
Analysis of different communication channels for promoting hygiene behaviour

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Abstract

A hygiene intervention study reduced diarrhoeal disease transmission in rural northeast Thailand by promoting hand-washing and dish-washing behaviour. Most of the target audience did not recognize a connection between these behaviours and diarrhoeal disease, and therefore a social marketing approach was used to develop a campaign promoting behaviours through a variety of communication channels keeping messages simple and in terms understood by the community. Overall, there was a strong correlation between the number of communication channels remembered by respondents and their knowledge score, with passive channels of printed media such as stickers, posters and leaflets associated with significantly higher scores than other channels. However, the same did not hold true for improvement in actual behaviour and only 'school children' were associated with significantly less fingertip contamination. In-depth interviews with conformers and non-conformers suggested that although most knew the intervention messages well enough, the importance they attached to them differed markedly. Thus dissemination of message knowledge was not consistent with

the process of dissemination of actual practice. Where a strong sense of community spirit existed, friends, relatives and neighbours were more likely to discuss intervention activities with each other.

Introduction

Diarrhoeal disease is one of the major causes of illness and infant death in developing countries (Bern *et al.*, 1992). There has been an increasing recognition over recent years that improvements to hygiene behaviours can play a major role in the control of diarrhoeal disease (Esrey *et al.*, 1991). However, educational programmes designed to improve hygiene behaviour have been largely disappointing as they have failed to deliver the expected health impact (Brugers *et al.*, 1988).

Traditionally health education has taken responsibility for hygiene behaviour; however, unfortunately, evidence and documentation describing the effectiveness of health education programmes in developing countries remains weak (Feachem, 1984; Loevinshohn, 1990). Such programmes are notorious for generating long lists of 'good' behaviours in the hope that these will be adopted by the target group and consequently lead to a reduction in disease transmission. However, studies have shown that knowledge does not necessarily translate into practice (Stanton and Clemens, 1987; Curtis *et al.*, 1993) and the better informed programmes have focused more on promoting behaviour directly. In order to improve further the design of hygiene promotion programmes we need more information on the effectiveness of communication channels used to promote behaviour change and

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we need to investigate why some people change their hygiene practises while others do not.

This article is the second describing a hygiene intervention study based in northeast Thailand. The previous article demonstrated that the intervention both improved behaviour and reduced diarrhoeal disease (Pinfold and Horan, 1996), while this article compares knowledge of intervention messages and behaviour change with communication channels used to promote hygiene behaviours.

Methods

Background information

The northeast is the largest and poorest region of Thailand. Most of the population lives in rural villages that are fairly cohesive clusters of 60 to around 200 homes. Poor soils and unreliable patterns of rainfall have led to a low-risk approach to farming and a large number rely on seasonal migrant work to supplement their income. Typically villagers rely on a variety of water sources for their domestic needs. Water from conveniently located tubewells is commonly used for washing activities. However, much of the ground water is saline and rarely used for drinking because of its adverse taste. Man-made ponds provide softer water and are sometimes preferred for specific washing activities. Drinking water is traditionally supplied by shallow wells located in special sites outside the village. However, rainwater harvesting has developed dramatically over the last decade, and when abundant this is used for both drinking and washing activities. Pour-flush toilets have also proved popular and estimates suggest a 70–80% coverage.

Although mortality rates from diarrhoeal disease have diminished in Thailand due to effective measures for treatment, morbidity rates are still high being the second most common reported communicable disease after upper respiratory infections. Over the past decade, there has been a sustained effort to improve the health network in rural areas. All sub-districts now have a clinic staffed by trained personnel and most districts contain a hospital. In each village, there are voluntary Village

Health Workers (VHW) who generally assist clinic staff in their work.

Field methods

Two hygiene behaviours were previously selected in a study investigating the relationship between human behaviour and faecal contamination within the home (Pinfold 1990a,b):

- (1) *Dish-washing*. Emphasizing dish-washing immediately after, rather than before, meal times. (Cooking and eating utensils were often left to soak, thus providing a favourable environment for bacterial growth.)
- (2) *Hand-washing*. Emphasizing hand-washing before feeding a baby, cooking or eating and after defecation or cleaning a baby's bottom. (During food-related activities, cross-contamination was identified as the major mechanism for transmitting faecal bacteria).

In selecting behaviours the following conditions were considered: messages should be simple and few in number; behaviours should already be practised by at least some members of the community (thus ensuring acceptability); and behaviour change should require very little extra effort or cost.

Indicators of behaviour

Since hand-washing, in this context, is concerned with preventing faeco-oral disease transmission, a microbiological indicator was developed which involved examining the fingertips for the presence of transient faecal indicator bacteria. Fingertip impressions are made on KF streptococcus agar plates (9 cm diameter) which were large enough to sample both hands, leaving 10 prints. Plates are incubated at 37°C for 48 h and enumerated by counting the number of prints containing faecal streptococci (range 0–10). Averaging the fingertip counts of at least three household members developed a hand-washing index (HWI) for each home. This method is described in more detail elsewhere (Pinfold and Horan, 1996).

Dish-washing behaviour was recorded by spot observation of the kitchen area. More dishes were left dirty in the afternoon but this also depended

on whether there were people present during the day. To help control for this effect, all subsequent checks were conducted during the morning.

Measuring knowledge of messages

A simple questionnaire form was developed to measure message reception and recall. Wherever possible questions on the content of messages were directed to the maternal head of household and were worded in such a way as to eliminate leading questions and biases. Two separate questions were asked for hand-washing ‘...before/after which activities do you think you should wash hands?’. Respondents were prompted for two answers per question thus providing a maximum of four correct answers, i.e. before ‘cooking’, ‘eating’ and after ‘toilet’, ‘cleaning a baby’s bottom’. For washing dishes the question was simply posed as ‘...should you wash dishes immediately before or after eating?’. For schools, a multiple-choice questionnaire was devised.

Collecting qualitative information

A continuous observation study was used to validate the dish-washing indicator. Villagers under observation were informed that this study was part of staff training to help them understand more about village life. The quantitative effect of observer presence was tested by conducting spot checks on homes in this village before, during and shortly after the observation study. This showed that homes under observation improved dish-washing behaviour during the observation period (5 days) but reverted to pre-study levels just a few days later.

Focus group discussions were used to collect qualitative information on prevailing attitudes to hygiene practices and proved useful in understanding the role of VHW. The number of participants ranged from 10 to 40 comprising mainly women, and, to a lesser extent, men and children. This method was improved by including a simple role-playing drama that helped create interest and stimulate discussion, without requiring a skilled facilitator. Holding one-to-one open interviews with selected participants after the group discussions validated information collected.

Different ways of promoting behaviours were tested, and open interviews and focus groups with both promoters and recipients provided more qualitative information for developing and modifying the communication strategy. Behavioural trials provided rapid assessment of both the hand-washing indicator and a plastic container with a tap designed to facilitate hand-washing practice in the home. Open interviews with key informants such as health workers, village elders, village headmen and school teachers were used to validate information obtained from the preliminary study and that from secondary sources (e.g. village baseline).

In-depth interviews with a selection of conformers and non-conformers to the intervention (as depicted by behaviour indicators) provided qualitative details about the effects of the intervention and reasons for compliance or non-compliance with intervention advice. These interviews (conducted by the author and a qualified anthropologist not previously involved with the project) were kept very informal and interviewees were guided into topic areas, with direct questions asked only when relevant issues arose. At the end of each day, interviewers shared their impressions about whether interviewees had modified their practices, irrespective of message knowledge or direct statements on these behaviours; their judgement always showed a close association with indicator selection.

Study outline

Six sub-districts in Khon Kaen province with a high incidence of diarrhoea were selected for the study. Intervention was divided between four sub-districts (I–IV) while two sub-districts (located at least 50 km from the nearest intervention site) acted as comparison areas. A sample of homes from the selected villages and a random selection of schools were subjected to the hand washing indicator and the questionnaires for measuring message knowledge. All homes were subjected to the dish-washing indicator.

Project staff were trained, and intervention materials, methods of promoting behaviours and indicators of behaviour were developed during a 9 month preliminary study that took place outside

the main study area. The main intervention lasted between 3 and 6 months.

Homes and schools were surveyed immediately before and after intervention. In order to assess sustainability further surveys were conducted some 3–5 months later on homes and schools not previously surveyed. Some 6 months after intervention had completed, in-depth interviews were conducted at 40 homes in eight intervention villages

Description of intervention

During preliminary investigation a mixture of qualitative and quantitative methods was used to collect information about hygiene practice and to develop a strategy for social marketing of the behaviours.

Information obtained from the focus groups suggested that washing dishes immediately after eating was generally regarded as the duty of a ‘good’ housewife. Many felt that dishes left to soak caused a bad smell and attracted flies. However, dishes were often not washed until before the next meal because people were either in a hurry or reluctant to change their habitual behaviour. Participants were divided on whether it was easier to wash dishes immediately after eating or after leaving them to soak.

Hand-washing was most commonly practised when hands were judged to be dirty rather than before or after specific activities. Washing with water alone appeared the most frequent hand-washing method, followed by water and soap (usually washing powder except in bathing areas). However, washing with soap was cited more often when hands were greasy or after visiting the toilet. Anal cleansing was sometimes counted as the same as hand-washing but sensitivity prevented following this topic in too much detail.

During group discussion and open-ended interviews with individuals, no one made any connection between the hygiene behaviours and diarrhoeal disease, except the occasional health worker. The two main themes that ran true for both behaviours were the concept of cleanliness (religiously connected with being spiritually pure) and fear of ‘germs’ (locally defined as an invisible body causing illness or bringing bad spirits). Consequently,

these themes were chosen as motivators for changing behaviour rather than stressing prevention of diarrhoeal disease, but with the added proviso of ‘strong healthy children’ as parents did identify this as a high priority.

Use of soap for both hand-washing and dish-washing was not emphasized too strongly for fear of alienating poorer families. Laboratory experiments on hand-washing show the importance of the washing action itself where just dipping hands in water, even if this is soapy water, has a limited effect on the removal of faecal bacteria (Pinfold, 1993). Once hand-washing involves pouring water and a rubbing action then its effectiveness increases considerably. The use of soap and/or larger quantities of water show further improvements. These findings are in general agreement with a study in Bangladesh (Hoque and Briend, 1991).

To a large extent a ‘social marketing’ approach has been used to develop the communications strategy (Rasmuson *et al.*, 1988). In this way, through both quantitative and qualitative research, attention is paid to ‘consumers’ by understanding their behaviour, investigating the determinants of current behaviours, and subsequently designing an intervention that is culturally appropriate and uses communication messages that make sense to the population. For this a variety of media (posters, stickers, leaflets, comic books, songs, slide show, T-shirts, badges) was developed to create awareness and support activities promoting the behaviours (Figure 1). All printed media were illustrated so the illiterate could understand messages and a project logo (adapted from ‘Fidodido’) provided continuity. Songs about the hygiene messages were recorded in the traditional folk music and tapes of this, as well as the community-produced play, were broadcast over village loudspeaker towers. The slide show demonstrated the effect of hand-washing on ‘germs’ by using photographs of the bacterial plates used for the hand-washing indicator and cartoons of ‘germs’ similar to that used in other media. Actual bacterial plates were handed round after the show to help stimulate more discussion. The hand-washing containers developed for the intervention were adorned with stickers and



Fig. 1. Examples of printed media.

distributed to homes with young children (below 5 years of age) in selected villages. Although the main target group was maternal heads of households and mothers of young children, other family members were not precluded.

Primary schools were also targeted, partly to improve hand-washing practice by pupils both in school and at home, but also to encourage children to act as a channel for communicating these messages to their family. Hand-washing and dish-washing facilities appropriate to the school water supply were constructed with full participation of staff and pupils. Children were also involved in activities specifically designed to bring messages to the village such as the poster competitions where their pictures were displayed at home and, prizewinners, at prominent places around the village.

Campaign strategy

Initially, in order to make the campaign as community-based as possible, health workers, school and village delegates were invited to workshops at the sub-district level, to discuss project aims and examples of promotion activities. School workshops were arranged through the district office and the headmasters from each school were invited to attend themselves or send at least one school representative (usually art teachers). Project aims, materials and examples of activities conducted earlier were presented and participants divided into groups for 'brainstorming' sessions, where they discussed and presented their own ideas for promoting hygiene behaviours in schools. After reviewing details and practicalities, all participants agreed to prepare a written proposal after discussions with their school colleagues.

Similar workshops were tailored to suit villages; at least two representatives from each village attended, usually the headman, member of the village committee and/or VHW. Sub-district level officials from health and local government also participated. Many original ideas were put forward, some were totally impractical, whereas others were successfully implemented.

After these workshops two staff were assigned to each sub-district for most of the intervention

period and they arranged further meetings in each of the villages and schools under their responsibility. All field workers were involved in developing monitoring instruments during preliminary study, and conducted the subsequent surveys working in pairs but not with the same partners as for the intervention. Their main role was to facilitate and record intervention activities.

In general, schools were far more active in the intervention than villages. Almost all schools were active in designing and constructing school hand-washing and/or dish-washing facilities. Rotas were organized for pupils to ensure behaviours were supervised and conducted at the proper time. Drawing competitions, songs, slogans, monitoring dish-washing practice in village homes were all activities adopted by some of the schools.

Village involvement depended more on individual personalities than official role. For example, although VHWs willingly gave out support materials to village homes, it emerged that, contrary to their own suggestion during workshops, they did not say much about the messages. Subsequent discussions with VHWs revealed that they considered themselves ordinary villagers and were neither confident nor accepted as health educators or agents of change (project T-shirts were provided during the main intervention to help remedy this situation). On the other hand, in one village the assistant headman, head monk and some members of the women's group wrote and recorded a play based on the hygiene messages.

The head health officer for the sub-district had a key role in the intervention and activities were coordinated through his office. In sub-district II the head health officers were not very active and the intervention there suffered as a consequence, while in sub-district I the health officer was over zealous and tended to adopt a didactic approach to intervention. Sub-districts III and IV generally received more materials including the slide shows and were generally more active as a result.

Impact of the intervention

The impact of the intervention is described in a companion paper (Pinfold and Horan, 1996). This

Table I. Socio-economic information of study population

	Control	Intervention
Sub-districts	2	4
Villages	12	25
Homes	1653	3221
Schools	13	20
Population	8092	16568
(% <5 years)	9%	9%
Toilet coverage	72%	74%
Wealth indicator ^a	37%	30%
Rainjars ^b	67% ^a	59%

^aHomes with bricks/blocks enclosing area beneath house.

^bHomes with two or more large rainjars (capacity 2000 l).

demonstrated a significant reduction (39%) in diarrhoeal disease for children under 5 years of age. There was a significant improvement in behaviour in homes and schools as measured by the indicators both in comparison to control and that practiced prior to intervention; generally, villages receiving more intervention materials than other intervention villages showed greater improvement in both behaviours. Both indicators of behaviour were retrospectively found to be positively related to diarrhoeal disease incidence.

Analysis of data

All quantitative data were entered on a micro-computer and analysed by the Statistical Package for the Social Sciences (SPSSx). Unless otherwise stated, Student's *t*-test has been used for comparing group means and Pearson's correlation for comparing linear relationships between groups.

Results

Baseline information is summarized in Table I. The mean level of education for the head of households was 4 years and this did not vary considerably between villages. Although primary school attendance is now compulsory, few pupils (below 5%) from the project areas went on to secondary school or further education. Without exception the main occupation was agriculture and in only two sub-districts, both located on major roads, did a significant proportion of families (but

still below 5%) cite non-agricultural work as main occupation. Shallow wells, tubewells, rainjars and ponds were the main water sources.

Schools

Pupils (6–12 years of age) from each school were questioned about hygiene messages before and after presentations of drama or hygiene lesson. As expected there was a significant improvement in the knowledge of the messages from before (35% correct) to after presentation (50% correct) and to after intervention period (60% correct); controls were only tested after the intervention period (30% correct). Improvement in knowledge was greater for senior pupils, and the correlation between knowledge and school grade after the intervention period was much stronger in intervention schools [0.46; $P < 0.001$ ($n = 912$)] than control [0.36; $P < 0.001$ ($n = 519$)].

The hand-washing indicator showed a 80% (1.82 to 0.36) reduction in intervention schools and 68% (2.03 to 0.65) in control. There was a significant difference in the hand-washing indicator between intervention and control schools after intervention ($P < 0.001$) but not before. A significant negative correlation (-0.13 ; $P < 0.01$) found between school grade and the hand-washing indicator before intervention was no longer present after intervention ($+0.04$).

Further fingertip examinations conducted about 5 months after the intervention finished in a selection of schools not previously subjected to the hand-washing indicator clearly demonstrate reactivity occurring in the control with a hand-washing indicator value of 1.18 for control schools significantly higher than those mentioned above ($P < 0.01$), but a hand-washing indicator of 0.41 for new intervention schools similar to those mentioned above. It is likely that teachers are influential in modifying pupil behaviour within the controlled environs that schools provide.

Villages

There was a 60% reduction in hand-washing indicator for intervention homes (3.8 to 1.5; $n = 387$) and a 36% (4.2 to 2.7; $n = 172$) reduction in

controls. Although this improvement was not as great as in schools, reactivity in control villages was not substantial, so that fingertip contamination was significantly lower in intervention than in control villages ($P < 0.001$). Dish-washing practice also showed significant improvement in intervention homes ($P < 0.05$), while there was no apparent change in the control (Pinfold and Horan, 1996).

Householders providing fingertip impressions were also questioned regarding knowledge of messages and asked to recall where they had heard about the intervention. Respondents were mainly female (98%) with a mean age of 39 (range 10–76). For hand-washing, villagers receiving the intervention were more knowledgeable than controls ($P < 0.001$), with 60 and 45% providing correct answers, respectively; knowledge of the dish-washing message followed a similar pattern ($P < 0.01$) with 73% of intervention and 55% of control providing correct answers. Less than 1% of those interviewed reported they had not heard about the intervention. There was also a discernible improvement in knowledge scores of controls, thus suggesting some ‘contamination’.

Respondents were asked to remember the source of the messages and Table II ranks channels by their popularity. The association of knowledge score and fingertip contamination with recall of each channel has been assessed by Student’s *t*-test, showing individual channels’ influence on knowledge and practice.

Clearly the printed media such as posters, leaflets and stickers were much better at imparting specific information than other channels. The main exception to this was the ‘Health officer’; however, most respondents would only meet this officer at the sub-district health centres which were all adorned with such printed support media. The two channels least frequently cited were only shown in selected areas; however, an audio visual slide show and bacteria plates (passed round after the slide show) were generally associated with higher knowledge scores.

What is surprising in Table II is that exposure to those channels relating to significantly higher knowledge scores did not translate into improved practice, i.e. lower fingertip contamination. If any-

Table II. *Recalled message source and relationship to knowledge scores*

Message channel (<i>n</i> = 379)	Channel recall <i>T</i> values by channel		
	Frequency (%)	Knowledge	HWI
Project staff	82	2.3	0.1
Poster with pictures	73	4.6 ^b	-1.1
Speaker tower	69	-1.1	-0.2
Health officer	64	4.9 ^b	-0.5
Leaflets	60	5.5 ^b	-2.0
Stickers	55	7.3 ^b	-1.6
Hand-washing containers	42	-0.1	-0.2
VHW	40	-0.6	-0.3
Headman/leader	27	-0.2	-0.1
School children	16	-0.4	2.8 ^a
School posters	15	-0.5	2.5
Slide show	(28) ^c	(1.5)	(-0.3)
Bacteria plates	(12) ^c	(2.5)	(0.1)

^a $P < 0.01$; ^b $P < 0.001$.

^cOnly shown in selected areas.

thing the opposite seemed to occur. Only those specifying ‘school children’ as a channel had significantly lower fingertip contamination than others. However, this influence did not hold for all the homes with children at school. Although homes with the hand-washing containers were similar overall to others, these containers did appear to be effective in sub-district II where other intervention activities had been weak with hand-washing indicator means of 2.0 for homes ($n = 77$) without a container and 1.4 for homes ($n = 53$) with a container deemed to be in use ($P < 0.05$). Project staff noted that a stronger sense of community spirit found in some villages usually resulted in a greater involvement in the intervention activities.

Due to the nature of the dish-washing indicator (only three levels) its relation to channels recalled was not as clear cut. However, there was an association between the two behaviours as families with clean dishes surveyed on two occasions after intervention had a hand-washing indicator mean of 1.2 compared to 1.8 for others in the intervention ($P < 0.01$) despite the fact that surveys for hand-washing and dish-washing were never administered on the same day. Thus families complying with

the intervention were likely to adopt both hygiene behaviours.

Discussion

In-depth interviews with conformers and non-conformers provided vital information on reasons for compliance and non-compliance. Knowledge of the messages did not automatically lead to behaviour change. Although most families appeared to remember message content quite well, some had clearly adopted the advice given while others had not. This could not be attributed to wealth, level of education, position in village hierarchy or identification with the main village community. No one was openly opposed to hygiene messages, but some did not rank these highly on their list of priorities. The only other consistent reason given for non-compliance with the intervention was the difficulty for adults, as opposed to children, of changing habits. On the other hand, conformers indicated a higher priority to cleanliness and preventing germs with comments such as '... cleanliness is good to look at; ...cleanliness stops germs getting inside the body; ... seeing dirtiness makes me feel irritable and uncomfortable; ...cleanliness is good because it gets rid of germs; ...others will look down on you if you are not clean'. Hence, it would appear that some people ranked the importance of the target behaviours more highly than others, either because the intervention underlined the significance of cleanliness/germs or stimulated an existing desire to improve hygiene practices.

Almost all villagers could specify hand-washing before eating as an important activity before any intervention; this custom is also common in other developing countries (Boot and Cairncross, 1993). However, observation studies revealed that although hand-washing before eating might be practised on special occasions or when important guests were invited to eat, it was not usually practised during ordinary meals with family and relatives. So although this behaviour was understood and practised on occasions, it was not usually a routine practice.

The results from schools imply that pupil's knowledge of the messages is not a necessary requirement for achieving the required behaviour change in pupil while at school. However, they would need to be knowledgeable in order to become agents of change in village homes. Although only 35% of respondents with children at school identified 'school children' as a message channel, this was the only channel that showed a significant association with behaviour change in Table II. In certain cases school children were instrumental in pestering older family members about hand-washing and dish-washing at the specific times given by intervention messages. As one mother put it '...every time we start eating or cooking the children sing a song about hand-washing...so we did this for them. I do it all the time now, even when the children are at school'. This provides the ideal situation for the intervention where the target group is reminded about behaviours at crucial times and from a non-confrontational source.

There was a marked difference between some villages in terms of the strength of community spirit found. A few villages stood out in that the community leaders had genuine support from the populace making their task in promoting hygiene behaviours easy and their general acknowledgement that discussions regarding these behaviours with other members of the village posed no problem. As one woman, from the second best village in terms of behavioural indicator, put it '...we have joked about this project with neighbours and relatives but everyone in the village still like the ideas it brings. We are proud of our village and everyone has helped to make it clean and beautiful'. Conversely, the following quotes come from families living in villages that did not appear to have such a strong identity: 'I never go to village meetings; ...we do not talk to neighbours, we are afraid of gossip; ...I have never talked about the project with anyone'. Consequently, even those were genuinely interested in the intervention did not feel obliged to interfere in their neighbours' business.

The dissemination of message knowledge was not consistent with the process of dissemination

for actual practice; social norms appear to play a more important role in influencing habits. A stronger sense of community means villagers are more likely to discuss hygiene practice with neighbours and friends, and thus influence social norms within village (either accepting or rejecting). Furthermore, certain channels such as demonstrating effects of the behaviour on 'germs' by using bacterial plates made the messages more interesting and also helped stimulate discussion amongst villagers as this was considered new and scientific without challenging their own understanding.

Plastic containers with a tap were an innovation to make hand-washing easier and more effective. The formal hand-washing process involves using a small bowl to pour water over the hands (with help) or one hand at a time (without help) while rubbing (with soap if available). However, scooping water directly from a water jar with one hand and rubbing hands together was also routine practice. The effect of the hand-washing containers was only notable in sub-district II where the intervention was weakest and consequently those homes not receiving this device were worst in terms of compliance to the intervention. Ninety-two percent of the containers showed evidence of usage, thus suggesting that for hand-washing behaviour this sort of device might be effective on its own without all the other intervention activities. For the purpose of this study villagers were told that the hand-washing containers were on loan; however, in a large-scale intervention householders would be expected to purchase such containers. The average cost of the communication materials ranged from £0.37 to £0.71 per capita depending on the location. If the study were to be replicated then, presumably, health officers could be trained to undertake the role of facilitating intervention activities instead of project staff.

In contrast to sub-district II, the health official from sub-district I was extremely keen, but tended to take an authoritarian approach to promoting the hygiene behaviour in village homes. Although overall this sub-district showed greater improvement than sub-district II, there was some reaction to this approach from some villagers who felt it

primarily based on coercion and anxiety such as hygiene competitions arranged and judged by officials.

The in-depth interviews also provided general information as a backdrop to the hygiene intervention. In terms of development projects, the most popular were those that, in some form, involved income generation. Usually these were agricultural projects. Health projects were of secondary importance with the most commonly cited being the liver fluke (*Opisthorchis viverrini*) project where the use of raw fermented fish in the local spicy salad is discouraged. Prolonged infestation can lead to cirrhosis of the liver and many knew of someone from their village who had died as a result of liver failure. Consequently, these health messages were taken fairly seriously although there was still strong resistance to changing the preparation methods of this local delicacy.

Few people cited diarrhoeal disease prevention as a motivating factor for improving hygiene behaviour. When sick, people seek ways of attaining the positive benefit of becoming well again, whereas preventative measures attempt to reduce the risk of a negative event (becoming ill) sometime in the future (date unknown), therefore there is no immediate health benefit. Apart from isolated epidemics, most of the people are not ill with diarrhoea, and it is difficult to envisage an individual being able to recognise a change in disease rates for family and relatives, even with the advantage of hindsight. The benefit an individual gains from modifying behaviour very much depends on his personal attitude to those behaviours. The advantage of social marketing over traditional health education methods is that it reinforces prevailing positive attitudes to selected behaviours rather than trying to modify beliefs of the way disease is caused and transmitted.

Loevinshohn (Loevinshohn, 1990) suggests that successful health education depends on using few messages of proven benefit, repeatedly and in many forms. However, Ahmed *et al.* (Ahmed *et al.*, 1993) in Bangladesh developed an intervention study that conveyed many different hygiene messages, not necessarily of proven benefit, as well as

the germ theory of diarrhoeal disease transmission. They attribute the success of the intervention partly to the fact that the community was involved in selecting behaviours. This creates a dilemma for project design as the positive benefits of community participation in selecting behaviours for change has to be weighed against the controlled prioritization of behaviours in terms of greatest health impact. Further development of participatory techniques that compromise community selection with prioritization in terms of impact and likelihood of adoption would help solve this dilemma.

In this research we have tried to understand existing behaviours within their social and environmental context, and work toward improving this rather than trying to promote an 'ideal' hygienic situation. We have carefully demonstrated the sustainability of behaviour change as a result of this intervention because reactivity has shown itself to be a real problem when attempting to measure behaviour change. Hygiene promoters should be very sceptical of sustainability, especially if behaviour change creates an additional burden of work for those involved.

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