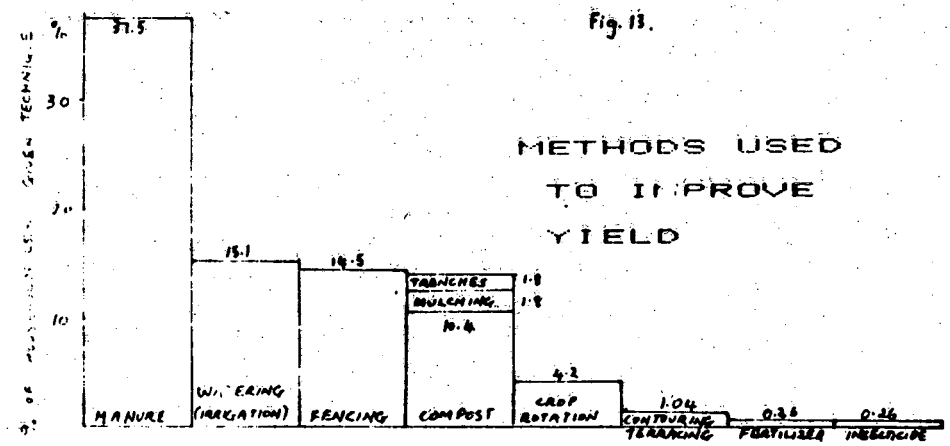


Fig. 14.

Food Production

Although rural and semi-rural areas are often thought to be essentially self-supporting with sibsistence agriculture providing the bulk of food supplies, this is clearly not the case in the Valley of a Thousand Hills. Only 0.26% of the households grew most of their own food all year round. A further 14% grew some of their own food including during winter months, a time during which the majority do not grow food. A large percentage 70.2% grew crops during the summer, leaving a minority of 15.6% who grew either very little or nothing at all. Fig (12).

The most common foods produced in order of magnitude are maize, pumpkins, legumes (beans), poultry/eggs, root crops, green vergetables, tomatoes, carrots and onions.

Maize and pumpkins are produced by virtually every household that grew vegetables with beans and poultry/eggs being produced by a sizeable proportion. Judging the small degree to which poultry and eggs are given as components of the diet it must be assumed that production of these is not quantitatively significant.

Fig (13) shows graphically the types of foods produced.

Appreciation of the need to maintain soil fertility appears relatively low with little regard being paid to sound agricultural practice. The most commonly used method of improving agricultural production was the traditional use of manure (37.5% of households) or by watering (15.1%). Low cost organic food production techniques including compost, mulching and fertility trenches were used by 14% of the households. Crop rotation was used by only 4.2%. An extremely low percentage (1.04%) of households specifically mentioned that they consciously used terracing or contour ploughing as a technique. This continues to have severe consequences on soil fertility by promoting soil erosion and leading to a continual irreplaceable loss of topsoil essential for sustainable food production. This is of particular significance in the steep hills terrain that characterizes the area. The use of inorganic fertilizer and insecticide is negotiable Fig (14).

C. SHELTER

Housing

The traditional 'beehive' wooden frame hut covered with grass no longer exists in the area asa housing form. In this form of housing, no distinction was made between walls and roof. This form gave way to the introduction of rondavel dwellings constucted of wattle and daub - a wooden frame plastered with mud. Initially because of the inability of such walls to bear weight, centre poles were utilized to distribute the weight of the roof which continued to be made of thatch grass. As walls became a more dominant feature, they became load bearing and together with trusses enabled the centre pole to be removed.

Despite the low cost of the wattle and daub technique, several porblems have lead to further changes in building techniques. Termites and wood-rot readily attack and weaken the structure, limiting the lifespan of such buildings. Increasing the height of walls to increase interior spaces lead to more rapid weathering of the walls. Thatching grass is in increasingly short suppply. Also the wattle is becoming more scarce as wood-lots become depleted of trees. Rain water cannot be collocted from a thatched roof.

Such problems have encouraged the development of the square ground plan with the use of modern materials such as cement blocks and corrugated iron for roofing. This had also enabled the introduction of lager houses with divided rooms which more comfortably accommodate morder furniture. Windows and doors fit more easily. Plastering internally and externally have also become more common.(3).

Several researchers have pointed to the fact that the ratio between the number of rondavel-type and rectangular-type dwelling units provides an index of the degree of modernization that characterizes the comunity (4,3).

In the study sample the mean number of rondavel-type dwellings was 1.56 or 49.8% ofthe total (SD=1.9 SEM=0.1 95% Confidence Limits 1.7 - 2.1). The mean number of rectangular-type dwellings was 1.57 or 50.2% (SD=1.8 SEM=0.06 95% Confidence Limits =1.45 - 1.67). The ratio of rondavel:rectangular dwelling forms =0.994, very close to unity. The total number of dwelling units per household was 3.13. Comparative figures for another similar area (Vulindlela, near Pietermaritzburg) revealed an average of 3.4 dwelling units per household and also the following data:-

	Rondavel-types	Square types
Vulindlela --------1975	62%	38%
Vulindlela --------1981	53%	47%
1000 Hills --------1981	49.8%	52.2%

During the 5 year interval44% of new dwellings were rondavels, and 56% were square (3).

Also characteristic of the modernization process has been the tendency towards single as against multiple dwelling units that characterize the traditional homestead (IMUZI). This has occurred partucularly rapidly in areas were 'Spontaneous' or 'squatter' settlement has occurred with the introduction of several novel building techniques including the use of corrugated iron, wood, beer cartons and other materials for building the walls. As areas of the sample contained such areas of spontaneous settlement, the single dwelling also figures prominently as a housing form.

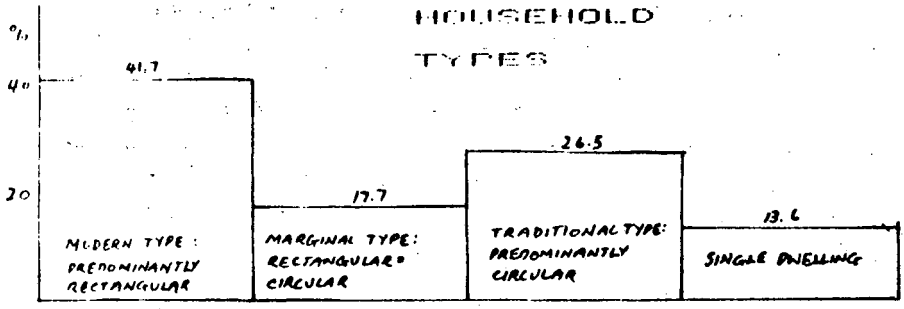


Fig. 15.

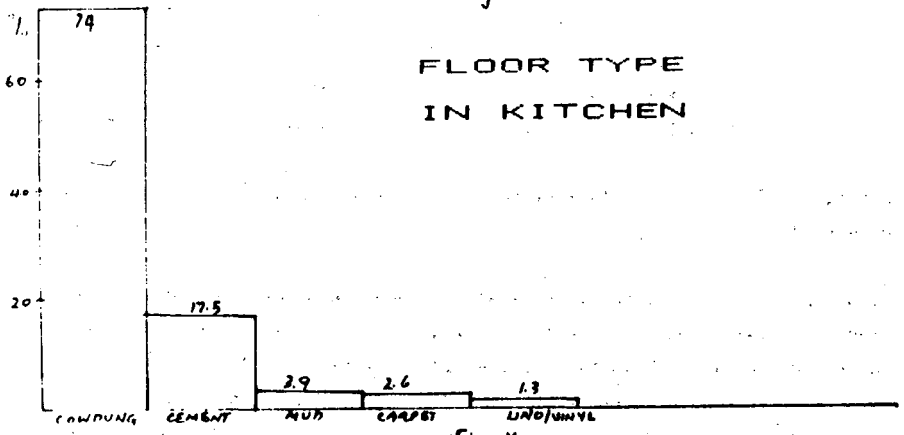


Fig. 16.

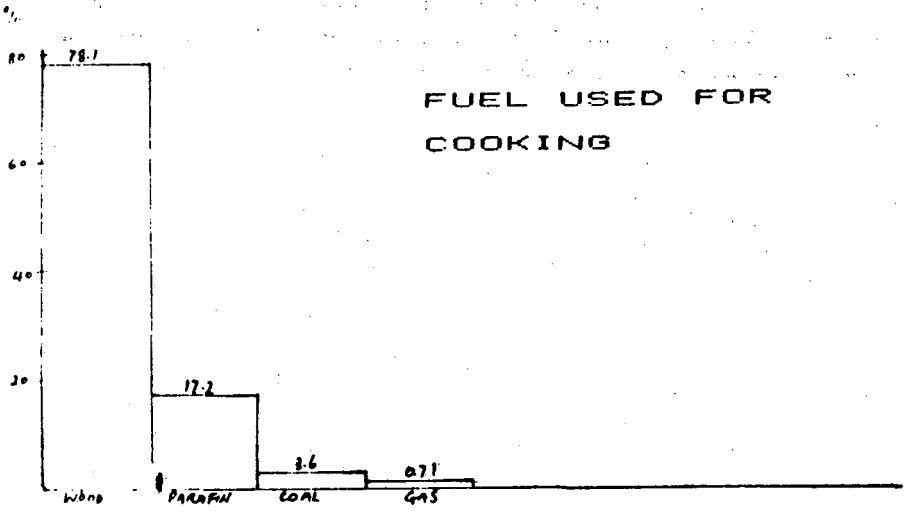


Fig. 17.

For the purpose of clear description, the households have been classified into four types:-

1. Modern : The number of rectangular structures in the household exceed the number of rondavels =41.7%
2. Traditional : The number of rondavels exceeds the number of rectangular structures =26.9%
3. Marginal : The number of rectangular structures is equal to the number of rondavels =17.7%
4. Single : The household consists of a single dwelling only =13.6%

Fig (15).

In addition to the overall structure of the household, the internal division of the household, particularly with regard to over-crowding, may be considered as having potential significance from the point of view of community health. The following table provides an analysis of the use of internal space.

PARAMETER	MEAN	SD	SEM	95% CONFIDENCE LIMITS
Rooms/household	5.4	3.4	0.17	5.1 - 5.7
Bedrooms/household	2.6	2.0	0.10	2.4 - 2.8
Persons/room	1.7	0.3	0.01	1.68 - 1.72
Persons/bedroom	3.5	0.5	0.03	3.44 - 3.56
Children/child-bedrooms	1.5	1.17	0.05	1.4 - 1-6
Windows/household	4.6	4.8	0.24	4.1 - 5.1
Windows/room	.85	0.89	0.05	0.75 - 0.95
Plastered or painted walls	45%			

Yet one further parameter reveals the character of the housing - the type of flooring found in the main food preparation area. Fig (16) shows, cowdung was by far the most common type of flooring (74%).

Fuel

Four fuels were in common use among the households with only wood and fuel paraffin used to a major extent. Coal and LP Gas were used to a minor extent Fig.(17). Wood used in 78.1% of households is the most important fuel and although a potentially renewable fuel, is becoming rapidly less easily available due to overexploitation.

Appliances

The mean number of appliances per household was 2.8 (SD=1.2 SEM=0.06 95% Confidence Interval =2.7 to 2.9).

Appliances/family = 2.02.

Appliances/person = 0.32.

The aim of collecting this information was to explore its usefulness as an a further quantitative socio-economic measure.

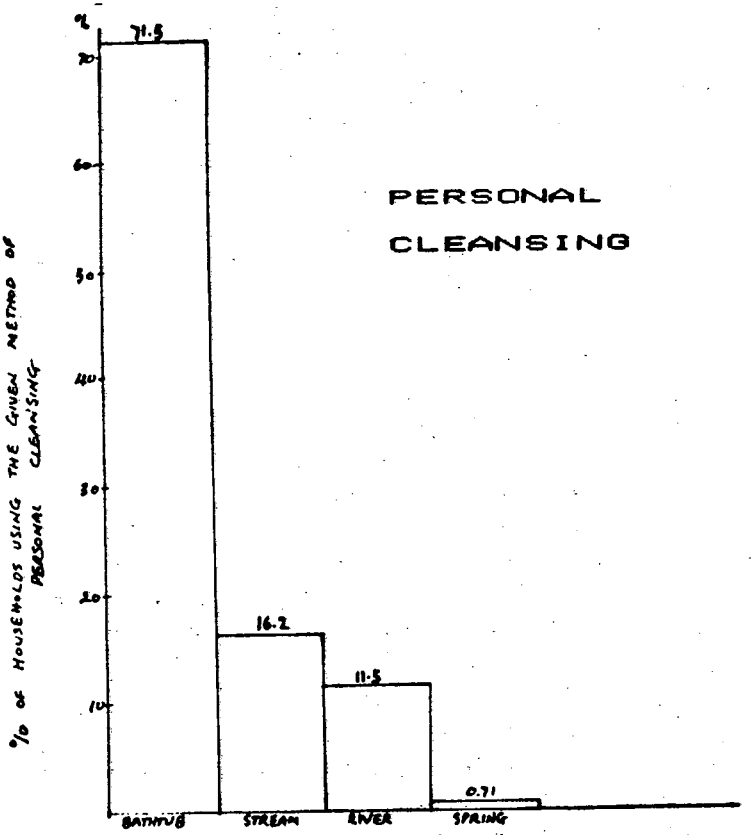

%
71.5
70
60
50
40
30
20
10
% OF HOUSEHOLDS USING THE GIVEN METHOD OF PERSONAL CLEANSING
PERSONAL
CLEANSING
16.2
11.5
0.71
BATHTUB
STREAM
RIVER
SPRING

Fig. 18.

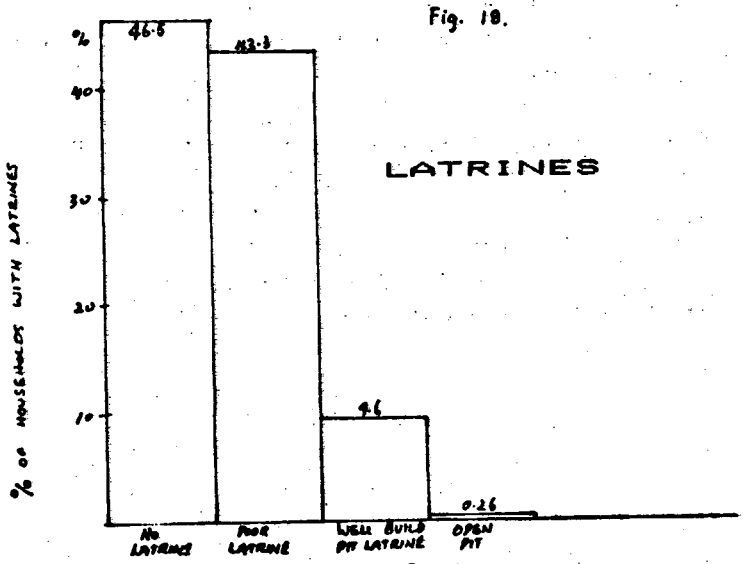

%
46.5
43.3
40
30
20
10
% OF HOUSEHOLDS WITH LATRINES
LATRINES
9.6
0.26
NO LATRINE
POOR LATRINE
WELL BUILT PIT LATRINE
OPEN PIT

Fig. 19.

D. SANITATION AND HYGIENE

Personal Cleansing

The majority of people (71.5%) used a galvanized iron tub as the primary location of personal cleansing. This is done inside the household. A significant proportion 28.4%, however, used a stream, river or spring, suggesting considerable potential for the transmission of water-borne diseases. Fig (18). Rivers and streams appeared particularly hazardous in this regard.

Observed Environmental Hygiene Practise

The interviewer rated the aerage score of the households on evidence of hygienic practise in relation to 9 common factors. Presence of a waste pit, the covering of food, tidy interior, tidy exterior, use of washbasin and towel, easily cleaned floors, easily cleaned surfaces, absence of pests and exclusion of animals from the home. The mean score was 39.6%.

Latrines

Only 9.6% of the households had a well-built or properly-used pit latrine. Fig (19). A large percentage (46.5%) had no latrine at all, and a further 43.3% had a poorly build or poorly used latrine. Considering the dependence of large numberso f the population on surface water supplies these are disquieting statistics.

There was a weak, paradoxical association between the number of latrines per household and the illness rate, suggesting that increased numbers were associated with increased acute illness ($r = -0.52$, p 0.05). This phenomenon has been noted elsewhere (16) and if valid argues for improvements in the effectiveness of latrines, such as improved construction methods or for improvement of hygience practises.

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These papers constitute the preliminary findings of the Second Carnegie Inquiry into Poverty and Development in Southern Africa, and were prepared for presentation at a Conference at the University of Cape Town from 13-19 April, 1984.

The Second Carnegie Inquiry into Poverty and Development in Southern Africa was launched in April 1982, and is scheduled to run until June 1985.

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