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Beliefs and Behaviour Related to Water in Rural Swaziland

Abstract

A knowledge, attitudes and practices (KAP) survey relating to water use and contact was conducted in rural Swaziland. A complementary qualitative survey reinforced and helped in the interpretation of KAP findings. Nearly two-thirds of rural Swazis lacked access to protected drinking water. The most important independent variable determining "correct" beliefs and practices, from a public health standpoint, was the level of formal education achieved by the respondent or by another member of his or her immediate extended family.

Introduction

RESPONDING to the United Nations' International Drinking Water Supply and Sanitation Decade 1981-90, development assistance agencies have increased their support for projects and programmes designed to improve access to drinking water and sanitation facilities in countries where a majority of the population lack these. Earlier experience with such endeavours taught that mere provision of water or sanitation facilities was insufficient to ensure their proper use, let alone to achieve improvements in health (e.g. Feachem *et al.*, 1978). There emerged a realization that planned change in water availability or excreta disposal must be based on adequate information about the knowledge, attitudes and existing practices of the population for whom the changes are planned (Elmendorf and Isely, 1983).

The United States Agency for International Development (USAID) reflected this awareness in its design of the Rural Water-Borne Disease Control Project, a five-year project which began in 1981 in Swaziland.

The terms of agreement of the project called for a Knowledge, Attitudes and Practices (KAP) study relating to water and sanitation in rural Swaziland. It should be noted that the project was designed with unusual sensitivity to the importance of behavioural and socio-cultural factors: instead of limiting social science input to the latter stages of project design and to an analysis based on little or no empirical research, such input was in this case to be based on extended empirical study and was intended to guide other components of the project during the first two years of implementation.

The intended purpose of the study was to: (i) provide baseline data for the design of a national health education strategy aimed at reducing the incidence of water-borne diseases; (ii) provide guidance for the sanitation and public health engineering components of the project; and (iii) provide baseline data for any future evaluations or related research.

Swaziland is a small, mountainous, landlocked kingdom surrounded on three

sides by South Africa. Nearly 90 per cent of the population is rural and a clear majority lacked access to safe drinking water or even rudimentary sanitation facilities, based on estimates prior to 1981. Rural Swazis live in dispersed extended family homesteads rather than in villages, making the provision of protected water systems relatively expensive and presenting special problems in community outreach and information dissemination.

Methodology

Fully aware of the difficulty in obtaining accuracte or valid data through survey methods in rural Africa (Cohen, 1973; Brown *et al.*, 1977; Clcleud, 1973), past survey/research efforts in Swaziland were reviewed in order to assess the suitability of an orthodox KAP study in the present context. Of greatest concern was whether or not rural Swazis would give candid replies — or any replies at all — to questions regarding toilet behaviour, personal hygiene, or other intimate, highly personal activities.

After considerable review, discussion and preliminary ethnographic fieldwork, it was decided that anthropological (or qualitative) research was needed in order to supplement, guide and make sense of any survey (or quantitative) research effort. Accordingly, the KAP survey fieldwork was preceded by a study that employed qualitative methods aimed at achieving high validity while necessarily sacrificing measurement capability. This study attempted to elicit the same information as the KAP survey, but through other-reporting rather than self-reporting and by means of a flexible, open-ended questionnaire rather than a pre-coded, inflexible questionnaire.

The subjects or informants of the first study were rural health motivators (RHMs), that is, women chosen by their communities to receive about eight weeks of training in preventive and promotive health care at a regional clinic. A sample of 42 RHMs was interviewed in eight regional clinics which supervise RHM activities. Standardized probing techniques were developed and used when answers seemed stereotyped. Since each RHM routinely visits approximately forty homesteads, the interviews provided information based on nearly 1,680 rural homesteads. These homesteads may be regarded as reasonably representative of Swazi Nation Land as a whole, since they are situated in the four major geographic zones of Swaziland, and do not overlap with peri-urban or privately controlled areas.

Swazi Nation Land (SNL) refers to that part of Swaziland held in trust by the king for use by the Swazi people. It is distinct from privately owned estates and town areas.

This preliminary study is referred to as the RHM study. Its results are presented along with those of the KAP survey in order to add depth of understanding to the KAP results.

The KAP survey was conducted between 13 December 1981 and 10 January 1982. Prior to this, four drafts of the questionnaire were pre-tested outside the areas selected for the survey. Although based primarily on the needs of the project, question content and wording followed to some extent that of previous water and sanitation studies conducted in Africa and elsewhere, so that results would be comparable to other survey results.

The final questionnaire included 69 questions of which 65 were pre-coded and 4 were open-ended. Of the 65 pre-coded questions, 23 provided for write-in options. Interviewers were also free to write in answers that did not conform to the available categories for any of the questions.

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TABLE 1
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Standpipe or tap
Spring, protected from animals
Borehole or well
Enclosed, protected spring
Stagnant pool or dam
Collected rainwater
Total

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A stratified cluster sample was used, based on data from the most recent census (1976). In the first stage, a sample of census enumeration areas (EAs) was derived by the Agricultural Survey Division of the Central Statistical Office to represent Swazi Nation Land. This sample consisted of 89 EAs, of which 24 were in the Highveld, 32 in the Middleveld, 25 in the Lowveld, and 8 in the Lubombo Plateau, reflecting population distribution in the four physiographic regions of Swaziland.

In the second stage, specific homesteads were chosen from Central Statistical Office lists of homesteads covering the selected EAs. Using a table of random numbers, 5 sample homesteads and 2 alternative homesteads were chosen from each selected EA. During fieldwork, 5 and occasionally 6 homesteads were interviewed. A total of 455 questionnaires were completed or just under 1 per cent of the estimated 50,000 homesteads in Swazi Nation Land. Given the cultural homogeneity of this area and the subject matter of the survey, this was felt to be an adequate sample size.

The survey results presented here represent a summary of a larger, unpublished report (Green, 1982) presented to the Government of Swaziland in 1982. Due to space limitations, only findings pertaining to water are presented here; sanitation findings will be presented in a separate publication.

Water Access

Most respondents lacked access to safe drinking water, as shown in Table 1. We see that nearly one-third of homesteads on Swazi Nation Land have access to drinking water that is protected in some way. However, it cannot be assumed that a protected source yields safe drinking water. Protected springs and even boreholes may become faecally contaminated, as an unpublished study by the Rural Water Supply Board in 1981 showed.

TABLE 1
Place of Collecting Drinking Water

	Number of Respondents	Frequency (%)
River or stream	161	35.9
Unprotected spring	128	28.6
Standpipe or tap	77	17.2
Spring, protected from animals	32	7.1
Borehole or well	19	4.2
Enclosed, protected spring	12	2.7
Stagnant pool or dam	11	2.5
Collected rainwater	8	1.8
Total	448	100.0

Since rural Swazis have limited access to water, answers were not very different from Table 1 when respondents were asked, "Where do you collect other household water?": 47.6 per cent said river or stream, 18.8 per cent said unprotected spring, 11.2 per cent said standpipe or tap, 6.2 per cent said borehole or well, 5.7 per cent said

spring protected from animals, 1.1 per cent said rainwater, and 1.4 per cent provided no answer. The surprising finding that a higher number of homesteads use borehole/well water for other household uses than for drinking water provides a behavioural measure for attitudes with regard to borehole water (see below).

Attitudes about Water

Respondents were next asked which kind of water tastes the best, and the worst. As can be seen in Table 2, of the "safe" types of water (standpipe, borehole, enclosed spring and rainwater) all are regarded as tasting good except borehole water. Data from the RHM survey corroborate this: borehole water is often regarded as too salty for drinking, at least in the Lowveld. It is probable that an even higher percentage would have named borehole water as the worst tasting, but for the fact that boreholes are found primarily in the Lowveld and a number of Swazis have never tasted water from this source.

TABLE 2
Best and Worst Tasting Type of Water

	Best Tasting		Worst Tasting	
	Number of respondents	Adjusted frequency (%)	Number of respondents	Adjusted frequency (%)
River or stream	90	20.3	166	39.0
Unprotected spring	92	20.7	52	12.2
Standpipe or tap	129	29.1	13	3.1
Spring, protected from animals	50	11.3	11	2.6
Borehole or well	5	1.1	88	20.7
Enclosed, protected spring	44	9.9	10	2.3
Stagnant pool or dam	5	1.1	53	12.4
Collected rainwater	25	5.6	18	4.2
Other	4	0.9	15	3.5
No answer	6	—	24	—
Total	450	100.0	450	100.0

Respondents were then asked to name what they thought were the healthiest and unhealthiest types of water. Only 55.1 per cent named "safe" sources of water as the healthiest kinds; this was resulted in part from the low esteem in which borehole water is held.

When RHMs were asked what kind of water people in their areas would like if they had the choice, most said tap or piped water, for the convenience. The health benefits of piped water were less appreciated, or even understood, even though health education on this topic had accelerated greatly following the outbreak of cholera in 1980–1. In one area, the RHM reported that people prefer river to borehole water because of the salty taste of the latter.

TABLE 3
Type Of Water Thought To Be Healthiest And Unhealthiest

	Healthiest		Unhealthiest	
	Number of respondents	Adjusted frequency (%)	Number of respondents	Adjusted frequency (%)
River or stream	71	16.2	181	42.0
Unprotected spring	72	16.4	53	12.3
Standpipe or tap	184	41.9	7	1.6
Spring, protected from animals	41	9.3	11	2.6
Borehole or well	7	1.6	74	17.2
Enclosed, protected spring	33	7.5	8	1.9
Stagnant pool or dam	1	0.2	70	16.2
Collected rainwater	18	4.1	11	2.6
Other	12	2.7	16	3.7
No answer	11	—	19	—
Total	450	100.0	450	100.0

When RHMs were asked which kind of water people least preferred for drinking, most said river water, a few in the Lowveld areas said borehole water, and about 20 per cent said spring or river water contaminated with cattle faeces. It seems that rural Swazis recognize faecal contamination by animals far more readily than that caused by humans. As partial evidence of this, about 10 per cent of respondents in the sample of homesteads thought that a spring protected only from animals (but not fully enclosed) was the tastiest and healthiest type of water.

Respondents were asked how they usually first judge the quality of drinking water (Table 4). About two-thirds referred to visual criteria. RHMs were asked the same question about people in their areas. Results were similar to the survey results except that taste was given more importance: about 29 per cent of RHMs mentioned taste first.

TABLE 4
How Do You Judge Drinking Water?

	Number of respondents	Adjusted frequency(%)
By colour	113	26.9
By knowing source	76	18.1
By degree of muddiness	66	15.7
By how it looks	59	14.0
By taste	47	11.2
By whether or not water appears flowing	43	10.2
By smell	15	3.6
Other	1	0.2
No answer	30	—
Total	450	100.0

Boiling of Water

Respondents were asked if they boiled their drinking water (Table 5). This is the kind of question to which one would expect at least some people would give the "right" answer to please a health department representative. Nevertheless, 83.7 per cent answered, "No, never."

It should be noted that fear of cholera seems to be the strongest impetus to boiling water. Subtracting the 11.6 per cent who recently began to boil water out of concern for cholera, only 4.8 per cent remain who even sometimes boil their water. This may be closer to the pre-1981 prevalence figure for boiling.

TABLE 5
Do You Boil Drinking Water?

	Number of respondents	Adjusted frequency (%)
No, never	375	83.7
Yes, only recently because of cholera threat	52	11.6
Sometimes, depending on convenience	7	1.6
Yes, only if babies are threatened by cholera	4	0.9
Sometimes, when water looks dirty or tastes bad	4	0.9
Yes, always	3	0.7
Usually, except when inconvenient	3	0.7
Total	448	100.0

Information from the RHM survey corroborates the extent of boiling water and adds to our understanding. The main reason cited that prevents people from boiling water was the flat taste (or "tastelessness") of the resulting water. A number of RHMs stressed this. A few mentioned that boiling water is time consuming and people in their areas are not willing to invest the time. In the words of one RHM, "If the water appears clean, people see no reason to boil it". Five others made comments of this sort, indicating that many people are unaware or unconvinced of the health benefits of boiled water.

On the other hand, 9 of the 42 RHMs reported that cholera education during 1981, and the cholera scare in general during its first "season", led a number of people to start boiling their water. This was reported mostly in Lowveld areas, but also in some Highveld areas. In one such area near Ntonjeni, people boiled their water briefly during the early 1981 cholera scare but then stopped the practice after they felt the threat had passed.

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TABLE 7
Time Required

< 15 minutes
16–30 minute
31–60 minute
61–90 minute
> 90 minutes
Cannot estim
Total

Water Transport and Storage

Water is fetched by women and children, especially girls. The number of trips required per day depends on the distance between a homestead and the source of water. In one day 87.1 per cent took 1 to 3 trips; within that group 45.1 per cent of the total took 2 trips a day.

Most respondents (86.9 per cent) said that between 1 and 4 people fetched the daily supply of water, and 58 per cent of the total specified that between 2 to 3 people fetched.

Water is usually fetched in the morning and afternoon, or if 3 trips are required, in the morning, noon and afternoon (Table 6).

TABLE 6
Time Of Day Water Is Usually Fetched

	Number of respondents	Adjusted frequency (%)
Morning and afternoon	225	51.0
Morning, noon, afternoon	96	21.8
Morning	68	15.4
Afternoon	31	7.0
Morning and evening	11	2.5
Morning and noon	5	1.1
Noon	3	0.7
Other	2	0.5
Not applicable, no answer	9	—
Total	450	100.0

It was discovered during the pre-test that rural Swazis have more difficulty estimating distance than time. For this reason, respondents were asked, "How long does a trip take to reach the place where water is usually fetched?" (Table 7). Most one-way trips took less than half-an-hour. These findings are supported by the RHM survey.

TABLE 7
Time Required To Fetch Water

	Number of respondents	Adjusted frequency (%)
< 15 minutes	191	42.6
16–30 minutes	124	27.7
31–60 minutes	86	19.2
61–90 minutes	23	5.1
> 90 minutes	20	4.5
Cannot estimate	4	0.9
Total	448	100.0

Water is carried in various types of buckets, tins or drums. RHMs reported that closed, 20-litre plastic drums have become popular in recent years. In any case, traditional clay jugs and pots have been largely replaced by manufactured containers that have the virtue of being unbreakable. A plastic container of this sort was used by 45.8 per cent of homesteads; 35.6 per cent used an uncovered bucket; 12.9 per cent used a covered bucket, 2.2 per cent used another type of closed container; only 2 respondents (0.4 per cent) used the traditional clay pot; and 3.1 per cent gave miscellaneous answers such as jugs and metal drums.

RHMs estimated that average-sized homesteads use about 50 to 60 litres of water per day for drinking and all other uses. Using the average homestead size of 10.3 people in the survey sample (admittedly a different sample), and assuming that about two members are absent on any given day, we arrive at a daily per capita water consumption of about 6.6 litres. However, there seem to be periods when rates of water consumption are substantially higher, such as when people are plastering walls, brewing beer, or watering their gardens. These findings are comparable with those of Feachem, *et al.* (1978: 101) who report a daily per capita water use of 6.5 litres in rural Lesotho.

Virtually all respondents claimed that their water container was cleaned from time to time: 37.3 per cent said they used soap or detergent ("Vim"); 34.4 per cent rinsed with water only; 17.4 per cent used water and steel wool; 8.6 per cent used sand or gravel with water; and 2.3 per cent did not clean their container at all. RHMs pointed out that it is the women and girls who clean the containers, and this is usually done in the river or spring and just before filling containers to carry home. However, this may not be done every time, unless it be a simple rinsing-out.

Water may or may not be stored at home in the same container in which it is fetched. RHMs reported that the traditional large clay pot was giving way to plastic containers, although not quite to the extent reported by respondents in the homestead survey (Table 8).

TABLE 8
Type of Container Used To Store Water At Home

	Number of respondents	Adjusted frequency (%)
Closed plastic container	199	44.4
Uncovered bucket	112	25.0
Covered bucket	72	16.1
Other containers	20	4.5
Covered clay pot	17	3.8
Uncovered clay pot	16	3.6
Other	12	2.7
Total	448	100.0

Most homesteads traditionally covered their clay pot or other water container with cloth or dishes to keep soot, dust, cockroaches, children's fingers, etc., out of the water. Buckets were covered in the same way. Some RHMs reported that they had to teach people to cover their water, and that some did not comply.

Water is scooped from most of the unclosed storage containers with mugs or tin cups (96 per cent), or with a calabash, dish or some other means (4 per cent). Some

sharing of the same cup of drinking water may occur, and unused water from the cup may be returned to the storage container, but these practices were not measured accurately. In general, wastewater is thrown in the yard or used to water gardens.

Swimming and Bathing

Since bilharzia transmission in Swaziland is closely related to the swimming behaviour of children and adolescents, information on such behaviour was sought (Table 9). First, respondents (all but 6 of whom were over the age of 18) were asked if they swam or bathed in natural bodies of water. About half replied, "Yes" or "Occasionally." A somewhat higher prevalence of swimming was reported among children (Table 10).

TABLE 9
Do You (Adult) Swim/Bathe In Rivers? Ponds? Etc.?

	Number of respondents	Adjusted frequency (%)
Yes	193	43.3
No	145	32.5
Bathe at home	77	17.3
Sometimes	19	4.3
Warm weather only	8	1.8
Rarely	4	0.9
Total	446	100.0

TABLE 10
Do Your Children Swim/Bathe In Rivers, Ponds, Etc.?

	Number of respondents	Adjusted frequency (%)
Yes	263	63.8
No	112	27.2
In warm weather	15	3.6
Sometimes	19	4.6
Rarely	3	0.7
Not applicable, no children	37	—
Total	450	100.0

Most children and adults have contact with water during the period of major bilharzia transmission (Table 11). Acording to RHMs interviewed, the middle of the day is the favourite time for children to swim, although schoolchildren also frequently swim after school. In some areas, where bilharzia is recognized as a problem,

parents and health promoters have tried to discourage or forbid children from swimming, but with little success.

TABLE 11
Time of Day When Adults and Children Swim/Bathe in Rivers, Ponds, Etc.

	Adults		Children	
	Number of respondents	Adjusted frequency (%)	Number of respondents	Adjusted frequency (%)
Early a.m.	8	2.7	3	1.0
Late a.m.	14	4.8	18	5.7
Noon	58	19.9	78	24.8
Early afternoon	72	24.7	100	31.7
Late afternoon	80	27.4	33	10.5
Evening	17	5.8	13	4.1
When it's hot	26	8.9	56	17.8
Combination of above	17	5.8	14	4.4
Not applicable, other, no answer	158	—	135	—
Total	450	100.0	450	100.0

Analysis and Discussion

Cross-tabulations and tests of statistical significance for 9 predictor or independent variables and 20 dependent variables were carried out. Predictor variables are characteristics of respondents such as age, education level or sex, any of which could have a determining effect on responses. Possible associations between predictor variables themselves were also examined. These procedures yielded few meaningful associations, however.

Next, cross-tabulations were carried out of the predictor and dependent variables after the answers to the latter were divided into "right" and "wrong" responses. Examples of right answers to the question, "Which kind of water do you think is healthiest?" would include enclosed, protected spring or standpipe/tap. Wrong answers would include unprotected spring or river/stream. Of course a degree of value judgement is involved in the designation of right and wrong answers to health KAP questions, but the scoring procedure yielded more meaningful associations than the general cross-tabulations.

The strongest predictors, or influencing factors, turned out to be the highest level of education of any resident member of the homestead, the level of respondent's education, and region. To a lesser extent, sex of respondent, whether or not homesteads were in RDA areas, and whether or not RHMs visited homesteads had a determining effect.

Education

Two education variables were examined: the respondent's level of education and the highest level attained by any resident in the homestead. The former will be considered first.

It should be noted first that age and level of formal education are inversely related: those with more education tended to be younger. This reflects the greatly expanded opportunities for education found in Swaziland in recent years. Furthermore, there were no significant differences between the educational levels of male and female respondents, even though males may have had greater opportunities for schooling than females in the past. Males in the sample tended to be older than females (83 per cent of the 144 male respondents were homestead heads) and this had a counter-balancing effect since older respondents tended to have had fewer years of education.

Level of formal education made a statistically significant difference in the answers to questions relating to the healthiest types of water and the boiling of drinking water (Table 12).

TABLE 12
Identifying Healthiest Kind Of Water, By Respondent's Level of Education

	No formal education	Grade 1–Standard 1	Standard 2–Standard 6	Above Form 1
Correct response	48.0% (82)	49.2% (30)	57.1% (80)	64.6% (42)
Incorrect response	52.0% (89)	50.8% (31)	42.9% (60)	35.4% (23)

$\chi^2 = 6.58$ (3 degrees of freedom)
Significance = 0.088

TABLE 13
Identifying Healthiest Kind Of Water, By Highest Level of Education In Homestead

	None	Grade 1–Std. 1	Std. 2–Std. 6	Form 1–Form 3	Form 4–Form 5	College
Correct response	45.5% (15)	68.4% (13)	37.2% (42)	56.3% (81)	63.4% (71)	80.0% (12)
Incorrect response	54.5% (18)	31.6% (6)	62.8% (71)	43.8% (63)	36.6% (41)	20.0% (3)

$\chi^2 = 23.76$ (5 degrees of freedom)
Significance = 0.0002

Respondents' levels of education were also associated with the practice of boiling drinking water (significance of $\chi^2 = 0.04$); and the type of container used to store drinking water (significance of $\chi^2 = 0.02$).

The second education variable, highest level of education achieved by anyone in the homestead, also related significantly to identifying the healthiest types of water (Table 13).

Region

There were significant differences in responses to questions on boiling water and identifying the healthiest kinds of water (Tables 14 and 15).

TABLE 14
Identifying Healthiest Kind Of Water, By Region

	Highveld	Middleveld	Lowveld	Lubombo Plateau
Correct response	62.2% (74)	51.7% (78)	55.8% (72)	27.5% (11)
Incorrect response	37.8% (45)	48.3% (73)	44.2% (57)	72.5% (29)

$\chi^3 = 14.96$ (3 degrees of freedom)
Significance = 0.002

TABLE 15
Boiling Drinking Water, By Region

	Highveld	Middleveld	Lowveld	Lubombo Plateau
Sometimes or always boil	22% (27)	8% (12)	23% (28)	15% (6)
Never boil	78% (96)	92% (144)	77% (103)	85% (34)

$\chi^2 = 13.92$ (3 degrees of freedom)
Significance = 0.003

Why should there be regional differences in health knowledge and practices, or at least differences in responses to questions of this sort? First of all, differences may be related to factors which were measured in the present survey. For example, there were some regional differences in educational achievement. The percentage of those in the sample with *no* education is only 27.3 per cent in the Highveld, but it rises to 35.9 per cent in the Middleveld, 46.7 per cent in the Lowveld and 50.0 per cent in the Lubombo region. Second, there were more female respondents in the Highveld and

females scored an average of 2 percentage points higher than men on all questions. Third, RHMs visited 50.4 per cent of homesteads in the Highveld sample, compared to 33.8 per cent in the Middleveld and 26.3 per cent in the Lowveld. And homesteads visited by RHMs scored an average of 4 percentage points higher than non-visited homesteads, when all scorable answers are considered. However, 50.0 per cent of homesteads in the Lubombo sample were visited by RHMs and scores were lowest in this region.

The following may also explain regional differences in health knowledge, attitudes and practices. Compared to the Lowveld and Lubombo regions, the Highveld and Middleveld: (i) enjoy somewhat higher levels of public health outreach; (ii) have had more exposure to Swazi radio broadcasts on health education; (iii) are influenced by Swaziland's two major urban centres in various ways; (iv) may have higher literacy rates, in part because the Sebenta National Literacy Institute has worked longer in these areas.

Regional income differences, if they exist, would also help explain health KAP differences. However, no information on income was collected in the present survey. In his 1979 homestead survey, deVletter found no significant regional differences in income levels, except that the poorest regions in his sample were in southern Shisulweni (deVletter, 1979). The 1976 census likewise found Shisulweni to have significantly less male and female full-time employment than the other three districts (Central Statistical Office, 1976). However, the geographic regions used in this survey cannot be meaningfully compared with the administrative regions used in the census. Further research on income differences is called for.

Sex of Respondent

There were significant differences in responses on one water-related question depending on the sex of the respondent. However, these differences may not be due to sex alone. First, as noted above, there are regional differences in respondent's sex, with more females in the Highveld and Middleveld regions. Furthermore, female respondents tended to be younger than male respondents (significance of $\chi^2 = 0.01$). However, females were not significantly less educated than males, as already noted. Nevertheless, when all scored answers are considered together, females scored an average of 2 percentage points higher than male ($\eta = 0.07$) (For a discussion of this statistic see Andrews *et al.*, 1969). This should not be surprising: the domestic use of water, as well as sanitation and hygiene are, considered "women's matters" in Swaziland. Moreover, there was a negative correlation ($\chi^2 = 0.09$) between being the head of a homestead (86 per cent of whom were male) and identifying the healthiest type of water.

In summary, the KAP findings have provided a basis for culture-specific health education and related programmes aimed at reducing the incidence of water-related diseases. The importance of formal education as prime determiner of knowledge, attitudes and practices tends to reinforce the findings of similar studies conducted elsewhere in Africa (cf. Holsinger and Theisen, 1977; Thompson and Tabane, 1980). The degree of formal education achieved by another member of the homestead (other than the respondent) had a determining effect of KAP scores as well. This suggests a "spread effect" of health-related education within the residential group.

Regional variation in KAP scores were found to be due in part to differences in formal education and in exposure to health education.

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