HEALTH EDUCATION RESEARCH Vol.24 no.4 2009
Pages 655–673
Advance Access publication 13 March 2009

# Planned, motivated and habitual hygiene behaviour: an eleven country review

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## Abstract

**Handwashing with soap (HWWS) may be one of the most cost-effective means of preventing infection in developing countries. However, HWWS is rare in these settings. We reviewed the results of formative research studies from 11 countries so as to understand the planned, motivated and habitual factors involved in HWWS. On average, only 17% of child caretakers HWWS after the toilet. Handwash 'habits' were generally not inculcated at an early age. Key 'motivations' for handwashing were disgust, nurture, comfort and affiliation. Fear of disease generally did not motivate handwashing, except transiently in the case of epidemics such as cholera. 'Plans' involving handwashing included to improve family health and to teach children good manners. Environmental barriers were few as soap was available in almost every household, as was water. Because much handwashing is habitual, self-report of the factors determining it is unreliable. Candidate strategies for promoting HWWS include creating social norms, highlighting disgust of dirty hands and teaching children HWWS as good manners. Dividing the factors that determine health-related behaviour into planned, motivated and habitual categories provides a simple, but comprehensive conceptual model. The habitual aspects of many health-relevant behaviours require further study.**

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## Introduction

Infectious diseases affect the world unequally. Sixty-two percent of all deaths in Africa and 31% of all deaths in Southeast Asia are caused by infections (Global Health Council, 2005). At the same time, only 5% of all deaths in Europe are from infectious causes. A half of all child deaths each year are due to diarrhoea and acute respiratory infections, both of which are transmitted from person to person during everyday interaction, through droplet and airborne spread, through skin contact and through contamination of the environment [1]. One of the most important ways of preventing these infections is handwashing with soap (HWWS).

Current epidemiological evidence indicates that HWWS prevents about 30–47% of child diarrhoeas [2, 3] and 23% of respiratory infections [4, 5]. A recent comprehensive review ranked hygiene promotion, including handwashing, as the most cost-effective intervention to prevent disease, at a cost of ~$3.4 for each disability-adjusted life year saved [6]. HWWS also prevents infection in HIV-positive individuals [7]. HWWS is not, however, a common practice. Hands are washed with soap on only about 5–15% of key occasions (such as after the toilet or after cleaning up a child) [8]. One study in the UK found that only 43% of mothers washed their hands with soap after changing a dirty nappy [9].


doi:10.1093/her/cyp002

Though increasing resources are being brought to bear on the problem, changing deep-seated, private, morally charged and culturally embedded hygiene practices is a difficult and uncertain process. Large-scale handwash promotion programmes that move away from the common assumption that imparting knowledge about germs and disease will change behaviour are needed. Previous studies of handwashing behaviour, for example in hospitals and among food handlers in developed countries, have confined themselves to using versions of standard models such as the Health Belief Model [10], the Theory of Reasoned Action [11] and the Theory of Planned Behaviour [12] or extensions of it [13], which tend to focus on cognitive and rational reasons for handwashing [14–16]. We have argued that a broader disciplinary approach to behaviour change, which embraces emotional, habitual and cultural factors, as well as rationality, is needed [9, 17, 18].

In this paper, we present the results of a series of formative research (FR) studies that used the perspectives and methods of medical and biological anthropology, as well as of consumer science to help elucidate a range of factors associated with risky hygiene behaviour. Thirteen studies were carried out in 11 developing countries. The research aimed to provide the insights needed to develop strategies for changing handwashing behaviour [19–21]. The study findings are analysed using a simple but comprehensive conceptual framework that incorporates planned, motivated and habitual as well as environmental determinants of behaviour. We compare the results across cultures and extract lessons for programmes designed to promote handwashing. We then discuss the utility of this broader framework for studies of health-related behaviour and consider where gaps remain in our knowledge.

## Methods

This review collects the results of 13 FR studies from Ghana, Kerala State in India, Kenya, Kyrgyzstan, Madagascar, Peru, Senegal, Tanzania, Uganda, Vietnam and the Sichuan and Shaanxi Provinces of China. The studies were carried out for the purposes of designing large-scale or national handwashing promotion programmes for child carers in domestic settings. All but one of the studies were carried out in connection with the Global Public–Private Partnership for Handwashing (PPPHW) (http://www.globalhandwashing.org/) [22], the exception being a study carried out in Kyrgyzstan prior to the formation of the PPPHW (see table 1).

The studies used a variety of methods developed mainly in the anthropological tradition of qualitative research aiming to provide an emic view of behaviour [23]. Further epidemiological, health psychological and consumer science research techniques were added, full details of which have been provided elsewhere [23–25]. Briefly, the studies used structured observations (Method 1) to measure current practice, since self-report of handwashing has poor validity [26, 27]. This involved the direct observation of carer and family handwashing practices, usually for a 3-hour period in the morning, and recording it using a structured format. Observational studies either covered small samples of households, so as to provide a picture of current practices, or larger samples (400+), so as to provide a baseline against which to measure later changes in handwashing behaviour. Behaviour trials (Method 2) involved other volunteer mothers being given soap and being asked to carry out HWWS for a period of 7 or 10 days, followed by an in-depth debriefing interview. Focus Group discussions (FGDs) (Method 3) with target mothers employed a variety of exercises to elicit active participation including soap attribute ranking [28], discussion of motivational images, story telling and word elicitation [25]. Key informants (Method 4) included village elders, health workers and teachers.

Research contractors were recruited to carry out the fieldwork in each country and they developed and pre-tested their own versions of the study instruments. Training of fieldworkers took place prior to the surveys in each country, usually with external technical assistance (Water and Sanitation Program, United States Agency for International Development, Hygiene Improvement Program, Basic Support for Institutionalizing Child

Survival, Colgate-Palmolive, Unilever, Centers for Disease Control and Prevention, London School of Hygiene & Tropical Medicine and consultants). Data consisted of verbatim transcriptions of FGDs and interviews, translated into English or French, as well as quantitative results from surveys. The qualitative data were analysed thematically both manually and with the aid of qualitative analysis software (NUD*IST). Quantitative data were analysed using Excel, EPIINFO, SPSS and STATA.

We analysed the transcripts from FGDs, in-depth and key informant interviews from the original data and from the completed reports by tabulating all relevant extracts according to their theme using our conceptual framework. This is shown in Fig. 1. Following recent thinking in social and evolutionary psychology and neuroscience, we assign behaviour to three types of discrete but interacting causes [29–33]. These are cognitive or executive control which produces 'planned' behaviour, the reward system which produces 'motivated' behaviour [34] and automatic or reflexive control which is responsible for 'habitual' behaviour [35]. Finally, we divide the environmental factors that influence behaviour into three components: 'social', 'physical' and 'biological'. We assume that salient changes in the environment lead to changes in the brain which can lead to changes in behaviour. We provide full definitions of the terms we use and the way in which we employ them in Table II.

The analysis followed standard qualitative methodologies of thematic ordering and interpretation [23] to identify tractable factors that can positively influence handwashing behaviour.

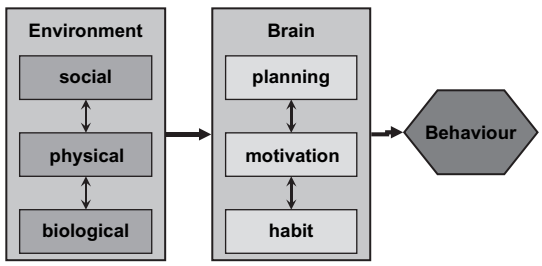


**Fig. 1.** Conceptual model of the causes of behaviour.

## Results

### What are current handwashing practices?

Table III sets out the rates of handwashing by child caregiver (usually the mother) at critical moments as directly observed by fieldworkers in each country. On average, only 17% washed their hands with soap after the toilet/going for defecation, a further 45% on average used water alone. Handwashing with plain water was in the order of three times more common than HWWS. HWWS tended to be higher after defecation and after handling stools and lower before feeding the child and before handling food/drinks.

### Handwashing: why?

We classed people's explanations of the causes of their handwashing behaviour as (i) habitual, (ii) motivated or (iii) planned, following the definitions of Table II.

#### *Habit*

The most primitive psychological system involved in handwashing behaviour is 'habit', which is learnt, automated behaviour that can be regularly triggered by a particular cue [36]. Table IV shows how mothers often ascribed handwashing (HW) habits to what they were taught when they were young. The habit of washing with plain water was much more frequent than HWWS and sometimes occurred as a part of religious ritual, a special form of habit [37]

#### *Motivation*

The motivations concerning HWWS that emerged from the transcripts were disgust, nurture, status, affiliation, attraction, comfort and fear. Table V provides typical examples of relevant extracts.

'Disgust' emerged as a motivator of handwashing in all the studies. Hands had to be washed when they became contaminated with organic material that was dirty, foul or smelly. The most commonly mentioned contaminants were faeces, fish, urine, bodily fluids and rotten or dead items. Faeces were found to be particularly repulsive. For some,

**Table I.** *Details of handwashing formative research studies*

| Country/location | Date | Research by | Target audience | Methods* | Locations | Report |
|---|---|---|---|---|---|---|
| Ghana | 2002 | Research International | Mother/child pairs, male neighbours, groups of mothers, Schools | 500 SO, IDI, FGD, BT | Ashanti, Eastern, Greater Accra, Northern, Western | What motivates hand washing in Ghana? A re-analysis of the results of the formative research data. Scott *et al.* 2002 [49] |
| Kerala, India | 2002 | IMRB | Mothers with children <6 years | 350 SO, FGD, IDI, BT | Kerala State | What motivates hand washing in Kerala? A re-analysis of the formative research data. Scott B, Curtis V, Rabie T, Indian Market Research Bureau, 2003 |
| Madagascar | 2003–2004 | TARATRA PEA | Mothers with children, households | 40 SO, HS, IDI, BT, KII, FGD | Bekhily, Ampanihy | Etude sur le Partenariat Public Privé—lavage des mains avec du savon dans les Fivondronana de Bekily et Ampanihy/2003–2004. Taratra Pea–Banque Mondiale, 2004 |
| Kyrgyzstan | 2000 | BDS | Households with children <3 years, teachers, male elders, school age children | 65 SO, HS, FGD, BT | Six villages, two from each of the three oblasts, Naryn, YsykKul, Talas | Formative Research for Hygiene Promotion in Kyrgyzstan. Biran *et al.* [50] |
| Senegal | 2004 | IRIS | Mothers with children <5 years | IDI, FGD, KII, BT | Dakar, Thiès, Diourbel, Velingara | Etude sur le Lavage des Mains avec du Savon au Sénégal, Rapport Final, IRIS, 2004. PPP for Handwashing: Senegal: Report on Behavioural Trials, Hygiene Centre, LSHTM, London, Aunger B. 2004 |
| Senegal | 2005 | MGP-Afrique | Mothers with children <5 years | 450 SO | Dakar, Diourbel, Thiès, Velingara | Rapport Provisoire: Initiative de parténariat public/prive de lavage des mains Situtation de référence en matière de lavage des mains au Sénégal, Dakar. Senegal MGP-Afrique, 2005 |

**Table I.** *Continued*

| Country/location | Date | Research by | Target audience | Methods* | Locations | Report |
|---|---|---|---|---|---|---|
| Peru | 2004 | AB PRISMA | Mothers/caregivers of children <5 years, school-aged children, other family members | 500 SO, IDI, BT, FGD | Lima, Arequipa, Iquitos, Cusco, Junin and San Martin | Behavioural Study of Handwashing with Soap in Peri-urban and Rural Areas of Peru AB PRISMA, for EHP Lima 2004 |
| Shaanxi, China | 2005 | Xian PDU/CDC | Female custodians of children, households with children <13 years, households with children <5 years, two primary schools | 78 SO, HS | Binxian County, Zhidan County, Yintai District, Yaozhou District | Hygiene Promotion Survey Report (Shaanxi) Re-edited (2nd draft), Xian PDU/CDC, 2005 |
| Sichuan, China | 2006 | Chengdu CDC | Female custodians of children, households with children <13 years, households with children <5 years, two primary schools | 64 SO, HS | Lezhi County, Renshou County, Jialing District | Hygiene Promotion Survey Report, Sichuan, Chengdu CDC, 2006 |
| Tanzania | 2006 | LMS international, Steadman International | Mothers/caregivers of children <5 years, children <5 years, community members, key informants, school children | 30 SO, HS, FGD, IDI, BT | Dar es Salaam, Rufiji, Mpwapwa | Understanding the Tanzania Consumer in respect to hand washing with soap, Dar es Salaam, LMS/Steadman International, January 2006 |
| Vietnam | 2007 | Indochina research | Mothers with children <5 years (income< US$150) per HH/ per month | 720 SO, HS, FGD, BT | Son La, Phu Tho, Hung Yen, Nghe An, Binh Dinh, Ving Long, Dong Thap, Ninh Thuan | Vietnam National Handwashing Initiative Consumer Research. Baseline Survey Final Report. Indochina Research (Vietnam) Ltd, 25 June 2007 |
| Uganda | 2007 | The Steadman Group | Caregivers of children <5 years, community l eaders | 500 SO, HS, BT, FGD, IDI | Kampala, Iganga, Mayuge, Mpigi, Lira, Bughenyi, Masindi, Kiboga, Mbale and Kbale | Formative research and baseline survey on handwashing with soap, Steadman International, Kampala, January 2007 |
| Kenya | 2007 | The Steadman Group | Caregivers of children <5 years, school children | 802 SO, HS, BT, FGD, IDI | All provinces except North Eastern | Formative and baseline study on handwashing with soap. Steadman International Nairobi, 2007 (undated) |

*SO, structured observation; HS, household survey; BT, behaviour trials; KII, key informant interviews; IDI, in-depth interviews; HH, household.

**Table II.** *Definitions of categories used in the content analysis*

| | | |
|---|---|---|
| Brain factors | | |
| Habit | Learnt automated behaviours produced by cues, often as part of a routine [35, 39, 51] | |
| Motivation | Tendency to do work to put oneself into a state that was good for the survival and reproduction of our ancestors (includes drives and emotions) [34, 52] | |
| | Disgust | Tendency to avoid objects and situations carrying disease risk [53] |
| | Status | Tendency to seek to optimize social rank |
| | Affiliation | Tendency to seek to conform so as to reap the benefits of social living |
| | Attraction | Tendency to be attracted to, and want to attract, high-value mates |
| | Nurture | Tendency to want to care for offspring |
| | Comfort | Tendency to place one's body in optimal physical, chemical conditions |
| | Fear | Tendency to avoid objects and situations carrying risk of injury or death |
| Planning | The pursuit of long-term objectives [54, 55] | |
| Environment factors | | |
| Social | The individuals, groups and institutions (e.g. local norms, national regulations and religion) that influence the behaviour of the target individual | |
| Physical | The geographic, climatic, material and artefactual factors affecting behaviour (e.g. water and sanitation availability and house design) | |
| Biological | Other life forms and their products (e.g. foodstuffs, domestic animals and disease agents) that influence behaviour | |

**Table III.** *HWWS and water by mother or caregiver on key occasions*

| Country | *n* | HWWS after toilet (%) | HWWS after cleaning child (%) | HWWS after cleaning up child stools (%) | HWWS before feeding index child (%) | HWWS before handling food (%) | HW with water only after toilet (%) |
|---|---|---|---|---|---|---|---|
| Ghana | 500 | 3 | 2 | — | 1 | — | 39 |
| Kerala, India | 350 | 42 | — | 25 | — | — | — |
| Madagascar | 40 | 4 | — | — | 12 | — | 10 |
| Kyrgyzstan | 65 | 18 | 0 | — | — | — | 49 |
| Senegal | 450 | 23 | 18 | — | — | 18 | — |
| Peru | 500 | 14 | — | — | 6 | — | — |
| Sichuan, China | 78 | 13 | — | 16 | 6 | — | 87 |
| Shaanxi, China | 64 | 12 | — | — | 16 | — | 14 |
| Tanzania | 30 | 13 | 13[a] | 13[a] | 4 | — | 33 |
| Uganda | 500 | 14 | 19 | 11 | 6 | 8 | 44 |
| Vietnam | 720 | — | 14 | 23 | 5 | — | 51 |
| Kenya[b] | 802 | 29 | 35 | 38 | 13 | 15 | 57 |
| Average | | 17 | 13 | 19 | 5 | 13 | 45 |

'—' means not reported.
[a]Tanzania: the figures quoted are the same as the observation was based on whether the person assisting the index child washed their hands after wiping a child's bottom or cleaning child's faeces.
[b]Kenya: note high figures for HWWS are thought to be a temporary response to a cholera epidemic and a current government handwash campaign and hence have not been used in the calculation of averages.

the smell or sight of faeces alone was enough to motivate handwashing, while others related that hands that had not obviously contacted faecal material during toileting did not need washing.

Disgust also related to status and affiliation; respondents said that one cannot be dirty and disgusting and still be acceptable or respected in society. For example, a Senegalese mother said:

**Table IV.** *Handwashing habit*

| Setting | Illustrative quotes |
|---|---|
| Ghana | 'Anytime I am at home I use soap and water to wash hands since it is the upbringing I was given.' |
| | 'That is what I do ever since I was a child, I remember when I was a child, they kept telling me to wash my hands with water, but they never mentioned soap.' |
| Madagascar | 'Hand washing with soap is not a habit round here.' |
| Kerala | 'By doing that [HWWS] kids will learn good habits as they follow what we do.' |
| Peru | 'They end up being like they were taught, if they were dirty growing up, they'll stay that way when they're big: if they were clean they will stay that way.' |
| Uganda | 'Us Muslims who have been taught from childhood that one must first wash (kutawaaza) with water in the kettle or jerrican that is within the latrine and use soap after leaving the latrine' |
| Vietnam | 'All people here have the same habit, it's common' |
| Kenya | 'So many times I forgot to use the soap but the one I rarely forgot was after visiting the toilet because with that I am used, though I wash with water only, but as days went by I got used to washing with this soap' |

> When you are dirty you shouldn't go out or meet people-you risk contaminating them or upsetting them with nauseous smells

'Comfort' emerged as a motivation for handwashing in all the studies. People valued having a skin that is free not just of disgusting substances but also of matter such as earth, charcoal, wetness, stains or oily residues. Comfort resided both in being able to sense cleanliness directly, but also as a state of mind: being clean implied inner comfort, freshness, readiness for anything, confidence and purity. People were discomfited by having hands that could leave other things dirty when touched (including during social contacts). Soap was often only thought to be needed for the removal of especially clinging material such as oily food or stains. For example, a Tanzanian mother said:

> Hands should also be clean, for example when you touch charcoal and then wash your hands without soap, they will not be clean for some charcoal will still be left on your hands, the hands will therefore not look good.

The most appropriate time to use soap for handwashing was often said to be after eating, to remove sticky food residues—the least important occasion for HWWS, from a public health perspective.

Many women claimed to enjoy the perfumed smell of clean hands after using toilet soap. However, in a number of countries (Ghana and Uganda) the perfume was said to spoil the taste of the food if soap was used before eating.

'Nurture' was, not surprisingly, a key motivation for our target groups, the caretakers of young children. When asked to describe the things that were most important to them, women almost always placed children first. Loving and caring for a child was among the most rewarding things a mother could do and the source of her greatest pleasure and satisfaction. Mothers felt a keen responsibility and a duty, frequently using words such as 'ought' and 'should', to ensure the smooth functioning of the family, to keep the child growing well and for it to be correctly educated.

Educating children, both in the formal system, but also informally at home to have good manners and be a good member of society, was a priority for mothers. Daughters have to be taught to be good wives and mothers. According to a Senegalese key informant:

> Apprenticeship for married life begins early. By the example of illustrious ancestors and glorious women in their family tradition, girls learn the arts of seduction, the art of keeping the attention of their husband, and the more subtle art of appearing to submit to marital authority.

However, mothers also felt that running off to wash hands should not get in the way of a child's immediate need for comfort or assistance (Uganda and Vietnam). HWWS was, indeed, rare before feeding a child (5% on average). Though mothers

**Table V.** *Motivations associated with handwashing behaviour*

| Motivation | Examples |
|---|---|
| Disgust | 'I don't want the scent of that thing [faeces] to remain on my hands.' (Ghana) |
| | 'The dirty things are cough, what women have-periods, rotten items or dead items.' (Kerala) |
| | [If they did not WHWS] 'When they next ate, they would be eating the microbes from their bottom' [this would be] 'like eating faeces and would be disgusting.' (Kyrgyzstan) |
| | 'I feel very bad if I come out of the toilet and I do not wash my hands. I feel like am just smelling like toilet' (Kenya) |
| | 'My hands stink after the toilet so my friends will boo at me.' (Madagascar) |
| | 'After defaecation there is no smell and nothing can be seen, so you feel that there is no need to wash your hands' (Kerala) |
| Comfort | 'So that they [hands] feel fresh, comfortable and smell like soap.' (Peru) |
| | 'Soap makes clothes and body smell good.' (Kyrgyzstan) |
| | 'After eating food you can't move with dirty hands. I have got to wash my hands with soap after eating fish or any other oily foods' (Uganda) |
| | 'Hands should also be clean, for example when you touch charcoal and then wash your hands without soap, they will not be clean for some charcoal will still be left on your hands the hands will therefore not look good' (Tanzania) |
| | 'HWWS is only important … when we have stubborn stains or after making fish that only soap can help remove' (Vietnam) |
| | 'Because when I am clean outside, even inside me I feel clean, even within my spirit and my mind' (Kenya) |
| | 'When I'm clean, I'm comfortable' (Senegal) |
| Nurture | 'All I do is for my children first, I work to have money for my children.' (Vietnam) |
| | 'The children are my future, so I should try to look after them well.' (Ghana) |
| | 'We do everything for the health of the children. We have to bathe them, wash their hands and legs, we have to give then food, look after them when they are sick.' (Kerala) |
| | 'My children are my pride and joy. I wash my hands to protect them' (Kenya) |
| | 'A woman might be doing some work and she sees a kid who is about to fall in to a trench she will just run to help the child out' [and not stop to wash her hands] (Uganda) |
| | 'We just say so [HWWS], but in reality when baby cries too loudly, we are frustrated, only have enough time to quickly wash hands with water, or rub on our clothes if hands are not too dirty, to soothe the crying baby' (Vietnam) |
| | 'If I don't do it (show her how to wash her hands) no one will.' (Peru) |
| | '[a soap user is one] who gives a good impression, she's pleasant to see, her and her surroundings' (Senegal) |
| Status | 'If we are clean others will have a good opinion about us. Hearing that we will feel happiness.' (Kerala) |
| | 'It is shameful to be dirty in front of your friends.' (Madagascar) |
| | 'If you don't wash they look at you like a pig at the school.' (Peru) |
| | 'My children are always clean and admired by other people because soap keeps us clean' (Uganda) |
| | '[Clean people are] attractive, acceptable, recognized, confident and earn respect from the community … you look rich … many people think you need money to be clean' (Kenya) |
| | 'Even if you are not polite and well mannered, your neighbours will respect you if you are neat.' (Ghana) |
| | 'Not everyone here belongs to the same social class, and I can't force myself to fit into someone else's living styles.' (Kenya) |
| Affiliation | 'A person who is not clean is like a mad person … people avoid him but feel sorry for him' (Tanzania) |
| | '[we] Villagers don't like dirt anymore.' (Senegal) |
| | 'Washing hands to fit in is very common with us here' (Uganda) |
| | '… and you know cleanliness is next to Godliness and when you live well with the community, it does you a lot of good' (Kenya) |
| | 'HWWS is … the ''respectable'' thing to do' (Vietnam) |
| | 'I will say that neatness is very important and good too. Because when you are dirty and go near others, they will say that you smell bad.' (Uganda) |
| | 'But you see the problem here is when you are clean, people say you want to be different from them and they hate you' (Uganda) |

**Table V.** *Continued*

| Motivation | Examples |
|---|---|
| Attraction | 'A clean person is attractive' (Senegal) |
| | 'Dirt can even put away a promising suitor' (Ghana) |
| | 'Because I believe a home which is clean earns the wife adoration from the husband' (Uganda) |
| | 'The baby you have; it is the husband who gave you, It is good to look clean to your husband so that both of you can get children' (Kenya) |
| | 'Dirty wives put their husbands off' (Ghana) |
| | 'If you try to look clean you are trying to attract other people's husbands' (Uganda) |
| Fear | There is a low perception of being at health risk. Diarrhoea especially is claimed to be unlikely. The overwhelming majority cite weather as the major cause of diseases: a fatalistic approach (Vietnam Report) |
| | 43% feel that a child cannot avoid getting diarrhoea. It is a normal part of growing up (Kenya Report) |
| | Cholera is the disease most closely associated with faeces. (Peru) |
| | 'If I did not wash my hands I would get cholera and diarrhoea for the children, many people do it because of Cholera' (Uganda) |

agreed that it was logical that HWWS could protect the health of the child, the immediate nurture motivation to care for or feed a hungry child, whatever the current state of one's hands, seemed to take precedence.

*Status* All the reports showed that people were driven to behave in ways that enhanced their social 'status'. Being seen to be clean could lead to being admired and respected, and a clean child was regarded as an ambassador from the family to society at large. On the other hand, being labelled as 'dirty' was thought shameful and to be avoided at all costs. However, some respondents raised the concern that if they HWWS, they might be seen as being too clean, as trying to get above themselves (Kenya).

HWWS is a private affair and several respondents pointed out that as nobody could see if you had washed your hands or not, handwashing could not help one to enhance one's social standing. This may be why HWWS is often insisted upon at public functions or in restaurants in the study countries, but not when eating at home.

*Affiliation* Being a good member of society by joining in and by doing what everyone else is perceived to be doing is an important motive for handwashing. This helps ensure membership in the social group. Conformity with local social norms is known to be a powerful driver of behaviour [38]. Unfortunately, HWWS is rare in most of the investigated communities, therefore the normative motivation militates against it. One Ugandan mother explained the dilemma thus:

> But you see the problem here is when you are clean, people say you want to be different from them and they hate you (Uganda)

On the other hand, people who are not clean are a threat to society and can be shunned and ostracized, a fate that most people fear greatly, since poverty forces them to have to depend on others.

*Attraction* Respondents discussed the question of whether clean hands could help make you more attractive to the opposite sex. Many agreed, for example:

> You cannot caress your husband when your hands are dirty (Kenya)

However, not all respondents were comfortable with discussing the idea that sexual 'attraction' might be related to HWWS, and there was a distinct variety of responses by country. Two types of culture were distinguishable—those for which female attractiveness was an important issue that was discussed openly and the seductive arts are taught by mothers to daughters (example.g. in Senegal). At the opposite pole was Uganda, where women presented themselves as God-fearing and did not wish

to appear to outcompete their 'sisters'. Their culture valued modesty and purity, where women were less ready to discuss the idea of sexual attraction as a motive for handwashing. However, we are again faced with the conundrum that although attraction is important, HWWS as a means to being attractive is not entirely plausible, since potential lovers do not necessarily notice whether hands are clean or not.

*Fear* When asked about their fears, child carers were concerned about immediate threats such as war, poverty and corruption. Specific health fears tended to cluster around life-threatening diseases and those that threaten adults, such as HIV/AIDS. Mothers were also worried about drug-taking and pregnancy in teenagers. When asked about hygiene-related diseases, immediate fears were related concerning epidemic cholera or typhoid. For example:

> I must wash hands to protect them from disease as cholera… (Kenya)

Some of the reports suggested that handwashing did increase during epidemics of cholera (Uganda, Senegal, Kenya and Peru). However, people said that they returned to their usual handwashing habits once this danger had passed. Having cholera in a household was both frightening and shameful—with severe repercussions for the status of the family.

Diarrhoea in children was rarely mentioned spontaneously and was understood mostly as a symptom of some other condition, or as a largely benign fact of life that inevitably affects young children, rather than a source of fear. Handwashing could, however, play a role in achieving the long-term objective of living a healthy life—which we will discuss below.

### *Planning*

We looked for evidence in the transcripts for ways in which caretakers constructed plans to use handwashing to help achieve some form of long-term end or objective. Such planned behaviour is distinct from motivated behaviour, which aims at short-term reward, or habitual behaviour which is automatic and cue-based, as we have discussed above.

The transcripts pointed to three ways in which handwashing could help in the achievement of long-term objectives. First, handwashing could help to provide a platform of good health for all the family. Second, handwashing was sometimes being carried out for the sake of beneficial supernatural objectives such as being in a state of religious purity or of having 'good luck'. Third, caretakers made plans to teach children handwashing so as to socialize them correctly. In each case, there was a chain of logically connected representations which linked handwashing to some form of long-term beneficial objective. We also found examples where handwashing gets in the way of achieving long-term plans.

Health as a long-term objective is often described as being instrumental in meeting other objectives, such as being beautiful, or saving money. For example, the report from Senegal stated:

> Women are particularly careful to protect themselves from illness. They fear that disease might affect their body and so spoil the beauty of their face or the elegance of their deportment. (Senegal).

Note that we make a distinction between health as a long-term objective, and the threat of epidemic disease, such as cholera, as an immediate danger that can motivate handwashing directly ('fear' motive-see above).

We found flaws in the chain of belief/knowledge that linked handwashing to long-term beneficial outcomes. Though knowledge about the germ theory of disease was found to be widespread in all the country studies, germs remained essentially abstract, since they are invisible and undetectable. Further, mothers have learnt that poor hygiene causes 'diarrhoea' (or the equivalent local term for loose motions) in children, yet mothers often did not recognize this condition as a disease; for them diarrhoea is just a symptom, either of normal child development (e.g. teething) or of another underlying disease. Diarrhoea was neither seen as life-threatening nor was it seen as being relevant to one's own children, and it was thought to be mild

and self-limiting, hence unlikely to lead to other adverse outcomes. Thus, the chain of associations that would make it worthwhile to go to the trouble of washing hands with soap, because of distant and uncertain benefits associated with preventing child diarrhoea, and hence the possible serious illness or loss of the child is probably too tenuous to cause mothers to make conscious plans to always carry it out.

The reports provided some evidence of the importance of hygiene in the achievement of religious and other supernatural objectives. While handwashing ritual is a part of religious devotion for Muslims, respondents were divided as to whether soap should have a place in a practice that is prescribed in detail in religious texts. In Madagascan tradition, future outcomes are assured through building tombs for the ancestors and sacrificing cattle; all available funds are used for this priority, and it was thought that buying soap could detract from such investment in the future. In Uganda, it was stated that handwashing is something one does after returning from a burial, after contact with the dead. Hence, to associate handwashing with contact with infants would be tantamount to bringing bad luck on the child. In Senegal, various local traditions suggest that soap can bring bad luck, reduce life expectancy or harm a pregnant woman.

These beliefs involving handwashing's possible outcomes are diverse and specific to local cultures, as one would expect. Mothers, however, often explicitly devalued such beliefs to the interviewers, labelling them as superstitions, and claiming that they did not affect their own behaviour.

Finally, we found evidence that some mothers did plan to introduce HWWS to their children as a part of a plan to teach them good manners, to socialize them as well-accepted members of the community (Table VI).

## The environment

In Table VII, we have collated information from the reports about environmental factors that influence handwashing practice. We have divided these into social, biological and physical factors which either positively influence the practice of HWWS or constrain it.

Physical factors that affected the practice of HWWS included water, soap and toilets. Water provision varied widely, both between and within countries. All households had enough water for daily use, but some said they had to use it carefully because obtaining it was either expensive or involved labour or queueing. Soap availability was, however, excellent and was present in 95% or more of households in all the studies that recorded it. The soap was often an unperfumed laundry bar; toilet soap was rarer and was sometimes referred to as a luxury or beauty product, to be bought sparingly and conserved carefully. Soap bars could be kept wrapped up, or kept out of reach, to save them from being 'wasted' by other family members, from being dirtied or from being eaten by domestic animals.

Not having a specific location, especially after leaving the toilet, was clearly a major environmental constraint to HWWS. While Kyrgyz mothers were proud of their Soviet-era washstands, Chinese households often had cheap washstands (<$10) with a place for soap, water bowl and towel and Peruvian mothers tended to have sinks and taps, in other countries handwash facilities were rare. Soap tended to be kept in kitchen areas and in bathrooms, sometimes on the ground in plastic colander-like holders. Water was often only available if one made an effort to go and fetch it, and even then, to wash both hands with soap while pouring water from a container requires some dexterity. In Uganda, efforts had been made to promote 'tippy-taps'—home made water dispensers for handwashing.

Social factors influencing caregiver handwashing behaviour included local culture, beliefs, traditions and norms, which are promulgated through social structures such as the family, neighbours, local social organizations, government health workers, schools and mass media. We have explored above how the perception of norms such as the rarity of handwashing and the desire to follow local tradition can motivate or demotivate HWWS (via 'affiliation' and status) and through planning.

**Table VI.** *Planning: long-term objectives relevant to HWWS*

| Objective | |
|---|---|
| Good health | 'I wash to guard against diseases because hands are the things used to do everything in the house. You may touch some dirty places and then pick a fruit and go ahead and feed it to the baby without washing hands. There, the baby will start to diarrhoea.' (Tanzania)<br>'There is gas from the toilet which can make us get germs' (Ghana)<br>'You wash your hands before eating: otherwise you get a stomach ache.' (Peru)<br>'Diarrhoea is caused by rain making the water dirty' (Kyrgyzstan)<br>'Or if we have defecated in such dirty toilets, bacteria will surely come into our body when we eat. Dirty toilet picture conveys that virus transfer by air is real' (Vietnam).<br>'Many children visit the traditional healer with the evil eye and diarrhoea.' (Kyrgyzstan)<br>'Soap also helps in the issue of preventing one from having lice on him/her. Soap and insects are repel each other' (Tanzania)<br>Soap is said to cause colds and flu probably due to allergic reactions to it. (Tanzania Report).<br>'Women are particularly careful to protect themselves from illness. They fear that disease might affect their body and so spoil the beauty of their face or of the elegance of their deportment.' (Senegal Report)<br>• 92% of caregivers know that hidden germs cause diarrhoea<br>• 43% feel that a child cannot avoid getting diarrhoea. It is a normal part of growing up<br>• 21% can tell if their hands are free of germs, just by looking at them (Kenya Report) |
| Religious/supernatural objectives | 'Before prayers. Because when we pray, there should be no stains on our hands and it has to be washed with soap.' (Kerala)<br>'Like I for instance, have to wash my hands and feet about 5 times before I go to pray in the mosque … when we visit the toilet, we have to wash using soap' (Tanzania)<br>'you can't use soap with the holy water for ablutions' (Senegal)<br>'Washing has to be practiced after a burial to wash away the connection with the departed person. This is very important in Baganda culture' (Uganda).<br>'You don't have to [WH before child] like you're from burial' (Uganda)<br>'soap makes luck run away'<br>'a pregnant woman should use less soap'<br>'In the Busoga tradition, they say you should not wash hands before holding the child. In that even a dirty person asks to carry a new born they cannot be denied since it is a belief that they are a blessing to the child' (Uganda)<br>'I also have to be clean not only my body but also my clothes so that my heart can also be pure and you know cleanliness is next to Godliness…' (Kenya) |
| Socialized children | 'By doing that [HWWS] kids will learn good habits as they follow what we do.' [Ker32(DI)BT]<br>'If I don't do it (show her how to wash her hands) no one will.' (Mother from Lima)<br>'I value my life, my children and their education … I work hard to put my children through school.' (Tanzania)<br>'I care for my children by cooking, teaching them, making sure they are clean and so on.' (Vietnam) |

Social factors varied from country to country, for example in most cases women controlled the family soap budget, but in some families it was the responsibility of fathers (Senegal) or of mothers-in-law (Kerala). In some countries, mothers were well connected with their society—the majority attending regular community meetings (Vietnam, Uganda and Senegal), but in others (China, Kyrgyzstan and Madagascar), there was little organized community activity. We found mixed attitudes to Government health workers, and in several countries we learnt that health and Non Government Organisation workers and other extension agents were often regarded as disdainful of poor folk, and hence unlikely to be effective as agents of behaviour change.

While school attendance has risen remarkably in the last decade, rising enrolment has stretched the

**Table VII.** *Environmental factors influencing HWWS*

| Category | Factor | Aspect | Finding |
|---|---|---|---|
| Physical | Water | Availability | Generally available difficult in a minority of remote communities, queueing and intermittent supply a problem for some. However, water specifically for handwashing was rarely located near toilet |
| | | Cost | Households varied greatly as to whether cost limited consumption for handwashing or not |
| | Soap | Availability | Available in >95% of all study households. However, soap often kept out of reach to save it from waste, spoiling or kept in cooking area |
| | | Cost | Toilet soaps were seen as expensive, as a luxury, laundry soaps were generally thought affordable |
| | Handwashing stands | Availability | Few households had handwash stands or specific handwashing locations near to toilets (except for Peru, Kyrgyzstan and China). Some Ugandan households had tippy taps and washstands. Note: it can be hard to HWWS without a tap, without someone to pour water for you. |
| | Toilets | Location | Public toilets or defecation grounds could be distant, making it hard to remember to HWWS on return |
| Social | Norms | Rarity of HWWS | HWWS generally not perceived as social norm, hence a disincentive |
| | Family | Economic | Usually mother controls soap budget, but in some cases it is father or mother-in-law. Mothers have to balance a tight budget where soap may compete with other basic family necessities |
| | Community | Organizations | Membership rates varied, but caretakers often did not belong to formal groups or attend community meetings regularly. Religious attendance was more common. |
| | Health workers | Low respect | Sometimes seen as negligent or rude, hence their advice not attended to |
| | Schools | Attendance | School attendance has increased rapidly in the last few years with most children now attending. However, as a result, schools are overstretched and hygiene is not a priority |
| | Mass media | Coverage | TV coverage was surprisingly high and growing rapidly in most countries. Radio coverage was much more varied. Consumption of print media by child caretakers was low |
| | | Handwashing visibility | Low visibility of HWWS on TV. Growing awareness of germs from commercial advertising. |
| Biological | Other priorities for bodily effort/energy | Time | Mothers often complained they were too busy to HWWS, other duties were more urgent |
| | | Effort | Mothers complained of fatigue, for example, being too tired to HWWS after a day working in the fields |
| | | Forgetting | Though they know they should HWWS, mothers often said they just forget |
| | Faeces, urine | Visible, 'smellable' | When faecal matter is visible or 'smellable', this can cue the need to HWWS. On the other hand: 'we live in a dirty environment, so why wash?' (Tanzania) |
| | Disease | Visibility | Mothers nowadays have less experience of children dying from infections |

ability of schools to provide anything other than the educational minimum; hence, hygiene was rarely given priority. Very few schools provided soap for pupil use. Mass media coverage has also grown dramatically in the past decade and TV reached the majority of respondents in all countries. Radio coverage was much more varied—ubiquitous in some countries, but patchy in others. Child caretakers consumed very little print media in any of the studies. HWWS featured rarely in the media, which adds to the problem that it is not perceived to be a social norm.

Biological barriers to HWWS include lack of time and energy for handwashing, and being so busy that handwashing is forgotten. Living in a contaminated and smelly environment, with few or poorly maintained toilets, however, was described as providing a reminder to wash hands.

## Discussion

### Implications of the findings

The FR reports reviewed here provided a rich seam of knowledge about handwashing, both in terms of what was actually practiced and the reasons why. Most painted a clear and colourful picture of what was happening in each country, and contributed original and useful insights towards the design of HWWS programmes. There were limitations as to what could be derived from the studies, which we discuss below. First, we look at the implications of these findings, and of other studies, for future programmes to promote HWWS.

#### *Changing habits*

The subject of habit is poorly addressed in the behaviour change literature, despite the fact that as much as 50% of daily activity may be habit driven [39, 40]. It seems likely that handwashing, like toothbrushing, occurs as component part of daily routines [18] and that these routines are often established from childhood [13]. Habits take time to establish, and mothers like to teach their children good habits. Ritual is a special form of habit associated with religious teaching, which again becomes automated after a period of being taught [37].

Habits are automatic reactions to particular cues, and more work is needed to understand exactly what these cues are for particular categories of handwashing behaviour. Naikoba *et al.* [15] found that placing posters in handwash locations in hospitals could be effective in cueing handwashing behaviour. Placing handwash facilities in sight of toilet exits may thus be helpful, though hard to achieve on a mass scale. Simple reminders displayed in the appropriate locations in homes may be more feasible. Mini-posters or stickers could be distributed free with wrappers by soap manufacturers, for example.

#### *Utilizing motivations*

Table VIII draws together our main findings about the motivations involved in HWWS and explains why we judge some as having more likely value than others in promoting handwashing. It appears that the motivations that could most easily be exploited in promotion campaigns are disgust and affiliation. Beyond this, comfort and nurture may also motivate handwashing. Our findings have something in common with Whitby *et al.* [13] who found that nurses in Australia were often motivated to wash hands by a sense of emotional dirtiness, for example after contact with the bodily fluids or genitals of patients, which can be equated to disgust. In the same study, the affiliation motive was also found to be important—handwash intentions were influenced by the perceived behavioural and injunctive norms of other health careworkers.

#### *Stimulating planned behaviour*

There are a number of reasons why people might plan to adopt HWWS as a step on the way to helping them to achieve long-term objectives. Local beliefs about being lucky or holy can provide reasons to adopt handwashing. However, once such behaviour becomes common in society, then it may no longer be due to individual planning but be sustained through local cultural norms (affiliation motive) and through ritualization (habit). Though mothers had a tendency to dismiss the importance of such local beliefs, they may still be important. If, for example it is a local norm not to do washing on a Wednesday, then such practices may still be followed, not because they are believed but because they are the local norm. Whether such traditional beliefs should form the target of a communications programme, would depend on how deeply embedded they were [41].

Biomedical beliefs can certainly be changed; however, the story of the advance of germ theory over the centuries shows that there has been a long slow process of assimilation of new knowledge, often in parallel with or adapting to local belief systems [42]. It seems, however, that concentrating on changing beliefs about disease may not be an effective strategy for behaviour change. Enhanced knowledge about germ theory may remain in the category of 'school learning' and live alongside

**Table VIII.** *Findings about motivations*

| Motivation | Conclusions from the review | Good candidate |
|---|---|---|
| Disgust | Being aware of contaminating matter on hands motivates an immediate need to HWWS. However, if the handwash location is distant disgust may not last as long as the time it takes to find soap and water. The communications task should be to make hand contamination feel real. | Yes |
| Comfort | Mothers will HWWS when there is visible or clinging matter on hands. They enjoy the feeling of clean, fresh-smelling hands from which dirt has been removed. The comfort motive may provide an additional benefit/reward to mothers from HWWS, but is not a central motive. | Maybe |
| Nurture | This is a strong motivator for maternal caring behaviour; however, the nurture motivation may work against HWWS, when there is an immediate need to feed or care for a child. On the other hand, mothers are strongly motivated to educate their children in good manners, for example, so getting them to teach handwashing to their children is a promising avenue to explore. | Maybe |
| Affiliation | Doing what everyone else is perceived to do is a strong motivator of current behaviour. When HWWS is perceived as not what everyone round here does, then it becomes less likely. The task of communication is to make it seem like 'everybody's doing it' and to publicize the injunctive norm: 'everybody round here feels that one should HWWS'. | Yes |
| Status | People care deeply about their social status and being perceived as dirty is to be avoided at all costs. Cholera, for example, can bring great shame to a family. However, HWWS is often a private affair, hence nobody can tell if hands have been washed or not, so status may not operate as a motive, except when being watched, for example, outside a public toilet. High status people tend to be copied, whatever they do, so using role models in handwashing campaigns can be helpful. | Maybe |
| Attraction | Though mothers differ in their desire to discuss it, many do want to look attractive to their husbands or others. However, as with status, it may be difficult to tell if hands have been washed with soap or not, hence the motivation link is probably too indirect. | No |
| Fear | Child diarrhoea is not perceived as a major threat, it can be benign and inevitable and so not particularly feared by mothers. The threat to oneself of a severe or epidemic disease such as cholera may motivate HWWS temporarily, but HWWS stops when the danger is past. | No |

many other concepts of disease causation [43] rather than replacing them. The fact that respondents often cited germ theory when asked why they wash their hands is likely to reflect the desire to give 'the right answer' to interviewers and to a post-rationalization of other motives they find hard to discern and report because handwashing behaviour is often habitual and hence carried out unconsciously. The causal chain for belief about diarrhoea is probably too long: the threat of a child catching a benign disease sometime in the future provides no immediate motivation to change a current practice in that instant. Hence enhancing knowledge about germs, without linking it to something that has plausible immediate value for mothers, is not likely to lead to higher levels of handwashing.

Inciting planned behaviour is a difficult task, requiring the individual to become convinced of plausible, high-value benefits, possibly undergo some sort of 'religious conversion' and then for the individual to make a conscious plan to carry it out. In this case, the individual would need to be convinced of a clear benefit and then need to acquire soap, a handwash stand and a water source and place it in a suitable location. They would need to make a commitment to use it (and perhaps to teach the whole family to use it). Eventually, through prolonged repetition, the planned behaviour will become habitual, triggered by specific cues (exiting the toilet, for example) and requiring less cognitive resource. This is known as the 'Implementation Intentions' approach and it has shown good results in improving problematic health-related behaviour such as dieting, exercise and smoking cessation on a small scale [44]. Whether such approaches can be made to work cost-effectively at a large scale,

however, remains in question. The best hope of a major change in planned behaviour might come at a life-changing event such as the birth of a new child, when a mother is biologically prepared to learn new habits [45].

## Changing the environment

Salient changes in the environment lead to changes in the brain, which lead to changes in behaviour. The task of the health promoter is therefore to identify the social, physical and biological factors that can lead to the desired changes, in this case, to regular HWWS.

Changing physical factors on a large scale, such as the availability of water, requires long-term sustained investment and may be beyond the ability of a handwash campaign to deliver. Though people cite cost of water and soap as a problem, in fact, almost all people had soap and water available in their households, and HWWS does not utilize very much of either resource. One route to behaviour change might be to demonstrate how little soap and water are needed for effective handwashing.

Changing the social environment is feasible and could be cost-effective on a large scale. We have already discussed the importance of the affiliation motive in people's desire to conform to what are seen as the dominant local practices or norms. While changing actual normal practice may be a long and slow process, changing perceived norms may be easier. For example, if handwashing is regularly portrayed in mass media, in TV ads or on entertainment shows, for example the impression or normality is created. A second way is to use the power of injunctive norms. For example, in Uganda, only 14% HWWS after the toilet, but 84% felt that was what one should do. It should be possible to exploit this injunctive norm, to make people feel they ought to HWWS because others think you should. We suspect this approach may be very effective (this method has been used to great effect to change alcohol drinking practices [38]). Campaigns should endeavour to give high visibility to HWWS as a social norm by creating the illusion that 'everyone's doing it'.

Biological factors such as lack of energy and being too busy are hard to influence in a large-scale health promotion programme. The above strategies have to overcome such negative factors so that caretakers assign a higher priority to HWWS.

## Similarities and differences

Though there are clearly differences in handwashing practices and in the factors that determine them between countries, it is striking how similar findings were. As one might expect, social and physical environments were quite varied, as were cognitive factors such as local beliefs. Specific motivations, however, coalesced around a common universal set.

## Limitations of the studies and methodological issues

The studies had a number of limitations. First of all, because the studies did not overlap perfectly in terms of design, comparison between countries was difficult. Some topics were explored in detail in some countries and ignored in others. Second, the studies were of uneven quality: some were well designed and analysed and some were less well conducted. Third, this review was based on summary reports, not the original data, which was not available in all cases. Hence, results have been filtered by the authors of the reports, and also through translation, which may have led to lost insight or bias.

Fourthly, and most importantly, these studies did not attempt to investigate the determinants of handwashing behaviour in a quantitative fashion, as is common in the practice of health psychology. We chose to use the qualitative methods of anthropology and consumer research because we found standard questionnaire-based methods too limiting. To understand planned behaviour, we needed to explore people's plans and objectives in more detail than is possible using quantitative methods. Motivated behaviour also is difficult to explore using questionnaires, particularly in countries without traditions of emotional literacy. Factors such as status, attraction and disgust often seem 'irrational' and are likely to be under-reported in questionnaire studies

where respondents rather try to give the 'right' answer. Respondents seek to give a good impression to investigators and hence demonstrate their book learning—how much they know about germs, for example—when faced with questions about why they wash their hands [46]. Even when people can accurately recount their own motivations [47], there are often good reasons not to do so. We saw, for example, how talking about sexual attraction is permissible in some cultures and not in others. As consumer researchers well know, even in cultures with strong traditions of exploring their own emotions, motivations can be hard to locate through introspection [25]. Humans everywhere tend to confabulate, that is to make up *post hoc* rationales for practices which have actually been determined unconsciously [48].

We took a step forward here by making *a priori* predictions about the motivations that are likely to be relevant to handwashing and specifically seeking them out through indirect means such as use of motivational images and story telling about daily life.

Habits are especially difficult to elicit using standard quantitative methods because they are, by definition, unconscious and thus hard to report on. The cues responsible for habitual behaviour can probably only be elicited by detailed, in-depth, real-life studies of daily routines [18].

The biggest drawback of the approach we have taken is therefore that we cannot statistically link reported brain factors to risk behaviour. Our approach rather followed the commercial model of in-depth exploration of plausible behavioural causes so as to generate insights that can be used for marketing campaigns.

This review employed a novel conceptual framework that is a product of both emergent findings from the field and an emerging consensus in the brain and behavioural sciences. Because the data pointed to factors involved in behaviour including emotional motivation and automated habit that could not be captured using standard models (e.g. the Health Belief Model, the Theory of Planned Behaviour), we built a new one. The theoretical aspects of our model derive from modern social psychology and biological anthropology, pinpointing biologically relevant natural kinds of behaviour that reflect real structures in brains [29]. We believe it to be a simple, but comprehensive, model that can be used in the study of many health-related behaviours, not just for hygiene, and in both rich and poor countries. It could also be adapted to quantitative factorial studies, where we expect it would perform at least as well as any other model currently employed in health psychology.

## Conclusions

### How to promote hygiene?

While HWWS can prevent infection and save many lives, it is still rare in many countries. Large-scale handwash promotion programmes that move away from the simplistic assumption that imparting knowledge about germs and disease will change behaviour are needed. The approach we set out here seeks to identify how handwashing can be slotted into the habitual, motivated and planned activities of the everyday lives of child caretakers in their own domestic environments.

The main practical implications from this review are as follows:

- HWWS at key junctures, such as following the toilet, is rare.
- Handwashing practices are often automated and habitual, and established during childhood.
- Since HWWS is rare, the perception of this social norm encourages people 'not' to do it. Hence, one of the tasks of handwashing communication should be to make HWWS 'seem' common (billboards, advertisements, seen in TV dramas, etc).
- While fear of epidemics such as cholera can motivate handwashing, the motivation does not outlast the epidemic.
- Disgust can be a potent motivator of HWWS. Messages about the disgusting nature of the material that gets on hands in the toilet can encourage handwashing and be highly memorable [49].
- While mothers may not make specific long-term plans to avoid disease, they do plan to teach the

social arts to their children. Persuading mothers that a child that washes hands with soap is demonstrating good manners may be an effective means of getting habits established early.

Finally, this review highlights the importance of continuing to develop the theory and practice of health promotion so as to be able to encompass concepts such as motivation, emotion and habit, in the light of emerging developments in psychology, anthropology and marketing.

## Funding

Country Governments; Water and Sanitation Programme; World Bank; UK Department for International Development; United States Agency for International Development; Irish Aid; Danish Agency for International Development Assistance; Unilever PLC. Funding to pay the Open Access publication charges for this article was provided by research.

## Acknowledgements

Most of the work described in this paper was carried out in the context of the Global PPPHW. Many individuals and organizations contributed, both in the countries and from the Global Steering Group. The institutions involved were the Academy for Educational Development, BASICS, Centers for Disease Control, Colgate-Palmolive, DANIDA, Hygiene Improvement Project, London School of Hygiene and Tropical Medicine, Procter and Gamble, Unicef, Unilever, USAID, Water and Sanitation Programme, World Bank, as well as Country Governments, NGOs and a number of contract research organizations. The UK Department for International Development funded the study in Kyrgyzstan. Adam Biran, Lene Jensen and Gaby Judah commented on the manuscript.

## Conflict of interest statement

None declared.

## References

1. WHO. *World Health Report 2002*. Geneva: World Health Organization, 2002.
2. Curtis V, Cairncross S. Effect of washing hands with soap on diarrhoea risk in the community: a systematic review. *Lancet Infect Dis* 2003; **3**: 275–81.
3. Ejemot RI, Ehiri JE, Meremikwu MM *et al*. Hand washing for preventing diarrhoea. *Cochrane Database Syst Rev* 2008; **1**: epub ahead of print, doi:10.1002/14651858.CD004625.pub2.
4. Rabie T, Curtis V. Evidence that handwashing prevents respiratory tract infection: a systematic review. *Trop Med Int Health* 2006; **11**: 1–10.
5. Luby S, Agboatwalla M, Feikin D *et al*. Effect of handwashing on child health: a randomised controlled trial. *Lancet* 2005; **366**: 225–33.
6. Jamieson D, Bremen J, Measham A *et al*. *Disease Control Priorities in Developing Countries*. Oxford: Oxford University Press, 2006.
7. Huang D, Zhou J. Effect of intensive handwashing in the prevention of diarrhoeal illness among patients with AIDS: a randomized controlled study. *J Med Microbiol* 2007; **56**: 659–63.
8. Scott B, Curtis V, Rabie T. Protecting children from diarrhoea and acute respiratory infections: the role of handwashing promotion in water and sanitation programmes. *WHO Reg Health Forum* 2003; **7**: 42–7.
9. Curtis VA, Biran A, Deverell K *et al*. Hygiene in the home: relating bugs to behaviour. *Soc Sci Med* 2003; **57**: 657–72.
10. Janz N, Becker M. The health belief model: a decade later. *Health Educ Q* 1984; **11**: 1–47.
11. Ajzen I, Fishbein M. *Understanding Attitudes and Predicting Social Behaviour*. Englewood Cliffs, NJ: Prentice Hall, 1980.
12. Ajzen I. The theory of planned behaviour. *Organ Behav Hum Decis Process* 1991; **50**: 179–211.
13. Whitby M, McLaws M-L, Ross MW. Why healthcare workers don't wash their hands: a behavioral explanation. *Infect Control Hosp Epidemiol* 2006; **27**: 484–92.
14. Clayton DA, Griffith CJ. Efficacy of an extended theory of planned behaviour model for predicting caterers' hand hygiene practices. *Int J Environ Health Res* 2008; **18**: 83–98.
15. Naikoba S, Hayward A. The effectiveness of interventions aimed at increasing handwashing in healthcare workers—a systematic review. *J Hosp Infect* 2001; **47**: 173–80.
16. O'Boyle C, Henly S, Larson E. Understanding adherence to hand hygiene recommendations: the theory of planned behaviour. *Am J Infect Control* 2001; **29**: 352–60.
17. Curtis VA. Hygiene: how myths, monsters and mothers-in-law can promote behaviour change. *J Infect* 2001; **43**: 75–9.
18. Aunger R. Tooth-brushing as routine behaviour. *Int Dent J* 2007; **57**: 364–76.
19. Curtis V, Kanki B, Cousens S *et al*. Dirt and diarrhoea: formative research for hygiene promotion programmes. *Health Policy Plan* 1997; **12**: 122–31.
20. Young D, Johnson C, Steckler A *et al*. Data to action: using formative research to develop intervention programmes to increase physical activity in adolescent girls. *Health Educ Behav* 2006; **33**: 97–111.

21. Curtis V, Kanki B. *Happy, Healthy and Hygienic: How to Set Up a Hygiene Promotion Programme*. New York, NY: Unicef, 1998.
22. Curtis V, Garbrah-Aidoo N, Scott B. Masters of marketing: bringing private sector skills to public health partnerships. *Am J Public Health* 2007; **97**: 634–41.
23. Russell Bernard H. *Research Methods in Anthropology: Qualitative and Quantitative Approaches*. Walnut Creek, CA: AltaMira Press, 2005.
24. Scott B, Curtis V, Rabie T *et al*. Health in our hands, but not in our heads: understanding hygiene motivation in Ghana. *Health Policy Plan* 2007; **22**: 225–33.
25. Zaltman G. *How Customers Think: Essential Insights into the Mind of the Market*. Boston, MA: Harvard Business School Press, 2003.
26. Biran A, Rabie T, Hirve S *et al*. Comparing the performance of indicators of handwashing practices in rural Indian households. *Trop Med Int Health* 2008; **13**: 278–85.
27. Curtis V, Cousens S, Mertens T *et al*. Structured observations of hygiene in Burkina Faso, validity, variability and utility. *Bull World Health Organ* 1993; **71**: 23–32.
28. Reynolds T, Gutman J. Laddering theory, method, analysis and interpretation. *J Advert Res* 1988; **28**: 11–28.
29. Aunger R, Curtis V. Kinds of behaviour. *Biol Philos* 2008; **23**: 317–45.
30. Dennett D. *Breaking the Spell, Religion as a Natural Phenomenon*. New York: Viking, 2006.
31. Ortony A, Norman DA, Revelle W. Affect and proto-affect in effective functioning. In: Fellous JM, Arbib MA (eds). *Who Needs Emotions? The Brain Meets the Robot*. Oxford: Oxford University Press, 2004, 173–202.
32. Rolls E. *The Brain and Emotion*. Oxford: Oxfrod University Press, 1999.
33. Sloman A. Beyond shallow models of emotion. *Cogn Process Int Q Cogn Sci* 2001; **2**: 177–98.
34. Wong R. *Motivation: A Biobehavioural Approach*. Cambridge: Cambridge University Press, 2000.
35. Verplanken B. Beyond frequency: habit as mental construct. *Br J Soc Psychol* 2006; **45**: 639–56.
36. Wood W, Neal D. A new look at habits and the interface between habits and goals. *Psychol Rev* 2007; **14**: 843–63.
37. Boyer P. Why ritualized behavior? Precaution systems and action-parsing in developmental, pathological and cultural rituals. *Behav Brain Sci* 2006; **29**: 1–56.
38. Perkins HW. *The Social Norms Approach to Prevention*. San Francisco, CA: Jossey Bass, 2004.
39. Wood W, Quinn JM, Kashy D *et al*. Habits in everyday life: thought, emotion, and action. *J Pers Soc Psychol* 2002; **83**: 1281–97.
40. De Bruijn GJ, Kremers SPJ, De Vet EE *et al*. Does habit strength moderate the intention-behaviour relationship in the theory of planned behaviour? The case of fruit consumption. *Psychol Health* 2007; **22**: 899–916.
41. Tomes N, Warner J. Rethinking the reception of the germ theory of disease: comparative perspectives. *J Hist Med* 1997; **52**: 7–16.
42. Curtis V. Dirt, disgust and disease: a natural history of hygiene. *J Epidemiol Community Health* 2007; **61**: 660–4.
43. Curtis V, Kanki B, Mertens T *et al*. Potties, pits and pipes: explaining hygiene behaviour in Burkina Faso. *Soc Sci Med* 1995; **41**: 383–93.
44. Gollwitzer PM, Sheeran P. Implementation intentions and goal achievement: a meta-analysis of effects and processes. *Adv Exp Soc Psychol* 2006; **38**: 249–68.
45. Rosenblatt J. Psychobiology of maternal behavior: contribution to the clinical understanding of maternal behavior among humans. *Acta Paediatr* 1994; **83**: s397.
46. Kanki B, Curtis V, Mertens T *et al*. Measuring hygiene behaviours: experiences of a comprehensive approach in Burkina Faso. In: Cairncross A, Kochar V (eds). *Studying Hygiene Behaviour: Issues and Experiences*. London: Sage Publications, 1994.
47. Trivers R. The elements of a scientific theory of self-deception. *Ann N Y Acad Sci* 2000; **907**: 114–31.
48. Bargh JA, Chartrand TL. The unbearable automaticity of being. *Am Psychol* 1999; **54**: 462–79.
49. Scott B, Schmidt W, Aunger R *et al*. Marketing hygiene behaviours: the impact of different communications channels on reported handwashing behaviour of women in Ghana. *Health Educ Res* 2007; **22**: 225–33.
50. Biran A, Tabyshalieva A, Salmorbekova Z. Formative research for hygiene promotion in Kyrgyzstan. *Health Policy Plan* 2005; **20**: 213–21.
51. Wood W, Neal DT. A new look at habits and the interface between habits and goals. *Psychol Rev* 2007; **114**: 843–863.
52. Franken R. *Human Motivation*. Pacific Grove, CA: Brooks/Cole, 2001.
53. Curtis V, Aunger R, Rabie T. Evidence that disgust evolved to protect from risk of disease. *Proc R Soc B* 2004; **271**: S131–3.
54. Wood JN, Grafman J. Human prefrontal cortex: processing and representational perspectives. *Nat Rev Neurosci* 2003; **4**: 139–46.
55. Miller EK, Cohen JD. An integrative theory of prefrontal cortex function. *Annu Rev Neurosci* 2001; **24**: 167–202.


*Received on June 13, 2008; accepted on January 27, 2009*