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# A HYGIENE INTERVENTION DESIGNED TO REDUCE THE INCIDENCE OF DIARRHOEAL DISEASE IN RURAL NORTHEAST THAILAND

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## EXECUTIVE SUMMARY

### Introduction

This study investigates methods for promoting and evaluating hygiene behaviour in rural northeast Thailand. Low-cost water supply and sanitation activities are part of preventative strategies designed to disrupt diarrhoeal disease transmission. Such programmes usually emphasise hardware components (water sources/toilets) but research indicates that improvements to hygiene behaviour are also crucial, if these measures are to be effective in preventing disease. However, human behaviour is complex, sensitive and culture-bound, and there is a lack of readily available tools for studying hygiene behaviour. In addition, health education programmes are notorious for generating long lists of 'correct' behaviours without empirical evidence of their relative health impact. It is also often assumed that once 'knowledge' has been communicated to the target group, a change in behaviour will follow. Such an assumption does not take into account established attitudes, beliefs and practices, nor does it not tackle the question of why people might change behaviour.

The northeast is the largest and poorest region of Thailand. Although major cities exist, most of the population live in rural villages which are fairly cohesive clusters of 60 to around 200 homes. Few villages are supplied with piped water and most villagers carry water to their homes. Water from public, and sometimes private, tubewells is commonly used for washing activities. Much of the groundwater is saline and although usually of good bacteriological quality (when not polluted by toilets), it is rarely used for drinking because of its adverse taste. Man-made ponds provide softer water and are sometimes preferred for washing activities. Drinking water is traditionally supplied by shallow wells located outside the village and these are often protected by concrete rings but not covered. Rainwater harvesting has developed dramatically over the last decade and large rainjars are now common in most rural homes. Rain is used for both drinking and washing activities when abundant. Pour-flush toilets have also proved popular and estimates suggest a 70 - 80% coverage. Most villagers rely on subsistent farming of paddy and upland crop production such as sugar cane and cassava. Poor soils and unreliable patterns of rainfall have led farmers to pursue a low-risk approach to farming and a large number rely on seasonal migrant work to supplement their income.

Local administration is divided into provincial, amphur (district) and tambon (sub-district) levels, in Khon Kaen province alone there are nearly 2,000 villages, 187 tambons, and 20 amphurs. All villages have an official hierarchy in which the headman is the most senior and forms an important link between government bureaucracy and village society. Primary school attendance is compulsory and schools are located in most villages. However, secondary school attendance is quite low in rural areas (5 to 10%), and literacy are

rates poor. Most northeasterners speak the Isarn dialect which is closer to the language of Laos than Thai.

Diarrhoeal disease, especially in young children, is a major health problem in developing countries. Although mortality rates have diminished in Thailand due to effective measures for treating diarrhoea, morbidity rates are still high. The current top 10 communicable diseases in Khon Kaen province are: Acute diarrhoea, Fever, Dengue fever, Influenza, Dysentery, Food poisoning, Conjunctivitis, Pneumonia, Tuberculosis and Measles. Over the past decade, there has been a sustained effort to improve the health network and sanitation in rural areas. All tambons now have a clinic staffed by trained personnel (anomie tambon) and most amphurs contain a hospital. In each village, there are volunteer health workers (VHW) who generally assist the anomie tambon.

Two hygiene behaviours were previously selected by a study investigating the relationship between human behaviour and faecal contamination within the home. These findings showed that contamination of water stored in the home to be far greater than that from water sources. Furthermore, stored water and fingertip contamination were both strongly related to water activities, where toilet and food-related showed much higher levels of contamination than drinking. Given the difficulties of behaviour modification, the following conditions were considered when selecting the hygiene messages:

- Messages should be few in number and as simple as possible.
- The hygiene behaviours should already be practised by at least some members of the community (thus ensuring acceptability).
- Behaviour change should require very little extra effort or cost.

In addition, behaviours need to have a realistic chance of being changed and be effective in disrupting faeco-oral disease transmission. As faecal contamination was common in many sites within the homes, it was decided to focus on reducing the risk of people ingesting faecal bacteria rather than eliminate all potential sources. Cooking and eating utensils were often left to soak, thus providing a favourable environment for bacterial growth. During food-related activities, cross-contamination was identified as the major mechanism for transmitting faecal bacteria. Thus, just 2 behaviours were identified:

i) **Hand washing:**
Emphasising hand washing before cooking, eating or feeding a baby, and after defecation or cleaning a baby's bottom.

ii) **Dish washing:**
Emphasising dish washing immediately after rather than before meal times.

## Tools of the research

Human behaviour is notoriously difficult to measure quantitatively. Answers to questionnaires do not measure actual practice, for example most respondents identified hand washing before eating as important but this was not widely practised in ordinary circumstances. A main objective of this study was to

produce simple indicators of behaviour. For hand washing a novel microbiological method was developed, involving fingertip impressions on agar plates for the examination of faecal streptococci. This method requires only basic laboratory skills and equipment, and provides a relatively inexpensive and reliable indicator of hand washing behaviour. Dish washing behaviour was rather more straightforward because there are tangible signs of this activity, and this indicator was based on spot observations of dirty dishes in the home.

A mixture of qualitative and quantitative methods were used to collect information about hygiene practice and develop a communications strategy. Focus group discussions provided quality information on prevailing attitudes to the behaviours, and proved useful for understanding the role of special groups such as the VHW. This method was improved by including a simple drama which helped create interest and stimulate discussion, without requiring a skilled facilitator. Observation studies provided details about actual practices and these were used in developing the indicators of behaviour. Open interviews with key informants supplied baseline information and validated quantitative data supplied by other sources. Different ways of promoting behaviours were tried, and interviews with both promoters and recipients provided more qualitative information for developing and modifying the communication strategy. Topic focused interviews were valuable for evaluating the intervention when used in conjunction with the behavioural indicators. Use of questionnaires was restricted to measuring message recall. Behavioural trials provided rapid assessment of both the hand washing indicator and a plastic container with tap designed to facilitate hand washing practice in the home.

## Communication strategy

A social marketing approach was used to develop the communication strategy. In this way, attention is payed to the 'consumer' 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. Diarrhoea was <u>not</u> stressed in promoting the behaviours because there is no immediate benefit to the 'consumer' from disease prevention. Most public health programmes attempt to reduce the negative impact of future illness but an individual would not be able to perceive changes in disease rates, even with the advantage of hindsight. Moreover, diarrhoea was rarely mentioned as a problem unless the topic was prompted and, apart from health workers, most villagers did not make any connection between the hygiene behaviours and diarrhoea. Villagers did talk about these behaviours in terms of cleanliness (religiously associated with spiritual cleansing) and preventing germs (locally defined as an invisible body causing illness or bringing bad spirit). Therefore, the communication strategy was based on these terms, with the added proviso of strong healthy children which was identified as a high priority amongst parents. Use of soap was not pushed too strongly for fear of alienating poorer families.

Although the hygiene behaviours were programme generated, community participation was encouraged in promotion process. In this way, the target group plays an active role in planning and implementing the communication strategy. Combining promotional methods along with community involvement blends both passive (providing information and advertising) and active activities (for interest, attention and motivation).

A participatory approach in villages proved less productive and more difficult to organise than in primary schools. Schools provide a uniform operation with an eager and willing human resource in school children. Although pupils were not the main target group of the project, it was hoped that they could be influential as agents of change in villages. Special class lessons and a full drama production about the hygiene messages were used by way of an introduction. The most successful school activities were drawing competitions, where the best posters were displayed in villages, and constructing hand washing and dish washing facilities suited to the school water supply. Other activities included checking dirty dishes in village homes (producing bar charts as part of their maths class) and composing slogans/songs about the hygiene messages.

Initially workshops held with different village groups generated many ideas and enthusiasm for the hygiene campaign. However, the actual involvement of villagers depended more on individual personalities than official roles. For example, although the VHW willingly gave out support media to village homes, it emerged that, contrary to their own suggestion, they did not say much about the messages. Subsequent discussions revealed that they considered themselves ordinary villagers and were neither really confident nor accepted as health educators or agents of change. In one village the assistant headman, head monk, and some of the women's group wrote and recorded a play based on the hygiene messages. Although a notable success for community produced media, this activity was not repeated because it took too much time to organise. Wherever possible village activities were adjusted to stimulate interaction amongst villagers, for instance preparing and distributing support media.

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. All printed media were illustrated so messages could be understood by the illiterate, and a project logo provided continuity. Photographs of local villagers illustrating the messages were fixed onto the posters. 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 photographs of the bacteria plates used for the hand washing indicator and cartoons of germs similar to that used in other media. Bacteria plates were handed round after the show to help stimulate more discussion. Plastic containers with taps were developed to facilitate

hand washing in the home and the behaviour trial, where a fairly homogeneous group of housewives tried out the container for one week, provided information on acceptability, suitability and design preference.

## Main intervention study

The first study phase was crucial to developing the main intervention strategy both through training project staff and learning from mistakes. After this phase, a workshop was organised for staff to discuss problems encountered and design the main intervention strategy. Although not all the suggestions were successfully implemented, it did provide important pointers on the following:

- How to involve communities as much, and as actively, as possible.
- The importance of timing when implementing the various activities.
- Practical considerations such as feasibility and time constraints.
- Human resource appraisal in relation to inputs from project staff.

Interventions were divided into high and low cost. In the low-cost: schools received 'hygiene lessons'; photographs for posters were not retaken for each village; slide shows and comic books were not included. A greater quantity of media was available in the high-cost where soap was also provided with the leaflets and schools were shown a drama production. Two project staff were assigned to each intervention tambon and responsible for 6 villages over a period of 3 or 6 months (the longer period meant intervention activities were timed to better effect). School and village delegates were invited to tambon workshops to discuss project aims and examples of promotion activities, after which participants generated their own ideas during 'brainstorming sessions'. Staff arranged further meetings in each of the villages and schools under their responsibility. These workshops were designed to stimulate community involvement in planning and implementing the communication strategy.

### Study design

Tambons in Khon Kaen province, were ranked by their incidence rate of reported diarrhoeal disease. Those with health studies currently in progress or containing large towns and amphur hospitals were excluded, and the 6 remaining, with the highest diarrhoea rate, were selected for the main study (Table 1). Tambons contained 6 to 10 villages but with only 6 in the intervention, a few acted as special controls. In each tambon, the hand washing indicator was administered in 2 to 3 schools and to a sample of homes in 3 villages, all homes with young children (< 5 years) received the plastic containers in these villages as part of the intervention. Homes with containers provided about half those sampled, while the other families did not have young children. All homes were subjected to the dish washing indicator. Tambons were surveyed before and after the intervention periods, and the 2 tambons receiving the 3 month period were surveyed again after the longer period had finished, to provide information on sustainability. Simple questionnaires for measuring message knowledge were administered together with the hand washing indicator.

Table 1. Allocation of tambons for the intervention.

| High-cost intervention | Low-cost intervention | Controls |
|---|---|---|
| Tambon Nachumseng (6 mths)<br>Tambon Khoanoi (3 mths) | Tambon Nongkong (6 mths)<br>Tambon Nongbua (3 mths) | Tambon Muangwan<br>Tambon Kharmpom |

## Results

After the drama production or 'school lesson', there was a marked improvement in pupils' knowledge of the hygiene messages and this was greater in higher grades. On the whole there was little difference in the efficacy of drama and lessons in explaining the messages. Knowledge was strongly correlated (+ve) to age both before and after presentations. Knowledge improved further during intervention, and was far better than that of pupils from control schools.

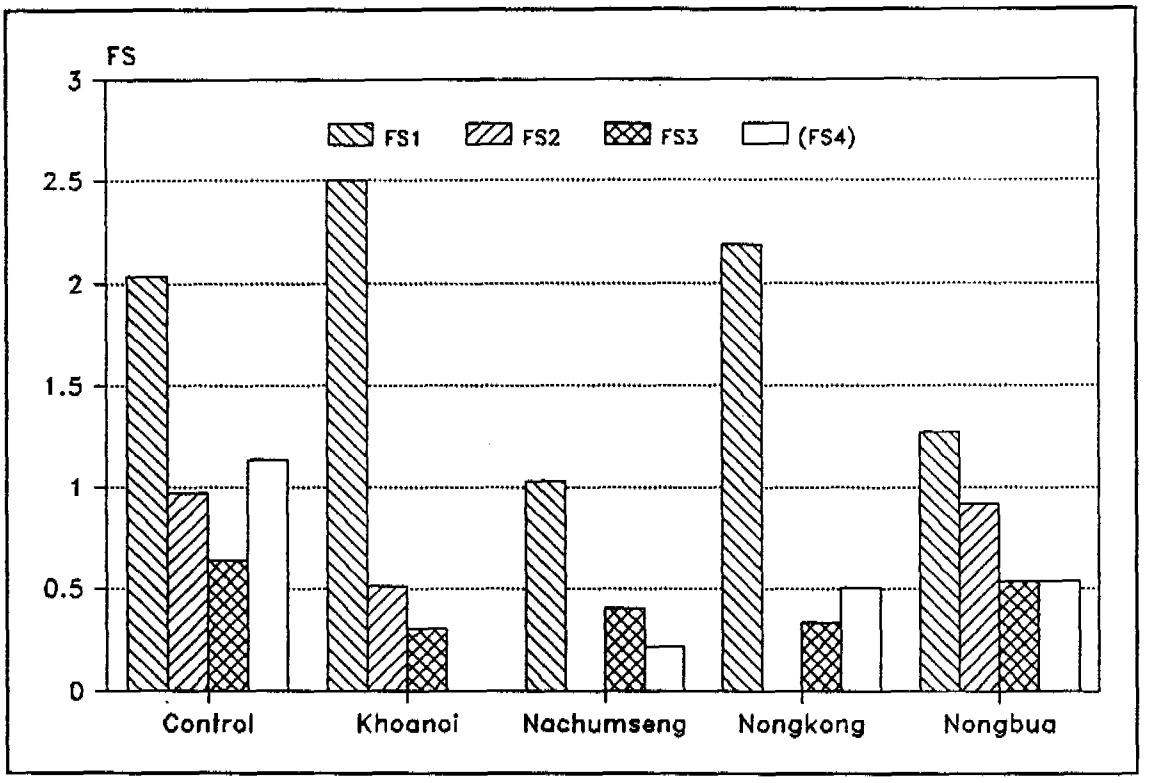


**Figure 1.** Schools: Hand washing indicator by tambon.

Figure 1 presents the results of the hand washing indicator for each tambon before (FS1) and after the intervention periods (FS2 and FS3). Overall FS1 means were negatively correlated with class but variance between schools was greater than between classes. Most of the contamination in each school was limited to just 1 or 2 classes, not solely restricted to junior grades, thus implying that physical contact within classes is important in spreading hand contamination. This relationship between class and FS1, disappears for FS2 and FS3, despite the strong correlation with knowledge. However, pupils

showing an improvement in knowledge from before to after intervention, had notably lower FS3 means than others. Although FS3 means were significantly lower in intervention than control, there was a dramatic reduction in FS means for all schools. Further tests (FS4), in schools not previously subjected to this indicator, reveal that reactivity appears to have affected the control. Although seasonal factors cannot be discounted, it seems likely that teachers in control schools are influential in modifying pupil behaviour and, in this situation, knowledge by pupils is not a prerequisite for behaviour change. However, it is unlikely that control pupils could be influential in their village without the supporting knowledge of these hygiene behaviours.

In villages, a good coverage was attained in terms of message reception, and knowledge of content demonstrably improved as a result of the intervention. Respondents were also asked about message source, and illustrated media such as stickers, posters and leaflets appeared far more effective in communicating knowledge than spoken messages (Table 2). Audio/visual media (e.g. slide show and bacteria plates) also proved effective. Respondents answering 'germ prevention' as reasons for the hygiene messages, were far better at recalling when to practice. Villagers receiving high-cost interventions tended to be more knowledgable and remembered more message channels than low-cost. Contrary to expectations, schools did not appear to be very effective in communicating knowledge to villagers although some evidence suggests that pupils are a better catalyst for drawing attention to other message channels.

Table 2. Source of messages in relation to knowledge scores (final survey).

| Message channel | Channels specified (%f) by intervention cost | | Knowledge scores analysed by channels (T-value) | |
|---|---|---|---|---|
| | Low-cost | High-cost | Low-cost | High-cost |
| Project staff | 82 | 82 | +1.7 | +1.6 |
| Posters with pics. | 71 | 74 | +2.6* | +3.2* |
| Speaker tower | 70 | 66 | +1.8 | -2.1 |
| Anomie tambon | 71 | 54 | +2.6* | +4.5** |
| Leaflets | 60 | 61 | +2.2 | +3.5* |
| Stickers | 54 | 57 | +3.8** | +6.1** |
| Plastic containers | 46 | 41 | +0.4 | +0.6 |
| VHW | 43 | 40 | -0.8 | -1.3 |
| Headman or others | 22 | 33 | +0.4 | -1.5 |
| School children | 15 | 17 | -1.6 | +1.1 |
| School posters | 17 | 16 | -0.6 | +0.3 |
| Slide show | n/a | 28 | n/a | +3.2* |
| Bacteria plates | n/a | 12 | n/a | +3.2* |
| Drama at school | n/a | 10 | n/a | +0.6 |
| Comic books | n/a | 9 | n/a | +0.6 |

*P<0.01; **P<0.001; n/a - not applicable

Durability of message channels was also apparent and villagers surveyed after shorter intervention period (4 months earlier) could generally remember more channels. This time spoken channels held their own with illustrated media but

these could not sustain knowledge. The main exception was the anomie tambon who was specified more often and appeared more effective in Table 2. However, they have a vested interest in disease prevention and support media displayed at the clinic would reinforce messages to visitors. The intervention appeared least effective in Tambon Nongbua where 10% of respondents professed not to have heard any of messages compared to 1% in Khoanoi. As a consequence the plastic containers, adorned with stickers, appeared to communicate messages more effectively in Nongbua, largely due to the dearth of other channels.

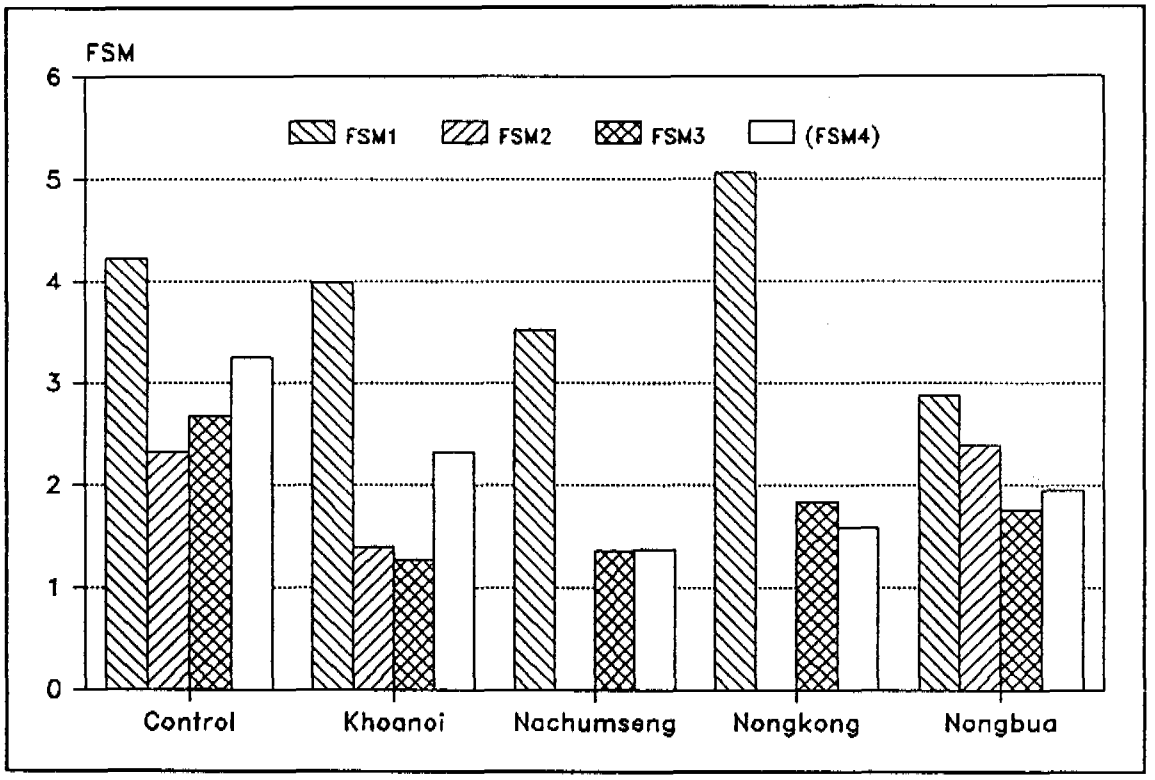


**Figure 2.** Villages: Hand washing indicator by tambon.

Schools provide a different environment than village homes and overall finger-tip contamination in villages (FSM) was much higher but there was no marked differences between characteristics such as age and sex (Figure 2). As with schools, all tambons showed a marked reduction from FSM1 to FSM3 but improvements to the intervention were far greater than control, and high-cost notably better than low-cost. In FSM2, Nongbua showed no improvement in comparison to control and was the only tambon where plastic containers with taps showed a notable improvement to hand washing behaviour, thus showing containers to be critical only when other message channels are scarce. Again, a selection of villages not previously tested were surveyed (FSM4), and these results suggest improvements were sustained well after the intervention had finished. Although reactivity seems less of a problem than in schools, seasonal factors such as relative humidity appear more important in village homes. This may partly account for the poorer results in Tambon Khoanoi.

Although this indicator cannot reveal specifically when people wash hands, analysis at the village level showed a strong negative correlation between the average knowledge scores and FSM3 means. However, the interesting factor to emerge from analysis at the household level was the lack of relationship between knowledge and fingertip contamination. Furthermore, in contrast to relationships found between knowledge and specific channels in Table 2, only 'pupils' (but not all homes with school children) showed any significant relationship with improved hand washing practice. Overall channels involving people, as opposed to illustrated media, tended to be associated with lower FSM3 means which is opposite to the effects on knowledge scores. These results contrast with the FSM2 survey where improved practice was correlated with knowledge in Khoanoi and number of channels remembered in Nongbua. Thus, homes receiving messages are more likely to practice initially but sustained behaviour change depends on whether these become habitual practices and this appears to be influenced more through social norms than knowledge.

Dish washing behaviour remained similar in the control but showed a marked improvement in all intervention tambons except Nongkong. Ironically, Nongkong was the most active in organising kitchen cleanliness competitions but the way these were organised may have caused a reaction in some villages. Special controls in Khoanoi were clustered close to intervention villages and these showed a marked improvement immediately after intervention. However when surveyed 4 months later, they had reverted to pre-intervention levels while improvements were sustained in intervention villages. Although the dish washing and hand washing indicators were never administered on the same day, analysis shows the relationship between the two indicators to be stronger after intervention than before. Thus suggesting that families complying to the intervention are likely to adopt both the hygiene behaviours.

Complementary qualitative information was obtained through interviews with families selected by the results of the behavioural indicators, providing contrasting samples of conformers and non-conformers to the intervention. Although most interviewees were positive about conforming, the interviewers were able to build an impression as to whether they had actually improved their behaviour, and this showed a good correlation with the indicators. It was clear that although most remembered the message content quite well, some adopted the advice proffered whereas others appeared not to. Conformity did not appear related to status, wealth or education. The main reason given for non-compliance was the difficulty for adults, as opposed to children, to break habits and these mundane behaviours were not considered important enough to change. On the other hand, conformers gave a higher priority to cleanliness and preventing germs. Hence, some appear to rank the importance of these practices more highly than others because the intervention either influenced the significance of, or stimulated an existing desire to improve, hygiene behaviour. Lack of water was <u>not</u> found to be a constraint these practices.

Villages in Tambon Nongbua appeared to be least exposed to the intervention (reflecting the quantitative results). In other villages, there was often a reluctance or embarrassment to discuss the messages with others. However, those who had seen a demonstration of the bacteria plates were impressed and this made the messages a more interesting topic because it was scientific. Other talking points were the plastic containers and distributing soap with leaflets. The biggest difference between villages, irrespective of high or low-cost interventions, was the strength of community spirit. It was evident that behavioural improvements were greater in villages with a strong sense of community because there was less inhibition to talk about the hygiene messages to friends and relatives. This finding concurs with the quantitative results where the dissemination of message knowledge was not consistent with that of practice and social norms play a more important role in influencing habits.

These results demonstrate that if sustained behaviour improvements are to be achieved, interventions need to involve communities in the promotion process and provide support media to ensure messages do not become vague. Although schools participated well, pupils are unlikely to be effective as agents of change unless their families recognise the importance of their efforts through other sources. From an operational point of view, a participatory approach in villages is difficult and takes more time to organise than formal education methods. It is therefore expedient to achieve a suitable balance where professional support, in organising a communication strategy and developing support material, stimulates local involvement in playing an active role, and create opportunities for locally produced activities to promote behaviours.

Although not the main part of this investigation, health impact evaluation showed that improvements to these hygiene practices did appear to reduce the risk from diarrhoeal disease. Active surveillance of diarrhoea in young children, after intervention, revealed less disease in intervention areas in comparison to the control (Table 3). Diarrhoeal incidence, measured by both active surveillance and cases reported to clinics or hospitals, was also found to be significantly related to poorer hand washing and dish washing practice as measured by the behavioural indicators.

Table 3. Active surveillance of diarrhoeal disease in young children after intervention (June to July, 1992).

| Intervention status | No. of homes | Children <5 yrs | Diarrhoea cases (%) | | | % diarrhoea reduction cf. control |
|---|---|---|---|---|---|---|
| | | | 0 | 1 | 2 | |
| Control | 170 | 199 | 70 | 27 | 4 | 0% |
| Low-cost | 188 | 219 | 81 | 18 | 1 | 39%** |
| High-cost | 208 | 250 | 77 | 21 | 2 | 29%* |

*P<0.05; **P<0.01