

Guidance on communication with respect to safe drinking water and household hygiene

Literature review, interviews and case studies

Output 1 of WHO contract 1265



Malawi – singing songs of sanitation and hygiene [photo credit Richard C Carter]

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Overview and Emerging Principles

This document forms Output 1 of the WHO Contract 1265 “Guidance on communication with respect to safe drinking water and household hygiene”. It consists of three distinct sources of information and evidence, namely:

- a literature review;
- a set of interviews with key informants;
- a set of case studies.

Broadly speaking, this evidence base focuses on two situations:

- situations in which long-term or chronic problems of inadequate access to safe domestic water and/or sanitation, often coupled with poor hygiene practices, expose people to health risks. Examples of these situations range from those in which groundwater chemistry (eg Arsenic, Fluoride) is harmful to health, through to those, especially in low-income countries, where behaviours relating to water use for hygiene, or the practice of safe sanitation, pose risks to health;
- situations in which a water pollution incident gives rise to the risk or the actuality of adverse impacts on public health. Examples are to be found across the spectrum of countries, including populations of all sizes served by piped water in wealthy countries such as Canada, the USA and Great Britain, through rural and urban populations in low- and middle-income countries such as India and Uganda, and in the extreme in failed states such as Zimbabwe.

The document forms an evidence base about communication approaches and strategies appropriate to this broad cross-section of challenging situations. A number of guiding principles emerge from the evidence taken as a whole. More specific lessons learned are highlighted in the detail of the document.

Principle 1: The academically rigorous evidence about “what works” and “what doesn’t work” in regards to health and hygiene communication is limited. Nevertheless, we do know enough to make a difference.

Principle 2: Communication strategies need to take account of context, and to meet people in their situation. Appropriate language and terminology, approach and technique, and content depend greatly on social, cultural and economic context.

Principle 3: Relationships between the different institutional actors, and between these and members of the public, are crucial. Trust, transparency and promptness in communicating problems only come about through strenuous efforts to build such relationships before incidents occur. Delays in communication about incidents can undermine trust in the authorities. Communication needs to be a two-way process.

Principle 4: Precautionary and risk-minimising principles (including those enshrined in water safety planning) need to be foremost.

Principle 5: The mass media can be an enormous asset in relation to communication, but they may also be a liability if they misunderstand the nuances of a situation.

Principle 6: There is a wide range of approaches to communication, and a large number of available techniques (

Table 3). Communications strategies need to capitalise on the strengths of all, and be designed for context.

Principle 7: Communication in this context is attempting to bring about behaviour change, either in the short term (eg boil water notices) or in the long-term (eg hand-washing after defecation). Changing the behaviour of the public is very challenging. Although personal and family health may be a strong motivator, other drivers (eg for sanitation uptake in low-income countries) may be stronger, especially where poor health is the norm.

Part I - Literature Review

Overview

The literature review begins (section 1) with a review of trends in thinking about health and hygiene communication. It shows how past ideas about information or knowledge transfer have given way in recent years to identifying drivers of behaviour change, and finding the most effective ways to appeal to people's aspirations and needs. Section 2 reviews current communication strategies and approaches, presenting the limited evidence for the effectiveness of different techniques. Section 3 addresses some of the key issues for rural and remote communities, raising a number of matters which also have relevance in poor peri-urban settings. The subject of communication in emergencies is tackled in section 4. The role of communication within water safety plans, and the actions which should be taken during outbreaks of disease are considered. The importance of keeping communication pathways open in advance of an emergency – part of disaster preparedness – is highlighted. The special situation of humanitarian emergency is also addressed. Section 5 examines a number of aspects of the acceptability, affordability and on-going utilisation of household water treatment methods. The conclusion (section 6) returns to the complex and little-understood links between promotion of good water safety and hygiene practices and the desired changes in behaviour which may or may not follow such initiatives. It also raises the unexplored but potentially very fruitful question of people's own search for information about water safety and hygiene, and how they use the knowledge which they acquire. The review ends with a summary table of communication techniques, with examples of their use, and a list of about 120 cited references.

1. Introduction

Public health professionals have tried various approaches to reduce diarrhoeal diseases. Globally, faecal-oral transmitted diseases due to water, sanitation and hygiene are a major cause of morbidity and mortality (Fewtrell et al, 2005; Luby et al, 2005). Roughly 90% of this disease burden occurs in children under five years of age (Prüss et al, 2002) and 88% (1.5 million cases) of diarrhoeal disease incidence is attributed to unsafe drinking water, sanitation and poor hygiene (Prüss et al, 2008). Achieving the water and sanitation targets of Millennium Development Goal No. 7 will halve the proportion of people without sustainable access to safe drinking water and basic sanitation. In the 1980s major investments were made to improve the coverage of drinking water and sanitation facilities. However, evidence collected over the past decade shows that communication that leads to behaviour change is essential to achieve the health benefits that arise from drinking water and sanitation projects.

According to the Oxford English Dictionary, to communicate is to share or exchange information or ideas. Traditionally, communications models (such as the Diffusion of Innovations theory) referred to information being transmitted from a sender to a receiver by means of a message that moves through a channel (Rodgers, 1963). Information use was taken as non-problematical: it was assumed that the information in the message would be 'processed' (incorporated into the users' framework of knowledge, beliefs or values) or used (leading to changes in behaviour, values or beliefs) (Walsh, and Wilson, 1995). The concern was mainly with the factors that create the need for information and the factors that affect the choice of information sources and channels (Walsh, and Wilson, 1995). Yet one of the main lessons learned regarding communication in the development process in recent years has been the need to move away from didactic, one-way, top-down transfers of messages. This approach was exemplified by the agricultural extension agents that disseminated the science generated in research institutions to change farmer practice during the Green Revolution. There has since been a move towards an approach that promotes more accessible means of communication within communities. For instance, UNICEF is using an approach (C4D) to change social practices, rather than individual behaviours; an example is the anti-AIDS clubs in Ethiopia where young people are trying to change social norms around HIV.

Classical hygiene education is based on the premise that people persist in unhygienic practices because they do not know about the germ theory of disease transmission. The underlying assumption is that awareness of causes of a disease and knowledge about its prevention are sufficient to induce people to make a rational decision to change their behaviour. Yet, interventions in the sanitation sector based on conventional approaches including lecturing of hygiene practices have been ineffective (Cairncross, 2003). Current thinking is that three key aspects of communication for safe drinking water and hygiene are needed:

- the development of messages or products that suit target audiences,
- targeting messages to the riskiest behaviours: the unsafe disposal of faeces, not washing hands with soap after defecating, the unsafe collection and storage of water,
- communicating these messages in ways that are appropriate, attractive, and motivating.

Over the past two decades a variety of different communication channels has been developed to disseminate water treatment and hygiene messages including: mass media (radio and television), participatory hygiene education, social mobilization/community participation (health clubs, schools, water committees), edu-tainment (soap operas, local theatre, videos), and interpersonal communication (motivational interviewing¹) (Ahmed, 1998; Thevos, Quick & Yanduli, 2000; Waterkeyn & Cairncross, 2005). See also the summary in Table 3 at the end of the Literature Review.

The literature suggests that in some developing countries, water treatment and household hygiene can be promoted in several ways, such as using a status aspiration approach or focusing on the benefits of treatment, such as improved taste and physical appearance, convenience, economy and portability. Lessons from the AED and USAID oral rehydration projects in Honduras and the Gambia (USAID, 1985) reflect the complexity of behaviour change, the importance of sustained communications efforts in maintaining new behaviours, and the challenge of institutionalizing systematic health communication strategy.

2. Communication strategies and approaches

In the last thirty years, the evidence in academic literature for success in communication strategies regarding health promotion within the developing world is extremely limited. Three key reviews, Loevinsohn, (1990), Cave & Curtis, (1999), and Ahern (2000) could only identify fifteen studies of health promotion that were sufficiently rigorous to be useful for replication.

Loevinsohn (1990) set out eleven criteria that he considered essential for a rigorous study (Table 1). However, although he short-listed 67 articles published between 1966 and 1987, he could find only three that could reach this level of scientific rigour (Sayegh & Mosley, 1976; Ross & Loening, 1983; Stanton & Clemens, 1987).

Nine years after Loevinsohn's review, researchers at the London School of Hygiene and Tropical Medicine, Cave and Curtis (1999) lowered Loevinsohn's standards and although 242 articles of interest from grey literature and peer-reviewed journals written between 1987 and 1999 were reviewed, they found that only five studies (Elder et al, 1998; Haggerty et al, 1994; Lloyd et al, 1996; Pant et al, 1996; Tayeh & Cairncross, 1996) could qualify as having even 60% of the criteria Loevinsohn identified. The following year, using the same 'blueprint', Ahern (2000) found an additional seven papers that were of sufficient methodological rigour to demonstrate behaviour change or improved health (Allen et al, 1992; Alpasca et al, 1995; Fawole et al, 1999; Morrow et al, 1999; Pinfold and Horan, 1996; Valente et al, 1994). These articles measured the success of communication at community level in health promotion studies either through evidence of

¹ Motivational interviewing is defined as a directive, consumer-centred counselling style for eliciting behaviour change by helping consumers to explore and resolve ambivalence (Rollnick & Miller, 1995). Differently from non-directive counselling, in this technique, the counsellor is intentionally directive in pursuing the resolution of ambivalence.

behaviour change, which is known to reduce disease, or by measuring the reduction of disease as a result of improved knowledge and behaviour.

Table 1 Loevinsohn's eleven criteria for a rigorous study

1. A study based on explicit theory
2. Adequate description of how the strategy was adapted to local conditions
3. Example given of materials or educational process employed
4. Adequate description of resources required to carry out educational process
5. Measured outcome before and after the intervention
6. Period between education and outcome more than one year
7. Evidence of community participation in design, goals or outcome measures
8. Article claimed to show positive results for intervention evaluated
9. Included discussions of possible bias or caveats
10. Included p-values or confidence intervals
11. Employ some form of modelling such as regression

2.1. Case Studies for research or real life?

A major difference between research (or emergency) interventions and development projects, is that the former tend to design interventions that target a specific disease or condition, whilst 'development' programmes tend to address the wider issues of health. As they are more disposed towards broader interventions that seek to improve the determinants of health, development programmes aim to be sustainable in the long-term. Claims for behaviour change are worth little if there is not a permanent change in behaviour. Reduction in disease on the other hand can claim to save lives by averting disease, but this may be a deceptive statistic, if the behaviour that prompted disease is not changed. Looking at the most rigorous health promotion case studies, it should be noted that fourteen of the fifteen studies selected targeted only a single disease or condition. Whilst this may be appropriate for research objectives, it is not a cost-effective method of delivering health promotion as it is limited to providing training in only one topic. Community members tend to see their health issues in an integrated manner, and should therefore be trained accordingly. Only one of the selected studies (Elder et al, 1998) used a more holistic approach but no quantifiable achievements were mentioned, indicating the difficulty of more community-driven programmes to be able to focus sufficiently to measure multiple indicators (Nutbeam, 1998a).

2.2. Comprehensive or limited messaging

The number of key hygiene messages promoted in the training will also provide a measure of how comprehensive the health promotion intervention is. A training programme that targets many messages is more comprehensive in terms of preventing disease. All the selected studies had less than four messages indicating that all the interventions were very limited in their approach to disseminating knowledge of the causes and prevention. For example, Stanton and Clements (1987) measured only three indicators of behaviour change, and only one of the three, achieved any change (49%). Only one programme (Pant et al, 1996) was really comprehensive, with 48 observations taken to indicate practices of nutrition.

2.3. Health Promotion studies in Water and Sanitation Sector

Of the 15 studies identified by the three reviews above, only four articles may interest us in the Water and Sanitation Sector (Table 2) as they focus on water-related diseases: three relate to diarrhoea (Stanton & Clemens, 1987; Haggerty et al, 1994; Morrow et al, 1999), and one to dracunculiasis (Teyeh and Cairncross, 1996). Therefore it would appear that the evidence base in the literature for successful communication strategies in water and sanitation sector is still limited.

Table 2 Studies in Water and Sanitation sector considered rigorous

Author	Year	Country	Disease	Number of messages	Behaviour change	Disease Reduction
Stanton & Clemens	1987	Bangladesh	diarrhoea	three	One achieved 49%	26%
Teyeh & Cairncross	1996	Ghana	dracunculiasis	one	56% change	
Haggerty et al	1994	Zaire	diarrhoea			11%
Morrow et al	1999	Mexico	diarrhoea			RR=2.2

2.4. Targeting appropriate comprehension levels

As many communities in low-income countries are still semi-literate, participatory activities to provoke debate, using pictures to help the community to visualise their problems, still remains one of the most effective methods of transferring key messages, as long as it is packaged into a structured training (Waterkeyn and Cairncross, 2005). Many communities are more literate than they were twenty years ago (Tichagwa, 1998) and what may have held true in the early 1990's, may no longer now apply in many developing countries. Thus communities may progress faster than research takes to publish! By the time the Sector has adjusted to the research findings, the associated 'recommendations' may be based on outdated assessment. Such may be the case with Loevinsohn's suggestion to only use a few key messages. Formative research² in the design stage of the programme (Curtis, 2000) is therefore critical to ascertain levels and type of training, and to ensure the programme is culturally appropriate and matches the level of literacy.

2.5. Participatory approaches

In the early 1990's, Participatory Hygiene and Sanitation Transformation (PHAST, Srinivasan, 1990) initiatives were started up in five sub-Saharan countries, (Botswana, Ethiopia, Kenya, Uganda and Zimbabwe), but a decade later, this approach had largely gone to seed and the cost-effectiveness of such programmes was being questioned (WSP, 1999). PHAST initiatives did not succeed in sustaining hygiene behaviour change. The tendency was to train many trainers in PHAST but the design for the community training was loosely planned, the target population haphazard and participatory activities too open-ended, with little follow up to monitor changes. Between 1995 and 2002 in Uganda, an estimated 4 million people received PHAST training in four large programmes costing over US\$12 million. Three years later in 2005, a survey was conducted using over 30 measurable indicators of behaviour change. Only 17 indicators were significant with an average of only 6.6% change (WSP/AF, 2006). Whilst these findings lead influential planners in the Watsan Sector to veer away from PHAST, deeper research into the psycho-social reasons for non-compliance of recommended practices, may have led to the adaptation of PHAST, rather than its complete rejection. However the trend has been to search out other 'silver bullets' such as Social Marketing, Public Private Partnerships (PPP) and Community Led Total Sanitation (CLTS) which have all provided alternative strategies in the past few years.

² Formative research is used to test concepts, product or message design and to pre-test materials with the target audience.

2.6. The Community Health Club (CHC) approach

The Community Health Club Approach is an adaptation of PHAST, developed to provide a means of measuring behaviour change, by having a defined target population and observable indicators. Whilst the CHC Methodology uses the same type of participatory activities, the key difference is that, instead of loose gatherings of unknown composition of people that vary each time, health clubs hold sessions regularly within a consistent group of members, who form a club. This process builds a structure within each village that is mandated to sustain recommended practices, as well as manage and monitor health issues in the village. This small difference between the standard PHAST and the CHC approach accounts for very large differences in hygiene behaviour change between the two strategies. Research in CHCs in Zimbabwe has shown that communities have processed with ease an entire raft of messages regarding the prevention of diarrhoea, malaria, bilharzia, parasitic worms and many skin diseases (Waterkeyn & Cairncross, 2005). Over 50 small behaviour changes were easily achieved by the majority of Community Health Club members who each attended 24 health sessions in six months. Improved health knowledge and positive hygiene behaviour change between health clubs and non health club members was highly significant: the club members achieved 79% for prevalence of positive change for fifteen indicators, while the control group only achieved 38%. Thus of 17 observable indicators, an average of 41% was obtained as opposed to PHAST in Uganda which achieved only 6.6%. It would appear that compared to the studies cited in the reviews up to 2002, this programme is one of the most cost-effective in terms of changing hygiene behaviour (WSP/AF, 2002), and has been adapted to other countries in Africa (Sierra Leone, Uganda, Guinea Bissau, and recently South Africa).

2.7. Social marketing

Social Marketing, a strategy using messaging based on commercial advertising, is now a popular method of Health Promotion, although it is expensive and has a loose target audience. Practitioners using this approach are influenced by Loevinsohn's recommendations, i.e. keep health messages short and simple and repeat them often enough, and people will change their behaviour. However, Loevinsohn is the first to point out that it is questionable whether generalisations regarding the success of hygiene behaviour change can be made on the limited existing evidence he had at the time, now more than eighteen years ago. The Saniya Programme in Burkino Faso (Curtis et al, 2001) used Social Marketing, and projected four key messages to a wide audience of the capital city, using radio, drama and house visits to change people's attitudes to hand washing. The four key messages were measured, the results were as follows:

- 11% increase of children (0-35 months of age) who defecated into a potty;
- 10% increase in the proportion of occasions in which children's excreta were disposed of in a latrine;
- 17% increase in the proportion of occasions in which mothers washed their hands with soap after cleaning a child's bottom;
- 13% increase in the proportion of occasions in which mothers used soap to wash their hands after using the latrine.

2.8. Community Led Total Sanitation (CLTS)

Community Led Total Sanitation (Kar, 2005) has become popular as a method of triggering sanitation by shaming communities into building latrines or otherwise disposing of excreta safely. Whilst the outputs of the programme are impressive in terms of the claims for open defecation free zones (ODF), the sustainability of this high level of sanitation is questionable as people change not through conversion based on knowledge or understanding, but through coercion by their traditional leaders and aggressive methods of peer pressure to enforce conformity. The use of authoritarian measures by village leadership means Community Led Total Sanitation is still a top-down, vertical approach, and with one main objective (open defecation free status), it does little to change norms and values that direct behaviour.

Thus, to-date there have been few studies that have been deemed sufficiently rigorous to enable replication. The few that have passed academic scrutiny have been vertical research targeting only one disease and only a few messages. This has biased the sector into regarding the mantra of 'a few simple messages' as the most effective method, and this has led to the trend towards shallow development practice. Based on measurable results (eg from Community Health Clubs), we find that, in fact, the more holistic developmental approaches can demonstrate a significantly higher level of behaviour change. These are also more cost-effective, because for the same budget used to target one disease, communities are able to address multiple health risks with a range of safe hygiene practices.

3. Communication in rural or remote communities

Most poor and food insecure people live in rural areas: 800 million of the 1.2 billion people that live in poverty live in rural areas (IFAD, 2001) and of the 850 million undernourished people worldwide, 70% live in rural areas. Groups particularly at risk of poverty in rural areas are landless labourers, small landowners and women. The most able people particularly young people and men generally, tend to migrate away from rural areas in search of better prospects, leaving very young children, old or disabled people and women behind. One of the definitive characteristics of rural poverty is persistence - continuity and consistency over time. Together with the rural on-farm economy and migration to urban areas, the new challenges facing rural areas include food and fuel prices and climate change. Some suggest it is also the characteristics of the place (its remoteness, its lack of natural resources and amenities) that contribute to or exacerbate the risks of poverty. Access to safe water, basic sanitation and hygiene is fundamental to people living a healthy and active life and fulfilling their potential. Seventy percent of people without improved sanitation and 80% of people using unimproved sources of drinking water live in rural areas (WHO/UNICEF, 2008). This section discusses a number of key issues for communication on safe drinking water and hygiene in rural communities.

3.1. Access to water sources

In the rural areas, drinking water sources generally include groundwater (tube wells, dug wells and boreholes) and surface water (river, dam, lake, pond, stream, canal, irrigation channel, springs and so forth). A key reason for low per capita consumption as well as household drinking water storage in rural areas is generally the long distance from the water source. Households in rural Africa spend an average of 26% of their time fetching water, and it is generally women who are burdened with the task. For instance, Esrey et al (1992) determined 8 L per capita per day as the average available amount in rural Lesotho.

Access to water facilitates related hygiene practices (behavioural outcomes). In Peru, using direct observation of household hygiene practices, Gilman et al (1993) found that families that used a greater volume of water and also interrupted faecal contamination by hand washing more often. Curtis et al (1995) found a similar result in Burkina Faso; "compounds with domestic water connections were more likely to report 'safe' hygiene behaviours" (Curtis et al 1995). In water-scarce areas, sanitary education programmes probably will not change hygiene practices (Gilman et al, 1993). In the context of a participatory approach to children's face-washing for trachoma prevention in Tanzania, Lynch et al (1994) found that proximity to water sources was a significant factor limiting water consumption in the village, and this situation was exacerbated when the village water pump broke down and people had to go even further for water.

In rural areas, dependence on nongovernmental organizations for free water treatment can have a negative long-term effect if those sources suddenly disappear. In rural Kenya, for example, Makutsa et al (2001) found that an important challenge in marketing the Safe Water System (point-of-use water treatment and safe storage) was trying to change the behaviour of a population with a history of receiving free goods from nongovernmental organizations, even though the price of these items was similar to that of commonly purchased items.

3.2. Geography

Location makes a difference both to the practice and understanding of water treatment and household hygiene. In Guatemala, it was found that women living closer to the capital, bus services and open roads understood the relationship between hygiene and diarrhoea prevention better than women living in less accessible places (Goldman et al, 2001). The authors concluded that since many rural villages are geographically remote, those connected to larger towns by roads are more likely to gain access to information related to disease prevention and were more likely to understand the concept of hygiene and water contamination.

Easy access to treatment products (such as chlorine, vessels, fuel, wood for boiling, filters) is another key determinant of water treatment behaviour. The follow-up investigation by Quick et al (1996) in Bolivia, three months after the study of an intervention (narrow-mouthed vessel and chlorine solution) was completed, found that chlorine use had declined. This decrease was attributed in part to the inconvenience in obtaining a supply of the calcium hypochlorite solution. In Madagascar, Dunston et al (2001) concluded that readily available distribution channels (a network of agricultural retail outlets in villages facilitated access) made it easier to satisfy the unexpected demand for the water chlorination product (Sûr'Eau) that emerged during a cholera outbreak.

3.3. Improved sanitation

The literature shows that attempts to improve sanitation by framing promotional messages in terms of faecal-oral disease prevention have largely failed to motivate changes in sanitation behaviour. The literature recognises that there is a wider set of incentives which persuade households to stop open defecation and to adopt an improved sanitation facility such as pour-flush latrine, a simple pit latrine or a ventilated improved pit latrine. Historically, farming has been considered the principal economic activity of rural households, particularly poor rural households. In Vietnam a market-based project on sanitation for the rural poor increased access to sanitation by about 100% within one year. Here, the driving factor for the poorest was the use of compost from human excreta as fertilizer (Frias and Mukherjee, 2005). In their study Jenkins and Curtis (2005) found that consumer motivation for acquiring sanitation in rural Benin showed that motivating drivers for installing latrines had more to do with prestige, well-being, and wider aspirations than health. Pakistan has a National Sanitation Policy which promotes 'Community Led Total Sanitation' as one of its basic principles and offers 'reward for outcomes' as incentives. The village of Inzer Killi in the Mardan district of Pakistan's North West Frontier Province (NWFP) received a reward of US\$5,000 for becoming the country's first Open Defecation Free (ODF) village. The village of 180 household residents became Open Defecation Free in only 40 days in 2006 (WSP, 2007). Providing fiscal incentives demonstrates a shift from financing sanitary inputs, such as household toilets, to an approach that emphasizes demand creation and rewards communities for collectively achieving sanitary outcomes. By providing incentives to community efforts to meet collective gains in sanitation, the scheme helps to raise the status of the village, create peer pressure among neighbouring villages, and foster competition among all tiers of governance within and across states.

3.4. Gender

The idea of time poverty is a particularly apt description of many poor peoples' daily struggle to survive. Rural women, in particular, struggle to do all the household tasks necessary to care for their families. Researchers recommend that, because mothers often have so many daily responsibilities that they cannot forego, household interventions need to take mothers' time limitations into account (Bentley et al, 1995). In Pakistan, many mothers had heavier workloads because boys and men were migrating to urban areas to seek jobs. Farming responsibilities were added to their regular housework. Mothers often said that "there is not enough time to boil water every day" (Halvorson, 2004). The literature also recommends taking the mothers' level of education into account when considering communication for drinking water and household hygiene, since this may well be lower for rural women than for their urban counterparts. Research has shown that, independent of a mother's knowledge of diarrhoea causation, her

educational level affects the likelihood that she will adopt preventive health behaviours (Ketsela, Asfaw & Belachew, 1991; McLennan, 2000b; Cairncross & Shordt, 2004). In McLennan's (1998, 2000b) studies in the Dominican Republic, "not having sufficient time" as well as "caregiver too tired" were common reasons cited for not boiling water. The author recommended that water treatment interventions take into consideration the added responsibilities of water treatment in a mother's daily workload.

In rural contexts, where traditional belief systems may persist, women may lack sufficient decision-making power within their homes or have access to resources outside their homes to take effective action regarding water treatment and hygiene promotion. However, culturally appropriate groups, like the Jiggasha groups in Bangladesh, have been established to allow women to join group discussions organized in the homes of opinion leaders located at central points in the village social network. The increase in modern contraceptive use was five times greater among women in these groups than among women who were visited by field workers at home (Kincaid, 2000b).

The importance of status or opinion leaders in communication efforts is also demonstrated in Burkina Faso, where one of the reasons mothers followed the hygiene advice provided at health education sessions may have been their wanting to be modern rather than believing in germ theory (Curtis et al, 1995). Nielsen et al (2003) found that hygiene practices in the Punjab area of Pakistan were related to the wife's perception of her social status rather than being seen as measures to prevent disease.

3.5. Ineffectual hygiene education

When people perceive the health risk from contaminated water to be low, they may see no need for treatment. In rural north-eastern Brazil, for example, one of the reasons participants gave for discontinuing water chlorination was their belief that the water was already clean (Kirchhoff et al, 1985). In Sri Lanka, villagers boiled their water for reasons unrelated to water contamination, such as when someone was ill. "Villagers do not associate boiling with killing bacteria", so boiling was seen as unnecessary for healthy people (Nichter, 1985). The evaluation of a point-of-use water quality intervention in rural Kenya found a widespread fear among community members that chlorine caused infertility (Makutsa et al, 2001). Community health workers had to convene special meetings to dispel those fears. In rural north-eastern Brazil, households discontinued water chlorination, not only because they disliked the taste of chlorine, but also because they believed that chlorine-treated water could be poisonous because it smelled like household bleach (Kirchhoff et al, 1985).

In addition, there can be a resistance to improved sanitation in rural areas, where open defecation is facilitated by accessible and convenient places to defecate with plenty of cover of bushes, trees and/or topography in surrounding area. In particular, the open disposal of children's faeces and open defecation by children can be thought of as harmless, making it difficult practice to stop. However, unsafe disposal of children's faeces was associated with a higher number of diarrhoea episodes (Esrey et al, 1985).

3.6. Implications for communication

Information can be slow to reach remote rural areas of developing countries. It is generally thought that access to mass-communication media (radio and television, and internet) can pose problems in rural areas, mainly due to many people being too poor to be able to afford access or else due to unreliable or non-existent power supplies in many areas. Nevertheless, PATH (2008) found that television is the leading information source for commercial household water treatment and safe storage (HWTS) products and is especially important for women and rural residents in Andhra Pradesh.

Where people, especially the older poor, have low levels of literacy, this effectively isolates people. In 2007, PSI Madagascar simplified the packaging and instructions for their products to better meet the needs of rural women users. Goldman et al's (2001) study in rural Guatemala found that individuals involved in community groups were significantly more likely to understand

the relationship between poor hygiene and diarrhoea, because they were more likely to come in contact with such ideas in the community. The authors concluded that both interpersonal (such as family and friends) and impersonal channels are important sources of information and that they influence social norms regarding hygiene and contamination. Yet the time and financial costs of attending meetings can be obstacles for poor people and may exclude poor people's participation. Convening meetings in areas where participants have to travel great distances is logistically more difficult in rural areas, even if the financial resources were available.

Language spoken has been found to affect hygiene-related beliefs. In rural Guatemala, Goldman et al (2001) reported that indigenous women who only spoke Mayan were less likely than those who spoke Spanish to have beliefs about the causative links between hygiene, contamination and diarrhoea and to accept new ideas related to hygiene and sanitation. Hence, the lack of water treatment might also be explained by lack of access to information in the appropriate language and in terms familiar to the population.

4. Communication in emergencies

This section synthesises existing best-practice in relation to what and how to communicate in emergency situations in both developed and developing countries. Glik (2007) has provided a comprehensive review of risk communication research and practice for the entire range of general public health emergencies. Relevant literature was drawn from four disciplines: (a) environmental risk communication, (b) disaster management, (c) health promotion and communication, and (d) media and communication studies. Public health risk communication requires being able to produce publicly understandable messages from complex sources like medical, epidemiological, behavioural and statistical evidence. This communication field continues to emerge and mature, but currently there is only limited empirical evaluation of the effectiveness of different approaches.

4.1. Communication within Water Safety Plans

Byleveld et al (2008) described the key role for communications within water safety plans which must include plans on responding to water contamination, including clear guidance on when to warn consumers and how warnings should be communicated to consumers. Warnings may include advice on boiling water through to complete avoidance of water usage or contact. In making these warnings there must be a carefully considered balance of the risks of normal consumption of water that may be contaminated versus the risks associated with adhering to the warning (such as burns from pervasive boiling, cost for bottled water or additional treatment, or risks associated with alternative supplies). The communications component of the water safety plan must also deal with when and how to remove a warning.

4.2. Boil water notices

The effectiveness of the boil water notice, one of the most common forms of risk communication for a contaminated water incident, has been questioned by the limited research which has been done on this topic. Angulo et al (1997) evaluated the effectiveness of an order to boil water issued in the Gideon, Missouri Salmonella outbreak that killed 7 consumers and made more than 650 ill in a community of 1100. In their survey they found that only 1 out of 92 Gideon households was unaware of the boil water order, but 31% of households reported someone had consumed un-boiled tapwater after being informed of the order and 12 out of 14 cases of illness that developed after the order was issued admitted having ignored it. Stated reasons for not complying included failing to remember (44%), disbelieving the order (25%) and not understanding that ice must be made with boiled water (17%).

O'Donnell et al (2000) studied consumer behaviour in response to a boil water notice issued as a precaution to 878 households by written notice after a sewage spill threatened their water supply. In their survey, 20% of notified households forgot to boil the water, 54% used un-boiled water for brushing teeth and 17% used un-boiled water for preparing uncooked foods. Willocks et al (2000) studied the behaviour of 675 hospital staff in a region populated by 300,000 who were

notified to boil their water. For this cohort who should be aware of health-related precautions, 9% drank un-boiled tap water, 20% used it for washing food that would not be cooked further, 57% used it for cleaning teeth and 4% used it for making ice. As an aside, 13 respondents (2%) reported someone in their household had experienced a scald or burn from boiling water since acting on the notice³. Byleveld et al (2008) reported that telephone surveys done during the 1998 Sydney Water Crisis (see case study 16) found that 7 to 13% of consumers ignored the boil water alert and continued to consume un-boiled tap water.

O'Donnell et al (2000) received several good suggestions for improving the manner of delivering the boil water notice. Several sub-groups (elderly, disabled and visually impaired) reported difficulty in reading and comprehending the message in the notice. Likewise, some suggested that attention to the notice would have improved if those delivering it had tried to speak with residents when they left the notice at each residence. Others suggested that using a loud-hailer would have attracted attention and a number of respondents commented that the physical appearance of the notice was too similar to common circulars such that residents were inclined to throw it out with the many other routine circulars received.

Harding and Anadu (2000) studied consumer response to water quality notices in two towns, one with a chronic water quality problem requiring quarterly notices and the other with an acute detection of *Escherichia coli* in treated water after a flooding incident required a boil water notice. They found that 76% of consumers took action in the town with the chronic problem while 90% took action in the town with the acute problem. However, only 57% of residents in the latter town boiled their water, but 77% drank bottled water (90% did one or the other). Noteworthy is that 30% of residents had not heard or seen the official public notice, so some awareness and compliance had clearly been achieved by alternative means of communications (e.g. word of mouth). Commenting on some earlier unpublished studies, Harding and Anadu (2000) noted that only 20% compliance occurred in a California notice which did not recommend any course of action for consumers, a feature that is obviously vital in crafting such messages. Johnson (2008) found there was scepticism about the degree of harm to expect in relation to variations from water quality standards. Johnson's findings make a strong case for understanding how the audience for a risk communication message will process that message, particularly when it includes quantitative information.

Hunter (2000) cautions that if a boil water advisory is issued, there must be an unambiguous understanding about the criteria for the advisory to be lifted. Wallis et al (2001) provided a tangible example contrasting two northern Ontario (Canada) communities which called boil water advisories on the basis of suspected *Giardia* cyst contamination of treated water. However, only one community needed the advisory because it was truly experiencing an outbreak, while the other maintained a boil water advisory for a year based on misinterpretation of a single sample monitoring result which gave the inaccurate impression of being high.

4.3. Effective risk communication for water safety

Lacroix (2006) summarized a variety of challenges to effective risk communication for water safety in relation to the fatal Walkerton outbreak (case study 12). These included: discrepancy between appropriate actions stated by participants on a questionnaire (hand washing, counter cleaning) and actual observed behaviours of participants in action (Clayton and Griffith 2003); optimism leading to an individual's expectations that others are at greater risk than themselves, thereby reducing the individual's likelihood of receiving and accurately processing a risk warning (Weinstein et al 1988); and the need to understand normal consumer practices to make a risk communication message meaningful for individual decision-making.

Parkin et al (2006a, 2006b) undertook a major investigation of the importance of collaborations among U.S. water purveyors, public health officials and clinicians (environmental / occupational

³ Guidotti and Ragain (2008) noted that health care providers, particularly physicians, are routinely cited as the most trusted sources of information on environmental health issues by the public, yet such clinical professionals have no training in these issues.

health-oriented physicians or nurses) regarding communication for water-related health with contributions from water utilities (100), public health agencies (160) and clinicians (30). The project identified the need to establish and sustain long-term, trust-based relationships. Achieving this goal required identifying the appropriate institutions and individuals with whom to interact, finding means to institutionalise relationships and basing relationships on accurate knowledge of each others' interests, priorities, roles and responsibilities. Parkin et al (2006b) found that both water purveyors and clinicians expected local public health officials to bridge communications on water-related health issues.

A strategic approach to risk communications requires that participants understand the risk problem from both a science-base and a community perspective (Parkin et al 2006a). This may be possible for a slowly emerging issue which has been subjected to considerable investigation. However, for rapidly developing issues, such as an emerging outbreak or an emergency release endangering a water system, information inevitably will be incomplete and possibly inaccurate, usually with considerable uncertainty attached. In this circumstance, trust among participants is critical to avoid parties articulating widely divergent views without some attempt at reconciliation and / or acknowledgement that uncertainty dominates so that divergent views merely represent a range of possibilities rather than confident predictions of extreme outcomes. Finding a trusted member or members of the community who can be relied upon for communications with the community at a time of need is critical, but such contacts must be made before a problem arises, not after.

4.4. Humanitarian contexts

In situations such as acute emergencies where populations are living in temporary camps (as a result of a one-off catastrophe such as a natural disaster, a slow-onset humanitarian crises, war or a complex political emergency) a more directive approach to behaviour change can be more appropriate and effective since information needs are often more short-term and narrower. Poor quality and quantity of water and insufficient sanitation, deteriorated living conditions and overcrowding, increase the vulnerability of the affected populations to outbreaks of different diarrhoeal diseases. The fact that usual hygiene practices are disrupted and healthcare seeking behaviours may be altered can also be contributing factors. Flooding and stagnant water create especially favourable conditions for mosquito vectors (of malaria and dengue fever) and for transmission of leptospirosis, and they heighten the epidemic risk for individuals and communities in overcrowded conditions and temporary shelters. The most practical and effective strategy to prevent diarrhoeal diseases (including cholera, typhoid, shigellosis, hepatitis A and E - depending on endemicity in the affected areas), is to provide clean water in adequate quantities⁴, adequate sanitation, the distribution of hygiene items⁵, and hygiene promotion to further prevent the transmission of disease.

UNICEF played a major role in ensuring provision of safe water and sanitation following the earthquake in Pakistan in October 2005, within which a comprehensive communication plan was formulated and implemented. The plan aimed to create awareness and motivation on water and sanitation related diseases and their prevention. Verker (2007) presents the Hygiene Promotion strategy used during the earthquake in Pakistan. Factors considered included:

- the crucial role of religious leaders;
- the combination of coordination, logistic and expertise facilitates the success of the strategy implementation;
- when disseminating messages repetition is a key factor;

⁴ UNHCR and WHO recommend that each person be supplied with at least 20 litres of clean water per day.

⁵ UNICEF's hygiene kit consists of 50 litre water storage container, soaps, towels, bucket, jerry can, mug, toothbrushes, toothpaste, nappies, potty, nail clipper and sanitary protection for women.

- multiple channels were used to convey specific messages, adapted as much as possible to a response phase;
- short and direct messages are the most effective ones.

In such a context, the perceived severity and fear of a disease like cholera can result in immediate action to treat water. An intervention in Madagascar promoting 20-litre jerry cans and hypochlorite solution reached peak sales during the rainy (cholera) season, then declined in the dry season (Dunston et al, 2001). Researchers concluded that in this situation, water treatment was perceived as a cholera prevention action, rather than as a routine water treatment practice. In Zambia, Quick (2003) reported that a major cholera epidemic in January 1999 increased the sales of the water treatment product Clorin, which had been launched in October 1998. Product sales, which had been low in the first three months, increased during the threat and then receded in the dry season, as the product was used as an outbreak response measure to control the epidemic. Once the disaster is over and the messages to treat water stop, most people go back to their normal practice of not treating their drinking-water. Such emergency response actions, while necessary and appropriate, may inadvertently send a message that water treatment is necessary only in “potentially fatal” occasions, not under normal conditions⁶. Nevertheless, there were reports that in rural Bangladesh after the 1991 cyclone, (Hoque: 1993) and the 2005 earthquake in Pakistan chlorination tablets were not used in a consistent and effective manner partly because chlorination of water was not a routine procedure for the affected communities but also because chlorination was said to spoil the taste of the water.

The home visitor program in Sudan played an important role in the surveillance of cholera in camps and for the health education of the refugees (Malholland, 1985). There was approximately one home visitor for 150 families. Through megaphones, public meetings and by home visits the refugees were informed about the symptoms of cholera and told to seek early medical help if any severe diarrhoea and vomiting occurred. Community health workers were also used to patrol the tents day and night to bring in suspected cases. The provision of appropriate and sufficient water containers, cooking pots and fuel can reduce the risk of cholera and other diarrhoeal diseases by ensuring that water storage is protected and food is properly cooked.

Although adequate sanitation facilities might be provided (in the form of latrines or designated defecation areas), people might prefer to use the open spaces around the camp for defecation or else might there might be a great deal of faeces within the camp, from children, ill adults and those who, under cover of darkness did not wish to make the journey to the latrine. Better consultation with people and a more demand- led approach means that toilets can be designed or located in a way that people (including the elderly, disabled and young) are willing to use them (in the meantime defecation fields could be used). UNICEF and its partners provided latrine kits as part of the emergency response to Cyclone Nargis. However, it was reported that rural people were shy of using a latrine in a public place because of privacy issues (IRIN News, 2008). In Chad, 2004, Oxfam public health promoters and sanitation engineers found that in one camp, latrines were not being used because refugees were afraid that the plastic slabs were too weak. In another camp refugees reverted to open defecation because the concrete latrines slabs had edges which made them hard to clean. Latrine superstructures also posed problems: termites can eat away a wooden latrine structure within a month, while sand and wind make plastic last for less than a year. For many of the refugees, who are nomadic herders, plastic sheets are more valuable for building shelter than latrines. To keep latrines clean, in one camp, Oxfam assigned a group of 20 families to become owners of a latrine and take care of its maintenance. For sanitation, communication materials might be required to address inadequate latrine cleaning, poor hygiene practices, and inadequate waste collection (<http://www.irc.nl/page/14952>).

⁶ Purposive water treaters treat water in special situations, such as when a family member is sick or a flood or other natural disaster temporarily affects the water supply. In contrast, consistent water treaters always treat their drinking-water. Most households consider water treatment unnecessary, either because they believe the source water is clean enough or because the water is already treated at the source (Figueroa & Hulme, 2007).

5. Household water treatment

This section focuses on identifying the socio-cultural and financial issues which will influence the adoption of different treatment technologies. Treating water at the point of use is a process that is independent of the means by which the water was drawn (surface water, well water or tap water) with the individual taking responsibility for improving the quality of the water (by adding cleaning agents, solar disinfection, filtration, boiling and safe water storage) (Sobsey et al, 2003). There are many reasons for treating water besides to remove contaminants, including to aid digestion, to give to family members after they become ill, to remove its “cold” properties and as a sign of status. In Latin America and in many Asian cultures, a common belief is that an imbalance of hot and cold causes illness. “Hot and cold qualities apply to foods, activities, and emotional and physical states and do not necessarily refer to temperature” (Pebley, Hurtado & Goldman, 1999: 198). In southern Punjab, Pakistan, Nielsen et al. (2003) found that mothers classified diarrhoea as both hot and cold—whether eating too many hot foods in the summer or eating cold foods during cold weather. Bloody diarrhoea was perceived to be the result of consuming hot foods; cholera, the result of consuming cold foods. In this context, the challenges for communication include ensuring consistent use and the need for safe storage.

A multivariate analysis in Andhra Pradesh (PATH, 2008) found that households are more likely to treat water if they live in an urban area, have younger and more educated household heads, live in better quality housing, pay less for water, and spend less time collecting water. In contrast, older people tend to consider routine water treatment unnecessary and to dismiss commercial household water treatment and safe storage technologies (HWTS) products as a fad. Qualitative research in Andhra Pradesh also revealed a psycho-emotional dimension to water treatment. Focus group participants describe people who treat water as more health conscious, educated, and wealthy. They also view them as more disciplined and conscientious or, alternatively, as more cautious than the average person.

5.1. Safe water storage

Deterioration of microbiological drinking water quality during storage has been widely recognized by several studies (Brick et al, 2004; Lindskog and Lindskog, 1988; Pinfold, 2003; Trevett et al, 2004). Few of the studies, however, discuss individual or household behaviours related to storage and other water management practices. The relevant aspects of household water handling include behaviours during water collection, transportation, storage and use. Homes in which storage containers were cleaned more often had less pollution of the stored water. Dipping a utensil in stored water is a common practice when storage containers do not have a spigot. Contamination also increased in storage containers when fresh water was added to the stored water. In rural Bolivia, Clasen et al (2004) found that when respondents were asked to demonstrate how they would access the water, 85% dipped a cup or other utensil into the stored water. Only 18% of households had a jerry can for water storage, and a majority of households stored water in a barrel, bucket, clay pot or tank. A study in rural Honduras by Trevett et al (2005) that examined post-supply water quality deterioration mechanisms found a series of household behaviours that led to water contamination after collection. The authors identified five factors that contributed to water quality deterioration: 1) use of hands, 2) dipping utensils, 3) collection containers, 4) storage containers and 5) bacterial growth. In Rwanda, Gasana et al (2002) found that additional contamination of water occurred during transportation from the source to the home.

5.2. Financial aspects

Several studies document the positive association between higher socioeconomic status and hygiene-related behaviours or purchase of commercial household water treatment and safe storage products. In Zambia, participants reported lack of money as one of the reasons that they did not intend to purchase chlorine to purify their water (Thevos, Quick & Yanduli, 2000). Also in Zambia, Quick et al (2002) reported that one of the reasons for the high observed use of the water disinfectant was its substantially lower price (perceived affordability) and time saved

(perceived ease of use) compared with boiling. In the Dominican Republic, some of the main reasons given for no longer boiling water were “cannot buy enough fuel”, “no stove” and “no appropriate pots” (McLennan, 2000a). In the Dominican Republic, families with more household goods (refrigerator, stove, radio and television) were significantly more likely to purify drinking-water than those who had less than four of these goods (McLennan, 2000b). These findings were reaffirmed in a study of home-based interventions for childhood diarrhoea. Luby et al (2004) found that some households with a refrigerator adopted the new behaviours (bleach, vessel and soap) sooner than others. In their Guatemalan study, Goldman et al (2001) concluded that households with a higher socioeconomic status were more likely than poorer households and other members of the community to report causes of diarrhoea related to hygiene or contamination. PATH (2008) note in Andhra Pradesh that whilst traditional treatment methods, including boiling and net or cloth filters, are universally known, viewed as less expensive and far more widely used than commercial products, people also perceive traditional methods to be less effective than commercial methods and more time-consuming.

5.3. Responses to chlorination

A consistent finding across all the water chlorination studies reviewed was the negative emotional response to the smell and taste of chlorine. About a third of participants in the intervention to increase water treatment among street vendors in Guatemala mentioned that chlorine had a disagreeable smell and taste, even though more than 90% said that chlorination was an effective way to purify water (Sobel et al, 1998). In the Dominican Republic, not liking the taste and smell was the second most common reason stated for not using chlorine (McLennan, 2000a), whereas disagreeable taste was the most common reason for not using chlorine among those who said that it was a good way to treat their water (McLennan, 1998). In a recent Clorin evaluation in Zambia (Olembo et al, 2004), the taste and smell of Clorin were among the reasons people gave for stopping its use. In Sri Lanka, people boiled water instead of chlorinating it because they disliked the medicinal smell of chlorine. However, they also felt that boiled water was “tasteless” (Nichter, 1985).

5.4. Attitudes and beliefs

Perceived attributes of a product for treating water, whether positive or negative, contribute to the product’s adoption and sustained use. Except for outbreaks of a cholera epidemic that motivate people immediately to treat their water, the perceived risk of diarrhoea does not always motivate water treatment or other hygiene behaviour. For instance PSI (Dunston et al, 2001) found in Madagascar that people generally believe that the water they use is unsafe only during the rainy season and during cyclones, floods and cholera episodes. Only 39% of the households surveyed in Andhra Pradesh reported treating water at home at any point during the year, for the most part seasonally or occasionally rather than year-round. Common triggers for treating water are a change in its appearance or illness in the family. For example, increased turbidity during the rainy season may prompt households to treat water, and women often boil water for a sick child or elderly family member.

Diarrhoea is not always seen as a significant health threat. According to a PATH study (2008) the residents of Andhra Pradesh view water treatment as a curative, rather than preventive, health measure, to be used in case of sickness. Pinfold (1999) concluded that attempts to reduce childhood diarrhoea through point-of-use water treatment should take into consideration the fact that diarrhoea is not always viewed as an illness or as being related to water purity. In a periurban community in the Dominican Republic, one of the most common reasons for not purifying drinking-water, among caregivers who knew about the connection between water and diarrhoea, was that their children were old enough to drink untreated water. More than a third of all respondents had already stopped or planned to stop boiling water by the time their child reached two years of age (McLennan, 1998). Similarly, in a periurban shantytown in Peru, mothers were observed letting older children drink unboiled water more often than they let their younger children (Gilman et al, 1993). In Madagascar, parents did not make a connection between their children’s bouts of diarrhoea and their children’s thin stature. Given Madagascar’s ideal of a

chubby child, the social marketing organization PSI deliberately created an advertising campaign with chubby, healthy-looking children drinking safe water to promote its water treatment product.

5.5. Household decision-making

The locus of decision-making about household expenditures is likely to affect sustained water treatment. The positive effect on health of women's control over some of the household income has been widely documented. In Pakistan, lack of control over household resources was one of the reasons that mothers mentioned as a barrier to investing in diarrhoea prevention measures and treatment (Halvorson, 2004). PATH (2008) found that women in Andhra Pradesh are primarily responsible for collecting water and deciding whether to treat it and they tend to be sceptical of commercial household water treatment and safe storage technologies. The research found that women are also more frugal and cautious than men in decisions to purchase new products. There is a strong preference for durable household water treatment and safe storage products, such as filters, over consumables, such as chlorine disinfectants.

In Kerala, a study of hygiene behaviour by Cairncross et al (2005) uncovered the effect of a supportive household norm on hand-washing behaviour. Respondents in their study were more likely to demonstrate correct hand washing in those households where all women reported the practice. The authors also observed that education and communication in the study sites affected women's behaviour, but not men's. Key informants confirmed that this lack of effect on men was explained by the fact that the interventions were directed to women, which gave the impression that the project was for women only.

Research in Guatemala by Goldman et al (2001) found that the closer household members lived to their relatives, the weaker the relationship between diarrhoea and hygiene practices. The authors concluded that people who live with or near parents or in-laws and who see them frequently are less likely to adopt hygiene-related behaviours, although the relationship was not statistically significant. They reasoned that when family members live near relatives, they may have less overall authority or relative power within the family than in the absence of relatives and thus be less able to adopt new practices on their own. Other studies have found that mothers-in-law, older mothers and grandmothers "strongly influenced decision-making about water management and hygiene behaviour within the household environment" (Halvorson, 2004). Thus health education needs to consider the role of the grandmother and the mother-in-law within each household, as well as the husband-wife relationship.

5.6. Social context

Communities can play a significant role in health promotion. In Zambia, "the strongest reason for starting Clorin use was [that] neighbours were using it" (Olembo et al, 2004, p. 14). Recent studies have advocated for the involvement of community opinion leaders to make water treatment interventions more effective (Luby et al, 2004). Some programmes have used integrated approaches: mass media with community and advocacy components (Ahmed, 1998; Waterkeyn & Cairncross, 2005). Social organizations, such as health committees, health clubs and mothers' clubs, have also proved effective in improving water treatment and hygiene practices.

In Zimbabwe, health clubs provided the opportunity for community members to socialize and to learn new hygiene behaviours. The health clubs attracted increased participation, which contributed to the continuation of hygiene practices in the community (Waterkeyn & Cairncross, 2005). Waterkeyn & Cairncross (2005) attributed the success of the health clubs to the opportunities they provided for community members to socialize, to learn while enjoying themselves in entertaining activities, to participate in issues of interest to them and to gain prestige by holding a club membership. The prestige of club membership helped new hygienic practices become the social norm. In Guatemala, Barbieri (1993) reported the positive role of strong community leadership in reducing diarrhoea. The president of the community development committee in La Soledad acted as a catalyst to initiate a water treatment intervention in the community. After receiving training on the use of a water filter, he took the

lead in motivating households in his community and in training them to filter their drinking-water to prevent diarrhoea. In Kerala, community mobilization activities (group meetings, the participation of a variety of community groups and entertainment-education activities, such as exhibitions, health camps, local theatre, films and health clubs) contributed to the success of a hand-washing promotion programme (Cairncross et al, 2005). In Madagascar, community mobilization significantly increased the community adoption of point-of-use water treatment and safe storage practices (Dunston et al, 2001).

6. Conclusion

The findings from this review show that people do not easily change and sustain the new behaviours promoted by water treatment and hygiene interventions. The review suggests that the promotion of water treatment and safe storage needs to utilize innovative, integrated and holistic approaches to be more effective in the future. The literature indicates that no single communication channels for the promotion of water treatment or hygiene is likely to be sufficient to sustain good practice. Multiple approaches should be integrated through a selection of common themes to ensure consistent messages for sustained long term behaviour change.

Giving people information about health risks is unlikely to change the behaviour of more than one in four people, and these are generally the more affluent and better educated members of a social group (Campbell, 2003). Health related behaviours are determined not only by the conscious rational choice of individuals, on the basis of good information, but also by the extent to which broader contextual and social factors support the performance of such behaviours. Recent decades have seen a move away from formal didactic health education methods towards more participatory approaches. This change in practice has gone hand in hand with a conceptual shift away from understanding behaviour as the product of individual decisions, in favour of the concept of behaviour as a socially negotiated phenomenon (Campbell, 2003).

Furthermore, the literature recommends communications campaigns find a way to promote water treatment and hygiene that does not rely solely on a promise of reduced diarrhoeal disease. The literature recognises that good health is just one of the reasons why people might change their behaviour; other reasons include prestige, modernity, convenience, social acceptance and disgust of faeces. Similarly, there can be many reasons why new behaviours are not adopted as a direct result of new learning: the suggested 'safe' practices may be too expensive or time consuming, appropriate facilities may not be available, women might not have sufficient decision-making power within their homes to take effective action, or there may be no support, or discouragement, from other household members and wider society.

With regard to further research, this review suggests that community norms, resources and relations be better understood by programmes to facilitate the development of water treatment and hygiene as a social norm. In addition, further research on the active information-seeking behaviour and search strategies of people in relation to water treatment and hygiene could prove very fruitful.

Table 3 Summary and examples of communications tools used in WASH projects

(A) Mass communication

Radio

The lack of a reliable power supply and the relatively high cost of batteries means that mass-produced (and therefore cheaper) wind-up radios have great potential uptake. Radio is proving to be a cheap and effective means for the dissemination of health related information including hygiene promotion at national and community levels in many countries and for encouraging community dialogue on health-related issues

Candidates for the Ghanaian presidential election scheduled for December 2008 answered questions on prime time radio about their sanitation plans if they were elected.

Source: <http://www.irc.nl/page/45178>

The Radio Instruction to Strengthen Education (RISE) project teaches Tanzanian children life skills related to health, hygiene, and nutrition via interactive radio instruction (IRI).

Source: <http://www.comminit.com/en/node/133590>

Guinea-Bissau, October 2008: in response to the cholera epidemic UNICEF has put out radio announcements encouraging people to wash their hands regularly throughout the day. A UNICEF report investigating the causes of poor hygiene found that cultural practices play a role. There is a saying among some groups that when a kid has dirty hands, he grows stronger.

Source: <http://www.irinnews.org/report.aspx?ReportID=80887>

On Christmas Island the Water Project (KWASP) does weekly awareness programmes on water and sanitation safety issues on Kiritimati Radio. Overseas technical consultants are sometimes invited to discuss issues on-air. A requirement of the project is to educate the local people in health and hygiene. Since there were no media on the island (no newspaper and no radio), the project director came up with the idea of adding a small radio station into the project as the "vehicle" for the educative role in the project.

Source: <http://www.comminit.com/en/node/1669>

Angola: IRIN Radio Southern Africa and Radio National de Angola. Camatondo is a serial radio drama that aims to support Angola's post-war reconciliation, and to provide information related to healthy living. The drama uses entertainment-education to create informative stories. To increase access of listeners to the drama and other programmes, IRIN distributed 2000 Free Play wind up radios in 2004. The drama uses simple language in an effort to be accessible to rural Angolans.

Source: <http://www.irinnews.org/Report.aspx?ReportId=69881>

IRIN Radio's soap opera, entitled Tuyage Twongere ('Let's Talk' in Kirundi), was launched in 2003. The drama is recorded by refugee actors in the camps in Ngara, western Tanzania. The series is aired by Kwizera, covering the camps and bordering provinces of Burundi. The project seeks to advocate on gender equality, health, hygiene, human rights and other issues to improve living conditions for Burundian communities

Source: <http://www.comminit.com/en/node/71090>

As part of the Post-Tsunami Hygiene Improvement Programme in Indonesia Center for Communication Programs (CCP) helped design and produce radio programmes to disseminate the message of hand washing with soap; increase the use of Procter & Gamble's PuR water treatment product - to ensure that PuR is distributed properly, and that those who receive it can understand how using PuR can help prevent diarrhoea and can use it correctly to purify their drinking water; strategic communication to generate demand from the public for the new safe water system Indonesia's commercial sector. The programme has also promoted playwriting by internally displaced persons ; mothers and children acted as performers in the dramas, which were video-taped and shared among other IDP camps; the mothers and children rehearsed and then performed "Searching for Soap", "Fighting Over the Bathroom", and "Syuur Cake" (Donuts).

Source: <http://www.jhuccp.org/asia/indonesia/>

Launched in 2004, Pilika Pilika, a radio soap broadcast in Kiswahili in Tanzania. The drama aims to spread awareness about issues relating to home hygiene and community water management. Pilika Pilika, which means "busy, busy" in English, is set in the fictional Tanzanian village of Jitazame. One of the episodes dealing with water, hygiene, and sanitation told the story of how Mawazo, a key character, falls into his poorly maintained pit latrine and then has to walk for hours to the river to clean up because the

water pump in the village was broken.

Source: [http://www.wateraid.org/uk/what we do/where we work/tanzania/4474.asp](http://www.wateraid.org/uk/what_we_do/where_we_work/tanzania/4474.asp)

Booklets / flyers

Paper-based materials such as posters, calendars, local newsletters, leaflets, coloured pamphlets can be produced fairly cheaply but often these are generic in style and content and do not reflect local needs, behaviours and culture. Distributing huge numbers of behavior change materials, like brochures and posters increase the capacity to inform local residents. Allow more detailed information to be included in the message, printed media also allow people to revisit the message over and over.

WSP Uses Cartoons to Spread Economics of Sanitation Messages in Cambodia

Information, education, and communication (IEC) materials distributed by the India PolioPlus Programme Muzzafarpur include a Ramzan calendar distributed to Haj pilgrims

Source: <http://www.comminit.com/en/node/267552/292>

Posters and Banners

Commonly placed strategically on public streets. These must be interesting, simple, impressive, and colorful enough to attract people's attention and become conversation pieces. Advertising hoardings are usually located in urban areas or on the road between urban areas which increases their effectiveness in reaching a large proportion of the population for hygiene promotion purposes

Newspapers

Regional and national mass media agencies in East Asia gave prominence to sanitation and hygiene in the first quarter of 2008 as sector leaders put the International Year of Sanitation (IYS) high on their agenda. Facts and figures from WSP's Economics of Sanitation Initiative (ESI) made the front page in major newspapers across East Asia with headlines calling for more country investment in sanitation and highlighting the number of deaths due to poor sanitation.

Source: http://www.wsp.org/index.cfm?page=page_disp&pid=13415

Television

Center for Communication Programs (CCP) through the popular television programme Alam Simsim (the Egyptian version of the American television show Sesame Street), taught children about general hygiene, safe water and hand washing. This hygiene and hand washing campaign will help to prevent the transmission of avian flu through hand-to-mouth contact, while also reducing the spread of other preventable diseases such as typhoid fever and diarrhoea.

Even though household ownership of radio and TV may be low, the actual rate of consumption could be higher. The owner of radio or television might share their consumption with neighbours by increasing the volume of their radio so that the others could hear the program as well, or put their television set in a strategic place in their homes, where their neighbors can also come in to watch the program. Community-owned televisions with individual generators might be a possibility for extending access.

Source: http://www.sesameworkshop.org/newsandevents/pressreleases/alam_simsim_future

Launched in August 2006, a joint United Nations (UN)/Music Television (MTV) Network – Water for Life Campaign - using information and communication technologies (ICT's) to inform youth about the world's growing water crisis with Jay-Z

Source: <http://www.un.org/apps/news/story.asp?NewsID=19459&Cr=water&Cr1>

Advocacy Kits

International Year of Sanitation Advocacy Kit includes fact sheets; a booklet with the five key messages; a communication matrix; the official IYS poster; an advocacy guide for sanitation; a compilation of web links, talking points; a MS PowerPoint presentation; interviews in print and in audio format; and resource materials. The kit's intended users are policy makers, journalists, and sanitation actors and advocates, including business people, religious leaders, non-governmental organisations (NGOs), teachers, communities, and households. The materials are intended to provide policy makers with the resources they need to make decisions and implement them. Another objective is to reach journalists because the media are key players in the sanitation struggle for influencing policy and stimulating individual behavioural change.

Source: <http://esa.un.org/iys/>

Global Handwashing Day

The Day is aimed at creating a local and global culture of handwashing with soap at critical moments (for example, after using the toilet, while cleaning a child, and before handling food). In the long term, the hope is that this Day can become a platform for advocacy geared toward policymakers and key

stakeholders and an occasion for concrete public commitment to actions that will spur behaviour change. During Global Handwashing Day – and the surrounding week – playgrounds, classrooms, community centres, and the public spaces of towns and cities are the site of educational and awareness-raising activities as countries unite to change handwashing behaviour.

In 2008, more than 120 million children in 70 countries across 5 continents were expected to participate in the campaign. Examples included washing hands was the topic of Afghan television and radio talk shows and Pakistani newscasts. Nepal's new Maoist government sent out mobile text messages and, in Bhutan, special animated videos were made with Bhutanese characters.

Source: http://news.bbc.co.uk/2/hi/south_asia/7670855.stm

In India Ministers at national and state levels launched the campaign by participating in handwashing activities with children in rural schools. These activities included: children pledging towards hygiene, organised handwashing games, and washing hands in a giant waterfall. Almost 1 million schoolteachers took part in training courses to execute the campaign and to reach out to about 100 million school children. Materials developed included: posters, teacher training module on handwashing, pamphlet with pledge for students. Radio jingles featured a 25-second song on the 5 steps for correct handwashing.

Source: http://news.bbc.co.uk/2/hi/south_asia/7670855.stm

The Global Public-Private Partnership for Handwashing With Soap

The Global Public-Private Partnership for Handwashing with Soap set out to tap the consumer marketing skills of industry for national handwashing programs. The partnership is spearheaded by the United Nations Children's Fund (UNICEF), the United States Agency for International Development (USAID), the US Centers for Disease Control and Prevention (CDC), the World Bank Water and Sanitation Programme, Unilever, and Procter & Gamble.

In 2003 in Ghana commercials were made that showed mothers and children walking out of bathrooms with a glowing purple pigment on their hands that contaminated everything they touched. The toilet cues worries of contamination, and that disgust, in turn, cues soap.

Swasthya Chetna hygiene education programme: Lifebuoy's 'glowgerm' demonstration counters the common misconception that 'visibly clean' is 'hygienically clean'. When held under ultra-violet light, glowgerm powder glows on hands washed only with water, providing a dramatic reminder of the need for thorough handwashing with soap.

Source: http://www.hul.co.in/citizen_lever/lifebuoy_chetna.asp

Use of well known celebrity figure

On one hand celebrities can boost the campaign's visibility and popularity and people who like the celebrity figure will remember better what he or she endorsed and may believe in the same values. However, if the celebrity falls out of favor then the campaign will be directly affected as well.

For Global Handwashing Day in India the mass media campaign was held with the support of Sachin Tendulkar and Yuvraj Singh, two "hugely popular cricket celebrities". A cricket event was held on the Mohali Cricket grounds in Chandigarh, where children joined the cricket team in demonstrating and taking part in correct handwashing procedures. Tendulkar also appeared for free in a public service announcement (PSA) developed by UNICEF and the Government of India broadcast in 14 languages on television channels across the country.

Source: http://www.globalhandwashingday.org/GHD_Matrix.asp?c=India

(B) Group Communications

Loud speaker (from mosque and mobile vans)

Loud speakers at the mosque or via mobile cars can be a highly effective modes of communication to reinforce national mass media message on the importance of community participation

Puppet shows

Egypt: The Village Environmental Assistance Project (VEAP) educational puppet shows which tour the project areas, using entertainment-education to spread the messages in a culturally appropriate way

Source: http://www.unicef.org/egypt/media_1445.html

Video

Videos addressing hygiene issues could be made for use at social gatherings, in schools and health clubs. Local participation in the video production would help to maximise local interest and foster the uptake of improved hygiene practices. Video is important where women's voices in societies bifurcated along gender lines.

In Pakistan, women, the main managers and users of water, were excluded from village management and decision-making bodies. The 'Woman to Woman Video' effectively gave women in purdah a sanctioned voice in water and sanitation planning. The video enabled women to discuss what water and sanitation infrastructure could be afforded, and participate in choosing the best water supply option for their households.

Source:

<http://www.siyanda.org/search/summary.cfm?nn=1436&ST=I.S&Keywords=icts&SUBJECT=0&Donor=&StartRow=21&Ref=Sim>

Plays

Wan Smolbag Theatre consists of approximately 50 (mostly young, at-risk) people working with communities throughout Vanuatu. Community workshops and plays, as well as radio and video offerings. The group's primary strategy is using face-to-face contact - in the form of participatory theatre - to educate and mobilise people in even the most remote villages. The mainstay of the group's work are short, 20- to 50-minute theatre pieces on environmental, health, reproductive health, and population issues

Source: <http://www.wansmolbag.org/DynamicPages.asp>

CARE in Northwest Bangladesh, supports Open Defecation Free paras (hamlets) to spread Community Led Total Sanitation to their neighbours through drama. CARE provides logistic support such as a generator and sound system, but the show is organised and run by the para. In one community's drama a true story was told of a rich person who was unwilling to install a latrine. In the drama, a 'matchmaker' brought some guests for his daughter's marriage. One guest wanted to use the latrine on an urgent basis, but the rich person did not have one. The embarrassing moment is portrayed through a comic scene that creates huge laughter among audiences

Source: Handbook on Community Led Total Sanitation : <http://www.plan-uk.org/newsroom/clts/>

Nepal: Aarohan Street Theatre performs a play called Kalchakra (The Death Circle) about sanitation, based on a famous folk story of Nepal Aarohan performs street plays in more than 55 out of 75 districts of Nepal Source: http://www.aarohantheatre.org/street_theatre.php

Group activities spiritual/religious life

Community activities to integrate other messages (such as education and health) in their group activities. They can also be utilized to induce motivation among all intended audiences in taking more proactive roles and participation in WASH projects.

Recitation of the Quran, group prayer, village meetings, sports activities and regular social gathering.

In Indonesia Muhammadiyah is a leading religious organization in Indonesia, boasting 30 million members nationwide and managing over 500 hospitals and clinics, 17,000 schools from kindergarten to university, and 350 orphanages. The Public-Private Partnership for Handwashing with Soap (PPP-HWWS) believes it is strategic to bring Muhammadiyah on board as a partner in disseminating handwashing messages to the public.

Source: Access November 2008

http://www.wsp.org/index.cfm?page=page_disp&pid=19119

Photography

Sanitation in my Neighbourhood was a children's photo competition aimed at addressing water and sanitation issues in Madagascar. A professional photographer explained to the children how the camera worked, and then asked them to take images showing the sanitation problems and solutions as they saw them - under the theme of 'sanitation in my neighbourhood'.

Source: http://www.wateraid.org/international/about_us/oasis/autumnwinter_05/1441.asp

Film

International Water and Film Events (IWFE) Contest. The 5th World Water Forum is calling for video entries on sanitation and hygiene for its International Water and Film Events (IWFE), scheduled for March 18 to 21 in Istanbul, Turkey – there is a "WASH Water Supply, Sanitation and Hygiene" Prize Source: <http://www.worldwatercouncil.org/index.php?id=342>

The Meena Communication Initiative (MCI) developed by UNICEF in South Asia uses animation films

and teaching aids to sensitize and empower families, communities and children on proper hygiene and sanitation practices. Screening of films accompanied by a discussion with peer facilitators
Source: http://www.unicef.org/rosa/media_2479.htm

Cinéma Numérique Ambulant (CNA) or [Mobile Digital Cinema] is a mobile cinema that brings entertainment and education to villagers in Benin (2 units), in Niger (2 units) and in Mali (3 units). Mobile cinema projection vans travel across rural areas in these countries, and in the open air project popular African films along with health messages about malaria prevention, child brides, HIV/AIDS prevention, and water and sanitation.
Source: http://www.unicef.org/infobycountry/niger_30623.html

The "Diorano WASH" project on Madagascar is seeking input from the public. Cameramen will roam around 11 regions interviewing villagers about their water and sanitation problems. The objective is to get a better idea of grassroots opinions and needs

Source: Madagascar: Mobile cameras and water problem - Cameramen will face residents in eleven regions, August 24, 2008

<http://washafrika.wordpress.com/2008/08/24/madagascar-mobile-cameras-and-water-problem-cameramen-will-face-residents-in-eleven-regions/>

Computing and Internet

Modern communications provide new opportunities for sharing experiences and data. IEC initiatives are important to water supply and sanitation programmes;

Initiated by the United Nations (UN) Country Team in India, Solution Exchange offers communities of development practitioners an opportunity, through online forums and face-to-face meetings, to discuss issues and share information about strategies and solutions for everyday use in development work
Source: <http://www.solutionexchange-un.net.in/en/index.php>

People in more than 2000 villages in rural India within 30 kms radius of a town have access to Internet kiosks which provide a range of communications services. Such kiosks could provide hygiene information accessible in local languages and with locally produced resources to promote improved hygiene behaviours.

Source: Kendall, Jake and Singh, Nirvikar (2007): Internet Kiosks in Rural India: What Influences Success? Unpublished

<http://mpira.ub.uni-muenchen.de/4320/>

Lao PDR Vice-Minister of Health inaugurated the launch of the country's first health promotion website, www.health.gov.la. The website compiles guidelines, manuals, toolkits and hygiene promotion materials in Lao and English. The 'Ask Expert' and 'Health Forum' functions, for instance, allow users to interact, post health, hygiene and sanitation-related questions and to share ideas through an interactive web board.
Source: www.health.gov.la

Akvo is an internet-based, global online water and sanitation resource and collaborative platform that is described as being "like a Wikipedia, eBay and YouTube for water and sanitation projects, rolled into one. It is intended to reach the local doers that can act as intermediaries and agents of change, providing them with the right knowledge and tools to solve problems

Source: <http://www.akvo.org/>

Health Education to Villages (HETV), the HETV forums are an online platform that are available for discussion among health-care providers about health programme issues, as well as an opportunity for members of the public to participate and provide their ideas on the development of these programmes - online forum for posting and reading of messages - exchange of ideas, best practices and solutions to health, water, hygiene and sanitation issues facing village communities

Source: <http://hetv.org/>

Sport

Soccer Aid: United Nation's Children's Fund (UNICEF) developed this sports-focused, communication-centred programme to raise awareness about, and funds to address, issues that impact the lives of children such as water and sanitation: Providing families in Mozambique with clean water and adequate sanitation. The use of information and communication technologies (ICTs) was also a means for involving the public in Soccer Aid - television show, public service announcements (PSAs), a website

Source: <http://socceraid.unicef.org.uk/>

Education material

GlaxoSmithKline in partnership with NGOs run a simple hand-washing programme 'Personal Hygiene and Sanitation Education' (PHASE) for children to reduce diarrhoea-related diseases associated with poor hygiene. Educational materials used in PHASE include cloth books and story cards, which are adapted for each country. Teachers and community leaders are given specialist training to deliver the programme in schools. PHASE curriculum has a strong focus on what children and communities can do collectively to make their lives and surroundings healthier

Source: <http://www.gsk.com/community/phase.htm>

Children to children

These schemes recognize the potential of children as agents of hand washing behaviour change by coupling water and sanitation improvements in schools with hygiene education. The use of environmental health clubs, drama groups and student focus groups creates the conditions for children themselves to be agents of change in their schools, families and communities.

Nigeria: One school initiated an Environmental Health Club, where students promote hand washing with soap in both the school and the community and advocate for secure household water supplies to continue hygienic behavior at home.

Source: http://www.unicef.org/infobycountry/nigeria_1468.html

Indonesia: A primary school project called "Dokter kecil," or little doctors, develops school clubs, consisting of 30 students that promote hygiene through community theatre. They also take charge of the village's Jum'at Bersih (Clean Friday), a national movement, begun in 1994, that encourages hygiene promotion, particularly hand washing with soap, during meetings on Islam's holy day.

Source: <http://www.child-to-child.org/wherewework/indonesia.htm>

Malawi: Children participate in a process of developing and instituting national standards for sanitation facilities and hygiene promotion in primary schools.

Source: http://www.globalhandwashingday.org/Lessons_UNICEF.asp

Pakistan: The Safeguard School Program uses an animated character Commander Safeguard to make hygiene message relevant, memorable and engaging for school children.

Source: http://www.globalhandwashingday.org/Safeguard_pakistan.asp

In south east Asia, UNICEF has supported many governments to target school physical environment to address helminthes infection in schools. Through the Water, Environment and Sanitation (WES) program, strategies aim to improve the number and hygiene status of school toilets and hand washing facilities, provide safe drinking water and policies relevant to the cleanliness of facilities

Source: <http://www.unicef.org/wes/>

Planned activities with school children in Senegal:

- Beautiful toilet competition - a national inter-school competition for the cleanest and best-decorated toilets.
- Hand washing fun fairs.
- Song competition - students can submit original rap songs to their school, and the winning song will be performed in collaboration with famous Senegalese Hip Hop artists. The song will be released and played on radio and TV.
- Cartoon super hero - Production and transmission of an attractive, high quality TV cartoon super hero series which promotes hand-washing and has all the 'cool' attributes that children seek (rap, clothing, and a gadget for dispensing soap).
- Letter writing campaign - Pupils could write letters to senior officials asking for better toilets and hygiene facilities.
- Scrub clubs - will be responsible for assigning toilets to classes and for the organisation of toilet cleaning and interior decoration

Source: http://www.wsp.org/UserFiles/file/712200752142_Can_Hygiene_be_cool_and_fun_-_Senegal_2007.pdf

Myriam Sidibe & Val Curtis (2007) Can Hygiene be Cool and Fun? Insights from School Children in Senegal Water and Sanitation Program

Green Ribbon for Sanitation and Hygiene Advocacy

A Green Ribbon Campaign was recently unveiled in a colourful ceremony to mark the formal launch of the IYS in Africa. The green ribbon complements other ongoing advocacy initiatives aimed at raising the profile of sanitation and hygiene, Africa's silent crisis.

Source: http://www.wsp.org/index.cfm?page=page_disp&pid=13415

Roadshows

The Total Sanitation and Sanitation Marketing (TSSM) Project in 11 districts in Indonesia since June. Funded by a grant from The Bill and Melinda Gates Foundation, TSSM aims to scale up the Community-Led Total Sanitation (CLTS) approach in East Java Province in 2007-2009. On average, each roadshow drew 50 participants from local government and lawmakers, NGOs, media and informal leaders. The roadshows consisted of presentations on a national sanitation strategy, on the TSSM project itself, Q&A, and stakeholder discussions.

Source: Access: News for the water and sanitation community. Water and Sanitation Program. September 13, 2007. <http://www.wsp.org/>

(C) Individual Communications

Community health & hygiene promoters / peer educators / animators

To provide one-to-one or small group participatory hygiene education. They should be selected from among the target population. They should be able to communicate in the local language and, where possible, be people who are respected within the community. A reasonable standard of education and an enthusiasm for community work are desirable.

Community Health Intervention Program (CHIP) – though the Water And Sanitation Extension Programme between 1997 and 2001- Pakistan addressed women in education sessions and visited households to discuss health and hygiene, causes of disease, prevention of food- and water-borne illness, and treatment of diarrhoea.

Source: Evaluation of a water, sanitation and hygiene education intervention on diarrhoea in northern Pakistan, Bulletin of the World Health Organization 2003 Vol. 81: 160-165.
<http://www.who.int/bulletin/volumes/81/3/en/Nanan0303.pdf>

A programme of the Sulabh International Social Service Organization is designed to provide low-cost sanitation services to communities in India. Door-to-door campaigns by volunteers and workers involve persuading people to convert from bucket latrines to Sulabh System. Women are included as both students and instructors in the re-education process and trained as sanitation volunteers, with the expectation that they will pass the message along to other women.

Source: <http://www.sulabhinternational.org/>

Both Nigeria and Ghana are on course for eradication of guinea worm disease, after a successful campaign characterized by nationwide searches for cases, and by highlighting the socioeconomic impact. Nationally, it was characterized by personal communication by national leaders.

Source: Maes E.F. and Zimicki S (2000) An Evaluation of Community-Based Surveillance in the Northern Region of Ghana. Division of International Health, U.S. Centers for Disease Control and Prevention, The Change Project, Academy for Educational Development and Unicef
http://www.changeproject.org/pubs/GhanaCBSEvalrep_3-00.pdf
http://www.cartercenter.org/health/guinea_worm/index.html

A pilot scheme to build 400 VIP latrines in southern Lesotho became a mass national campaign after people in rural areas became so convinced of the benefits that they were willing to pay a month's wages to buy one. Studies of local knowledge and beliefs were used to prepare to train 4,000 village health workers to promote latrine construction and use. The programme became more successful after printed messages were supplemented with personal contact. A study showed that children were healthier in the pilot project area.

Source: M. van Ittersum and F. van Steenberg. 2003. Ideas for local action in water management. Stockholm, Sweden: The Global Water Partnership.

<http://www.gwpforum.org/gwp/library/Ideasbook%20Local%20action%20in%20water%20management.pdf>

Motivational Interviewing (MI)

This is a client-centred directive intervention: the helper is active and states opinion, but the final decision for behavioral change is made by the individual

A project in Zambia whereby nurses and health care workers use Motivational Interviewing techniques to achieve long term behavior change and the adoption of healthier lifestyles. Educational materials were also used in homes to show the use of treated stored water, and the washing of hands and utensils. In Motivational Interviewing, nurses visit individual homes once a week to monitor progress and attitudes of the people towards the introduced methods.

Source: Thevos A, Quick R and Yanduli V. Motivational Interviewing enhances the adoption of water disinfection practices in Zambia. Health Promotion International 2000; 15(3):207-214
http://www.cdc.gov/safewater/publications_pages/2000/thevos1_2000.pdf

Pharmacies

In Egypt, the majority of people go to their pharmacist instead of their doctor to receive health information. There are roughly 21,000 pharmacies in the country and about 15,000 of those are part of the AskConsult network. The AskConsult network taps into a large pool of trained professionals who are a great resource for citizens around the country, even in remote areas.

Source: <http://www.healthcom-egypt.info/>

Telephone

An NGO The Network for Water and Sanitation (NETWAS) Uganda has a Mobile text message project called 'Ask NETWAS (U) a WASH question'. The question in the form of SMS will be sent by the beneficiaries who will get an answer by a WASH professionals on their phones within one or two days on management of water sources, WATSAN technologies, spare parts, pumps, policy issues, water user committees etc.

Source: <http://www.ngomobile.org/?id=13>

Visual Aids

Phosphorescent powder can demonstrate dirty hands, simple water quality testing results and water clarification demonstrations are all useful aids for 'seeing is believing'. Such demonstrations can quickly lead to one group acting as an agent of change in a locality to bring about improved hygiene practices

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Part II - Interviews

1. Introduction and overview

The findings from the interviews of key informants are grouped according to broad commonalities in the types of water supply infrastructure and support systems, and the issues faced with communication with respect to safe drinking water, household hygiene and sanitation. The three main sections are therefore:

- Rural or remote communities. Here, the majority of findings relate to day-to-day public health risks posed by microbiologic contamination of water, poor hygiene practices or poor sanitation. In many cases it is a combination of all three. Some findings relate to other localized contamination such as groundwater contamination (e.g. arsenic or fluoride) and agricultural runoff. Evidence draws from a broad range of both low-income and high-income countries⁷.
- Urban populations. All findings relate to public health risks posed by potential or short-term, known microbiologic contamination of water. With one exception, these are high-income⁸.
- Emergencies. All findings relate to threats that result from large natural or man-made disasters, such as earthquakes, tsunamis, hurricanes or conflicts. Most findings relate to a diverse range of non-specific low-income countries.

The key themes that emerge are summarised at the end of each section, with a final concluding section drawing these together.

1.1. Methodology

Seventeen key informants were identified by WHO, the SCWSM and HHW Networks and Cranfield. RegNet (Table 4). Informants often represented multiple backgrounds, beyond their current title.

The use of semi-structured interviews, with open ended questions allowed both structure to these interviews and also probing of key strands of the discussions. The richness of data gathered through SSIs was preferred to other techniques such as questionnaires. All interviews were conducted by phone, recorded with full permission, transcribed, and coded.

Key informants were asked four main categories of questions (see section 1 for full interview schedule):

- Their experience of communication with respect to safe water, household hygiene and sanitation
- The process of communication used
- What worked well and what didn't
- Key determinants of change

⁷ Low-income: Bangladesh, Malawi, Guyana, Uganda, Uzbekistan and Zimbabwe. High income: Australia, Canada, New Zealand and South Africa

⁸ Australia, Canada, Germany, Guyana (low-income), Japan, New Zealand and the UK

Table 4: Interviewees

No	Name	Details
01	Mr. Andy Bastable	Public Health Engineering Coordinator, Oxfam, UK
02	Prof. Paul Jagals	Professor of Environmental Health, Tshwane University of Technology, South Africa
03	Mr. Kenneth Bekunda	Water & Sanitation Coordinator, Kigezi Diocese Water & Sanitation Programme, Uganda
04	Dr. Anthony Waterkeyn	Director, Africa AHEAD, South Africa
05	Dr. Juliet Waterkeyn	Executive Director, Africa AHEAD, South Africa
06	Dr. Nick Hewer-Hewitt	Senior Advisor, Environmental & Border Health, Ministry of Health, Wellington. New Zealand
07	Dr. Brian Matthew	Freelance Water, Sanitation, Health Education and Livelihoods Consultant, UK
08	Ms. Savitri Jettoo	Scientific Services Manager, Guyana Water Incorporated
09	Mr. Oliver Schmoll	Federal Environmental Agency, Berlin, Germany
10	Ms. Marion O'Reilly	Senior Health Advisor, Oxfam, UK
11	Prof. Steve Hrudey	University of Alberta, Canada
12	Dr. David Cunliffe	Principal Water Quality Adviser, Health, South Australia
13	Dr. Dominique Poulin	Manager, Drinking Water Program, First Nations and Inuit Health Branch, Health Canada
14	Prof. Jeni Colbourne	Chief Inspector of Drinking Water, UK Drinking Water Inspectorate
15	Dr. Susanne Herbst	Executive Manager, WHO Collaborating Centre for Health Promoting Water, Bonn, Germany
16	Dr. Andy Trevett	Environmental Health Adviser, WHO Bangladesh
17	Ms. Tomoko Ishimoto	Osaka Municipal Government, Japan

2. Communication in rural or remote communities

2.1. Culturally contextualised communications and approaches

Juliet and Anthony Waterkeyn, co-innovators of the Community Health Club (CHC) approach, promote the use of the well established PHAST⁹ approach in a “structured, formative way ... in Ethiopia now, with UNICEF funding, they have some really nice materials: coloured card sometimes plastic encapsulated and they seem to be having some nice results” (04: 186). “You have to ... assess what the cultural beliefs are and what the values and the value system of the culture is ... it could be to do with religion and it could be to do with ethnicity” (05: 186). In Ugandan IDP camps, through such structured approaches, 10,000 latrines were built in 6 months, with similar results in Rwanda (05: 179).

Amongst the residents of the First Nation in Canada, Dominique Poulin, Manager of the Drinking Water Program, Health Canada, reports that communicating a drinking water advisory by phone or through other community members was ineffective, as many individuals were unaware that they could not use their drinking water for brushing teeth when there was a drinking water advisory. The preferred methodology was to have a door-to-door notice, posters and radio announcements, though the effectiveness of this has not been assessed yet due to recent implementation (13:36). Due to low levels of formal education, communication needs to be “in simple words and lots of images ... for each step we have a drawing ... It was done by a contractor but with them because we did a lot of focus testing with a lot of First Nations. So they

⁹ Participatory Hygiene and Sanitation Transformation

saw it before and they said oh we need to change this. So we had three, one for boil your water which was like colour-coded. For example, boil your water, because they can still use it to take a shower so the colour is yellow like the traffic light. The do not drink, you have to use bottled water is red. The one where the water is safe you use green.” (13:76).

WHO has been piloting safe water supply in urban slums in Bangladesh, reports Andrew Trevett, Environmental Health Adviser for WHO in Bangladesh. “As part of the communication strategy, we developed in the national hygiene map, a three-page leaflet on cardboard with pictures, graphics and limited text. It was predominantly on safe water systems, with photographs of chlorinating water, how to store it and other methods of making sure that your drinking water was safe, boiling, but it was predominantly focussed on safe water supply ... other organisations took it up” (16:88). “Community level promotional material should mainly be visual and not much text but maybe a little bit of both, put your ideas into the community, go in and get people to tell you what they perceive and then draw them up based on community members’ visualisation” (16:190). By contrast, Anthony Waterkeyn reports that “in Rwanda now, with all that’s going on there and all the aid that’s pouring in there, the toolkits consist of two diagrams photocopied many times over, really low quality onto an A4 sheet of paper that one person holds up in front of the class” (04:202).

The use of local radio to achieve the same objective was similarly popular (although no assessment of success has been made) in spite of significant governmental bureaucratic delays: “We’d try to get some music or a drama in between the message to break it all up every fifteen minutes ... they seem to have a lot of interest at community level ... An opportunity to engage with a radio station I suppose, and to have your letter read out over the air ... that they are talking about something that affects me in my daily life and making that type of connection” (16:140).

In Australia, a software tool, the Community Water Planner, is used to develop a risk management plan, taking about half a day for small communities. In South Australia, Dr. David Cunliffe, the Principal Water Quality Adviser explains “we developed generic templates for very small suppliers so even going down as far as bed & breakfasts” (12:65). About two thirds of the rural population prefer to drink rainwater due to the taste. “Hospitals ... have to supply some of their patients with rainwater because they won’t drink the mains water. There is national guidance on use of rainwater and in fact there are now two or three guidances on rainwater, including insulation of tanks and use of rainwater. There is a health document on use of rainwater. Each state health agency has a brochure, a public pamphlet, on the use, control and management of rainwater. And we apply a risk management approach to that as well” (12:166).

In New Zealand, the 150 million dollar government funded Drinking Water Assistance programme for suppliers to less than five hundred people, consists of the TAP (Technical Assistance Programme) and the CAP (Capital Assistance Programme). Nick Hewer-Hewitt a Senior Advisor in the Ministry of Health, reports that TAP facilitators are resourced with animated DVDs (being used also by the UN in Afghanistan and Croatia), Powerpoint presentations, brochures, and educational booklets. For the indigenous Maori population, the tools are in the vernacular and meetings are in the Marai – the communal meeting house. “In each community we teach them about a lot of the pathogens in the water, the treatment technology that can get rid of the pathogens in the water, we teach them about being a water supply manager and how to maintain their water supply system” (06:137). Before a community can receive funds through CAP, they must have gone through the first part of the programme – TAP and produced an approved water safety plan, and sustainability plan, based on risk management (06: 179). The motivation for attending the TAP programme changes from an initial ‘necessary evil to receive CAP’ to valuing it in its own right. Initial suspicions about the programme have been addressed through employing TAP facilitators from the local region.

Similar cultural factors need consideration in addressing sanitation in Vietnam, reports Susanne Herbst, where more than 70% of people use fish pond toilets. “If you offer them a toilet which is attached to the house, a very small room, they think that there’s less privacy, people can hear you, there is a smell” (15:248).

2.2. Participation and ownership

In south west Uganda, the success of the Kigezi Diocese water, sanitation and hygiene promotion programme according to the WATSAN coordinator, Kenneth Bekunda, is essentially due to participation. “We involve the community in everything that we do. When we are starting to work in the community, we have a water and sanitation committee, which is responsible for mobilisation and implementation. We also have a monitoring team put in place when we start the project, and it is trained in a way to make themselves hygiene educators with their own indicators ... if you just get indicators from the office, they will say "we don't understand this" ... they do the monitoring themselves and give you a report. We do it together alongside with them, for sustainability reasons.” (03: 159).

The results of baseline surveys, which includes health centre data and often identifies contamination of water “through poor handling, and indiscriminate faeces disposal, ... are owned by the community. They are not yours ... You ask them "is this a problem"? You do not tell them it is a problem, you just give them the results and asked them if it is a problem ... they prioritise the results ... according to their priority. Then you arrange with them to cover them one by one. They make the way forward themselves” (03: 67 & 97). However, some guidance is necessary, as some participants “want to point out even with names "this problem is at so-and-so's house", but we discourage them, not to mention names. We say that the problem is with the community, so don't mention specific names” (03: 121).

Brian Matthew, a freelance consultant, sees the success of the Community Health Club approach in Zimbabwe partly due to breaking the monotony of life outside of main agricultural seasons. “It offers a way for people to actually get together and talk about something that is really important to them and to learn and to share experiences and to improve their lives” (07:34). A sense of membership is important - members are given a card that is signed on attendance: “There was an idea that there should be some sort of prize giving ceremony for those people that had attended but actually the main prize is the fact that you are part of a community and you are trying to make things better” (07:103). CHCs encourage men to participate “as a bit of a game” with men on one side, women on another, with chanting, songs and specific gender segregated sessions. Training women as masons was successful “because men tend to work individually and women work in groups (and were more willing to work in groups); the women saw it as a chance to earn some pocket money which they could then spend on their children’s education whereas the men regarded it as a full-time job and didn’t want anyone else involved” (07: 150).

2.3. Leadership, and leading by example

Juliet Waterkeyn, reports that amongst Muslim communities in Sierra Leone it “had 100% buy-in because the authoritarian approach in Muslim societies means that if the Imam says that everybody has got to join the health club, then they ... join” (05: 38). Similarly, sanitation went from zero to 50-60% coverage, the balance in cat sanitation, in 6 months¹⁰. “In more Christian countries (e.g. Zimbabwe and Uganda) we might have had like 60% of the community, may be at best 80% of the community, would join the health clubs” (05: 92).

A cholera outbreak in Busia, Uganda was successfully addressed by a key individual (the Minister and Director of the Health service) generating “a great big public thing of pride: the best village, the best home, the best ward ... prizes, not big prizes, but the honour of being the one with the best home, the best village ... made a huge impact” (05: 271).

Similarly, Andrew Trevett, observed that a 100% sanitation coverage target in Bangladesh is on track to be reached due to a ‘very powerful’ Government Minister championing the cause: “it was like a personal goal for him, and on a quarterly basis he would hold a presentation for all the

¹⁰ CARE have produced a book ‘Communicating Health, Communicating Rights: A participatory toolkit for field agents’. ISBN 0620351780.

achieving sub-districts, villages. There was a reward system to those whereby if you'd done quite well you'd get certificates. And if you'd done really well you'd get a plaque" (16:10). However, the sustainability of such activities that are initiated through one-off incentives is not established.

Conversely, the lack of promotion by Government of household water treatment is cited by Andrew Trevett for the poor economies of scale that make it unattractive to manufacturers and suppliers (16:109).

In Uganda, Anthony Waterkeyn, co-innovator of the Community Health Club approach, identified two critical factors that influenced a change in national policy towards hygiene and sanitation. Firstly the President challenging the Ministry of health that they were spending 95% of their budget on curative rather than preventive measures. Secondly, the Ministry of Finance who wanted "the best return in terms of development" and rejected MoH's annual budget (04:79). However, Waterkeyn recognises the need for legislation - a Public Health Act that can be enforced. "Everyone says 'oh, well when it comes to hygiene and sanitation it is a private matter' ... there has to be a certain amount of stick as well" (04:241).

Kenneth Bekunda identifies seeing others teaching by example as a critical component of successful hygiene promotion – a combination of trainers living in the communities for extended periods, practicing what they preach, and families adopting these practices willing to have their homes as demonstrations to other community members are key. "Women have a lot of influence, as far as hygiene promotion in the family is concerned. And children have an influence on each other, peer influence" (03: 12)

In Malawi, Brian Matthew reports that an EcoSan approach was uptaken more slowly: "it is such an awkward subject to start with for many people that it is only once they start to see tangible benefits, like seriously increased crop yields a year or two later when they get a chance to start using the conditioner in their fields, then that starts a genuine interest that other people want to take it up. For anything like that it really is a case of seeing is believing" (07:188).

2.4. Training and empowerment

Anthony Waterkeyn states that a key motivation for mothers to attend CHC training is that "they have this opportunity to meet and get knowledge that the men don't have and make the improvements in the home ... You can turn around in a very short time very shy, illiterate individuals (into) very empowered, more confident women. Dramatically more confident" (04: 221). The promise of training for holds a lot of incentives for village health workers "There is a lot of prestige and they come back loaded with knowledge and respect when they get back so they can start making a difference" (04: 143).

2.5. Literacy levels

Juliet Waterkeyn observes that literacy levels determine hygiene promotion uptake: "if you look at the spread of knowledge amongst semi-illiterate or illiterate people, they do have a deep anxiety about if they have understood things correctly or not. It may be a difficult language or something like that so what I've found is that, depending on the level of literacy, everyone who is literate and can cope with it will take the knowledge and share it with the people who aren't. And the people who aren't able, maybe they are older or less educated, and unable to grasp the issues, they maybe just follow and just copy. So they don't actually have to know every reason but because their next door neighbour is a school teacher and says it's a good thing, they'll just do it ... it was a critical mass of people who had decided to change because that was what they learnt through the clubs, and then the rest would just follow ... in the past development agencies have tended to target people as individuals and asked them to make up their own mind as individuals how to behave or whatever. I think that has been a major misconception amongst educated people that individuals in semi-illiterate or illiterate communities are willing or able or want to make up their minds individually. They are far happier working in a group context and that is what we train on ... It takes a little bit longer to get everybody on board but once you've got a group and the group has made up its mind to do something and they have got their plan of

action and they are eager to go and do it, then the whole group works together rather than individuals, which is more of a diffusion of innovation theory” (05:119&216).

Anthony Waterkeyn identifies that even in Government ministries, often “you are dealing with people who really don’t read documents willingly - that is a major constraint” (04: 25).

2.6. Convenience

In South Africa, Paul Jagals, Professor of Environmental Health at Tshwane University of Technology, reports that Government Environmental Health Officers did not focus beyond the point of delivery “until recently when these big cholera outbreaks started in early 2000” (02:254). Now, convenience is recognised as critical: “it’s got to be available, it’s got to be accessible and of course it must be safe” (02: 145). Studies have shown that hygiene behaviour and microbial water quality improves with taps being closer than the standard of within 200m from a home: “taps should not be communal, they should be quite close to households” (02: 36). “The government has embarked upon a roll-out which has been extremely effective in getting as many taps in as possible ... (getting) water to the people for political gain ... many of these taps don’t work ... the thing that needs to follow that is communication with your recipient community in how to optimise that not-so-perfect service. It is a huge thing that is just totally lacking ... the bureaucrats ... must make sure they have community activist groups together and start community action around getting the message across.” (02:186).

The need for improved convenience is echoed by Kenneth Bekunda in Uganda: “rainwater harvesting at individual households is very well cared for, rather than (distant) tap-stands that are for instance for 15 homesteads” (03:175).

Similarly in Guyana, Savitri Jetoo, Scientific Services Manager for Guyana Water Incorporated (GWI) reports that GWI has spent “a lot of money” on the hinterland which covers 80% of the country but has only 20% of the population, largely native Amerindians. “Yet we are not seeing the returns in the improvement in water, access to safe water for people in the hinterland. So we ... thought that we need to come up with an alternative strategy rather than community based suppliers. So we are now moving into a more household-based supply for the hinterland ... they are used to using whatever water is closest to them” (08:121).

Convenience is noted as a major incentive for rural Australian communities to adopt water safety plans (WSPs). “In our remote communities, sampling is very difficult. ...you’re not going to get it to a lab, not in twenty four hours ... So the biggest advantage to the risk management approach is it actually decreases the focus on that weekly, or however frequent it is, sample on the practical things of just good management” (12:122).

2.7. Attitudes

Susanne Herbst, Executive Manager of the WHO Collaborating Centre for Health Promoting Water in Bonn, Germany has identified political fatalism as a major barrier to improving water quality in Uzbekistan. “For seventy years they were under the Soviet system ... They are not used to using their initiative to change water quality ... They are just waiting for somebody to come and tell them how they should do it ... there was one well and there were mushrooms growing inside the wall and the people told me that they grow there and that is our drinking water” (15:116).

Similar barriers to health improvements are identified by Anthony Waterkeyn in the curative rather than preventive attitudes to health that are commonly seen: “many Ministries of Health are run by doctors who love the idea of curing and having state-of-the-art hospitals but when you start talking about things like sanitation and hand-washing, actually their eyes just glaze over and they are just not interested and they just don’t engage”. Waterkeyn finds in rural communities “people tend to be much more susceptible to behaviour change than engineers and doctors who really are set in their ways” (04:40).

2.8. Risk awareness

Susanne Herbst reports that water pollution in Vietnam is commonly seen to be due to environmental factors other than sanitation, such as the practice fish pond toilets: “They release the water from the fish ponds ... and they drink or brush their teeth twenty metres below... On the other hand they know that diarrhoea and disease are caused by germs ... they have the basic knowledge but they are not aware of the risks” (15:273).

2.9. Availability of data

Savitri Jetoo recognises that “one of our weaknesses in GWI is that we don't have a lot of baseline data ... we do use a lot of pesticides and herbicides ... there hasn't been a lot of monitoring of the run-off in these areas” (08:197&222).

2.10. Summary

The main conclusions can be summarised under the methodology, or form of communication, and its content, or subject area.

In terms of methodology, communication should be:

- Culturally contextualised to preferred methods of communication, based on rigorous baseline data of the target group and assessment of methodologies used
- Participative, generating a sense of ownership amongst all stakeholders, especially the target group, especially though the setting of own indicators of success
- ‘Championed’ by key influential figures
- Empowering: to women through training; to all stakeholders through judicious use of methods such as ‘name-and-shame’; to all through generating a sense of belonging
- Sensitive to levels of literacy
- Promoting critical mass buy-in of hygiene behaviour, rather than focussing on individual behaviour
- Varied, recognising diversity of target groups’ preferences

In terms of content, communication needs to:

- Practiced by communicators, especially through the demonstration of hygiene behaviour by example, recognising that ‘seeing is believing’.
- Address issues of: convenience (promote risk management, address unwillingness to pay); low risk awareness; and Government buy-in and bureaucracy.
- Address fatalistic attitudes and curative perspectives
- Use a combination of carrot and stick approaches, e.g. promote legislation for sanitation, and attendance of training as a prerequisite for funding
- Be sensitive to cultural preferences (e.g. drawing up community members’ visualisations, using colour coded images)
- Ensure the links between health knowledge hygiene behaviour are made

3. Communication in urban populations

In urban settings, many interviewee's experiences are concerned with the development of water safety plans (WSPs). In high-income countries, with the exception of Walkerton and Sydney, most issues revolve around minor water quality incidents, but as Steve Hrudehy states "we are victims of our own success in the developed world ... water borne outbreaks are relatively rare and that certainly breeds complacency" (11:133).

3.1. Culturally contextualised communications and approaches

Revenue collection in Guyana, much needed to improve water quality is an issue. Savitri Jetoo of GWI explains: "People just see water everywhere, and they think that it should be free we have a public relations department, for public education and marketing, because we realise that we need to get buy-in" (08:272). GWI uses various mass media methods of communication with the public on the 17 water treatment plants in Guyana, "including TV, radio, newspapers, and also using loudspeakers, where we would go by in the community, and basically broadcast what we are doing in certain areas" (8:23). In addition to this multi-media approach, school tours through treatment plants are also used to explain the costs associated with the various processes involved in water supply, and as a result, revenue has increased, although attributing this to any specific communication methodology, or group of methods has not been done.

In Australia, much success has been had linking messages to events; "that is why the risk management plans worked because it was linked with Walkerton ... Mosquitos were a driver for us with rainwater tanks ... At the moment we have got a dengue fever outbreak in North Queensland and there is a link to rainwater tanks so they use that to reinforce the need to maintain rainwater tanks ... if we can link to a trigger we'll get better media coverage" (12:201).

Differing methodologies are used in Australia according to age: "The national radio for the slightly older sector ... For the younger people it has got to be TV or the newspaper although really it does tend to be the older people who tend to pick up the messages more. The younger people are either less interested or more complacent about water quality" (12:248).

Steve Hrudehy, from the University of Alberta sees that "there is lots of potential for role play. If you can identify who are the people that have to get the understanding, take the case studies and cast people into a role-playing exercise. You can have a lot of fun with that and let people start imagining how it might play out if this ever happened to them and they weren't prepared" (11:225).

However, generally, very little assessment is conducted of the impact of varying methodologies. Two exceptions were mentioned by interviewees.

One was the Federal Environmental Agency in Germany who have very recently hired an individual with a journalist background, to review communication tools and recommend improvements of content and format, to "better disseminate information and better educate the normal population on crucial water quality issues" (9:199). Recognition of different target audiences, with differing web sub-sites for the general population and for experts looking for specific technical recommendations and information is also practiced (9:227).

Secondly, Tomoko Ishimoto explains that in Osaka, "We recognized that the previous communication was one-sided, self-righteous and inadequate to obtain the understanding of customers. So, we changed the communication to a more interactive one based on "small world network theory". We have specifically targeted women in their twenties and thirties and carried out various interactive communications ... they have a major influence on their family members. Furthermore, they have strong communication networks in the kindergarten or school of their children and in their community. If they understand the safety of tap water, they will inform family members and friends in their network" (17:81). The "Smile Water Club" - the fan club of Osaka Municipal Waterworks- has 500 members. Customer satisfaction and monitoring surveys reveals that face-to-face communication is the most powerful communication method.

3.2. Stakeholder relationships

Savitri Jetoo states that one of the main benefits of developing Guyana's first water safety plan, in Linden, is multi-stakeholder "partnership and communication ... never before have we had a grouping of so many stakeholders in one place, and it has allowed us to discuss issues in all the sectors that are included in this process" (8:49).

Similarly, in Germany, Oliver Schmoll reports that a 4-year national consultation process with pilot studies and feedback loops, has led to the promotion of WSPs, which not only causes a shift "from end-product testing to a more process orientated approach and would also very much improve the communication between service providers and local health officers. (It would) need them to be more strongly collaborating with each other and to have a joint understanding on the risks they are dealing with" (9:88).

Steve Hrudehy emphasises the need for good relationships prior to any disaster: "if you recognise that you are in a position where one of these disasters can happen you need to cultivate your relationships with the other key players. You can't build trust during a crisis: it's too late" (11:214).

Professor Jeni Colbourne, Chief Inspector of Drinking Water in the UK endorses this: "If you are going to make any changes or improvements or you want people to change their behaviour in relation to the water supply, you must then explain that to a number of people before you take action" (14:184). "In a big incident or some loss of trust for bad service reasons ... you can relatively quickly, if you do it properly, you can recover about 65%. However there is a very persistent 10% who will still have lost their trust and not re-gained it for twenty to forty years, so pretty much a generation. 5% of those will pro-actively try to persuade other people to their views. Every time you handle it wrong you lose about 5% of people to make them to be permanently negative to you and you can never recover them" (14:243).

However, Hrudehy also states that communications within the water industry and with consumers is often found lacking: "if there is one overwhelming criticism I would make to the water industry, compared with other organisation that would describe themselves as high reliability, there isn't enough sharing of near misses and learning from past mistakes ... How are people supposed to learn from those experiences if there is not a co-ordinated effort to collect that kind of (data)? Every time there is an incident in the airline industry we have a transportation safety board that comes in and does an investigation and puts out information that becomes the guidance for anybody else from that point forward. There is nothing like that in the water industry that I'm aware of" (11:249).

3.3. Long-term, permanent education

Jeni Colbourne advocates permanent and on-going information that is structurally built into, for example, the education system. "You need to structurally have core information on water in that basic programme permanently ... you have to have a permanent ongoing low-level, low-key, local education campaign to raise people's awareness about the very basics of how water supply is provided in the community and how you can access information to build their trust in whatever is there ... that is the only way of ensuring that people will respond appropriately to any specific communication that you want to give them ... kids, all teachers and all health professionals at a basic level need to have the accurate facts ... (so) when people are pregnant and when a family unit is at its most vulnerable and most absorbent of good advice (they receive) correct information at that time" (14:178 & 213). If people "have gaps in their fundamental knowledge they will make assumptions" (14:128). "They use heuristic judgement. They use any knowledge from their personal experience to conclude what the problem is, they don't actually rely on truth, because most people have minimal information about where water comes from" (14:78).

Similarly, in Osaka, although the musty odour of the Yodo river is a thing of the past, many people still think tap water to be unsafe. Therefore a campaign of "oishii mizu" (tasty water) was conducted in 2006, but customer surveys still revealed these lingering perceptions of tap water being bad, failing to recognize the effect of the advanced water treatment system (17:43).

3.4. Motivations

Many differing motivations or drivers for change were cited by interviewees.

In Guyana, Savitri Jetoo identified funding agencies as a major driver, with, for example, World Bank funding of treatment plants requiring completion of a baseline study (8:235). However, the process was described as dialogue.

In New Zealand, it is illegal to have a private water supply – water is therefore supplied by councils, 95% of which comply with Government drinking water standards through water safety plans, approved by District Health Boards. Nick Hewer-Hewitt explains “We’ve gone from a quality control point of view to a quality assurance point of view so rather than make the drinking water standards mandatory, the Water Safety Plans are mandatory. It’s more about risk management rather than monitoring the final product. ... We publicly publish a document called ‘The Grading’ where every water supply is actually graded ... So we’ve used the name and shame process and it’s worked, as I say, with the larger water suppliers where they have actually got the money to upgrade their infrastructure. Small to medium-sized plants have turned around and said we can’t meet the standards and they have to accept a D or an E grade. We’ve had to put in the stick approach” (06:101).

David Cunliffe explains that differing states in Australia have differing legislation with regards drinking water, with capital cities leading the way in developing WSPs due to better resourcing (12:55). However, an overriding motivation for adopting WSPs is fear of being the next Sydney. Steve Hrudehy asserts that “there is nothing better to get the attention of senior management than having a CEO fired and that is what happened ...” (11:52). David Cunliffe adds “Once you have got the capital cities, the others will follow because we’ve got a bit of a culture of what is good in the cities should be good in the bush type-approach. Another driver is that we’re not that big in population, 20+ million. We have a relatively strong Water Association, reasonable communication between the federal and state government on water matters.” (12:99).

Steve Hrudehy tries to “get people to understand why microbial pathogens have to be seen as an ever present danger just because they follow us around and you will find pathogens wherever you find people and their animals” (11:110). “Basically you’ve got to get people’s attention, and fear is a good way to do that, and then you have got to translate that into a desire to establish responsibility” (11:239).

3.5. Risk assessment and management

Steve Hrudehy notes the problems with adopting WSPs in Canada: “The overwhelming culture that was encountered was the idea that guideline numbers, water quality numbers, were all you needed and you have to understand that the numbers are really more of a retroactive validation concept, they do very little to prevent problems and they certainly don’t guide good operations” (11:29).

In advocating a risk management approach, Steve Hrudehy suggests “The whole premise of risk management is prevention rather than reaction. Who is going to argue with that? If you start from the big picture and say we can either operate with tables and numbers and lodge results and get the answer weeks later and find out we’ve screwed up or we can focus on what we think is likely to go wrong and put in place measures that will help us anticipate trouble and prevent it. What sounds better to you?” (11:118). A common issue is that “people tend to imagine that because drinking water involves science and engineering that everything is cut and dried, black and white. They don’t appreciate the amount of judgement that you always have to rely on just to make day-to-day decisions” (11:175). “A lot of practitioners will just take the numbers that come out of the risk assessment and this is enshrined as a guideline or standard and not have any appreciation of what it is based on ... in Alberta when our federal government brought a new guideline for one of the disinfection by- products and that number was 16 micrograms per litre and a health authority encountered a situation where they got some monitoring evidence that showed eighteen and they shut the system down!” (11:151).

3.6. Summary

Again, the main conclusions can be summarised according to the methodology and content of communication.

In terms of methodology, communication should:

- Use multi media approaches and be interactive (e.g. using school tours and role play).
- Be aware of differing target audiences according to age, information requirements, and preferred communications methods.
- Place a high premium on stakeholder relationships, especially collaboration and partnership between suppliers, and trust with consumers
- Learn from near misses in the water industry, in a formalised, open atmosphere
- Be long-term and permanent in terms of consumer education in particular
- Consider the use of name and shame, fear based, or carrot and stick approaches

In terms of content, communication needs to:

- Be attached to trigger events
- Further promote process oriented, preventive, risk management approaches rather than outcomes oriented, compliance based approaches
- Include sound training in risk assessment

4. Communication in emergencies

The majority of interviewee's experiences of emergencies reported in this section are concerned with low-income countries.

4.1. Culturally contextualised communications and approaches

Oxfam's generic process of engaging in public health in emergencies is explained by Marion O'Reilly, Senior Health Advisor "one of the first things we would do is a needs assessment and some sort of analysis of the context. ... Then a decision as to first of all whether to intervene, how to intervene and then also the whole programme design and proposal writing to get funding for the response ... exactly how it plays out is a bit different according to the context in each emergency. As part of the software it would be about people's beliefs and practices before the emergency and then how the emergency had affected those in terms of changes ... issues such as what the literacy levels are, what knowledge, attitudes and practices (KAP) was existing and whether it still exists in terms of outreach work within the health or water authority, with which we could coordinate or build during the emergency response. All that is covered in our initial assessment and probably in a lot more detail in the baseline data assessment which" (10:36 & 51). "(We) try to walk around the affected area with some beneficiaries, men and women, to get their feedback if that's possible on what has happened, how they are coping and if there is other information on their normal practices" (10:109). "I think you could say that we are fairly prescriptive on hygiene promotion. In most situations we will be looking out for similar risks: hand washing, clean water, clean sanitation, good hygiene practices. You've got to make sure that they are all covered" (1:39).

Oxfam seek to see "if there is a particular cultural medium locally that people are used to in terms of communication, whether it is shadow puppets or radio broadcast or local dance and drama medium. We would try and find out about that and would take advantage of that as much as is possible ... what they like in terms of messages that are communicated to them and then another would obviously be literacy and education levels and religious custom and practice. We've worked through mosques and Imams before in Islamic societies for example. And also I suppose who we are targeting as well. We would always try and work with children as well as men

and women. Partly because they are a large part of the population we are normally responding to and, in terms of learning and taking on board new information quite quickly, they are obviously a good target group. We often do child-to-child activities on the basis that slightly older kids often do a lot of caring for the younger kids and in camp situations as well, I guess, that what we find is it's quite a good way to communicate to adults through children. So we set up interactive activities with the kids and inevitably there is a big audience of adults around the periphery. So indirectly we are talking to them by playing it through fun activities with the children as well. So a number of things really the culture's literacy levels, normal available media that they are used to and what is available to us" (10:276).

Savitri Jetoo states that in Guyana "We learned from the 2005 experience in terms of proactiveness and unity of approach. So GWI has set up a coordinating group which includes the CDC, the Ministry of health and so forth, and we have one important message during floods - boil water ... the communication at this point has been through the various relief agencies and also again through the mass media, using TV etc" (8:262).

4.2. Community initiated solutions

Andy Bastable, Oxfam's Public Health Engineering Coordinator, states that 'blue flag' volunteers in Sierra Leone are community groups "trained up, given some resources and they made their plan, and they did it without any external resources, then they held their own meetings and they did that out of the groups, and they did their transect walks, they were suitably incentivised to get on and do it themselves, and I thought that home-grown model definitely had more of an impact than external promoters coming in, people not from that community" (1:165).

Similarly, using respected members of a community, typically older women, for hygiene promotion is preferred to the common practice of using younger, fresh hygiene promoters (1:122).

In Bangladesh, where community led total sanitation (CLTS) had been practiced, "after the last big cyclone the areas where they have been excelling in total sanitation there was virtually no open defecation after the cyclone ... it was proof of three years of attention on community led sanitation - - they had got it, they had really got it. The ones whose toilets were washed away, they dug little holes and put what was left of their slab on it. It was incredibly impressive" (1:126).

4.3. Political support

Local politicians in Bangladesh made having toilets an electioneering topic: a fact identified by Andy Bastable as the reason other countries have not fared so well with a CLTS approach – the lack of political support. "People were being named and shamed for not having a toilet" (1:142).

4.4. Motivations

Fear is often a key motivator in emergencies, as explained by Marion O'Reilly: "You can certainly see from field experience that when people feel quite threatened by ... for example cholera, and in communities where cholera is endemic and then you have an outbreak, people tend to know that can be very dangerous and causes death. Especially in displaced situations where people are living in very overcrowded situation. So what we've seen there sometimes is that you can get acceptance of, let's say, communal latrines by people who may have no experience of using latrines at all before" (10:233). "Women, again in my experience, tend to buy in much more quickly to latrines, not in all communities, than men because of the privacy and the dignity issues which is very important to them, not such an issue for men" (10:246).

4.5. Impact assessment

Andy Bastable is clear: "I think all emergency agencies especially are incredibly bad at getting the good data to prove impact" (1:91). Marion O'Reilly states that "all our guidance and literature

would encourage certainly the use of proxy indicators” (10:194). In many ways this resembles a WSP, using a preventive approach.

Similarly, in Guyana, there is no assessment of the relative effectiveness of the different communication methodologies.

In Germany, Oliver Schmoll states “We have enormous anecdotal evidence that things are going wrong there but there is very little hard facts because intervals for inspection and water quality testing are so low that we know very little actually about that. So we are following a preventative approach” (9:185).

4.6. Summary

For emergencies, the methodology of communication should:

- Be culturally contextualised, based on comprehensive risk assessments and baseline data that is sensitive to changes in KAP due to the emergency context
- Identify preferred local cultural mediums
- Utilise child-to-child training, in addition to adult promotion
- Use respected (typically older) members of communities as hygiene promoters
- Have minimal use of material incentives
- Utilise ‘champions’ i.e. key influential figures such as politicians
- Utilise existing fears, as well as issues of privacy and dignity, to gain buy-in to marked changes in practices

The content of communication should:

- Promote community initiated solutions, e.g. CLTS.
- Promote data gathering to assess impact

5. Conclusions

There are several overlaps in the findings and recommendations for communications across the three contexts of rural or remote communities, urban populations and emergencies.

In summary, the methodology of communication should:

- Be culturally contextualised, participative, varied, empowering and sensitive to levels of literacy, age and information requirements
- Utilise ‘champions’ i.e. key influential figures, and respected community members
- Promote critical mass buy-in of change
- Enhance stakeholder relationships, especially collaboration and partnership between suppliers, and trust with consumers
- Learn from near misses in the water industry
- Be long-term and permanent
- Consider the use of name and shame, fear based, or carrot and stick approaches
- Be assessed in terms of impact

The content of communication should:

- Be sensitive to cultural preferences

- Be practiced by communicators
- Address issues of convenience, low risk awareness, Government buy-in, fatalism and curative attitudes.
- Promote risk management approaches, linking knowledge, attitude and practice
- Be attached to trigger events
- Promote community initiated solutions, e.g. CLTS.
- Be assessed in terms of impact

6. Interview schedule

Q1: Can you broadly outline your experience of communication with respect to safe water and household hygiene – according to:

- i Developed / developing country
- ii Urban / rural;
- iii Large / small supply;
- iv Type of risk:
 - Potential microbiologic contamination that poses / posed a public health threat
 - Known microbiologic contamination that poses / posed an immediate public health threat
 - Naturally occurring localized contamination such as groundwater contamination (e.g. arsenic or fluoride) and agricultural runoff - a risk that goes beyond daily exposure to faecal contaminants
 - Threats that result from large natural disasters and other hazards such as hurricanes and tsunamis.

Q2: Please describe the process of communication used:

- i How did you **identify the problem** and the proposed solution - who was involved?
 - How frequent are needs assessments before communicating.
 - What tools did you use for needs assessment
 - How did the supplier/system know of these risks
- ii **Who** was involved and how (e.g. Government, utility company, networks, community leaders, community based organisations, household members, women)?
- iii **Who** are the key influencers and influences on existing practices – how are they identified?
- iv **What** was done (what information was communicated)?
- v **How** was it communicated (e.g. leaflets, radio, TV, meetings)?
- vi How was any **monitoring** of effectiveness? AGAIN, PLEASE SUPPLY EXAMPLES IF AVAILABLE

Q3: What has worked well and what hasn't?

- i What lessons have you learned / what guiding principles do you have?
- ii What limitations have you encountered?
- iii What recommendations do you have for improvements – how can you build on existing best practices?

Q4: In bringing about change:

- i How do you identify the drivers/motivators of change?
- ii What is the best way to change entrenched cultural beliefs and practices?
- iii How do you categorise cultures in relation to appropriate communication strategies i.e. what works well with what type of cultural groups?
- iv What is the place of marketing and social marketing principles?
- v What is the place of participative and social processes versus information and instruction?
- vi What is the place of technology in communication?

Part III - Case Studies

Introduction and overview

This Part of Output 1 consists of 20 case studies in which lessons can be learned from the way in which water safety and hygiene messages were communicated. The case studies presented here fall into two broad categories:

- those relating to chronic or long-term problems of water supply, water quality, poor hygiene or inadequate sanitation;
- those relating to outbreaks of disease, associated with sudden changes in water quality delivered to consumers.

In all cases, the aim of communication has been to protect or enhance public health.

Table 5 outlines the case studies, which are each presented as single page summaries in the main text of this document. Supporting information (including references) is provided in Annex A. Table 6 relates the case studies to the original categories proposed in the RFP.

Table 5 List of Case Studies

No.	Title
Chronic problems of water quality, poor hygiene or inadequate sanitation	
1	Arsenic in Bangladesh
2	Arsenic at Chapels Cove, Canada
3	Fluoride in Gujarat, India
4	Nitrate in Morocco
5	Community Health Clubs in Zimbabwe
6	Community Health Clubs in Sierra Leone
7	Community-Led Total Sanitation in Sierra Leone
8	Community Health Clubs in Northern Uganda
9	The Cluster System in Northern Uganda
10	Handwashing Promotion in Ghana
11	Ecological Sanitation in Malawi
Disease Outbreaks Associated with Sudden Changes in Water Quality	
12	Waterborne Disease Outbreak at Walkerton, Canada
13	Giardiasis Outbreak at Edmonton, Canada
14	E Coli, Skin Rashes and Evacuation at Kashechewan, Canada
15	Cryptosporidium Outbreak at Milwaukee, USA
16	Giardia and Cryptosporidium, Sydney, Australia
17	Cryptosporidium at Pitsford, England
18	Sewage Contamination of Mains Water at Freuchie, Scotland
19	Cholera Outbreaks in South Africa
20	Cholera Outbreaks in Zimbabwe

Table 6 Case Studies by Category

	Small Rural	Large Urban
Naturally occurring contamination and long-term health effects	(1) (2) (4)	(3)
Potential microbiological contamination that posed a public health threat	(5) (6) (7) (8) (9) (10) (11)	(10)
Known microbiological contamination that posed a public health threat	(12) (14) (17) (18) (20)	(13) (15) (16) (19) (20)

Case Study 1 – Arsenic in Bangladesh

Background

In the 1970s and 1980s, the government of Bangladesh and NGOs encouraged the population to switch from using contaminated surface water sources to groundwater sources, through an information campaign and a programme of borehole drilling. This was very successful with ultimately 97% of the population coming to rely on groundwater for their water supply.

However, in the early 1990s, it was realised that many boreholes contained arsenic levels above the WHO guidelines (50 ppb) and many of the population were suffering from arsenicosis. The symptoms include lesions, hardening of the skin, dark spots on hands and feet, swollen limbs, loss of feeling from hands and legs and ultimately death, although recovery is possible with an uncontaminated water supply and good nutrition. The barriers to a successful communication campaign included a lack of scientific understanding (arsenic cannot be seen or tasted therefore people do not believe it will make them ill), a distrust in the authorities since it was only a decade previously that they were encouraged to switch to groundwater usage and an unwillingness to accept the inconvenience of using a safe borehole (for example, a greater walking distance, and greater queues and even arguments at safe water points).

Good practice

From 1998, a comprehensive testing programme was started. Boreholes that were found to meet WHO guidelines were painted green, those that failed were painted red. Thus red painted boreholes could only be used for household tasks, not cooking or drinking, and alternative boreholes or even alternative sources (e.g. rainwater harvesting) would need to be found for red painted well users.

This testing and painting scheme was accompanied by an information campaign about this colour coding system and the treatment for arsenicosis. This was a multi-sectoral approach, with interpersonal communication techniques accompanied by TV and radio commercials and even a Bollywood style movie. It was found that the engineers doing the testing were often best placed to communicate with well users as the well testing took up to 30 minutes per well and this was sufficient time to pass on basic facts. Teachers, health workers and religious leaders were also used as communicators as it was recognised that they all have different influences within communities.

Lessons learned

1. Involvement of many different players, for example governments, NGOs, health workers, engineers, teachers and religious leaders can reinforce the message from several angles.
2. If limited funds are available then these should be concentrated on spreading a simple message in the most cost-effective way possible to as many people as possible, as even this can result in behaviour change. National media can be a cost-effective communication tool. Bringing about behaviour change in sceptics is much harder and requires a greater investment.
3. Using people already on the ground as communicators can be a cost effective way of spreading the message, even if these people are not conventional communicators

Case Study 2 – Arsenic at Chapels Cove, Canada

Background

In 2002 the community of Chapels Cove with a total population of approximately 1000 had a water supply consisting of several wells and a surface source. A provincial monitoring survey of water quality conducted by the Department of Environment during the summer and fall of 2001 found that a well serving approximately 160 people in the community was contaminated with arsenic. The highest well water concentration was 0.302 mg/L and resulting tap water concentrations ranged from 0.243 to 0.288 mg/L. These data were reported to the Department of Health in January 2002 and the local Medical Officer of Health immediately informed the affected residents and advised them to not ingest this water by ceasing any use for drinking or food preparation. The well in question had been operational for nine years without any previous monitoring for chemical contaminants.

Good practice

This case was particularly challenging for public health officials because the arsenic levels were high (up to 12 times the Canadian drinking water guideline of that time and 30 times the current guideline which was under consideration at that time), the evidence for a causal connection between high levels of arsenic in drinking water and human cancer is generally accepted, the contaminated well had been in use for nine years without any monitoring and the first results were obtained by Environment officials several months before public health officials were notified. For all of these reasons, it was vitally important for public health officials to act immediately and decisively. The message to consumers to immediately stop drinking and cooking the contaminated water was clear. Engagement of family physicians was rapid. Implementation of a biomonitoring program provided relevant information at a personal level which was used to engage residents with their family physicians. Despite national media coverage and inevitable political involvement, the issue was managed effectively to the extent that after one year, community concerns had dropped considerably and there was insufficient interest among exposed residents to perform a three year follow-up.

Lessons learned

This case had all the potential to become a risk communications disaster, but for the reasons listed above, that fate was avoided.

1. The delay of several months from the time of first performing the water quality sampling until public health officials were informed of the problem results for arsenic created an immediate problem with the public sensing a cover-up. In cases where data are being collected that may generate adverse results, a communications plan that anticipates the possibility of finding adverse results should be developed in advance to ensure expedited validation and notification is achieved.
2. A relationship between water purveyors, environmental regulators and public health officials will often only occur after a problem arises. Trying to establish trust and effective professional interactions during a crisis is not an effective way to manage risk communications because any divergence in messages from the key players will be immediately noticed by the public and the media.
3. There are only a few contaminants, such as arsenic, which have credible evidence of adverse human health effects from drinking water exposure. Generic health risk communications packages for such contaminants would be useful for these.

Case Study 3 – Fluoride in Gujarat

Background

In the 1980s, many boreholes were drilled in Gujarat, India to provide uncontaminated sources of water for rural populations. However, there were few water quality assessments at this stage. By the 1990s, clinicians were identifying cases of fluorosis (potentially fatal weakening of the bones and teeth enamel), which were attributed to elevated levels of fluoride in the groundwater. It has been suggested that private contractors hired to drill the wells deliberately drilled them deeper than necessary in order to claim more money from the donors. However, deeper wells are more likely to intersect the deeper fluoride bearing geological strata which cause the elevated levels of fluoride in the water. The problem is exacerbated as sodium fluoride is often used as a salt in food, and fluoride is often added to dental products to improve oral hygiene.

Good practice

The solution to the problem was to identify villages where the fluoride content in water was too high (over 1.5mg/litre). If health workers are sufficiently educated as to the early signs of fluorosis, they can record cases amongst school children and this can be used as an indicator that the local water supply might be contaminated. This has proved more efficient than individual well testing. Once a contaminated supply is identified, uncontaminated water needs to be provided to the villagers. This can be achieved either through defluoridation of the current supply or the provision of an alternative supply. Sufferers of the disease also need improved nutrition, which includes education to avoid fluoride-rich foods.

Lessons learned

1. Training health workers to identify potential early stage fluorosis can be cheaper than methodically testing water supplies.
2. Education of the population about the dangers of contaminated water and the need to use an alternative supply is essential for community co-operation. For example where piped river water was supplied to villages, many people made illegal connections to avoid paying tariffs and there was a lot of wastage. There were also some recorded cases of panic in communities where engineers simply removed pump handles from contaminated wells without any explanation.
3. Communities do not necessarily have the capacity to fund and maintain water treatment plants, so external support is required if such plants are to be sustainable – many in India have fallen into disrepair.

Case Study 4 – Nitrate in Morocco

Background

Groundwater in Morocco typically exceeds the WHO guideline on nitrate in drinking water (50mg/l). The source of this nitrate is fertilisers applied to crops, which ultimately enters the groundwater. There are few alternative water sources, so the population is heavily reliant on groundwater. There have been some attempts to install denitrification facilities for municipal supplies, but these are very expensive, and unsuitable for rural supply. An alternative approach is to try and reduce the amount of nitrate entering the groundwater. This can be achieved through improved agricultural practices, specifically proper irrigation scheduling and split fertiliser application, both of which ensure that excess water does not leach nitrates into the groundwater.

Irrigation water is supplied by the Office of Agricultural Development. Since the 1970s, farmers were meant to pay the Office of Agricultural Development for water but often these dues were not paid, and the state was still covering 50% of the costs of irrigation. “Water masters” formed a link between farmers and the Office of Agricultural Development. However, farmers could only officially complain if they were state registered landowners or tenants. More recently the Office of Agricultural Development is implementing a water scheduling policy to reduce nitrate leaching, but this requires participation from the farmers.

In 2002, to combat the problem of non-payment of water dues, Water User Associations were set up. They also provide an opportunity to educate farmers about good irrigation and fertiliser practices. However they require considerable support and training, for example in financial matters and the procedure for running meetings.

Good practice

In this type of contamination problem, the solution is either to prevent the contamination at source, or to treat it before it reaches the consumer. In this case, more progress has been made towards mitigation at source than treatment. This mitigation requires community participation to be effective.

Lessons learned

1. Explaining the potential health benefits of reducing nitrate leaching could motivate behaviour change. This has not been emphasized thus far.
2. Farmers do not necessarily comprehend the need for good water management practices.
3. Enforcing water payment not only reduces the financial burden on the state, it also has the benefit of more efficient water use, less nitrate leaching and better quality groundwater.
4. Farmers do not necessarily have the skills required to form water user committees, so may need support and training.
5. Community participation and the formation of water user associations provide an alternative to “top-down” water management.

Case Study 5 – Community Health Clubs in Zimbabwe

Background

Although safe sanitation and hygiene is critical for improving family health, rural communities in Sub Saharan Africa have shown little inclination to change their traditional behaviour, and sanitation coverage has now dropped to 47%. With the Millennium Development Goals seeking to halve the 2.6 billion people without sanitation by the year 2015, there is an urgent need to find cost-effective health promotion strategies that will actively engage rural householders in modifying risky hygiene behaviour. Between 1995 and 2005, Community Health Clubs in Zimbabwe successfully galvanised rural communities into active behaviour change leading to a strong demand for sanitation. In Tsholotsho District, after six months of weekly hygiene promotion sessions, at the cost of US 35c per beneficiary, good health knowledge of nine different topics was 47% higher in the intervention than for the control, and latrine coverage rose to 43% contrasted to 2% in the control area, with the remaining 57% members without latrines practicing faecal burial, a method previously unknown ($p>0.0001$). Spot observations of 736 Health Club households in two districts was contrasted to 172 in a control group, and showed highly significant changes in 17 key hygiene practices ($p>0.0001$) including hand washing. The study demonstrates that if a strong community structure is developed and the norms of a community are altered by peer pressure from a cyclical to linear world view, hygiene behaviour change will ensue and a demand for sanitation can be created. Despite adverse socio-economic conditions in Zimbabwe over the past eight years, Health Clubs have flourished, providing a sustainable and cost-effective case study (Waterkeyn and Cairncross, 2005).

Lessons learned

1. Health promotion carried out within dedicated groups who meet regularly (like Community Health Clubs) is more powerful than though house-to-house health chats with individuals.
2. PHAST activities carried out within the structure of a CHC are more cost effective than when PHAST is addressed to unstructured gatherings, or at longer once off workshops.
3. 'In for a penny, in for a pound' : it is more appropriate for community to do 'holistic' health promotion addressing all aspects of preventable disease rather than focus narrowly on a few simple key messages (e.g. wash your hands with soap)
4. 'Little but often' People need to understand and absorb over time: a raft of at least 50 key messages can be delivered over a period of six months with weekly reinforcement
5. Health Facilitators for CHCs are most effective when they are trained Environmental Health Technicians rather than semi-educated community volunteers.
6. The more underdeveloped the community (i.e. less previous support for water and sanitation) the more impressive will be the levels of hygiene behaviour using the CHC approach.
7. Health Promotion is an ideal entry-point for water and sanitation programmes and it should be started at least six months prior to any hardware provision to ensure full community-based management.
8. The main obstacle to effective health promotion through CHCs is lack of consistent funding from external donors, who are often fickle in terms of dedicated and continuous support to an area .
9. The CHC approach is most sustainable when institutionalised through existing structures in government (e.g. Environmental Health Technicians in Clinics).

Case Study 6 – Community Health Clubs in Sierra Leone

Background

In 2006, a short 10- month pilot project in Moyamba District in which 8,189 people (1,026 households) in 26 newly reconstructed villages after years of civil war, benefited from significantly improved hygiene, water supply and sanitation. Community Health Clubs were formed in all 26 villages. Unlike in Zimbabwe where membership of CHCs was optional, every household was required by the imam to attend and the societal control in this largely Moslem society, could account for the high levels of attendance at the weekly sessions and the consequent adoption of zero open defecation (ZOD).

Whereas open defecation was the norm prior to this intervention, safe sanitation was practiced in every one of the project CHC villages by the end of the project. Latrine coverage went up from zero to 46% with 461 households constructing latrines in one year and wells were upgraded in all villages. The willingness of the villagers (including women) to be trained as ‘village technicians’ before accepting their unpaid role of supervising the construction activities has also been proven a success in most cases.

In the evaluation at the end of the project, CHC members testified to substantial improvements in the health of the villagers as a direct result of this intervention. In particular they reported that cases of diarrhoea had dropped significantly. Casual observation showed most households had constructed plate racks, washing lines and were storing their water in covered containers. There was a significant improvement in understanding of nutrition and particularly that of weaning foods for babies, which was identified as a major problem before this intervention. There were also claims that there was far greater cohesion and cooperation amongst villagers as a result of the inclusive and participatory forum of the weekly CHC meetings.

Lessons Learned

1. CHCS do not only work in relatively prosperous and stable countries but also in post conflict countries where villages are being rebuilt after years of civil war.
2. Visual Aids are essential for communities with low literacy, enabling people to visualise issues, but they must be adapted to be culture specific to each country or ethnic group.
3. Problem solving through participatory activities (PHAST) is the most effective way of getting ‘buy in’ from communities
4. Whereas in Christian communities families join the CHC voluntarily and thus it takes time to persuade all families to join, in Moslem villages the approach is more top-down, controlled by the imam who ensures 100% participation.
5. In Moslem CHCs, men and women should be separated into groups to enable women to speak more freely.
6. Community Health Clubs should be a strategy that becomes institutionalised through government (Ministry of Health) rather than reliant on one-off efforts by NGOs that move on to other areas.
7. The CHC approach provided the structure for all types of subsequent development such as agricultural projects, which will be more successful if they are introduced following health promotion, water and sanitation.
8. The CHC approach was adopted and modified by INGOs working in Sierra Leone (e.g. CARE, Oxfam and SCF) as a way of dealing with post-conflict situations and rebuild social capital that had been destroyed by 10 years of fratricide and anarchy.
9. Where government facilitators are not available, community members should have some health or training background (nurses, teachers) and not just be respected community members.

Case Study 7 – Community-Led Total Sanitation in Sierra Leone

Background

Sierra Leone has given a new national emphasis to “Community-Led Total Sanitation” (CLTS), a participatory approach to achieving and sustaining open defecation free (ODF) communities that started in Bangladesh and has also been trialled in some African countries. In a CLTS process, facilitators encourage communities to analyze their sanitation/defecation practices. This generally leads them to recognise the volume of human waste they generate and how the practice of open defecation means they are likely to be ingesting one another's faeces. The resulting disgust and desire for self-respect can induce them to build latrines and stop open defecation without waiting for external support in the form of hardware subsidy.

Good Practice

Triggering adoption of CLTS is based on stimulating a collective sense of disgust and shame among community members as they learn the facts about mass open defecation and its negative impacts on the entire community. The goal of the facilitator is to help community members see for themselves that open defecation has disgusting consequences and creates an unpleasant environment. It is then up to community members to decide how to deal with the problem and to take action. It is a hands-off approach the facilitator doesn't lecture or try to educate the community about the disease caused by open defecation, flies as agents of contamination, or the need for hand-washing at the triggering stage. Communication tools that trigger disgust pathways of faecal contamination include:

- Transect walks: The embarrassment experienced during this ‘walk of disgust’ can result in an immediate desire to stop open defecation and get rid of these areas.
- Mapping of defecation areas: The community makes a simple map on the ground showing households, resources, defecation areas, water points and problems, to stimulate discussion. The mapping gets all community members involved in a practical and visual analysis of the community sanitation situation.
- Marking defecation areas: Coloured powders or locally available materials like ash, saw dust, rice husk, chaff straw, leaves, grass etc can be used to mark defecation areas.
- Community discussion: for instance discussion of which is the dirtiest neighbourhood of their village. Calculating the amount of faeces produced and how much people spend on health treatment can help to stimulate discussion and illustrate the magnitude of the sanitation problem.
- Stunts: for instance offering people a glass of water contaminated with faeces can lead to realisation of the fact that everyone has been ingesting each others one another's faeces.

Lessons learned

1. It is important to discover effective drivers or motivators for people to adopt safe sanitation. These may have little to do with health.
2. Technologies should be identified which (a) are affordable, (b) give people choice, and (c) are inclusive, especially of the elderly, young and disabled.
3. Sanitation supply chains (i.e. local availability of latrine slabs for purchase) need to be developed.
4. Clear plans need to be put in place for latrine emptying or relocation when full. Complementary actions would include pit emptying services.
5. Hardware subsidies should be reduced to the absolute minimum, and a proportionate cash contribution should be required toward the cost of external materials.

Case Study 8 – Community Health Clubs in Northern Uganda

Background

By 2004, the LRA insurgency in Northern Uganda had been ongoing for 18 years, and had displaced 89% of the population in Gulu district. There were over 30 IDP camps with between 15,000 and 68,000 people in each camp. The population was demoralised and worn out by constant atrocities against civilians, and NGOs were getting little response from IDPs as a strong dependency culture had developed. With only 5% sanitation coverage, NGOs had been battling to get sanitation into the camps for years. The excuse was that the huts were so closely packed into the limited area, that there was simply no space for the construction of latrines. CARE International had an emergency programme and had sourced funding from the Bill and Melinda Gates Foundation to provide health promotion to 20,000 people and build 10,000 latrines. This unrealistic target had to be met within six months! Working backwards from this target, it was calculated that 120 CHCs would be needed each with 100 members. A PHAST tool kit was cobbled together from existing visual aids. A local NGO (HIDO), made up of clinical technicians, was founded and 23 of their facilitators were trained by Africa AHEAD. Within two months there were 116 Community Health Clubs in 15 IDP camps, and HIDO facilitators were operating with 15,522 regular members who met weekly for hygiene sessions. They worked through the existing sanitation committees and started CHCs within each zone of the IDP camps. This programme demonstrated more than any to date the strength of the CHC methodology. Within 4 months, health club members constructed 8,504 latrines, 6,020 bath shelters, 3,372 drying racks, and 1,552 hand washing facilities, with an estimated 100,000 direct beneficiaries. By the end of eight months the original target had been exceeded with over 11,250 new latrines constructed and well maintained.

Lessons Learned

1. The CHC model can be adapted from the original 4 year development model to be used in emergency water and sanitation programmes to generate a demand for hygiene and sanitation.
2. Refugees who are often not a ‘real community’ can be effectively organised through CHCs.
3. Health sessions using PHAST activities can pull in vast crowds in refugee camps where many are bored and dispirited –as an ‘entertainment’ the CHCs provides an alternative to alcohol consumption.
4. CHCs help to build social capital through increasing social networks and levels of trust.
5. CHC programmes should be properly supported with long-term funding: more responsibility is required from supporting international organisations to help ensure follow-through and continuity whenever CHCs are introduced.
6. CHCs self-help strategy provides dignity to IDPs rather than promoting a dependency culture.

Case Study 9 – The Cluster System in Northern Uganda

Background

There are two main methodologies in the Health Promotion Sector that have been achieving high levels of sanitation: the Community Health Club approach mainly in Africa and Community Led Total Sanitation mainly in Asia. However, an interesting fusion of the two methodologies is providing some outstanding results in terms of hygiene behaviour change. The ‘Cluster System’ as developed by an indigenous NGO, called WEDA, has since 2005, been working in the Teso Region of North East Uganda (supported by WaterAid / funded by BandAid). This home-grown strategy is based on President Nyerere’s ‘Ujamaa’ concept of ‘Nyumba Kumi’, the clustering of groups of ten households. This provides a manageable structure supervised by a Cluster Head, and the clusters are grouped under an umbrella committee for each village. This system has generated the same sort of group consensus, as a result of peer pressure that is typical of Community Health Clubs. By sensitising local leaders through public embarrassment such as the ‘village walk of shame’ and by provoking competitiveness between villages, this strategy also has much in common with CLTS. However the objectives of the project are broader than the construction of latrines, which is the main outcome of CLTS. As in Community Health Clubs, the MoH Health Assistants provide the village with a series of participatory health sessions and encourage a range of good hygiene behaviours with monitoring done by the Cluster Head, very much on the same lines as the standard household inventory which is monitored by CHC committees. Like many conventional WATSAN projects, WEDA also uses the incentive of water supply provision as a reward for those villages which are ‘open defecation free’. Therefore WEDA uses both ‘the carrot’ in form of rewards (like the CHC approach) with ‘the stick’ - fines to galvanise the laggards in the village to change behaviour for the common good (much like CLTS). The results from this combination of strategies provide results that are as high as both methodologies. Although as yet it is not rigorously researched, the preliminary results that are being claimed are impressive: four out of 17 villages achieved 100% sanitation coverage within six months. This is a considerable achievement in rural communities in North Eastern Uganda where two years ago less than 15% of the households used a latrine. In one village, Oribi, the percentage of households changing in seven months from the base line to the post intervention survey show that latrine coverage had increased from 9% to 54%; from only 3% to 28% of households put up hand washing facilities; from 12% to 54% constructed pot racks; those with new bath shelters changed from 7% to 54%; and households with rubbish pits from 5% to 54%. More rigorous research is needed to verify these results, which should then be published.

Lessons Learned

1. The ‘carrot and the stick’ approach works well in rural communities with traditional authoritarian leadership.
2. The ‘Nyumba Kumi’ (Cluster Approach) may be more practical than the larger health clubs.
3. PHAST activities combine well with the CLTS approach to give more holistic development.
4. Community can monitor clusters of 10 homes effectively and this helps to ensure behaviour change by stronger peer pressure.
5. The cluster approach is a good fusion of the best of both CLTS and CHC approach.
6. Hygiene issues are part of sanitation and latrine coverage is one of many key indicators.
7. Using MoH to reinforce the work of NGO field staff ensures more sustainability.

Case Study 10 – Handwashing Promotion in Ghana

Background

The Ghana Public-Private Partnership to Promote Handwashing developed a high-impact communication strategy with the slogan “*For Truly Clean Hands, Always Wash with Soap.*” An intensive programme was carried out from 2004 to 2006 to bring the handwashing with soap message to the target audiences – mothers and caregivers of children under five years and children in school, ages 6-15 years. The programme used mass media, direct consumer contact and a district-level programme through schools, health centres and communities. The communication strategy also targeted policy makers and opinion leaders and promoted handwashing infrastructure in schools and public latrines.

Good Practice

Mass media: The programme employed state-of-the-art marketing strategies. The guiding concept for this phase of work was “Your hands are only truly clean if washed with soap.” Two radio and two TV adverts suggested that there was “*something* on your hands,” suggesting an unseen contamination that only soap could remove. The radio adverts and a TV advert targeted mothers and caregivers, while the other TV advert targeted children. Posters and billboards were put up in all 110 district and 10 regional capitals of the country, and badges, T-shirts, branded polythene bags and soap were distributed. The radio and TV adverts ran for six months, with particularly intense activity in the first three months of the campaign.

Direct consumer contact: An event management firm visited two districts per region in six regions and conducted 128 events in schools, reaching more than 100,000 school children, 2,930 teachers and 926 food vendors. Another 132 activities in health centres and communities reached 11,500 mothers. This interpersonal communication provided information on handwashing with soap in an innovative, interactive, face-to-face manner, allowing consumers to ask questions and talk about handwashing with soap, in a way that supports behaviour change.

PR campaign: A programme targeted at opinion leaders as well as the two strategic target audiences used press and media coverage to promote handwashing. Radio and television discussion programmes and interviews were broadcast throughout the country on national media and district-specific FM radio stations. An advocacy brochure outlining the strategy for the initiative was distributed to strategic targets and partners.

After six months of the campaign, rates for handwashing with soap for mothers topped 80 percent. Exposure to campaign materials was high, with many people able to sing the campaign theme song, and more than 80 percent of children and adults reporting more frequent handwashing with soap.

Lessons learned

A major lesson from the Ghana programme was that it takes time and effort to establish common ground and trust and to get partners from different backgrounds and sectors working effectively together. However, the programme showed that the public and private sectors can work together for the public good when there is transparency, the strengths of each are recognised and each member is treated as an equal partner.

Case Study 11 – Ecological Sanitation in Malawi

Background

WaterAid Malawi and the CCAP Synod of Livingstonia (a faith-based organization) have been implementing a sanitation programme in Northern Malawi. The programme offers ecological sanitation and hygiene options using a marketing approach to households. Ecosan has proven to be increasingly popular among households and schools in the programme areas. The programme promotes three types of eco-toilets: the arborloo, the fossa alterna, and the skyloo. Promoters of ecosan technologies are paid on a commission basis by the project. A trend has been observed in the CCAP programme areas where households start from a simple arborloo and evolve to a more permanent fossa alterna. Various business models are under trial in programme, and ideas such as marketing of “humanure” (compost from ecosan latrines) are under discussion to increase the uptake and sustainability of the technology. The manure from the latrines may be sold for as much as US\$2 per 50kg.

Good Practice

The Ecosan approach has been very successful in bringing about good sanitation practices. Many people are motivated by the economic benefits and promotion is not linked to death and doctors as in many previous approaches to sanitation promotion. There is clear evidence that work on ecosan latrines and hygiene promotion has been scaled up in the programme, to the extent that some previously unreached communities have now been reached. One such isolated community is Kanongola village in Salima District. Before the intervention by WaterAid/WRH there were only three unimproved latrines, while at the time of the evaluation coverage had risen to 100%. Some communities selected the arborloo for its benefits related to manure and food security (fruit trees grown on a filled pit). Other households are choosing the fossa alterna type of ecosan latrine since the latrine is also permanent and therefore more convenient.

The Ecosan programme has triggered a massive change in behaviours of households including hand washing after visiting a toilet. Several promotion methods were used including small-scale entrepreneurs, sanitation promoters (including government Health Surveillance Assistants), sanitation clubs and demonstration centres where health committees explain the ecosan technologies to the would-be buyers and users and their benefits. PHAST principles and practices are utilised, but sometimes with significant modification. Local drama and dance groups are sometimes employed. There is generally a high level of understanding of the importance of good hygiene, and in the best villages and communities, enthusiastic attitudes and sound practices are evident; for instance, hygiene education messages are clearly displayed on the walls of almost every house. Sanitation was also well integrated with good hygiene practices (hand washing facilities, rubbish pits, dish racks, hygienic kitchens and well cleaned houses).

Lessons learned

1. In some communities and areas the handling of composted human excreta is not acceptable (especially Muslim communities). Nevertheless, the arborloo could be promoted here since it does not require such handling.
2. The partially commercial model being practised in CCAP’s Livingstonia synod is an excellent compromise between an illusory “no-subsidy” approach, and an unsustainable “free-gift” model of sanitation delivery.
3. Further development of technology needs to take place (e.g. mass-manufactured latrine slabs which may be cheaper and more easily transported than cement slabs).
4. All options of ecosan and improved latrines should be exposed to the communities to enable them choose the type of latrine they desire and one which they can afford.

Case Study 12 – Waterborne Disease Outbreak at Walkerton, Canada

Background

An outbreak of waterborne disease killed seven people and caused gastroenteritis in an estimated 2300. The pathogens responsible for the deaths and illness were *Escherichia coli* O157:H7 and *Campylobacter*. The faecal pathogens from a nearby livestock rearing farm contaminated the drinking water system through a shallow well that was operated without adequate disinfection treatment, monitoring or regulatory oversight.

Good practice

The action of the public health officials to issue a boil water advisory despite the repeated reassurance from the water system general manager that the system was safe proved to be a vitally important action that illustrates the need to understand and heed the emerging evidence.

The Walkerton disaster provides a strong case for the communication elements of a water safety plan approach because the lack of comprehension of the threats to the water system would have been overcome by a competent water safety plan.

Lessons learned

Communication failures occurred in Walkerton at many levels and they contributed to the disaster by reducing or eliminating the requisite level of comprehension of the public health risks that eventually caused illness and death in Walkerton. These included:

1. The need to protect the source well from agricultural contamination was identified in a professional technical report but this was not translated and communicated into adequate regulatory requirements.
2. Operating personnel did not understand that a failure to continuously maintain the chlorine residual on this water source could, and unfortunately did, lead to illness and death.
3. The need to regularly and accurately monitor the chlorine residual was not recognized as the primary effective means by which the operators could be assured that chlorine disinfection was functional; providing a real time indicator of water contamination.
4. A regulatory inspection two years before the disaster listed a number of operating deficiencies, but the problems identified were not translated into remedial actions by the operators and the regulators failed to follow up to require the improvements.
5. Emerging evidence of an outbreak is likely to be uncertain and confusing so that public health officials must make logical and reasonably precautionary inferences which must then be effectively communicated by multiple means (radio, television, direct home delivery and targeted high profile messages to high risk facilities)
6. The local government chose to dispute the assessment of public health officials and did not become actively involved in communicating with citizens about the need to boil water and take other precautions. The reaction was partly attributable to a personality conflict between the Mayor and the Medical Officer of Health. This experience demonstrates the need for effective relationships and communication before a disaster strikes.
7. The provincial regulator did not recognize the need to launch an immediate investigation into the problem despite the evident illness in the community and did so only following the insistence of local public health officials. This experience demonstrates the need for effective communication between public health officials and technical regulators to build mutual trust and understanding before a disaster strikes.

Case Study 13 – Giardiasis Outbreak at Edmonton, Canada

Background

Edmonton experienced one of the largest documented waterborne outbreaks of giardiasis in the world in 1982-83 during a period when early reports from public health officials, water treatment plant managers and politicians denied that the city's drinking water could be responsible. Recurring water quality problems related to chemical contaminants and off flavours in 1985 led to the commissioning of an independent expert investigation of the safety and quality of Edmonton's water supply. During one of these taste and odour events, a water treatment spokesperson explained to the media "we don't know what is causing the problem [i.e. taste and odour], but we know that the water is safe." Consumers did not need to be water quality or public health experts to see the limitations of this logic.

Good practice

The decision to undertake an independent and credible expert evaluation of Edmonton's water system led to the identification of numerous problems that would be fixed over the next 5 to 10 years while converting the water treatment utility from one that was seriously challenged into one that is now widely regarded among the best in Canada.

A key feature of the expert evaluation was a commitment to and support for public advertising soliciting questions and concerns from the public about their drinking water and a public forum on the draft report to be sure that the public concerns were addressed.

One of the key improvements in the water utility practice that emerged from this experience was the commitment of qualified professional resources to water quality problem identification and solving so that managers could be assured that technical advice they provided to politicians and to public health officials was based on evidence rather than speculation. This basic forward-looking approach is consistent with the emphasis on achieving best practice that is inherent in a water safety plan approach.

Lessons learned

Overconfidence in water treatment technology that was not being operated in an optimal manner for a periodically-challenged raw water treatment situation led to some public health officials being reassured by water treatment personnel about the safety of the water.

1. Public health professionals need to have a constructive relationship with water treatment professionals, but they must also retain their independence to pursue their public health mandate and they must be prepared to challenge the reassurances that they may be provided about risk to public health.
2. The credibility of public health officials with the public they serve must be founded on justifiable confidence from the public that their health will be treated as paramount by public health officials.
3. Politicians will have access to the media to express their views, whether or not they are well informed. There may be inevitable inertia among some politicians that will cause them to deny the existence of problems or to be too ready to accept reassurance that problems do not exist when the evidence suggests otherwise.
4. The lack of a forward-looking preventive approach, such as will be encouraged by the water safety plan approach can create public relations problems leading to loss of public confidence and demands on limited professional resources to deal with those problems that ultimately undermine the capacity of a water purveyor to focus on safe water.

Case Study 14 – E Coli, Skin Rashes and Evacuation at Kashechewan, Canada

Background

On October 12, 2005, a treated water sample was taken in Kashechewan, a First Nation community of about 1700 residents located on the shores of James Bay in northern Ontario, 450 km north of the nearest major town. This sample was reported positive for the indicator *E. coli* on October 14. On October 25, a physician from the nearest hospital at Moose Factory, more than 100 km away brought a laptop computer with photos of severe skin rashes (predominantly caused by scabies or impetigo, neither caused by *E. coli*) among Kashechewan residents, notably children, to a meeting with the Premier of Ontario. The physician argued that elevated chlorine levels in the Kashechewan treated water were making the skin rashes worse. The Premier announced an evacuation of residents in need of medical attention, leading to over 946 residents being flown to cities to the south.

Good practice

The response of the water treatment technicians to identify and repair the chlorinator failure was a rapid and excellent technical response to a water treatment failure, but the subsequent attempts at communicating this success were overwhelmed at the public and decision-maker levels by the flood of misinformation that prevented decision-makers from learning the meaning of detecting the indicator *E. coli*, its lack of any causal relationship with the obvious skin diseases rampant in the community and the absence of evidence for a damaging effect of normal chlorine levels on the skin lesions.

Lessons learned

This event became a major national media story with corresponding lessons about how stories take on a life of their own when media coverage becomes intense.

1. Accurate communication becomes very challenging, even within an agency and from the civil service to politicians, when media become involved in covering stories about the incident
2. It is difficult, even under effective communication conditions, to convey critical, but subtle differences like that between *E. coli* the ubiquitous indicator bacteria found in all humans and animals and *E. coli* O157:H7 the pathogenic strain which can cause serious illness and even death. Communication of such distinctions when media coverage is intense is almost impossible.
3. A plausible but inaccurate viewpoint (e.g. the premise that chlorinated drinking water was causing irritation of existing skin diseases that were not caused by or in any way related to any form of *E. coli*) can obtain considerable traction in the media and therefore with the public if the erroneous message also provides a justification for an otherwise unwarranted action (i.e. evacuation of half the community).
4. Relationships for effective communication have to be in place before a major crisis because the realities of intense media coverage simply do not allow public health officials to recover the initiative and clarify errors in messages once a crisis occurs.
5. When an incident attracts intense media coverage, politicians will be under extreme pressure to appear decisive, which in the absence of accurate communications, can lead to expensive and unnecessary actions.
6. When an incident involves overlapping levels of government, intense media coverage can lead to reactive decisions by politicians trying to be seen as most decisive.

Case Study 15 – *Cryptosporidium* Outbreak at Milwaukee, USA

Background

Following severe winter storms, Milwaukee experienced the largest single waterborne disease outbreak in US history, with an estimated 400,000 residents ill, 4,400 hospitalizations and 50 deaths among immune-compromised patients. This massive outbreak was attributed to contamination by the protozoan pathogen *Cryptosporidium parvum* at one of the two water treatment plants serving the city. This pathogen was relatively unknown to the US water industry at that time, with only two previous outbreaks documented in the US. A large *Cryptosporidium* outbreak in England in 1988-89 led to an expert inquiry (Badenoch 1990) that made recommendations, which if followed in Milwaukee, may have prevented or substantially reduced the magnitude of the outbreak. Public health officials identified the water treatment plant responsible for the outbreak, issued a boil water advisory and closed the water treatment plant relatively quickly for an outbreak caused by a pathogen which was rarely requested by physicians ordering laboratory analysis of stool samples. The rapid identification of the water treatment plant was based on monitoring records showing a very distinct treated water turbidity spike (still within regulatory limits at that time) and a similar spike in consumer complaints at the plant under suspicion while the second plant did not exhibit these problems. When diarrhoea rates at nursing homes served by the suspect plant were compared with those from the other plant, the evidence for a problem was convincing. This was all done much more quickly than in some later outbreaks caused by *Cryptosporidium*.

Good practice

City and state public health officials responded very quickly upon learning of reports of gastrointestinal disease, large-scale absenteeism at schools and workplaces, bacterial culture media shortages at some hospital laboratories because of an increased demand for stool culture testing and media reports of shortages of diarrhoeal medication at local pharmacies.

The communication of public health officials with drinking water regulators and water supply personnel was effective in acquiring critical data on water treatment plant performance that identified the plant responsible for the outbreak. This made it possible (along with the convenient fact that the other plant could supply the entire city) to shut the problem plant down with some confidence, within two days of issuing the boil water advisory, a measure likely to be much more effective at controlling consumer risk than sole reliance on consumers boiling their water adequately.

Public health officials also appeared to have engaged the media effectively to create a high level of awareness about the problem, locally and nationally, such that 94 cases of non-residents who had visited Milwaukee for less than 48 hours were identified and assessed.

Lessons learned

Communications among water treatment professionals were not as effective as they could have been. In particular:

1. Greater attention by senior technical personnel to water safety issues in other developed countries might have led to awareness of the Badenoch inquiry and its recommendations.
2. The treated water turbidity spike coincided with a sharp rise in consumer complaints about offensive water colour and taste which, given appropriate in-house communications should have warned management personnel that a water quality incident worthy of some detailed investigation had occurred.

Case Study 16 – *Giardia* and *Cryptosporidium*, Sydney, Australia

Background

Following major restructuring of the governance of the municipal drinking water supply and distribution system for Sydney, a metropolitan region of almost 4 million residents, and two years before Sydney was hosting the Summer Olympic Games, a series of boil water advisories over a period of almost 9 weeks were called because of recurring detection of what was believed to be *Giardia* cysts and *Cryptosporidium* oocysts in Sydney's treated drinking water. No outbreak of disease occurred, which was confirmed by analysis of elevated health surveillance monitoring, but the circumstances involving a number of communication failures led to a serious loss of confidence in the safety of their water supply by consumers, a high profile public inquiry and major restructuring of the governance for Sydney's water system.

Good practice

The relationship between severe weather events and poor raw water quality, potentially affecting treated water quality became recognized as a trigger to increase watchfulness by all concerned, including the consuming public.

The media took an uncharacteristic interest in the community's drinking water supply leading to better awareness of the importance of safe water.

The report of the public inquiry communicated the complexity of issues involved in assuring safe drinking water making it clear that science could not provide black and white answers to all questions that arose.

Lessons learned:

Communication failures occurred in Sydney largely because of a dysfunctional and antagonistic relationship between the water utility (Sydney Water Corporation) and the regulator (New South Wales Health Department). Some examples included:

1. The initial boil water advisory was found to have been issued two days after the first high monitoring results were reported. This revelation allowed the media to suggest the possibility of a cover-up in the delay of making the public announcements.
2. The regulator and the water purveyor could not agree on joint statements to the public. The regulator issued an initial public statement that the water purveyor was able to convince a television network which used to be run by its current CEO to modify after it was first aired. The net effect of these competing perspectives only undermined public confidence in their drinking water system.
3. Boil water advisories were issued and withdrawn 3 times during a nine week period seriously undermining public confidence in both the drinking water purveyor and the drinking water regulator.
4. Surveys of the public showed inconsistent compliance with the boil water advisories estimated at between 64 and 74%, meaning that approximately 1 million consumers were ignoring the safety warnings.
5. Paid public advertisements by the water purveyor attempting to reassure the public were challenged by other authorities as inaccurate and the statements ultimately had to be withdrawn.
6. The controversy and political involvement of this series of incidents provided media commentators with remarkably sarcastic and humorous material to lampoon all those in official positions.

Case Study 17 – Cryptosporidium at Pitsford, England

Background

Overnight tests on water at the Pitsford Water Treatment Works on June 24th 2008 revealed that cryptosporidium oocysts were present in the supply. A Boil Water Notice was put in place early on June 25th, which remained until July 4th. It affected around 250 000 residents of Northampton and Daventry. Anglian Water was obliged to deliver bottled water to vulnerable people in the area; however, their database of vulnerable people who would require bottled water distribution (both institutions and individuals) was not up to date. There were 22 cases of infection.

Good practice

An emergency procedure was already in place which involved the Emergency Planning Service (which represents all the local authorities in Northamptonshire), the Health Protection Agency and Anglian Water.

A multi-media approach was used to inform customers about the incident, including:

- Mailing postcards informing customers of the Boil Water Notice and its subsequent removal. These were translated by the local authority into most-used additional languages.
- Notices in TV and radio bulletins
- Vehicles equipped with loudspeakers
- Two mobile Customer Support units
- A postcode checker on the Anglian water website which allowed customers to check if their postal district was affected.

The information distributed not only included the Boil Water Notice, but also updates on the disinfection process and timescale, advice on dishwashing, giving water to animals, the use of ice, the symptoms and need to contact GP/NHS Direct etc. These additional updates and information helped maintain public confidence in Anglian Water.

In general, surveys performed after the incident by the Water Consumer Council and Northamptonshire County Council suggested that the public were satisfied with the speed and manner in which Anglian Water informed them of the Boil Water Notice. There was little criticism in the media, and the Drinking Water Inspectorate decided that there were insufficient grounds for legal proceedings against Anglian Water.

Lessons learned

1. Having procedures in place involving the relevant authorities and service providers in advance of an incident meant that each party knew the role they had to play, and they appeared well co-ordinated. This helped to maintain public confidence in Anglian Water and the authorities as well as minimising the number of infections.
2. The strengths and expertise of each party need to be properly recognised to ensure maximum effectiveness and avoid duplication, specifically a database of vulnerable institutions and individuals is best maintained by the local authority not the water company.
3. Relevant aspects of the emergency procedure need to be communicated to the public in advance of an incident, specifically the needs of vulnerable people during a water supply failure.

Case Study 18 – Sewage Contamination of Mains Water at Freuchie, Scotland

Background

The village of Freuchie in Fife, Scotland, was supplied with water from a reservoir on the outskirts of the village. On 6th March, 1995, a vegetable processor near the village cross-connected a private source, which was contaminated with treated sewage, with the mains supply.

Although many residents had experienced illness in the few days following March 6th, only a few had visited their doctors and this had not triggered an alert. The water supply only needs to be sampled and tested 26 times a year and no samples were taken during the contamination period. Although some informal complaints had been made about discolouration of the water, these had not been comprehensively investigated.

It was not until 10th March that the regional council received its first formal complaint about discoloured water. This was followed by several more complaints, and they started to investigate the cause. Their investigations identified the source and disconnected it from the mains supply. The village's water supply had been contaminated for five days.

From a total population of 1100 there were 633 gastro-intestinal infections. Some of the infections were thought to be a direct result of drinking contaminated water, while others had not consumed contaminated water but the infection was passed to them via another human (for example, it was passed between children in a child minder's home).

Good practice

A Boil Water Notice was issued and Environmental Health staff visited houses to deliver letters on March 10th. A loudhailer van was also used on 11th March to confirm that the Boil Water Notice was still in place. On 13th March the Boil Water Notice was removed from all but three houses, again by letter. Later, information was issued on personal hygiene to prevent inter-human infection.

Lessons learned

1. Where cross connection is possible, local councils need to ensure bye-laws preventing it are complied with, especially in remote regions where monitoring and observation are infrequent.
2. Medical practitioners and water inspectors need a co-ordinated reporting system so potential water contamination incidents can be identified and investigated earlier.
3. Information supplied to residents about dealing with infected water needs to be more comprehensive and include personal hygiene information in addition to Boil Water Notices at an early stage.

Case Study 19 – Cholera Outbreaks in South Africa

Background

In 2000, South Africa implemented a cost recovery policy for utilities, encouraged by the World Bank and IMF. This increased households' water bills to the extent that some could not pay and were cut off from municipal supplies. They then reverted to collecting water from nearby rivers. Within weeks of the first disconnection a cholera epidemic began. There were 114,000 cases in South Africa, five times more than the previous twenty years combined. There was only a 0.21% fatality rate, which was attributed to good case management. The epidemic was exacerbated by the fact that whilst water supplies had improved, sanitation had not and there was still open defecation in the rivers, which had become a water source for people cut off from municipal supplies.

Good practice

A communication campaign was launched immediately. The messages of the campaign focused on water storage, personal hygiene, safe refuse disposal, good food handling and the use of chlorine for water purification in homes. It was delivered by health workers, schools and religious leaders. Additional health workers were recruited to deliver the message. In some areas, special religious masses were convened to recruit volunteers for health education, and health presentations were even made at funerals.

The Red Cross, working in specific areas, observed a sharp fall in mortality rates following the start of their education programmes.

Lessons learned

1. Governments need good mechanisms for receiving communication from their citizens, so they can reverse policies that are proving to be detrimental to health. This may also require inputs from health workers and utility companies.
2. A good base level of hygiene education is essential so the population already know how to prevent the spread of disease. Thus any information campaign is a reinforcement of prior knowledge, rather than new material
3. A strategy for recruiting hygiene educators needs to be in place in advance so there are no personnel shortages. This was the major limitation on the effectiveness of the campaign.
4. Health and hygiene messages should be well planned, so key points are not omitted. For example, at a late stage in this campaign it was realised that education was also required on the treatment of diarrhoea with fluids and oral rehydration salts, and the importance of seeking medical help at an early stage.

Case Study 20 – Cholera Outbreaks in Zimbabwe

Background

In September 2008 a cholera outbreak commenced in Zimbabwe. Although the outbreak is stabilising in urban areas, in the rural areas infections and mortality are still increasing (February 2009). The sustained infection rate has been caused by a breakdown of infrastructure – all sectors have been affected by a lack of funding and support. For example, there is insufficient food and hence widespread hunger, which compromises people's immune systems. Health workers are unpaid, or paid in worthless local currency – many have had to stop working. Sewerage and sanitation provision is grossly inadequate. Drugs and other medical supplies are severely limited. Safe water sources are not maintained so many people are drinking dirty water. Donors are reluctant to provide funds for work in such a politically unstable country.

Even where good hygiene practices are understood, they may not be acted upon due to lack of resources, for example no alternative safe water sources, or no water purification tablets. Additional obstacles to outbreak control include an unwillingness to drink chlorinated water due to the taste, and religious sects who do not believe in using health centres.

Good practice

Amongst this chaos, hygiene promotion is continuing, principally by NGOs. NGOs have needed to build on existing community organisations for assistance with communication.

310 000 flyers and 14 000 posters in three languages have been distributed to 250 000 people. These cover aspects of hygiene such as cholera prevention, control, safe food preparation, hand washing and the use of water purification tablets/sachets. More diverse communication methods such as t-shirts and drama are also being used. This has resulted in some behaviour change, for example an unwillingness to attend public gatherings like funerals, and a reduction in physical contact between humans, like shaking hands or hugging.

ActionAid has decided to focus on hygiene promotion in unaffected areas, so they will be better prepared in the event that the outbreak spreads to them. They have been training volunteers as hygiene promoters.

Lessons learned

1. Hygiene promotion is possible in regions of political instability. However, for hygiene to improve, communication needs to be accompanied by physical resources.
2. In Zimbabwe, NGOs have done a lot of the hygiene promotion. The fact that the outbreak is not under control illustrates that this might best be done by governments, integrated into other infrastructure provision.

Annex A Case Studies - Supporting Information

Case Study 1 – Arsenic in Bangladesh

References

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UNICEF, Arsenic Mitigation in Bangladesh, 2008

Other Background Information

There are also social impacts of arsenicosis with some people believing it is contagious, with sufferers becoming ostracised from the population. In addition, women with pale skin are considered attractive, so sufferers from arsenicosis can find it hard to marry or are divorced, both of which have significant social implications in a society where women have only a limited status compared to their husbands.

In 1998 only 7% of the population had heard of arsenic. Within a year 80% of people surveyed knew the meaning of the colour coded wells, but still only 40% had changed their behaviour accordingly.

Another independent study found that even basic information provision resulted in 60% behaviour change (i.e. changing water points where necessary). It was also found that the mass media were surprisingly effective, despite apparent low levels of TV or radio ownership.

Case Study 2 – Arsenic at Chapels Cove, Canada

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Other Background information

Information on the health risks of arsenic was provided to local physicians and linkages were established to receive any clinical reports of illness that might be attributable to arsenic exposure. A public meeting was organized to inform the community what was known and what would be done about the situation. A fact sheet on the health risks known about arsenic was prepared and distributed to the public. An

alternative water supply was arranged, given the need to eliminate any further use of the arsenic-contaminated supply.

A community exposure survey was performed involving ~ 50 exposed households involving 154 individuals ranging in age from 2 to 83 years. Among participants 73% reported using the contaminated water for more than 5 years and 40% consumed more than 1.5 L of water /day. Biomonitoring of arsenic in hair was chosen as the best means of obtaining a measure of cumulative exposure in the recent past. Participation of 142 individuals was obtained and results were compared with a reference level of arsenic in hair that was verified with 7 control samples. Results showed 85% of participants were above the reference level and 4% were greater than 10 times the reference level. All individuals with hair samples above the reference level were referred to a family physician but physicians reported no cases of any arsenic-related illness. To confirm arsenic was being eliminated from individuals with elevated arsenic in hair, analysis of urine samples for arsenic was offered. All of the four samples taken were negative. For the exposed participants, follow-up was offered at 1, 3 and 5 years. Of the total, 59 participants agreed to be followed and 38 returned the 1 year follow-up questionnaire. This follow-up revealed no evidence of any arsenic-related disease. At three years, there was insufficient interest shown to pursue any further follow-up.

The events in Chapels Cove attracted national media attention. Residents were initially upset upon learning that the initial sampling had been done months before the Health Department was notified and before they were told. Some were also upset and concerned about the results arising from the biomonitoring program which showed elevated levels of arsenic in hair samples. The public concerns led to questioning of the Minister of Health in the Newfoundland House of Assembly on at least two occasions.

Considering the evidence from the community exposure study, a review of epidemiological studies on drinking water exposures to arsenic and results from other situations in North America where elevated exposure to arsenic has occurred, it appears unlikely that there will be any significant, lasting health effects as a result of the exposure to excess arsenic in Chapel Cove's drinking water.

Case Study 3 – Fluoride in Gujarat

References

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Case Study 4 – Nitrate in Morocco

References

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Case Studies 5, 6, 8 and 9 – Community Health Clubs in Diverse Settings

References

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Background

Case studies 5, 6, 8 and 9 provide a comparative analysis between four very different countries and contexts. The CHC approach was pioneered in 1995 in the rural areas of Zimbabwe and an organization was founded by Juliet Waterkeyn to scale it up in 1997. In 2001 the country collapsed politically and economically and to ensure that the lessons learned from the pilot were not lost, a DFID funded research and dissemination project supported research at the London School of Hygiene and Tropical Medicine in the cost-effectiveness of the methodology (Waterkeyn & Cairncross, 2005). The CHC approach has now been used in East, West, Southern and Central Africa, in rural and urban settings; in established rural villages, in IDP camps, in post-conflict resettlements and in informal settlements. The approach is likely to spread to countries in Asia in the near future. The classic CHC approach, as developed and disseminated by Africa AHEAD, has the following standard aspects which comprise a model capable of predicting high levels of hygiene behavior change, provided specific components are present:

- Visual Aids are developed specifically to depict the culture of the target group.
- Trainers are equipped with a PHAST Tool kit of visual aids and well trained in PHAST.
- The (2 hour) health sessions are regular weekly events lasting at least six months.
- Membership cards are used to mobilize community and monitor their progress.
- Those who complete the specified number of sessions are awarded a certificate of attendance.
- Community monitors indicators of behavior change through household inventory.

Whilst all these basics are present in all programmes implemented in conjunction with Africa AHEAD, many other organizations have now emulated the approach and may have neglected one or more of these critical components, hence lower levels of attendance and hygiene behavior change.

Replication and Scaling up

More research is needed to ascertain how this programme has expanded and been adapted since 2003. Monitoring of standard indicators is needed to be able to ascertain comparative effectiveness.

In Sierra Leone, it is rumoured that the CHC Approach has now spread to most of the key implementing NGOs. A Training Manual was published in 2006 by CARE International with a comprehensive PHAST Tool kit which would indicate that this approach has gone to scale, and become institutionalised.

In Zimbabwe, many NGOs are now claiming to be 'doing' Community Health Clubs, but preliminary observations indicate that these are poor copies of the original as pioneered by Zimbabwe AHEAD. DFID is now supporting IWSD in partnership with ZimAHEAD to provide a training programme for all NGOs in Zimbabwe to replicate and scale up the CHC Approach (DFID - PRP II).

In Uganda, the initial project in Gulu (CARE) was replicated in Pader and it is understood that many other organisations (Malaria Consortium, Lutheran World Federation, Unicef, and USAID) are emulating the approach but this is not adequately documented.

A useful exercise would be to follow up on exactly how and to what extent the CHC Methodology has taken root in these countries.

The Classic CHC Approach

The following is applicable to the case studies where training has been done by Africa AHEAD (Zimbabwe, Sierra Leone, Guinea Bissau and Uganda)

What is Communicated

Over 50 key messages related to 24 Topics which, depending on the context and country may focus some of the following: water usage, safe sanitation, community management of sanitation, water and solid waste, prevention of diarrhoea through good hygiene, handwashing, nutrition, weaning, child care, immunization, and on diseases that are relevant to the area including the transmission, prevention and cure of communicable and preventable diseases such as malaria, bilharzia, skin disease and worms, TB, as well as the practical management of HIV/AIDS through home based care.

How are Messages Communicated?

Community Health Clubs are formed (50-150 household members) and the members (mainly women) meet weekly over a period of six months. Key messages are communicated on the principle of 'little but often' - one topic per week with one target practice to achieve (homework). Messages are reinforced each week in different topics. This process of knowledge transfer is far more effective than one-off workshop trainings of a few days which is information overload and only a small portion is retained. Activities are all participatory, based on standard PHAST 'games' which are designed to stimulate debate and communal decision making. All training is done with over sets of illustrated cards for each topic, and no written notes are distributed, except to trainers.

Who Communicates?

The CHC is initiated by a facilitator, who is trained on all the above participatory sessions. This facilitator varies according to context and country. Ideally he (or preferably she) can be a trained Government Ministry of Health official, (Environmental Health Technician, Health Assistant). However in many countries this cadre is not available, therefore the two other options are to train NGO field staff who should live in the village and integrate with the community (HIDO in IDP Camps) or failing that, a Community member, preferably with health or educational experience (teacher, nurse or midwife).

Uganda: National Policy Shifts through Demonstration of Good Practice

Changing behaviour is not just something that applies only to ‘the community’ but also to programme managers and government officials who are often resistant to change and have vested interest in the status quo. Ministries of Health, run by thoroughly intelligent and competent doctors, usually tend to focus to a large extent on *curative* health when in fact the best value for money is achieved by preventing people getting ill! In Uganda about 95% of the Health budget is spent on the curative wing of Ministry of Health and the Environmental Health Department is neglected.

Changes in Uganda’s National Health Policy came about when the Ministry of Finance (rather than the MoH itself), became convinced that ‘hygiene and sanitation’ should be prioritised. A local case study (Busia District) of ‘Best Practice’ showed significant improvement in the health and well-being of rural communities, which led to a decisive drop in cases of cholera and diarrhoea. Opinion leaders in the MoH witnessed this first hand, and being keen to get the best ‘bang for their buck’ realized that preventative health through improved hygiene and sanitation was a cost effective strategy. MoF began to advocate H&S in their revised Poverty Eradication Action Plan (PEAP) document. This, in turn, led to the MoH *having* to adopt similar wording in their own revised Health Sector Strategic Plan (HSSP II).

In Uganda’s case MoF is in the driving seat when it comes to national budgetary allocations and therefore they were able to insist that MoH began to prioritise preventative health activities that obviously include hygiene behaviour change and sanitation.

Lessons learned from national policy shift in Uganda

- Seeing, not reading is believing: Reading reports is not often done, even in senior management
- Best Practice: Establish success stories as a demonstrable example of what can be achieved
- Cross fertilization: Provide forum for senior health officials to be exposed to these projects first hand
- Promote local project implementers to tell their stories in national forum (Annual Sector Review)
- Focus on Ministry of Health paymaster rather than Ministry of Health itself
- Use statements from Ministers (even Presidential directives) to pressure civil servants to perform
- Expose and promote government district staff who have succeeded (or failed) to engender competition
- Increase budget for Environmental Health department and build a grass roots team of EH personnel.

Case Study 7 - Community-Led Total Sanitation in Sierra Leone

References

Richard C Carter, 14th-25th September 2008, Report of a visit to advise on water and sanitation interventions in World Vision’s programme, Sierra Leone

Kamal Kar with Robert Chambers (2008) Handbook on Community-Led Total Sanitation Prepared with the support of Plan International (UK) March 2008

Other Background information

The current thinking in relation to sanitation is that a so-called “zero-subsidy” approach should be taken. This means that although externally funded programmes are still needed in order to promote sanitation uptake and to establish (private sector) hardware suppliers, the full cost of the hardware should be borne by the user(s). Naturally there are some situations in which this is not possible, but the principle should

be one of zero- or least-possible subsidy of the costs of external materials (e.g. cement, rebar and zinc sheeting).

Case Study 10 – Handwashing Promotion in Ghana

References

Source: Public-private partnership to promote handwashing in Ghana
http://www.globalhandwashingday.org/ppph_in_ghana.asp
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Other Background Information

In Ghana, diarrhoea accounts for 25 percent of all deaths in children under five and is among the top three reported causes of morbidity. Children under five typically have three-five episodes of diarrhoea and a similar number of respiratory infections a year. Nine million episodes of disease could be prevented each year by washing hands with soap. The programme made contamination visible to the ordinary Ghanaian for the first time, effectively communicating a hygiene message using commercial marketing techniques.

Case Study 11 – Ecological Sanitation in Malawi

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Richard C Carter, Gloria V Msosa and Rita M Zacarias with support from David Shaw (3rd February 2008) WaterAid Malawi Country Programme Evaluation Final Report

Other Background Information

Ecological sanitation, also known as ecosan, processes human waste to recover nutrients (usually for the purpose of growing crops) that would otherwise be discarded. Technologies include:

- An Arboloo is the simplest and cheapest form where a pit is dug, used as a toilet and a tree is planted after the pit is full.
- The Fossa alterna consists of two permanently sited shallow pits used alternatively. Once one pit is full, usually after 8 months, the contents are excavated and used as manure.
- The Skyloo does not require digging as vaults are built above ground level

Case Study 12 – Waterborne Disease Outbreak at Walkerton, Canada

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Other Background information

This disaster attracted unprecedented national media attention in Canada and led to a \$9 million public inquiry lasting almost two years which identified governance failures at many levels with the most pervasive by provincial regulators. The Premier of Ontario (specifying personal reasons and subject to a number of other controversies) resigned in October 2001, three months after becoming the first provincial premier compelled to testify at a public hearing while in office. His governing party was defeated in the next provincial election, 16 months after the release of the inquiry report.

Walkerton was served by three wells in May of 2000, one of which, Well 5, was clearly subject to surface contamination and had been so identified 22 years earlier by the hydrogeologist who commissioned that well. The 1978 commissioning report on Well 5 warned of the contamination risks, specified the need for chlorination and recommended that the community purchase a buffer zone to protect Well 5 from the nearby farms, but no action was ever taken on this cautionary land use recommendation. Microbiological and turbidity monitoring over subsequent years confirmed that Well 5 was often contaminated, yet the compelling need for adequate disinfection treatment was not effectively enshrined in regulatory requirements nor did operating personnel understand that failure to maintain adequate disinfection could cause illness in the community.

The water at Well 5 was supposed to be chlorinated to achieve a residual of 0.5 mg/L after a minimum 15-minute contact time. Continuously meeting that simple requirement would have inactivated more than 99 percent of the pathogens responsible for the outbreak. Assuring that this requirement was met required regular measurement of the chlorine residual (was specified to be measured once a day). However, chlorine residuals were usually not measured and fictitious entries for residuals were reported on daily operating sheets. This monitoring failure which could have identified the presence of contamination in real time was critical, because the contamination was not recognized by public health and drinking water regulatory officials for over a week. The need to call a boil water advisory was not evident until widespread gastrointestinal illness began to emerge in the community after six days.

Well 5 was recognized from the outset as a vulnerable shallow well and routine monitoring over the years demonstrated consistently that it was often subject to contamination. The evidence in this case needed to be translated into a comprehensive understanding of the contamination threats facing this water supply which would be used to develop an action plan to manage those threats, including effect remedial actions, such as using alternative water supplies and boiling the water, if the action plan measures were ever to fail.

Case Study 13 – Giardiasis Outbreak at Edmonton, Canada

References

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Other Background Information

From the fall of 1982 to the spring of 1983, Edmonton, a city of 580,000 at that time, experienced one of the largest documented drinking water outbreaks of giardiasis in the world. This outbreak lasted as long as it did because of ongoing communication failures among drinking water professionals, environmental regulators, public health officials and politicians leading to ongoing public denials that the municipal water treatment plant could have allowed an outbreak to occur. Ultimately, a total of 895 laboratory-confirmed cases occurred during a period before giardiasis was a reportable disease in Alberta.

Only after an epidemiological analysis showed that cases were clustered in close proximity to the treatment plant which had no treated water storage to achieve adequate contact time while using chloramination for primary disinfection meaning that consumers closest to the plant would receive inadequately disinfected water and an inspection by a U.S. EPA outbreak specialist confirmed that the filtration operations would not be able to withstand a raw water challenge of *Giardia* cysts did officials and some politicians admit that the outbreak was waterborne. In less than a year, some politicians were denying the need for treatment upgrades, some of which were ultimately implemented anyway.

In 1985, chemical water quality problems in the treated water; benzene attributable to stormwater runoff upstream of the raw water intake combined with recurring taste and odour problems persuaded the Mayor to join forces with the provincial Minister of Environment and the chief public health officer to commission an independent study of the quality and safety of Edmonton's water supply.

As an illustration of the progress made by the Edmonton water utility, a paper was prepared to document a close call in 1997 when Edmonton's plants were challenged with massive *Giardia* (more than 2,000 cysts per 100 L) and *Cryptosporidium* (more than 10,000 oocysts per 100 L) loadings in raw water, which led to a breakthrough into treated water, fortunately without any corresponding evidence of illness in the community (Gammie et al, 1998). Sharing the experience of such events with others is an important service and the insights gained have been used to justify providing additional barriers for Edmonton's drinking water supply, including a large-scale installation of UV disinfection.

Case Study 14 - E Coli, Skin Rashes and Evacuation at Kashechewan, Canada

References

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Other Background Information

The Canadian federal government flew in a qualified technician on October 15 who found that the water treatment plant's chlorinator was blocked and the problem was repaired in about 4 hours. The technician took water samples showing that between October 17 and 19, no indicator *E. coli* were present in the treated water. On October 17, the first media report of the *E. coli* result was followed by a flood of national media attention, describing the contamination as "potentially deadly" confirming the media confusion of the indicator *E. coli* with the pathogenic *E. coli*. The community water system had been on a boil water advisory because of turbidity for about 2 years.

Following the fatal Walkerton outbreak in May 2000, the Canadian media was sensitized to drinking water quality issues, particularly anything associated with *E. coli* (*Escherichia coli*) because pathogenic *E. coli* O157:H7 was responsible along with *Campylobacter* spp. for the disease causing the deaths in Walkerton. The distinction between *E. coli* the ubiquitous intestinal bacteria found in all healthy humans and used as an indicator of faecal contamination versus the pathogenic strain of *E. coli* (O157:H7) of Walkerton infamy was not commonly understood among the media, the public and politicians. One national media

story stated: “officials warned of potentially deadly bacteria in water flowing the taps...*E. coli* can make people ill, and even prove deadly for young children, the elderly and those already sick.”

Experts in scabies and impetigo confirmed that these diseases were caused by overcrowding and poor sanitation, these skin diseases were not caused by *E. coli* contamination of drinking water, nor were the resulting skin rashes irritated by levels of chlorine such as those present in Kashechewan. Health Canada completed more than 700 medical assessments and determined that no cases of illness related to *E. coli* infection were found. The technicians who repaired the chlorinator reported that chlorine levels never exceeded 3.5 mg/L and had been brought down to 1.7 mg/L by October 17. These levels were confirmed by an expert technical team that visited Kashechewan from October 28 to 30. They found some important operational deficiencies in the 8 year old water treatment plant, but the most important improvements required related to training for the local operators.

As of October 24, 1500 – 18 L bottles of water were being delivered daily to Kashechewan and on October 30, Canadian Forces had airlifted a transportable 50,000 L per day membrane filtration water treatment plant into Kashechewan. The Ontario government which ordered the evacuation was able to send the bill for this action to the federal government.

Case Study 15 - Cryptosporidium Outbreak at Milwaukee, USA

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Other Background information

Milwaukee had a long history of drinking water outbreaks having experienced a major typhoid outbreak in 1916, followed by outbreaks of unknown etiology in 1936 and 1938. This history was evidently forgotten prior to the 1993 outbreak, considering a quote attributed to the City's health commissioner seeking to explain how the outbreak happened: "It was an issue of complacency, false complacency. I think the feeling was – Hey the water's always been fine'" (Smith, 1995). The 1993 outbreak came as a surprise because Milwaukee was using full conventional water treatment (coagulation-filtration-chlorine disinfection).

Case Study 16 - Giardia and Cryptosporidium, Sydney, Australia

References

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Other Background information

This event was estimated to have cost the Sydney Water Corporation over \$37 million in direct costs, with contingency costs estimated at over \$100 million (Quill, 1999). By the end of the affair, both the Chairman and Managing Director of the Sydney Water Corporation had resigned, senior managers were removed and the Sydney Water Corporation lost responsibility for major assets including dams, reservoirs and catchments to the new Sydney Catchment Authority. Furthermore, laboratory testing by Sydney Water's subsidiary required positive results to be verified by an out-of-state laboratory.

The Warragamba river system southwest of Sydney is the largest of four catchments supplying water to Sydney. Raw water was collected, processed at the Prospect Water Filtration Plant (WFP) and delivered to about 76% of the 3.6 million residents who were served by Sydney Water in 1998. Ten smaller filtration

plants also produced water for the Sydney Water Corporation to serve the city and surrounding communities. All eleven plants supplied filtered, disinfected and fluoridated water to Sydney residents via ~22,000 km of pipes. The Prospect WFP, which started operation in 1996, employed what was described as contact filtration, meaning there was no sedimentation stage between chemical coagulation and the single media high-rate filters. The Prospect WFP was operated by Australian Water Services (AWS), a private corporation, which created an interesting dynamic when Sydney Water was being blamed for allowing the incident. There was also some important disagreement in the monitoring results for *Cryptosporidium* and *Giardia*. AWT collected most of the data during this crisis, but after the first event in July, AWS set up its own laboratory-testing program for *Cryptosporidium* and *Giardia*, which came into play during the second and third contamination events. The original monitoring detection of pathogens likely was detecting fluorescent algae rather than protozoan cysts and the subsequent detection events may have detected protozoan cysts as a result of laboratory contamination (Clancy et al 2000).

Case Study 17 – Cryptosporidium at Pitsford, England

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Additional Background Information

The cause of the incident was subsequently revealed to be a rabbit that had gained entry to a tank that formed part of the treatment process. The water supply was eventually disinfected by installing UV filters at the treatment works which remain in place, and then flushing the water supply pipes. After the incident, customers were given a goodwill payment equivalent to 6 weeks' credit on their subsequent water bills.

Case Study 18 - Sewage Contamination of Mains Water at Freuchie, Scotland

References

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Additional Background Information

The village of Freuchie in Fife, Scotland, was supplied water from a reservoir on the outskirts of the village. A vegetable processor a few hundred metres away from the village also had a private water supply borehole. However, on 6th March 1995 their borehole pump failed. In order to continue their

operations they reactivated both an old water supply in Freuchie Burn, now downstream on the village's treated sewage outlet, and a mains water supply. However, because of the high rate with which they pumped water from the stream, backflow of the stream and sewage water into to public water supply occurred.

On 7th and 8th March the Water Inspectors received some informal complaints about discolouration, but their investigation concluded that these were localised. The discolouration in Freuchie Burn was principally caused by building work upstream, and hence the water supply was not constantly discoloured.

However, at 0755 on 10th March the regional council received its first formal complaint about discoloured water. This was followed by several more complaints, and they started to investigate the cause. Their investigations had identified the source and disconnected it from the mains supply by 1745. A Boil Water Notice was issued at 1900, and at 2100 Environmental Health staff were called to visit houses and deliver letters. By 2345 most houses had been visited; a few were missed and these received visits early on 11th March. A loudhailer van was also used on 11th March to confirm that the Boil Water Notice was still in place. On 13th March the Boil Water Notice was removed from all but three houses, again by letter.

On 21st March, a further letter was delivered advising residents of personal hygiene measures which should be undertaken to reduce the spread of infection.

From 16th-22nd March, a helpline was operational which received 130 enquiries.

Case Study 19 – Cholera Outbreaks in South Africa

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Case Study 20 – Cholera Outbreaks in Zimbabwe

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