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Margaret Miller

Domestic Water Use - Education Aids

Supervisor : Peter Howsam

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ABSTRACT

The aim of this project was to produce an educational poster to tackle the problem of water contamination between collection at a communal source and use in the home. Literature review, interviews and correspondence were used to determine the present scale of such contamination, what can be done about it, what has been done about it and what messages need to be communicated to prevent it. The educational level and cultural symbolisms of the people at whom the posters are aimed was then examined (literature) to determine a suitable poster design. Posters were designed and tested on people from a wide variety of social and cultural backgrounds, resident in Bedfordshire at the time of this research. The posters were redesigned according to feedback from the trials.

It was concluded that production of a final copy poster for use universally was not within the scope of this project. The posters produced were intended as prototypes which could be sent to local organisations world-wide to be traced and altered to suit the communities for which they are intended.

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INTRODUCTION

The provision of adequate water supplies to rural communities is a primary objective internationally. Time saving and improvements in the health of the community are often seen as the object and direct result of such projects. If, however, the new systems are not used as the designers intended, a rural community may benefit little if at all from an "improved" water supply. In communities where only communal water supply points are provided, high water quality at the source, at the time of installation, will have little impact if quality cannot be maintained over time and through the various stages between water collection and use. Education programmes must therefore be incorporated as part of the water supply project to ensure that water quality is maintained from source to mouth. The success of such education programmes is dependent on choice of appropriate teaching techniques.

People who live in rural villages in developing countries are those most unlikely to have received any formal education. In an article written for "International Literacy Year" (1990), illiteracy rates are quoted as 54% of African people, 56% for people in India, 74% in Nepal and 67% in Bangladesh. Literacy rates are invariably lowest in rural areas and amongst women (Ref 1). Rural women constitute a large part of the group requiring education in maintenance of water quality. The aim of this project was

to design a poster without any writing on it which could be used universally in such education programmes.

Three main activities have been carried out in this project:-

1. Collection of Information

   Collating data collected from various field studies on how water contamination occurs and what has already been done to prevent it. This also included collecting data on education in developing countries. Information was obtained from literature, correspondence and interviews.

2. Poster Design

   This involved deciding on the messages to be conveyed by the posters, the people to aim the messages at (target audience), the receptiveness of the target audience to posters and the way in which the posters would be used. Posters were then drawn and painted.

3. Poster "Pretesting"

   This activity should involve testing posters on the intended audience and, from comments and interpretations illicited, devising a final poster appropriate to that audience. Unfortunately the project was not based in a developing country with easy access to the target audience. Tests were therefore carried

out on people living locally including Overseas and British students, residents of Silsoe village and Pakistani women living in Bedford. After pretesting, the posters were redrawn.

The following project report examines first what messages need to be transmitted then how these messages might best be transmitted using posters and finally details of poster design.

1.0 WHAT MESSAGES NEED TO BE TRANSMITTED ?

To determine what messages must be communicated to improve water maintenance practice, current practice and the consequences of that practice were reviewed. It was found that the problem of water contamination between source and use has been recognised by organisations world-wide and that research programmes in this field have been carried out in many countries. The level of the research varies, from observation of local practice, to bacteriological analysis of water samples taken at various stages between water collection and use. The methodology and results of some relevant programmes are summarised in Appendix 1. A sample study is given below. Some common routes for contamination can be recognised whereas other sources of contamination appear to be more localised as a result of specific practices (Ref 3-8).

Malawi (Interview, Mr YMZ Nyasulu,
Researcher for Ministry of Health ,
Malawi)

Sample : Rural Communities.

Water Sources : Gravity fed tapstands, boreholes

Data collected : Bacteriological quality of water at source, during transport, in storage. Stool samples from children under 5 with diarrhoea.

An initial survey to determine the causes of diarrhoea in the under fives in rural areas indicated that the majority of cases were caused by a virus carried in water taken from recently installed supplies (tapstands and boreholes). A subsequent survey was then set up to determine how this water contamination occurred - was it before or after collection?

Water was sampled at source and if it was contaminated further research was concentrated on checking the source supply. If water was uncontaminated at source, researchers would "follow" the water collectors back to their homes. Collectors were chosen at random. They were asked to collect water and take it home as usual while the researcher followed, taking water samples just after collection, during transport and finally from the domestic water container. Water maintenance practice was observed.

The data from this survey has not yet been processed but

the initial indication is that considerable contamination of stored water is caused by drawing water in the home with a dirty cup. The cup is seldom if ever washed after use and may be left on the ground between usages. Other significant means of contamination were from contaminated leaves during transport (floated on the surface to prevent splashing) and from washing out the collection pot at source with unwashed hands. Further research involving swabbing the hands of water collectors to test for faecal contamination is planned.

Discussion

The cases studied showed that the extent to which water becomes contaminated between collection and use varies greatly from place to place. There is some disagreement between commentators as to how serious the impact of such water contamination is. In many communities, food preparation practices have been identified as the cause of most diarrhoeal morbidity, whilst other research projects indicate that water contamination has the greater effect. If the faeco-oral transmission route is to be completely broken, however, water contamination must be eliminated and therefore has relevance in all communities. Some general guidelines on routes of contamination have been drawn up below :-

Contamination at Source (open wells)

Activities around the source such as animals defecating or young children urinating may cause contamination of drawing vessels through contact with the contaminated ground. The vessels can then contaminate the well water when they are dipped into it.

Contamination On Drawing

Unclean collecting vessels or contact with unclean hands may cause contamination of water in the vessel. Vessel cleansing practices may actually be causing greater contamination where contaminated cleaning materials or dirty hands are used.

Contamination During Transport

Dust can easily enter uncovered vessels as water is transported home. The practice of floating leaves on the surface of the water to prevent splashing can cause contamination if leaves are taken from areas where animals or humans have defecated or urinated. Lids used during transport can also contaminate the water if they are not clean.

Contamination During Storage

Where separate containers are used for storage in the home, contamination may occur during the transfer of the water from collection container to storage container if the water is poured out over dirty hands. The storage container may

never be cleaned out and this will lead to deterioration in water quality. If water is not covered dust, insects and small animals are free to enter and contaminate the water. An additional danger is that the mosquito " aedes aegypti" which carries yellow fever can breed in domestic water containers (Ref 9).

Contamination on Dipping Water

If the utensil used for dipping water is dirty, contamination of the remaining water will result. Similarly if dirty hands come into contact with the water whilst dipping, water quality will diminish.

Other Sources of Contamination

There are many traditional practices related to improving water quality and taste which have not been researched but where the possibility for contamination exists.

In Hyderabad, India, water is sometimes purified by dropping a piece of granite or brick heated on an open fire into it. This practice has been shown to have a beneficial effect on water quality. In Mali "kaolen", a type of clay, is placed in the bottom of water jars before they are filled with water. The clay layer, which is kept in the pot for several days, through changes of water, is said to make the water clear and tasty. Tests in Denmark showed that the technique was effective in removing viruses present in Danish tapwater (Ref 7). In both cases

practices are clearly beneficial if properly executed, but if contaminated materials were used water quality could diminish.

In many areas plants and plant derivatives are used to improve the taste of water. In India and some parts of West Africa, tiny roots off vetivera zizanoides or v. nigritana are put in the bottom of water jars to "cool" the water. In India, Kola nuts (Cola acuminata) are said to render putrid water agreeable. The Tuaregs in Niger use "tabarekkat" (tamarix aphylla) to sweeten water. In Kerala the bark of the "Karingali" (Malayalam), Acacia catechu, roots of Vetivera zizanoides and cumin seeds are added to boiled water to improve its taste. The addition of contaminated ingredients is again a possible hazard.

Contamination and Water Containers

Interestingly it appears that in many areas, traditional water containers are earthenware pots with narrow necks, easily covered with an inverted bowl, mug coconut shell or the like. Such containers are still popular because water stored in them is kept cool by its slow evaporation through the slightly permeable clay. As the water evaporates it takes with it its latent heat of vaporisation and therefore the remaining water is kept at a lower temperature than the surroundings. An advantage from the point of view of hygiene is that drawers in the home are discouraged from dipping water with their hands since the neck of the

container is restrictively narrow. The water must be poured or ladled from the storage container, thus avoiding contamination by dirty hands. Here is an example of traditional practice which should be encouraged.

Another traditional container, the calabash, may be causing contamination, probably because it is difficult to clean out properly due to its organic origins. It may be advisable to discourage the use of such containers if there is a clear indication that serious contamination is occurring.

1.1 METHODS OF PREVENTION - MESSAGES

Having examined how water becomes contaminated between collection and use it was possible to isolate some methods by which this contamination could be prevented. Several "checklists" have already been published in various texts and a comprehensive list, with additions from this research, is given below :-

- Ensure that the source is fenced off. Animals and young children should not be permitted to enter.
- At well sources a clean bucket and rope should be maintained for drawing. Other vessels should not be used.
- Activities such as clothes washing should be performed away from the source. or with good slab + drain
- Drawers should wash their hands, utensils and collection vessels before drawing water.
- A clean lid should be used to cover the water vessel as it is transported home.
- Hands should not come into contact with the water as it is transferred to the domestic storage container.
- The domestic water container should be kept indoors, elevated from the ground and covered.
- The domestic water container should be washed out frequently.

- Clean utensils should be used for dipping water and hands should not enter the water when dipping.

- Any leaves, clay or other "improving" substances added to the water or used to clean utensils should not be taken from areas where faecal contamination is possible.

- Hands should always be washed after defecation.

The implementation of these measures would require relatively little effort from any water user. It is apparent however that these measures are not carried out universally. The reason for this common omission is that the link between illness and contaminated water is not common knowledge.

Traditional beliefs about the transmission of disease vary widely. In some areas there is already a widely held view that to avoid the spread of disease water must be isolated from possible sources of contamination. In such places, little or no education in water maintenance is required. In other areas however popular beliefs do not make the link between illness and water contamination.

In Lesotho, illness is traditionally ascribed to three possible sources : Malimo (god), Balimo (spirits), and Baloi (witchcraft and sorcery). Remedial action therefore includes prayer,giving offerings or employment of a sorcerer. An anatomical or functional view of health does exist concurrently with these beliefs and is readily

apparent in the names given to various diseases ; bubonic plague is called lefu la matsetse - "sickness of fleas" and pellagra is known as lefu la poone - "sickness of maize". Some illnesses are attributed to rotten food (lijo tse mape) and dirty water (metsi al litsila) , but just as often an imbalance of bile and blood (nyooko and mali) could be blamed. (Ref 3).

In some African countries, modern research indicates that traditional practice was instituted with a knowledge of the link between water and disease. In many areas the leaves used to stop splashing and "improve the balance" of the water in transport are not chosen at random. Only the leaves of particular species are used although collectors do not know why this is. Recent research has shown that the leaves chosen are from species traditionally used in the treatment of diarrhoea (Ref 7). In these societies there was clearly an ancient knowledge of the link between water quality and diarrhoeal morbidity. It is not clear whether this knowledge has persisted to the present day.

In some parts of Malawi, people believe that diarrhoea is caused by leaves growing on the trees. This belief is held because the time when trees come into leaf each year (Spring), is also the time when diarrhoea in the community is at its worst.

Faeces is not always perceived as being hazardous. In China fresh human faeces is put on the fields as fertilizer without any handling precaution or subsequent hand washing.

Workers in Baldia, India collect night soil from bucket latrines and carry it out of the city on bicycles, again without protective clothing or washing facilities. Hand washing after defecation is not widely practiced.

Gaps in knowledge which lead to the contamination of water between source and use are widespread. To fill the gaps, it is necessary to communicate that faeces is hazardous and that therefore, faecal contamination is hazardous. The mechanisms by which faecal contamination of water may occur must be highlighted.

Other hazards related to storage of water are not universally recognised. Some householders have been known to use the presence of living mosquito larvae in drinking water to confirm that it is uncontaminated (Ref 9). These larvae are of the mosquito "aedes aegypti" which carries yellow fever. Where such practices exist, education must be initiated to make people aware of the dangers involved so as to encourage adoption of better practice.

The messages chosen for communication must be relevant and clearly transmitted but, more importantly, they must be feasible. One survey by Marguerite Jellicoe noted the great discouragement of girls in Tanzania when unable to realise at home the standards of cleanliness set for them in school (Ref 3). If people consider the messages of posters to be unfeasible, the posters will be ignored and future poster campaigns are then at risk because a president has been set that posters' messages are

irrelevant. For example the message "cover all water pots" must only be transmitted alongside a project to ensure that covers for water pots are easily available to all people.

2.0 HOW MESSAGES CAN BE TRANSMITTED

Communication is an art highly developed by the human species. Our main means of communication is by the use of language. The aim of this project was to develop an educational poster which did not use language. The design of such a poster involved analysis of the visual impact of pictures on different people. In particular, it was important to discover whether it would be possible to devise pictures which would have the same meaning to all target audiences regardless of their cultural experience and level of education. The following chapters examine the composition of the target audience, the way in which they are likely to interpret pictures (visual literacy and cultural considerations) and how posters might be used most successfully for education.

2.1 TARGET AUDIENCE

In recent years water and sanitation education programmes have been increasingly aimed at educating women. The reasoning behind this is that the majority of domestic water collectors and carriers are women. Women are usually responsible for food preparation, domestic cleanliness and childcare and it is in these areas that bad practice may lead to health problems. Women are able to teach good practice to their families by example. The main drawback of this approach is that men are excluded.

Recent surveys have shown that many men feel that they are being overlooked in health education programmes and that use of resources is unfairly biased towards educating women (Ref 10). Health is a topic which involves all people and ideally education should be available to all. The idea that women will be able to pass on their education to those in their families does not compensate for a programme's deliberate exclusion of men. In many cultures men are not accustomed to receiving educational information from women and this departure from the status quo may actually lead to rejection of the principles being taught. Women, men and children must all draw water in the home to take a drink, so all must utilise good practice if water contamination is to be avoided.

Children are another possible audience. In many developing countries health education has been taken into schools. Songs about "special drink" (oral rehydration solution) , games on the correct diagnosis and treatment of diseases and practical work within the community are some of the imaginative ways in which children's attention has been captured and focussed on health issues. The UNICEF "Child to Child" programme is an example of the importance placed on children as learners and educators within the community. In many areas children take on household duties, including the collection of water, at an early age. If good practice can be introduced at this age it is likely to benefit the next generation and, if children are accepted as educators, the present benefits will be great.

In this project, a poster has been produced specifically for people who cannot read. It is probable that children in school can or are learning how to read and that proper attention will be given to their health education. The poster is therefore not specifically aimed at school children. The poster is aimed at children, women and men who are unable to read and have had little or no formal education. It is important that the poster should appeal to this wider audience since it is only through universal good practice that water contamination will be eliminated. Although the poster could be used in programmes with only women as the target audience, this use is not recommended. All people should be encouraged to take responsibility for the maintenance of clean water. The aim of the poster is

to promote good practice, not to perpetuate the myths that women must collect water or that water must be collected by women.

2.2 VISUAL LITERACY

Visual literacy is a measure of a person's ability to interpret and comprehend pictures. In industrial societies this ability is usually highly developed due to high levels of exposure to pictures, photographs, diagrams, television, films and the like. People from industrial countries are often so immersed in their visual culture that they believe the comprehension of visual material to be an innate human characteristic rather than a culture specific, sophisticated, acquired technique. Jung was surprised by this realisation when he visited a remote people who had had no previous contact with modern technology. He showed an illustrated magazine to a group of hunters. The hunters, who were all clear sighted young men, were unable to recognise that the photographs depicted people, regarding them rather as a collection of meaningless smudges. Jung commented:

"His psychic functioning is the same - only his primary assumptions are different." (Ref 16)

In designing a poster it is most important that the depiction is based on primary assumptions common to both the artist and the viewer. Some key areas where perception may vary are outlined below.

Perspective and superposition are two artistic conventions which are widely accepted in industrial societies. With perspective, distance from the viewer is drawn by representing lines which are in reality parallel as lines

converging on a perspective point towards the top of the picture. In this system, closer objects are shown as being larger. Superposition is the convention by which an object is shown to be nearer if it is obscuring part of a further object (behind it). Perspective and superposition only became popular in Europe during the Renaissance. A brief examination of any European art from before this period quickly reveals that great artists did not work by these conventions. To them, size and being pictured completely indicated importance, not proximity. Cave paintings from around the world, Ancient Egyptian art, Greek art and even the highly sophisticated art of Ancient China do not exhibit perspective as accepted in industrial societies.

In a study carried out by Hudson in 1962, a group of illiterate, rural, African people were shown two pictures in which three figures were depicted :- a man with a spear, an elephant and an antelope. In both the pictures the man and the antelope were in the foreground, one on each side of the picture with the spear pointing to the antelope. The elephant was placed in the middle of the page on the same level as the spear but shown much smaller than the foreground figures. In one poster the elephant was also shown slightly obscured by the antelope. Most people from an industrial country would quickly recognise that the man was spearing the antelope. In the survey most people (91%) quickly recognised that the man was spearing the elephant. Evidently the "primary assumption" of the viewers was that

the spear would hit the animal closest to it on the page. Perspective and superposition cues indicating that the antelope was the animal in the spear's path were not received (Ref 17).

Problems do arise when trying to represent three dimensions on a two dimensional medium. When a fourth dimension is added, further confusion is likely. The depiction of time or, put another way, the depiction of a moving, sequential world on a static medium is not straightforward. A photograph of a person running taken from the front when one leg is fully bent could equally be a picture of a person with half a leg missing. A person accustomed to photographs would know from other cues such as arm position and the balance of the body that the person was running. A person unused to looking at photographs would notice the absence of half a leg.

The portrayal of any operation which occurs over time is difficult. Often, posters portray a continuous operation by presenting a series of pictures of various stages in that operation. A company wishing to advertise its pain-killing pills once produced a poster with three pictures on it. The left hand picture showed an unhappy person, the middle picture showed the person taking the company's pills, the right hand picture showed the person with a wide smile on their face. The poster was not successful in the Arabic speaking country where it was

released. The viewers were reading the pictures from right to left, as they would read Arabic script. In the case of people who cannot read and are unaccustomed to sequential pictures there is no reason to assume that actions shown on a sequential poster are not all happening simultaneously. Such people may not get any message at all from a sequential poster (Ref 13).

People do not all view pictures in the same way. If a person has not been exposed to pictures before it is unlikely that they will see the same thing in a picture as someone who has grown up with picture books, "dot to dot" puzzles, "spot the difference" games, art lessons and photographs. In a study of rural people in Kenya, Holmes showed a variety of line drawings of familiar objects to the subjects and asked them what they thought was in the picture. The success rate of the pictures was not very high although to a person from an industrial society the depictions are clear. Some of the misconceptions which occurred are interesting because they point to a distinct method of viewing pictures. A picture of a goat was most often identified as a "cow", which mystified researchers since to them the picture was clearly of a goat. The mystery was resolved when it was noticed that the goat's tail had been drawn falling downwards at the back like a cow's tail where in reality goats' tails turn upward. 30% of the respondents did not recognise the picture of a tortoise as such. Alternative answers included "snake",

"elephant" and "crocodile". These alternatives are clearly suggested by the picture if one looks at the head, feet, or shell of the tortoise in isolation. It seems that many of the respondents were not viewing the picture as a whole but were scanning the page picking out details and comparing these to their everyday experience (Ref 17).

The style of presentation used in a picture is another factor which will affect ease of comprehension. Simple line drawings, shaded drawings, cartoons, silhouettes, block outs (a photograph of the subject with the background whited out) or photographs are some alternatives. Opinions differ as to which style is most universally understood. In a survey in Zambia 4 different representations of the same picture were shown to rural people. The tester told each subject:-

"These four pictures show you the same thing, tell you the same story. Can you tell us what you see?"

Once the subject had determined what the pictures were about they were asked to point out in which picture they had first seen this. The results were as follows:-

STYLE	RESPONDENTS WHO FIRST SAW MEANING IN THIS PICTURE
Line drawings	3.7 %
Silhouette	7.4 %
Block out	57.1 %
Photograph	31.8 %

(Ref 12)

Clearly the block out photograph was the most easily understood in this survey. The use of block out photographs and photographs is however not advised for large scale rural production. Photographs easily "block in" on xerox reproduction so that for example a black face in bright sunlight will appear as barely recognisable blocks of black and white (Fig 1).

Silhouettes were more readily recognised than line drawings. One explanation for this may be that the viewer was not easily able to distinguish from a line drawing which was the background and which the figure. In a silhouette where the background is clearly the lighter colour, it is easier to pick out the dark shape of the figure. Silhouettes can, however, be confusing if the two colours used are fairly equal in quantity as they are in the well known candlestick/two faces optical illusion (Fig 2). It must be clear which colour represents the background and which the figure.

Line drawings are probably the most commonly used style in development posters, despite their low rate of recognition in the Zambia survey. A silhouette cannot show details such as facial expression or what the hands are doing which are often vital to transmit the desired message. There is disagreement as to how realistic a drawing should be made. Some authors recommend outline and skillful shading to show depth in the picture (Ref 14). Others discourage shading since this may confuse the viewer (Ref 15). Dark and

Figure 1 : Photographs often "block in" on reproduction.
From "Illustrations For Development" (Ref 14).

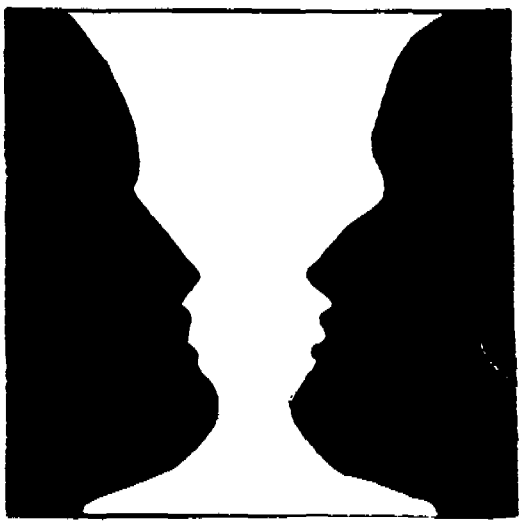


Figure 2 : Where background and figure are not obvious, more than one interpretation may be made.
From "Eye and Brain" (Ref 19).

light patches on the skin might be interpreted as leprosy rather than the light and shade intended by the artist (Ref 16).

Cartoon style drawing is another option. In cartoons facial features and body proportions are somewhat distorted. The resulting characters are often very appealing, especially to children. This is an interesting phenomenon since children are seeing with the eyes of people only recently introduced to pictures. Perusal of children's books in an industrial country shows that pictures for very young "readers" are highly stylised and simplified, becoming more realistic for older children. Books with photographs tend to be for children who are already proficient in reading. Although there is not necessarily a direct parallel with non literate adults, non literate children may be seeing the world in a similar way and may give an indication of appropriate styles to use. In drawings for young children faces are drawn large with an almost circular head, two dots for the eyes, a line for the mouth and a line or pair of dots for the nose. Ears and hair are roughly drawn in and the rest of the body is shown in very basic blocks - torso, two arms and two legs. This system, which lays great emphasis on the presence of facial features but not on details, works for young children because this is how they view other people - first looking at the eyes, mouth and nose. Studies using retinoscopes have shown that all humans react in this way, looking at

the eyes mouth and nose much more than any other part of the body. A picture which stresses eyes mouth and nose without other distracting details may therefore have greater effectiveness than a more "realistic" drawing.

Pictures are not a direct translation of reality into a universally understood visual code. Methods of portraying objects and actions on a two dimensional surface require artists to give their own translation. Artists' translations onto paper of what they see and a viewer's translation of a picture will depend on what visual stimuli either have previously encountered.

2.3 CULTURAL CONSIDERATIONS

A poster may be well designed, clear and unambiguous but still fail to transmit its message. Depictions must be both relevant and socially acceptable to the viewers.

In some cultures, pictures of women are unacceptable, particularly if the face is shown. In such areas the artist must balance clear depiction with social modesty (Fig 3). People should not be drawn in stances that suggest aggression, insult, rebuff, or any other inappropriate signal. There are an endless number of "faux pas" which can be committed by accidentally giving an inappropriate gesture in an unfamiliar social setting.

Colour has different significance in different places. In Western societies, the colour of mourning is black, whilst in India it is white and in other places, red (Ref 11). Colours of such significance should be avoided unless they are to be used in their cultural context.

Style of dress has been shown to be of great importance in the reading of posters. One survey showed that rural women in Tanzania paid no attention to an education poster which showed a mother dressed in a short skirt according to the village fashion of neighbouring Kenya. It was not decent according to their traditions. As soon as the poster was altered to exhibit the local style of dress, the women took an interest in its message (Ref 7). If people are

Figure 3 : Poster where woman's head has not been drawn for cultural reasons. (The message is to wash vegetables before consumption.)

From "Hygiene Education in Water Supply and Sanitation" (Ref 10).

portrayed they must be recognisable as local people to give relevance to the poster's message.

Cultural differences are the main stumbling block for production of a poster which can be used universally. There are so many possibilities which must be considered that it would be a virtually impossible task to collate all information and if this were done, the resulting guidelines would probably cripple all attempts to communicate anything. For this reason, no further attempt has been made to seek out specific information on different cultural symbolism. Design proceeded with the revised aim to produce pictures which could be tested on a wide variety of people and modified according to reaction.

At this stage it was realized that production of a final copy universal poster is a near impossible task. Production of prototypes for pretesting in each community was seen as a more appropriate goal.

2.4 THE WAY IN WHICH THE POSTERS WILL BE USED

Posters are already widely used in health education programmes. Several students from developing countries, interviewed in the pretesting stage of this project, said that they had already seen these posters in use in their own country. This rather surprising revalation was then qualified by saying that the posters mentioned were on similar issues or at least related to health.

Health education posters are frequently displayed at health centres, clinics, schools and in other public buildings. In some countries, campaigns may involve placing posters at strategic points such as on road signs.

At village level posters are best introduced by someone who knows the message of the poster and can explain it. In Malawi, health educators from the Ministry of Health usually work through the village headman and village health committee. The health committee of about 10 villagers (women and men) is called by the headman at the request of a technical officer from the Ministry of Health. The technical officer spends about an hour on each visit explaining a different aspect of health education. For example one meeting's lesson might be on how to wash hands using ashes and water (soap is not widely available). Practical demonstration and the discussion of various visual aids form a major part of the lessons. Once the village health committee have been educated, the technical

officer takes a passive role, sitting in on general village meetings whilst the health committee communicate the new information to the rest of the village. Again visual aids and practical demonstration form a major part of the teaching. Posters may then be distributed to anyone that wants, for display in their home.

The use of posters as teaching aids and then as a reminder of what has been taught is probably the most appropriate technique. If posters are put up without any explanation it is unlikely that their message will be universally understood. Many people who are unused to seeing posters would be fascinated by the straight edges and different shapes on the posters, colour too might be attractive but it is unlikely that a message will be transmitted if the viewer has never had a message from a picture before.

3.0 POSTER DESIGN

Since the poster being designed is aimed specifically at people who are not educated and are unused to seeing pictures, an early decision in the design was to limit the number of messages being transmitted by one poster to one message. More than one message per poster might lead to confusion of the viewer and therefore rejection of the poster.

The way in which the posters are going to be reproduced must be considered. It has already been decided that large scale reproduction of a final copy poster is pointless. What is envisioned is large scale distribution of prototype posters which can be used as a base for production of the final copy suited to the communities where it will be used. The facilities available for local reproduction of posters must therefore be considered. An example of an organisation reproducing visual materials in an African country is given to illustrate the possible facilities available:-

The unit produces attractive photocopied black and white and multicoloured silk screened posters. Personnel comprises a graphic artist with four years of post secondary training and two untrained artists, one a former messenger, the other a former garage mechanic, both with innate artistic abilities. Equipment comprises drawing boards, ink, pens, paint, brushes and a silk screen. The

unit produces posters and flipcharts both on demand and at its own initiative. Often, however, it can do nothing unless the requester supplies paper, ink and paint. Its annual budget is $2000 (Ref 17).

Other organisations might have even less - perhaps just pens, paper, and a kitchen table. The style of representation used must therefore be uncomplicated for ease of reproduction. It was decided to use simple outline line drawings which could be reproduced on a photocopier or by tracing. Once a picture has been drawn it is relatively easy to trace it, making alterations to hair style and clothing style so as to portray local people. Other details such as the style of water pot can also be changed with little difficulty. The designs could be traced onto locally available cloth using indelible markers, ink or paints to make more durable posters.

Studies have shown that the use of colour alone does not improve comprehension of pictures significantly (Ref 17). Reasoning however that it is easier to distinguish figure from background if the figure is coloured in, and that a brightly coloured poster will attract attention much more than a shaded one, it was decided to use colour. Reproductions and alterations of the poster need not be coloured, but could be shaded in if resources are limited.

The aim of the design was to produce depictions of familiar objects, unambiguously drawn with as little background

detail as possible. In a survey in the Indian Punjab the problem of irrelevant background detail was highlighted : The local drinking water was high in mineral salts and was causing villagers to have pains in their joints, backache, stones in the bladder and yellow teeth. To illustrate the connection between the water supply and the villagers' health problems, a poster was drawn. A side view of the face of a local man was shown baring yellow teeth. Beside the face was a picture of the village well to indicate that the problem of yellow teeth was connected to the well water and above, the artist drew in some clouds. One villager gave the following interpretation:-

" The man is smiling. He is happy because there are clouds in the sky. It will soon rain and fill his well, so he will have plenty of water for drinking and for growing his crops." (Ref 13).

This reasonable interpretation was given because of the clouds shown in the picture, which were not necessary for conveying the intended message. Background detail may be good for putting a picture in context, but it may be totally distracting and give the viewer the opposite message to that intended. No background was used in the poster design.

The poster should have no writing on it. In many countries, health education posters do have writing on them, even where literacy rates are low. It is often thought that if the majority cannot read, literate viewers

will read the writing for others. Although this is a valid point, there are many villages (eg in Bangladesh) where nobody can read (Ref 18). One pretesting programme encountered a non literate person trying to make sense of the Hindi script below a picture of a baby as being the baby's stools. A picture with writing on it may also be inappropriate because writing will intimidate the non literate person and precondition them to believe that the message on the poster is not for them or cannot be understood by them. In areas where literacy is high and there is still a need for education on water maintenance, writing can always be added.

Initially three pairs of posters were designed. There was not time to draw a poster for every point on the checklist for good water maintenance (Section I).The following messages were considered to be of primary importance:-

- Cover water containers
- Clean out water containers
- Use a ladle

It was hoped the by conveying these messages, using the posters, health educators would explain clearly the most important message of all, that faecally contaminated water is dangerous and can cause disease. A poster was not made specifically for this message because it was felt that explanation by a health worker would be the most appropriate means of conveying this axiomatic point. Once

this point is grasped, the posters can be used to reinforce it by showing what actions are appropriate to guard against water contamination.

The messages were conveyed by showing a picture of good practice along with a healthy baby and bad practice along with a baby suffering from diarrhoea. Babies were chosen rather than adults since the sight of an adult with diarrhoea could easily be seen as an invasion of privacy and cause rejection of the poster before its message is read. The posters were drawn in two different styles, one more realistic and the other more simplified (cartoon style). It was thought that the cartoon style might have more universal appeal and be easier to "read".The pictures were pretested on 46 people.

3.1 PRETESTING.

The pretesting of visual materials involves showing prototype copies of visual materials to a sample of the people at whom the final copies are aimed. Reactions are noted and a revised design drawn. Previous blunders in the use of visual aids have indicated that a designer cannot hope to guess how different visual materials will be interpreted by different groups of people. The most widely told illustration of this fact is the story of the tsetse fly:

A large model of a tsetse fly used to illustrate a talk on the spread of sleeping sickness was very reassuring to one village woman - "Thank goodness we don't have monster flies like that in our village ", she later confided to the health worker. Evidently the whole village had been mystified by the model, wondering what relevance such flies had to their lives.

Since this incident, health workers have been careful always to explain scale when showing visual aids (Ref 14).

The pretesting of visual materials is known to be desirable, but this stage is often left out of projects due to lack of time, funds (for travelling to and from villages) and interest. Artists employed by health promoters are not often sociologists or educators. The fear of having their materials shown up as being deficient

coupled with the inconvenience of having to alter "completed" materials will dissuade most artists from submitting work for pretesting. Such artists do not believe pretesting will actually be beneficial. The advantages of pretesting have however been clearly demonstrated (Ref 17).

Pretesting of posters and photographs in the Yemen Arabic Republic revealed that women could not readily relate to drawings of veiled women who they saw as being unlike themselves, whereas pictures of unveiled women could be shocking and were rejected. Photographs were the least useful as they were seen as shocking and raised suspicions that the health workers were carrying cameras. Drawn pictures were therefore used only as a minor part of the programme whilst photographs were abandoned. Audio tapes were adopted as the most appropriate medium of communication.

Pretesting of pamphlets promoting the use of oral contraceptives in Bangladesh saved the programme from near disaster. A woman was shown sleeping, with the pill and a glass of water at her bedside. The viewers saw her as being dead, perhaps from taking the pill, because her hair was loose rather than tied. In Bangladesh women's hair is braided or tied at night. Pictures were revised accordingly.

Pretesting can be very costly and time consuming but "minimal" pretesting will also produce valuable insights. Minimal pretesting involves (Ref 17):-

- Pretesting of a limited number of priority visual materials

- Selecting pretest sites that require a minimum of travel. In developing countries most cities will contain neighbourhoods inhabited by ethnic groups from every part of the country. Many of these people are recent immigrants to the city and still think as rural people would. These people could be subjects for pretesting.

- Ask questions of groups and individuals including female, male, young, old, literate and illiterate. These questions should include:-

* What do you see?
* What do you understand?
* Do you like the materials? Why? Why not?

In this project posters were pretested on people living in Bedfordshire. The following questions were asked:-

- Have you lived all your life in the UK ?
- Where else have you lived ? (Rural/urban)
- How long have you lived there ?
- At what age ? (ie as child or adult ?)

- What can you see in these pictures ?
- What do you think their message is ?
- Do you find the pictures confusing, annoying, offensive or unattractive ?
- Which style do you prefer ? (shown same pictures in other style)

The pairs of posters were shown either singly (ie only one pair shown to the viewer) or all together or one after another (the sequence of showing the pictures was alternated). Viewers were asked about one style of picture only, until the end of the interview, when the other style was shown for comparison.

Initially no information was given as to what the pictures were about. Respondents knew only that the reaction of people from different countries to certain pictures was being tested. If respondents had difficulty in making any sense of the pictures they were told that the project was about water contamination between collection and use and that posters were being devised to promote practice to prevent such contamination. All responses and suggestions were noted and care was taken to give nothing more away about the intended message of the posters.

Interviews were as informal as possible and much information was gained on general water storage and health education practice in the home countries of the

respondents. Often people had ideas on how the pictures could be improved and these too were noted. In the case of Pakistani women in Bedford, an interpreter was used but again interviews were as informal as possible, taking place in the same room as the sewing class which the women were attending.

3.2 RESULTS OF PRETESTING

Detailed results from the pretest are presented in Appendix 2. A more general description of the survey's findings is given below.

The posters which appeared to be easiest to understand were the "cover water pots" posters in both styles. When all posters were shown simultaneously respondents did not see messages as easily as when all the posters were shown one by one. The order of showing the posters did not appear to influence comprehension so these results have not been included.

European students (particularly British students), seemed to follow the logic of the designer (a British student) much more readily than students from developing countries. European people who were not students did not follow the logic so readily.

Interestingly whilst all the European respondents felt that the smiling child was happy and healthy whereas the prostrate child (shown with diarrhoea) was unhappy and unhealthy, many respondents from developing countries did not see this in the pictures. When asked about the health of the children, many thought that the smiling child was malnourished or had worms whilst the prostrate child, although temporarily in pain as it passed its stool, was much more healthy. This interpretation arose from the shape of the child's stomach, especially in the simpler style of

drawing (S). Some people thought the depiction of diarrhoea should have been clearer since ,as shown, it could have been a sharp rock, a leaf on the ground, urine or normal stools.

In the two pictures where adults were shown there was much attention given to what the interaction between the adult and the child might be. Many people thought that the nature of the interaction was the main message of the poster. For example the woman shown washing a water pot was looking after the happy child whilst the child shown with a broken pot was unhappy because there was no one to look after it.

A lot of the respondents who could not see any message in the pictures were not making a connection between the health of the child shown and the water maintenance practice illustrated. One person described the figures in picture 1 as:-

1a) "An uncovered water pot. A child with diarrhoea."

1b) "The same water pot with a cover on. A happy child."

Having given these descriptions, the respondent could not see any message in the posters.

Many respondents pointed out that they had never seen a water pot quite like the one depicted in the "realistic" style, whereas the pot shown in the "simple" style was a little more credible. Some of those interviewed described

or drew water pots commonly used in their own country. The cartoon style was not popular with respondents during pretesting, because it was "not so well finished" as the realistic style and many felt that the depiction was too "funny" for such a serious subject. A lot more was read into facial expression in the cartoon style because this is not so well defined and is therefore open to interpretation. For example, mood swings were often attributed to the man shown drawing water first with a cup and then with a ladle (poster S3). His mood was perceived as changing from contented when the child was happy, to surprised when the child had diarrhoea. In fact the intention was to draw the man's face identically in both pictures. In the other style, 3, the man was mostly seen as unhappy in both situations. Respondents never thought that the characters in the simpler style resembled people from their own country whereas many of the African respondents felt that the people of the more realistic style could have been members of their own families. Although cartoon characters were initially an attractive idea because of their "universal" nature, it was eventually concluded that their universal dissimilarity to any local person was in fact an overwhelming disadvantage.

The group who were least interested in the posters were the Pakistani women. This may have been because of the difficulties of speaking through an interpreter, but it seemed that their disinterest stemmed more from the

pictures having no connection whatever with their daily lives. Most of the women had lived in Britain for at least 10 years and, according to the sewing class coordinator, only got out of the house to go to the weekly sewing class. Noticeably it was the women who understood more english that made more sense of the posters, indicating that those who had more contact with the world outside their home found it easier to relate to the posters. The Pakistani women were perhaps the closest of the groups tested to people who have lived all their lives in a secluded rural community. People who lead a more introverted lifestyle are unlikely to connect easily with pictures of unfamiliar objects.

3.3 REDESIGN OF THE POSTER

It is envisaged that the posters produced will not be used in isolation but will be explained by a health worker. Nevertheless, it is important that someone who has not received such an explanation does not confuse good and bad practice as a result of seeing the posters. Some modifications were therefore necessary.

The first modification made was to depict the difference in health of the children more dramatically. The standing child was slimmed down slightly to avoid any suspicion of malnutrition whilst the child with diarrhoea was drawn as being painfully thin with ribs protruding and the wrinkled skin typical of dehydration.

Originally it was intended that the child depicted should not be of specific gender. This was done both to avoid the possible unease of viewers caused by genital detail, and to give even handed treatment to male and female children, not favouring one over the other. However since many respondents saw the prostrate child not as having diarrhoea but as urinating, it was considered necessary to include more detail. Since female genitalia is often a taboo subject, a male child was drawn.

One of the main problems with the posters was that people could not see what was in the container. Was the pot empty or full? Was the woman taking something out or washing

something in the pot? Was the man putting in or taking out something? What was in the containers ? For this reason it was decided to show a cut away view of the water pot. This was not done initially since this artistic device might be confusing to people who are unused to looking at pictures. It was decided to include a cross section in the posters but separate this from the rest of the picture so that the main picture could be viewed without the interference of the cross section. In this way it could be emphasised that the water pot was full of water, that the woman was washing the pot and that the man was (a) using a cup and (b) using a ladle to draw water out of the container. The way in which contamination might enter the water could also be demonstrated on the cross section.

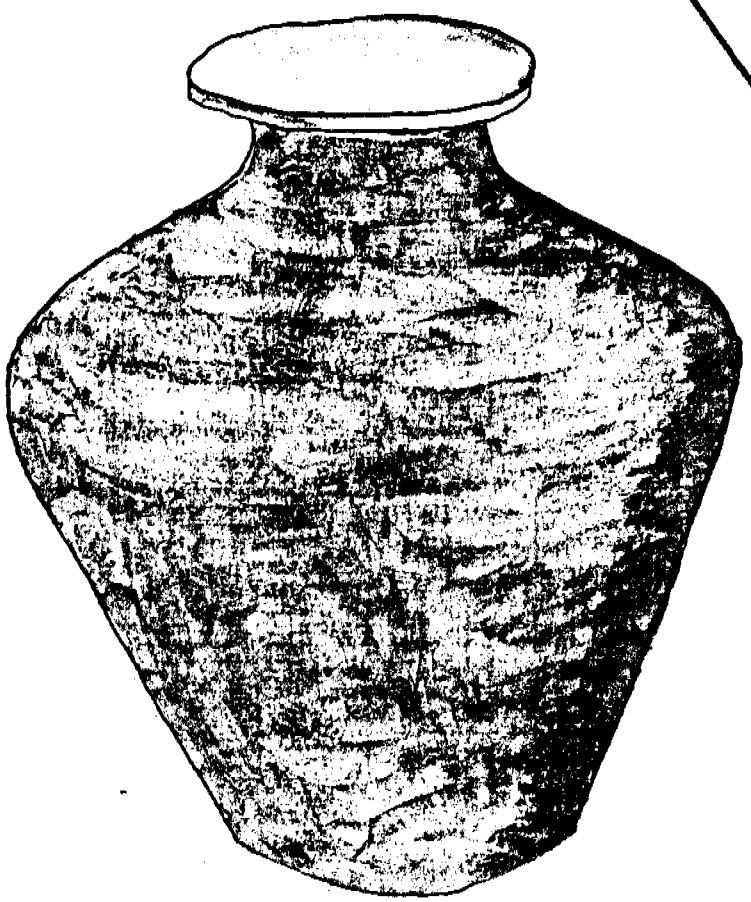
The water container was modified according to respondents' descriptions of water containers in their own countries.

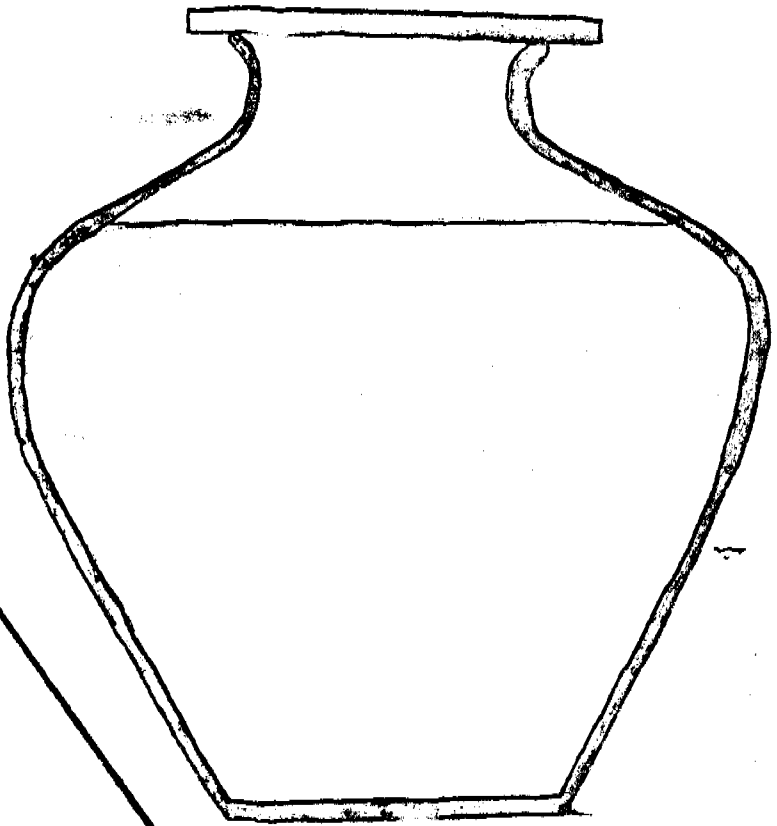
Pretests indicated that seeing more than one message does indeed confuse the viewer, even where the messages are on separate pieces of paper. It was decided therefore to maintain a "one poster, one message" policy.

The redesigned posters are shown in the following pages.

50-51
(over)

PLATE 1: Cover Water Pots





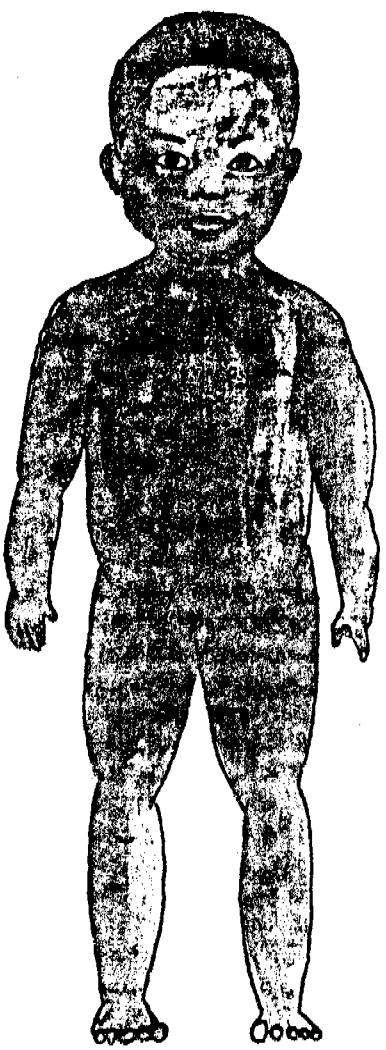
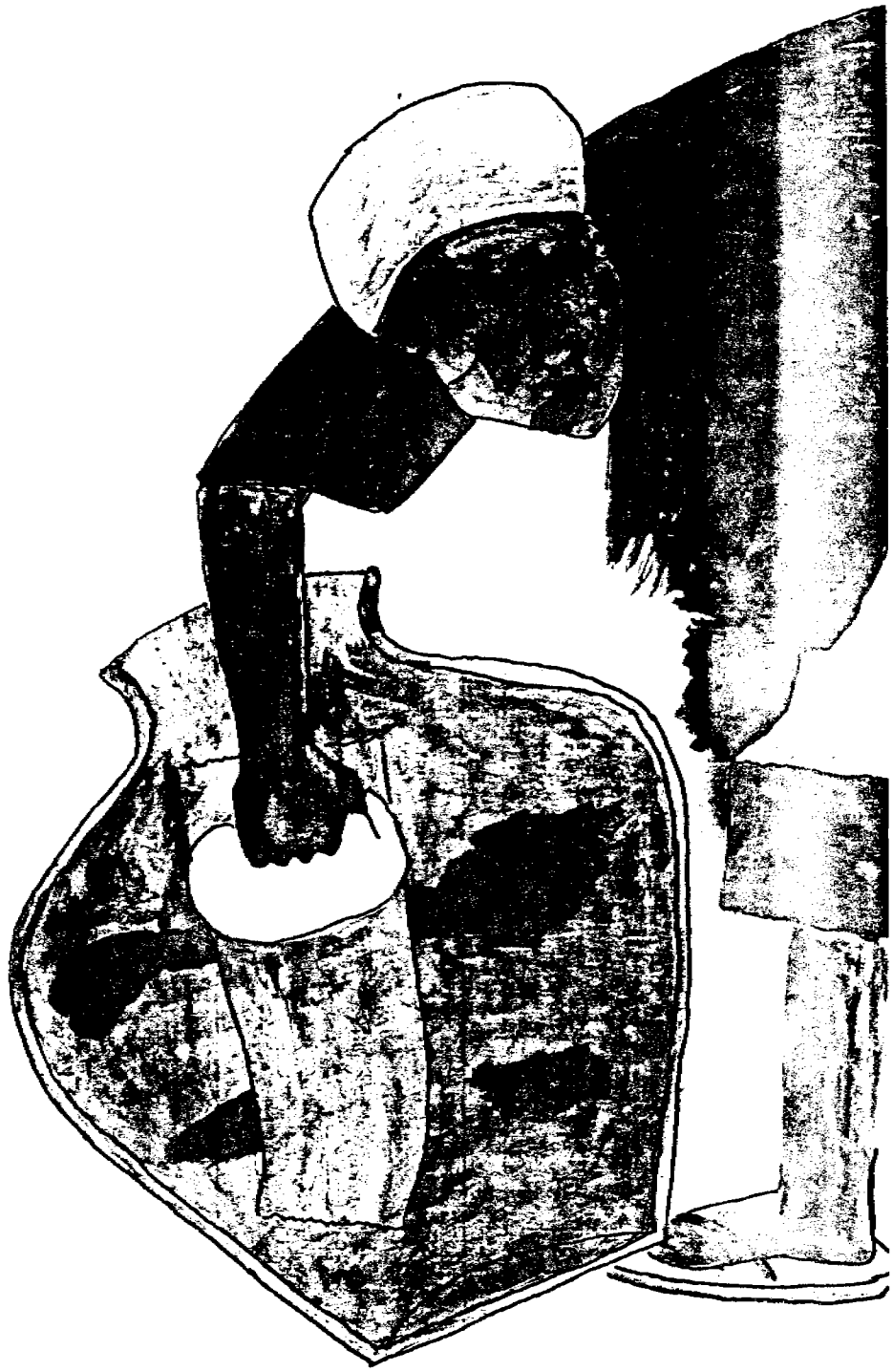
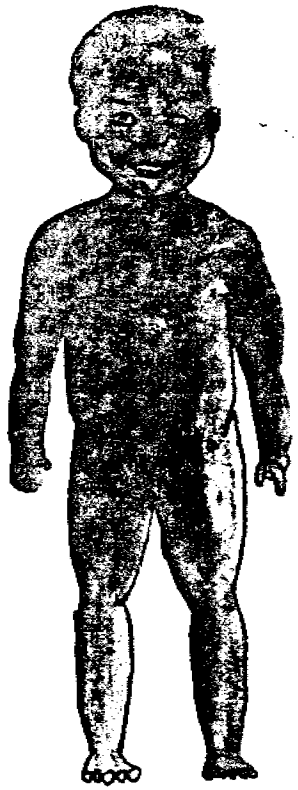


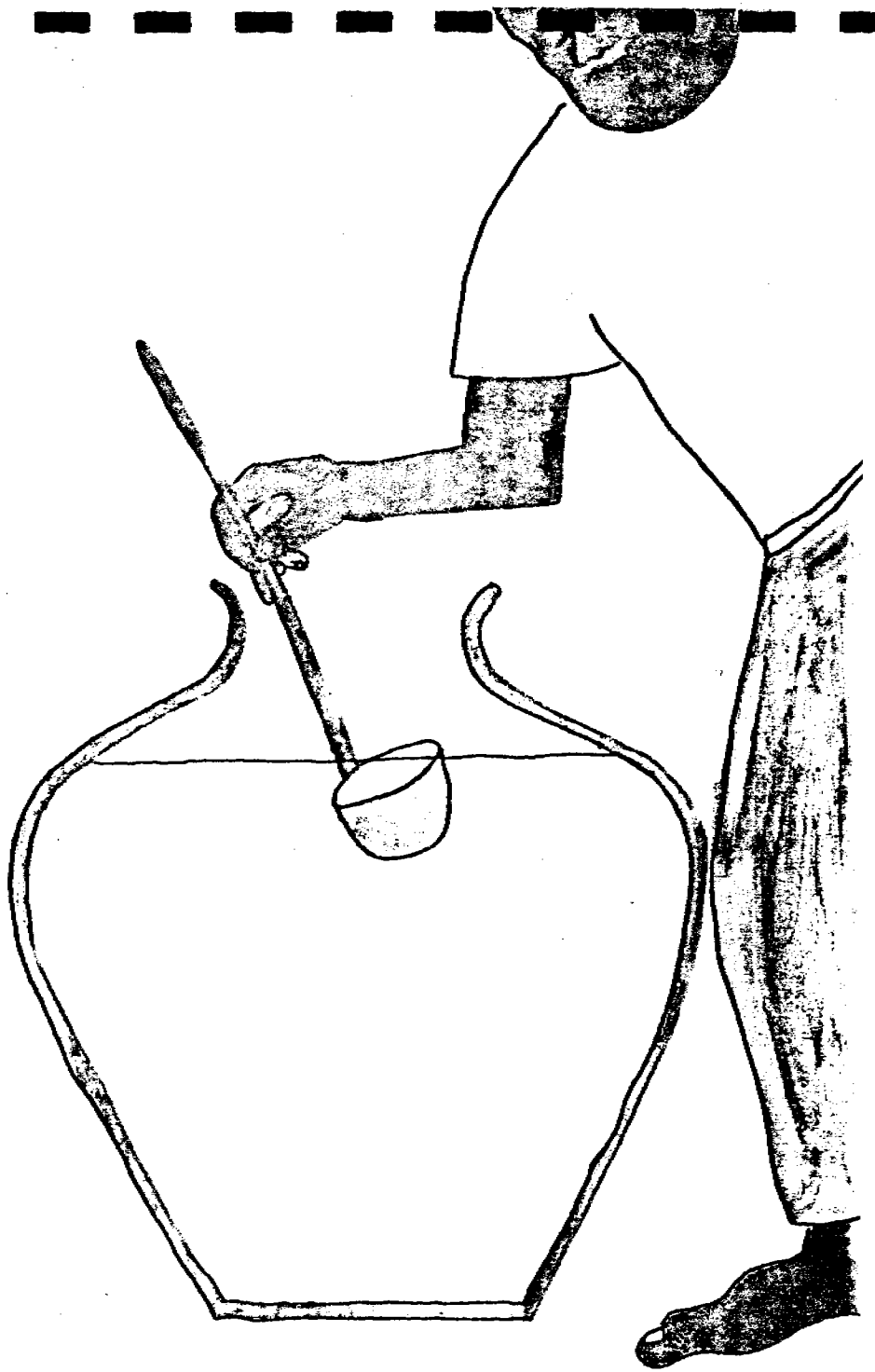
PLATE 2: Wash Water Pots



54-55
(Over)

PLATE 3: Use A Ladle





4.0 CONCLUSION

The initial aim of this project, to produce a universal poster for use in water maintenance education, has not been fulfilled. Prototype posters, for local adaptation and reproduction have however been produced. It is envisaged that these prototypes could be distributed along with paper or cloth, pens and paint supplies to small units which could produce the final copy after pretesting in local communities. Local units could also produce posters using tracings of the children and cross sections with their own illustrations of particular good and bad practice relevant to the locality.

Two universally applicable messages have been isolated:-

- Contaminated water is dangerous
- Bad practice will lead to water contamination

Although it is is possible to attempt illustration of these messages on posters, experience has shown that it is not possible to convey a specific message to all viewers through pictures alone. The pictures must be used as an aid to comprehension and should never be thought of as the means of transmitting a message. If language is not used in education, communication of a specific message can never be assured. Where students cannot read, this communication must be verbal. The posters must be explained and during this process, the two messages on water contamination should be highlighted.

5.1 REFERENCES

1. "Spelling out the problem", Common Cause (the magazine of Actionaid), Vol.1, No.3, 1990, pp 14.

2. SENGAL, Dr PN, "Water , Environmental Sanitation, Public Health and Hygiene - Role of Voluntary Organisations", Voluntary Health Association of India, New Delhi, India 1989 (mimeo).

3. FEACHEM Richard et al,"Water Health and Development", Tri med books ltd, 1978.

4. "Rural Household Survey : Pilot Sites Three and Four, baseline data", Ministry of Health, Masero, Lesotho, 1985.

5. Rural Household Survey : Pilot Sites One and Two, baseline data", Ministry of Health, Masero, Lesotho, 1985.

6. MOLBECK K, HOLJLYNG N, JEPSEN S, GAARLSEV K, "Bacterial Contamination Of Stored Water And Stored Food : A potential source of diarrhoeal disease in West Africa", Epidemiology and Infection, 1989, pp 309-316.

7. AL AZARIA Jahn Savia, "Traditional Water Purification In Tropical Developing Countries - existing methods and potential application", German Agency for Technical Cooperation (GTZ), Postfach, Germany, 1981.

8. SUTTON Dr Sally, MUBIANA Domonic, "Household Water Quality In Rural Zambia", Waterlines Vol 8, No 1, July 1989, pp20-21.

9. CORBET Prof Philip, "Using Dragonflies To Suppress Mosquitos In Domestic Water Storage Containers", Waterlines, Vol 4, No 3, Jan 1986.

10. BURGERS Lizette, BOOT Marieke, VAN WIJK-SIJBESMA Christine, "Hygiene Education In Water Supply And Sanitation Programmes", Technical Paper No 27, IRC, The Hague, The Netherlands, 1988.

11. MORGAN John, WELTON Peter, "See What I Mean", Edward Arnold, London, 1986.

12. FUSLESANG Andreas, "Applied Communication in Developing Countries", The Dag Hammerskjold Foundation, 1973.

13. LINNEY Bob, "Pre-testing posters for communicating about water and sanitation", Waterlines, Vol 4, No 2, October 1985, pp2-4.

14. M°BEAN George, KAGGWA Norbert, BUGEMBE John, "Illustrations For Development", Afrolit Society, Nairobi, Kenya, 1977.

15. WERNER David, BOWER Bill, "Helping Health Workers Learn", The Hesperian Foundation, Palo Alto, USA, 1982.

16. SAUNDERS Denys J, "Visual Communication Handbook", United Society for Christian Literature, Lutterworth Educational, Guildford & London, 1979, pp21.

17. KARLIN Barry, ISELY Raymond, "Developing And Using Audio-Visual Materials In Water Supply And Sanitation Programmes", WASH Technical Report No 30, Arlington, USA, 1984.

18. EWING Deborah, "Reading Signs Of Hope", Common Cause, Vol 1, No 3, 1990, pp18-19.

19. GREGORY RL, "Eye and Brain", Weidenfeld and Nicolson, 3rd edition, London, 1989.

5.2 BIBLIOGRAPHY

Water Contamination between Source and Use

AHRTAG, "Health Extra : Practical Hygiene", Dialogue On Diarrhoea, Issue No 36, March 1989.

BLUM D et al, "The Bacteriological Quality of Traditional Water Sources in north eastern Imo State, Nigeria", Epidemiology and Infection, 1987, pp429-437.

HOFKES EH, "Small Community Water Supplies", International Reference Centre for Community Water Supply and Sanitation (IRC). John Wiley & Sons, Chichester, New York, Brisbane, Toronto, Singapore, 1981, reprint 1988.

KERR Charles, "Small Community Water Development", Intermediate Technology Publications, London, 1989.

NYAMWAYA D, "A Handbook For Village Health Educators for use in the self help environmental Sanitation Programme, Botswana", UNICEF & Ministry of Local Government and Lands, Republic Of Botswana, 1985.

SOUNDY Jaime, RIVERA Humberto, "Acute Diarrheal Disease Longitudinal Study In a Sample Of The Salvadoran Population. II Techniques. Analysis Of Faeces And Foods.", Institute Of Medical Research, San Salvador, El Salvador, 1972, pp315-318

WAGNER EG, LANOIX JN, "Water Supply For Rural Areas and Small Communities", WHO Monograph Series No 42, Geneva.

Education and Literacy

BERTRAND Jane T, "Communications Pretesting", Media monograph 6, Communication Laboratory, Community and Family Study Center, University of Chicago, 1978.

BIFANI Patricia, "How Kenyan peasants pastoralists and periurban women see water problems", Waterlines, Vol 4, No 3, January 1986, pp16-19.

BOOT Marieke, "Making The Links : Guidelines For Hygiene Education In Community Water Supply & Sanitation", IRC, The Netherlands, 1984.

HUBLEY Dr John, "Effective Communication Theory and Practice in Health Education", Leeds Polytechnic 1988.

LAVER SML, " Information - The Link Between Technology and People.", The Zimbabwe Science News, Vol 19, Nos 9/10, September/October 1985, pp120-121.

MACDONALD Ian, HEARLE David, "Communication Skills For Rural Development", Evans Brothers Ltd, Nairobi, 1984.

MISRA KK, "Safe water in rural areas - an experiment in promoting community participation in India", International Journal of Health Education, pp53-59.

"Village Health Workers Guide for Home Visits In Relation To Water and Sanitation", Village Water Supply Ministry Of Interior, Lesotho, 1985.

"Communicating Development", International Institute of Rural Reconstruction, Silang, Canite, Philippines, 1987.

APPENDIX 1 : CASE STUDIES

India (Ref 2)

Sample : Calcutta, households including a cholera patient

This study showed that carriers of vibrio cholera were causing contamination of stored water by dipping their fingers into it when taking water out of the household storage container. The report concluded that chlorination should be practiced using chlorine tablets in the storage containers and that wide mouthed containers like buckets should be replaced by the traditional narrow necked earthenware vessel - the surai. The narrow neck necessitates use of a ladle or pouring out of water since it is too small for hands to enter.

India (Correspondence : N Kamalamma
The Gandhigram Rural Institute
Tamilnadu)

The main sources of water contamination between collection and use were identified as :-

" 1. Multiple use of the source - Hand pump/ Tap / Well. Using these sources for activities other than collection of drinking water.

2. Cleaning water pitchers with contaminated mud which is available near the source.

3. While transporting especially when distance from the source to house is high.

4. The habit of taking water from the container used for drinking water storage by dipping a glass/ small container and using the same repeatedly without washing and dipping while drinking and repetition of the same process by other members of the family or group."

Lesotho (Ref 3)

Sample :13 households in Khubetsoane on 2 occasions

Water Source :Privately owned handpump (owner charging for water)

Data collected :Faecal streptococci (fs) and faecal coliform (fc) counts from water samples at source and in domestic water storage containers.

The general finding of this study was that water contamination increased significantly between source and use. In one case fc contamination increased from 0 to 1344 per 100ml and fs from 0 to 4284 per 100ml. Other cases were less alarming. Data showed that contamination was greatest in households where water was stored in large containers which water was frequently removed from and added to. The least contamination occurred where water was used straight from the collection bucket.

Lesotho (Ref 3)

Sample : General

This study encompassed water maintenance practice for water from all sources in rural areas. At tap sources the general practice was that the drawer first rinsed the collection vessel and enamel soup bowl used for covering the vessel. Hands were not usually washed. The drawer then supported the vessel as it filled whilst holding the enamel soup bowl clear of the ground. Once the vessel was full, the bowl was placed on the surface of the water and the vessel carried home on the drawer's head. Young girls did use a hand to steady the vessel but this did not come into contact with the water. In the home the water was either left in the collection container or transferred to a large storage container. The most common type of domestic storage container was a 20 litre metal or plastic drum. Traditional 7 litre narrow necked clay pots covered by an inverted mug or dish were also popular. The storage container was seldom if ever cleaned out. Sampling from the same household storage vessel over a period of time showed that contamination increased steadily over time indicating that the water was not contaminated by a single event but by a cumulative process.

In a further experiment a woman was given a clean bucket and sterilized scoop and asked to maintain the water as usual whilst researchers took periodic water samples from

the storage container. The experiments indicated that the use of a dirty scoop to dip water will seriously contaminate not only the water in the scoop but also the water remaining in the storage container.

The authors suggest that contamination between collection and use is not an important cause of faeco oral disease transmission in Lesotho. Their reasoning is that incidence of typhoid and diarrhoeas has a seasonal pattern, peaking in midsummer, whereas contamination between collection and use has no obvious seasonal association. Little evidence is presented however and the authors still give suggestions on how, " if it were significant", such water contamination could be prevented.

The traditional belief in Lesotho that water brought into the home after dark must be "cleansed" by dropping a match or cinder into it seemed to be dying out at the time of the survey.

The main observations regarding water maintenance were:-

- Drawers do not wash their hands before drawing water
- Householders do not always cover of ever clean out storage vessels
- Water is drawn in the house using unwashed scoops
- Hands are never washed after defecation

Lesotho (Ref 4, 5)

Sample : 98 and 97 households in 2 rural areas

Water source : -

Data collected : How many households cover their water and how consistently they do this.

This research showed that in one area (area I), 38 % of households stored drinking water separately from water to be used for other purposes whilst 62% used the same container to store all water. Researchers questions were backed up by unheralded "kitchen inspections" when researchers would privately note whether water containers were actually covered. In area I, 77.3% of respondents claimed that they did cover their water but at the time of the inspection it was found that only 20.6% had all water containers covered, 49.5% had some covered and 29.9% did not have any water covered. In area II 41.8% covered all water, 28.6% some water and 29.6% covered none. Drinking water was covered in 68.4% of households studied in area II.

Liberia (Ref 6)

Sample : Urban slum 144 households
3 rural villages 266 households

Water source : Tapstands
Hand dug wells, river creek

Data collected : Number of enterobacteria in food, water at source and stored water

In the urban slum 52% of the households surveyed stored water in a closed container, 24% in an open container, 16% in the refrigerator and 5% did not store water (3% did not respond). In the rural area 34% stored water in a closed container and 61% in an open container (5% did not respond).

The water quality at source was not high in this survey. In the urban area several illegal connections had been made to the pipeline causing contamination by leakage. In rural areas only handpump supply was of an "acceptable standard " whilst the great majority of sources (shallow wells, water holes and the river creek) were contaminated. Statistical analyses (X^2 test) were carried out on the data to compare contamination levels at source and in storage. It was found that in the urban area the increase in contamination between source and stored samples was significant whilst in the rural areas although contamination did increase it was not statistically significant.

Interestingly although stored water in the urban area was

of higher bacteriological quality than that in the rural areas, diarrhoeal morbidity was higher in the urban area. The concurrent survey of food preparation practices and contamination showed that in the urban area food was often prepared 24 hours before consumption and then left at ambient temperature before consumption. Serious food contamination in the urban area was much higher. It was concluded that morbidity from diarrhoeal disease is "not only dependent on the quality of the water supply" and that the health benefits of clean water cannot be expected " as long as other major risk factors are present and important routes of transmitting diseases are not interupted."

Niger (Ref 7)

Sample : Tuareg People

These nomadic people collect and store water in "aboyers" - goat skin bags complete with goat hair on the outside. Full aboyers are stored in the home on the ground and are often left on the ground near to the well prior to water collection. Clearly the hairy bags pick up alot of contamination in their day to day use and this is transferred to the source when water is drawn from the well using an aboyer on a rope. Faecal coliform counts in excess of 50000 per 100ml have been recorded in such wells.

Sudan (Ref 7)

Sample : Sabil water

There is a Moslem tradition that ,for the sake of Allah, a cool drink of water should be offered to anyone passing by. The person should not even have to knock at the door to ask for water and for this reason a jar of water is often left in front of the house "at the road " of the wayfarer. This is Sabil water.

A study of the bacteriological quality of Sabil water in Khartoum and Omdurman produced a high percentage of samples showing faecal contamination. The jars sampled had originally been filled with chlorinated tap water.

Sudan and Tunisia (Ref 7)

Sample : Water stored in tar smeared containers

Water Source : -

Data Collected : Levels of benozapyrene in stored samples

The people of southern Tunisia use juniper tar to protect and purify their drinking water. The tar is rubbed around the necks of earthenware water containers or used for rinsing waterskins. The practice deters snakes, scorpions and, some would believe, evil spirits. Usually the tar is washed into the water and this may be a risk to the users' health. A study of Sudanese tars used on water containers showed a high concentration of benozapyrene - up to five times that found in cigarette smoke. The pathologist,

Ahmed Mohammed el Hassan, has discussed the possible link between the use of tars from the plant citrullus colocynthis and the occurrence of bladder cancer linked with chronic urinary schistosomiasis in rural areas of Sudan.(Ref 7)

Tanzania (Ref 7)

In a study carried out in 1979 by the Tanzanian Ministry, CIDA and SIDA, an attempt was made to assess contamination in different types of containers used for the transport of water. The report concluded that the worst contamination during transport occurred when calabashes were used.

Zambia (Ref 8)

Sample : Rural areas , Western Province, 250 households

Water Source : Handpumps, shallow wells, traditional source

Data Collected : Faecal coliform count at source, in transport and in storage

This survey indicated that "local perception of clean water and efforts to retain its cleanliness from well to mouth were logical and effective". Methods of water maintenance were described as follows :-

" An average Western province household collects water about twice a day. Children sometimes help, but most do

not do so every day as a regular routine. Families are poor, and most (about 80 per cent) also use the collecting vessel for storage, but may decant some of the water into a special storage vessel for a particular purpose, usually drinking. The pots are made from a variety of materials, just over half being galvanised iron buckets and bowls, 15 per cent being plastic bottles (2.5-1.5 litre cooking bottles) and the same proportion being enamel bowls and buckets. The rest are mainly clay pots, with a small proportion of gourd calabash pots....

...Almost everyone rinses or washes out their pots when collecting water, and it is usual to see it scoured by hand if not with sand or ash....Only about one in four people cover pots in transit to the house, but a higher proportion cover drinking-water in storage. Vessels for drinking water are usually kept separate."

"When taking water from the storage jar, 80 per cent scoop rather than pour the water, but this is almost always done with a vessel kept in a clean place and used only for this purpose. Fewer than 15 per cent of households use the last bit of water left in the storage jar for drinking. It tends either to be thrown out or used for washing clothes or utensils before the vessel is refilled. Drinking water storage vessels are usually covered. "

Samples were taken from storage containers via the household decanting vessel or drinking cup. Of these

samples 85 % had zero faecal coliform per 100 ml and only 4% contained more than 10 faecal coliform per 100 ml. Less than 1% of samples exhibited gross faecal contamination. Total coliform counts were generally higher, especially where leaves were floated on the surface of water being transported, to prevent splashing. Leaves are a particularly good source of non faecal coliform.

This survey would indicate that there is little contamination of water between source and use in Western Province.

APPENDIX 2 : RESULTS OF PRETESTING

No statistical analysis has been attempted since it was felt that the sample was too small and too varied. The results of the survey are presented in tables 1 and 2. The responses have been graded as follows :-

Message Immediately : The respondent immediately saw the intended message in the posters.

Message eventually : The respondent took some time looking at the posters, perhaps putting forward several interpretations but eventually settling on the intended message.

Message after prompt: The respondent did not see the intended message until the interviewer divulged that the posters concerned water contamination between source and use.

No message : The respondent did not see the intended message even after prompting.

Other interpretations of the pictures are presented after reproductions of the pictures in question. The original posters were A3 size, coloured with water colours. The reproductions have been coloured with pencil since this is considered adequate for illustration.

TABLE 1: Comprehension of posters by different groups

	British Students	Other British	European	Students From Developing Countries		Pakistani women	
				Urban	Rural	Urban	Rural
Message immediately	2	0	1	3	2	1	0
Message eventually	0	3	2	6	1	1	0
Message after prompt	0	6	2	1	0	2	2
No message	0	2	1	3	3	0	1
Number interviewed	2	11	6	13	6	4	3

TOTAL 46

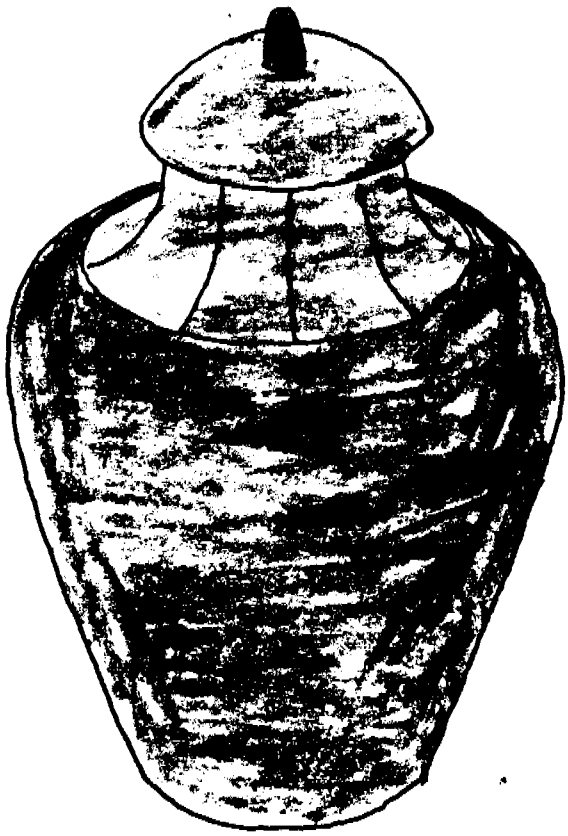
TABLE 2 : Comprehension of specific posters

	Message immediately	Message eventually	Message after prompt	No message	Total
U1	2	1	2	0	5
U2	0	2	2	1	5
U3	1	0	2	2	5
AT	0	1	2	2	5
OBO	1	2	1	0	4
US1	2	1	1	1	5
US2	0	2	1	2	5
US3	1	0	2	2	5
SAT	0	0	2	1	3
SOBO	1	0	3	0	4
				TOTAL	46

KEY:

U1	Posters 1a and 1b only shown	US1	Posters S1a and S1b only shown
U2	Posters 2a and 2b only shown	US2	Posters S2a and S2b only shown
U3	Posters 3a and 3b only shown	US3	Posters S3a and S3b only shown
AT	Posters 1-3 shown simultaneously	SAT	Posters S1-S3 shown simultaneously
OBO	Poster pairs 1,2,3 shown one by one	SOBO	Poster pairs S1-S3 shown one by one

Figure 4a : Poster 1a



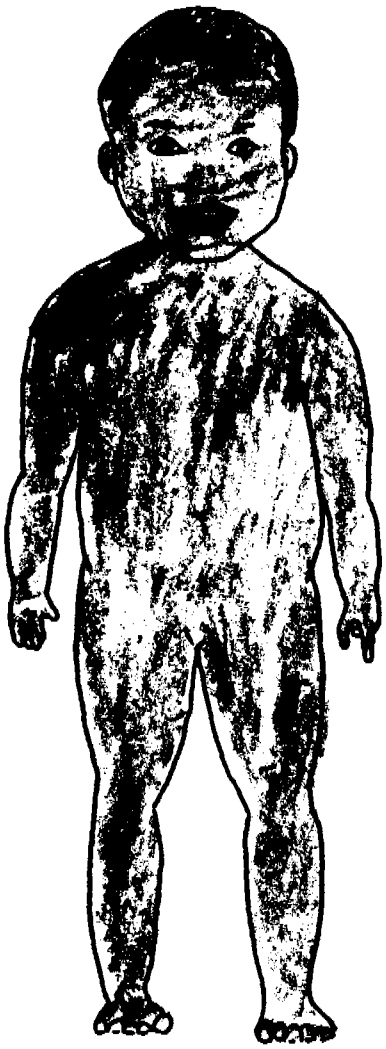


Figure 4b : Poster 1b

Poster 1

Intended Message : 1a) Child with diarrhoea. Uncovered water pot.

1b) Happy child. Covered water pot.

COVER WATER POTS

Respondents' Perceptions

1a) Unhappy child. Empty jar.

1b) Happy child. Full jar.

CHILDREN ARE UNHAPPY WHEN THERE ISN'T ENOUGH TO EAT/DRINK.

1b) Happy child. A fruit with bites out of it.

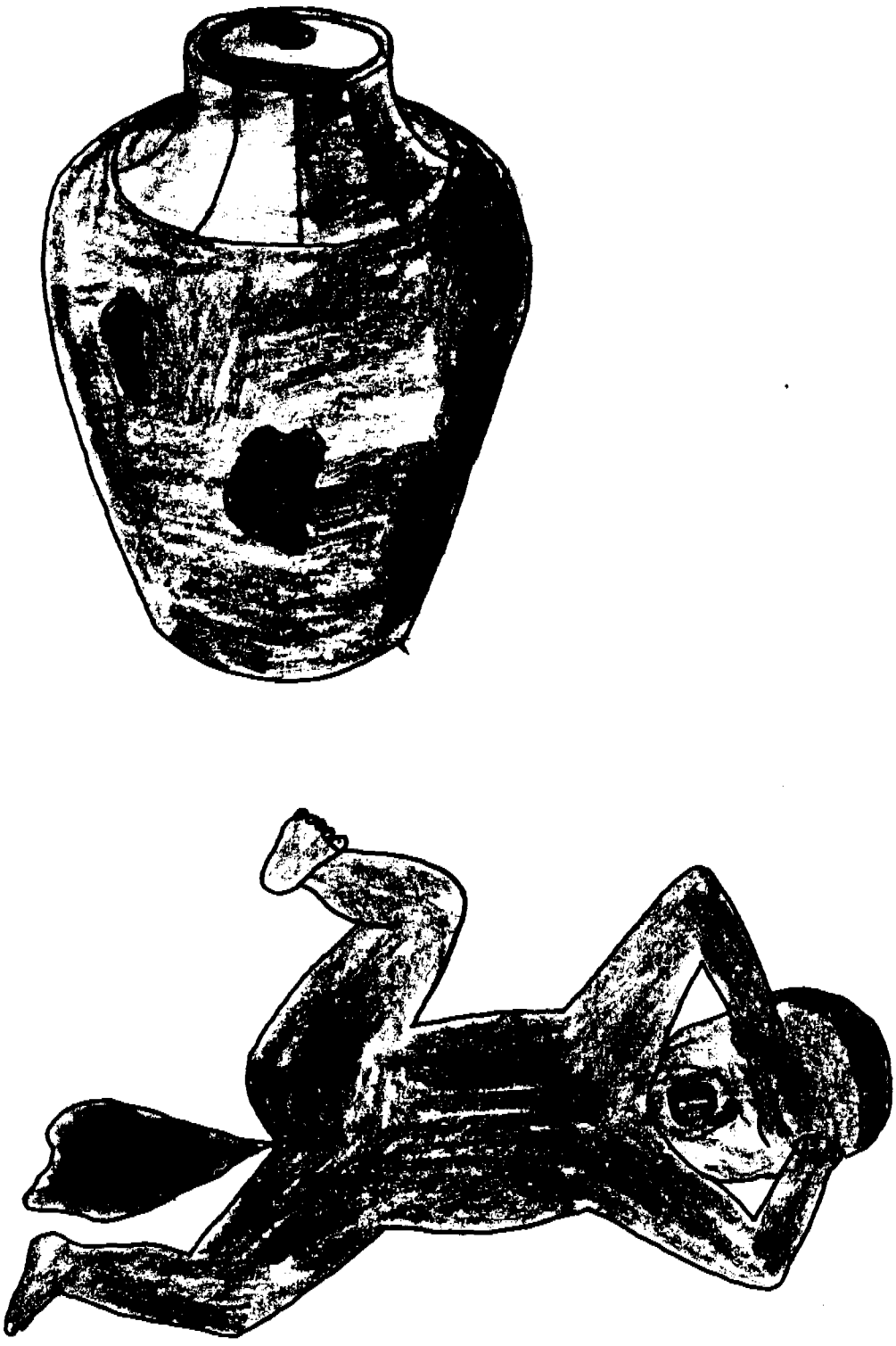


Figure 5a : Poster 2a

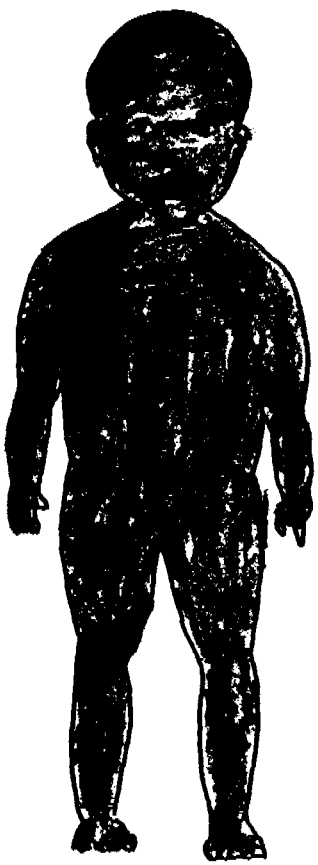


Figure 5b : Poster 2b

Poster 2

Intended Message : 2a) Child with diarrhoea. Dirty water pot.

2b) Happy child. Woman washing water pot.

CLEAN WATER POTS

Respondents' Perceptions.

2a) Unhappy child. Broken pot.

2a) Unhappy child and fruit.

2b) Happy child. Woman cleaning something inside the pot.

2b) The woman is having problems cleaning the pot because of its shape.

2b) The woman is struggling to get something out of the pot.

Figure 6a : Poster 3a

Figure 6b : Poster 3b

Poster 3

Intended message : 3a) Child with diarrhoea. Man using a cup to dip water, allowing his hand to enter the water.

3b) Happy child. Man using ladle to dip water (no contact between hands and water)

USE A LADLE

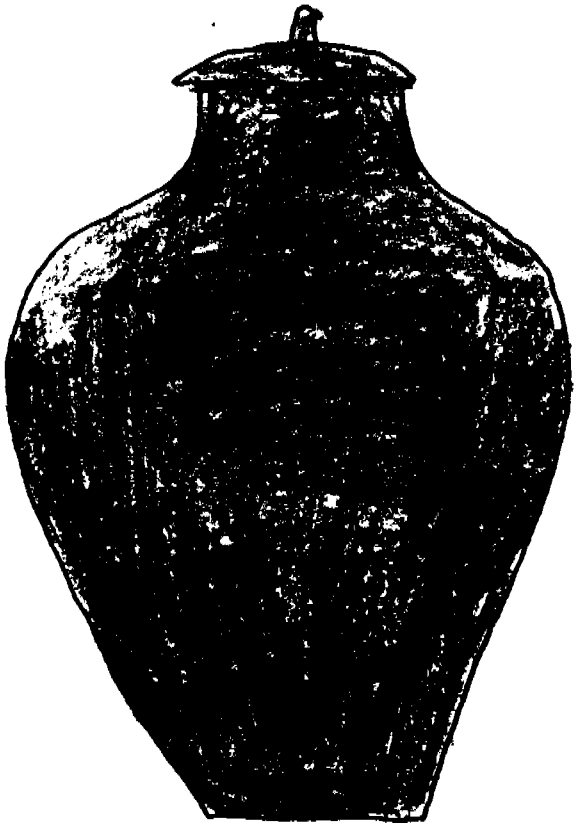
Respondent's Perceptions

3a) The child is excreting so the man is going to clean it up.

3b) The child is happy because it thinks the man is getting it some water.

3a) The child cries when the man puts the water back.

Figure 7a : Poster S1a



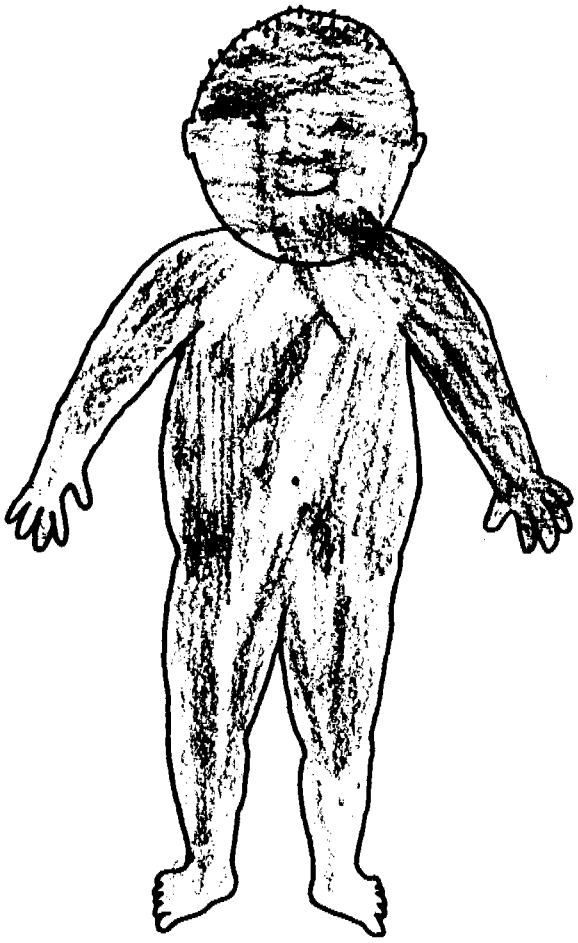


Figure 7b : Poster S1b

Poster S1

Intended Message : As 1

Respondent's Perceptions

S1a) Baby being born.

S1a) Baby with diarrhoea. An onion bulb.

S1b) Happy child. A washing basket.

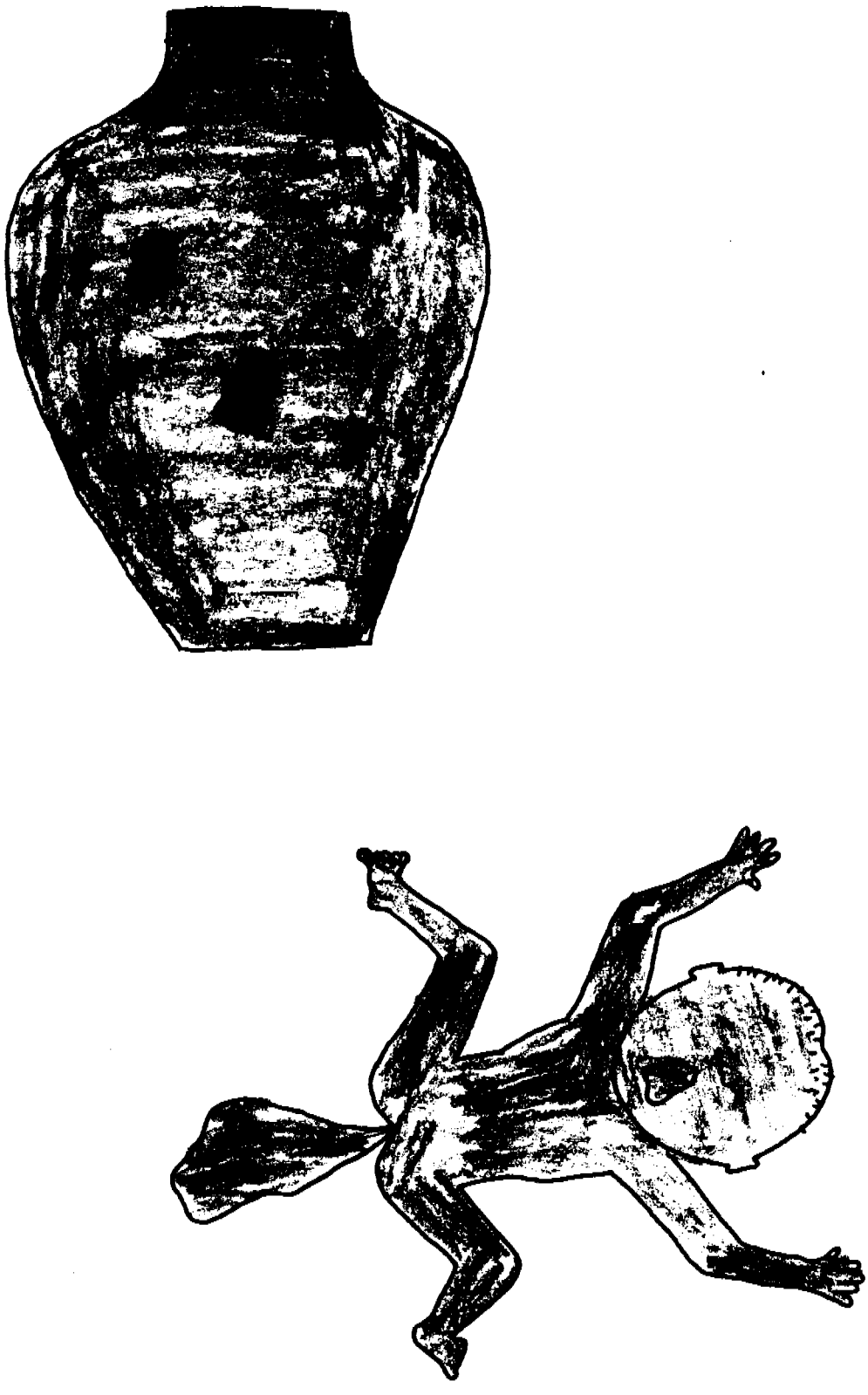


Figure 8a : Poster S2a

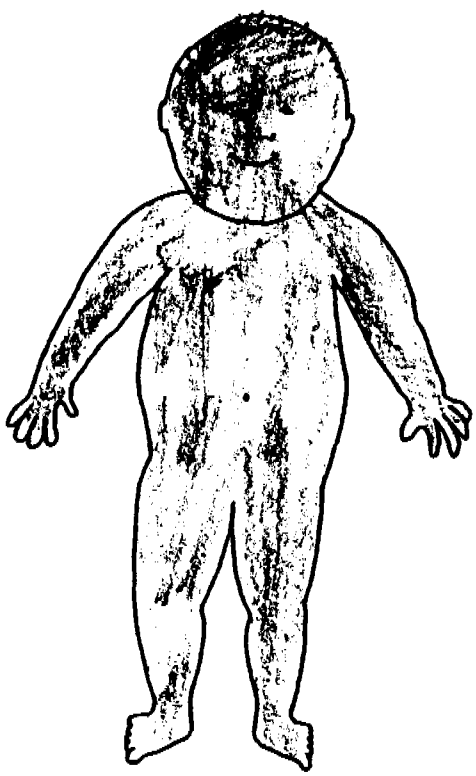


Figure 8b : Poster S2b

Poster S2

Intended Message : As 2

Respondent's Perceptions.

S2a) The child tried to get a drink of water from the pot but it slipped over because it was too small to do this and is now crying.

S2b) The person is listening to something in the pot - Maybe this is about a new way to test for water quality by listening ?

S2a) A pot with holes in it.

Figure 9a : Poster S3a

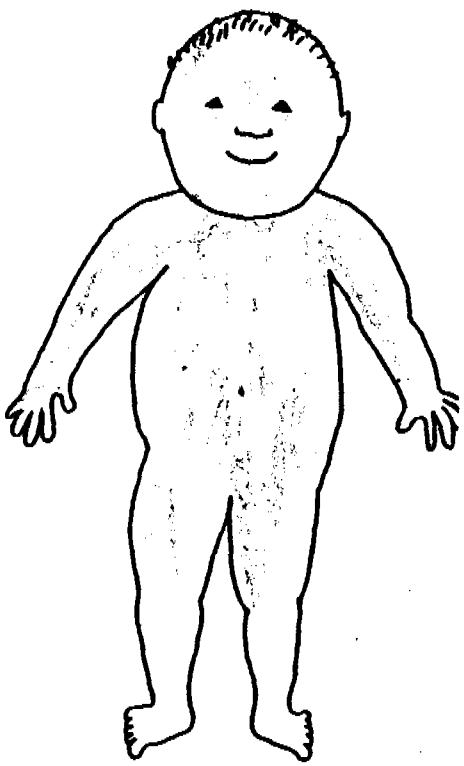


Figure 9b : Poster S3b

Poster S3

Intended Messages : As 3

Respondent's Perceptions.

S3a) The man is going to wash the baby because it has just passed its stool

S3b) The baby has finished passing its stool and is therefore happy. The man is getting himself a drink.

PEOPLE USE THE SAME POT FOR DRINKING AND WASHING.

NO CLOTHES, NO SHOES, NO SHELTER FOR THE POT, THEREFORE THE CHILD IS UNHEALTHY.

THE MAN IS MIXING SOMETHING FOR THE CHILD'S DIARRHOEA

S3b) The man calls to the child and gives him a drink of water. S3b) He is surprised when the child gets cholera.

S3a) The man is putting something into a washing basket.

S3b) He is taking something out of the washing basket.

The man carries on what he is doing whether the child is happy or sad.

IGNORANCE IS BLISS

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