THE DANGERS OF DIRT

HOUSEHOLD HYGIENE AND HEALTH

Valerie Curtis

Propositions/Stellingen

1. Public Health improvement programmes are mostly driven by the innovations of the health sciences. Greater benefits to health might be achieved if interventions were designed from the perspective of the household: what do people know, do and want, and what additional support do people need to improve their own health?
(This thesis)

2. Hygiene, morality, ritual and religion are inseparably entwined:
"Wash me clean of my guilt, purify me from my sin." (Psalms 51:2)
"God loves those that turn to him in repentance and strive to keep themselves clean." (The Koran 2:223).
"If cleanliness is next to Godliness then soap must be considered as a means of Grace." (Henry Ward Beecher, 1885)
(This thesis).

3. Proverbs teach morality in many cultures. For example:
Tori ka bessya (Bambara) A toad can't teach hygiene.
Aglouza do nou glo do ni yi za ho ton me (Fon) The pig who asks the sheep to sweep his room.
Pig sorak ni moog nang Boum (Moré) Clean your courtyard and the scorpion will no longer be right to bite you [because scorpions are dirty].
Ko bountonyi kin youo ti dimi chogomina, ka teme a yi chin mogo min ka kogo doura (Dioula) The man bitten by the scorpion feels less pain than the man in whose house the scorpion bites.
Sabou dou foot bopam (Wolof) Soap doesn't clean itself.
Opgeruimd staat netjes (Dutch) Tidy does nicely.
Don't wash your dirty linen in public (UK).

4. Scientific researchers who try to cross disciplinary boundaries are faced with the dilemma, that though multidisciplinary approaches are often recommended and praised, professional evaluation of scientific performance is, almost without exception, carried out in monodisciplinary mode.

5. "The greatest challenge today, not just in cell biology, but in all of science, is the accurate and complete description of complex systems." (Edward O. Wilson, Consilience, 1998). This can only be achieved through a fusion of disciplines.

6. The process of learning is like climbing a ziggurat; the higher the terrace one reaches, the further one can see.

7."Even now most anthropologists and social scientists are firmly committed to the view that evolution has nothing to tell them. Human bodies are products of natural selection but human minds and human behaviour are products of 'culture' and human culture does not reflect human nature, but the reverse. This restricts social scientists to investigating only differences between cultures and between individuals - and to exaggerating them. Yet to me the interesting things about human beings are the things that they share, not the things that differ between cultures: things like grammatical language, hierarchy, romantic love, sexual jealousy, long term bonds between genders. These are trainable instincts peculiar to our species and are just as surely the products of evolution as eyes and thumbs are" (Matt Ridley, The Red Queen: Sex and the Evolution of Human Nature, 1994). Ridley's description of evolutionary psychology sets the agenda for future research in the social sciences.

8. Science would be nothing without passion and daring. "L'aquisition des connaissances fait approcher de la vérité quand il s'agit de la connaissance de ce qu'on aime, et en aucun autre cas" (Simone Veil, L'enracinement, 1978).

9. Writing a thesis brings rewards: "Blessed are those who know the causes of things" (Virgil, Georgics Book II).

10. De Beauvoir offers the following hypothesis for test: "The rage for cleanliness is the highest in Holland where the women are cold, and in puritanical civilisations which oppose an ideal of neatness and purity to the joys of the flesh" (Simone de Beauvoir, The Second Sex, 1952)

11. Whilst there are dangers in dirt, there are hazards in cleaning!

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For Naïma, Abidine and the *Sotigui*.

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The Dangers of Dirt

Summary

Encouraging changes in hygiene practices are potentially one of the most effective means of reducing the global impact of diarrhoeal diseases, which kill an estimated 3.3 million children a year. However, efforts to improve hygiene in the developing world have met with limited success. Some of the reasons behind this include:
-the complexity of the subject of hygiene
-the problem of how to identify and target only a few specific household risk practices
-the difficulty of measuring hygiene behaviour accurately
-the lack of available methods for understanding what hygiene means to people
-the lack of strategic thinking in planning interventions.

This thesis presents the results from nine years work on these problems from the town of Bobo-Dioulasso, Burkina Faso and elsewhere. The first chapter addresses the subject of hygiene in general and suggests that it has dual origins; in the need for individual and social order, and also in the need to avoid disease. The second chapter evaluates the specific hygiene practices most likely to put health at risk. The literature on the subject suggests that practices which can reduce the faecal contamination of the household environment, such as safe stool disposal and hand-washing with soap after contact with stools, are likely to be of greatest protective value. The problem of the measurement of hygiene behaviour is addressed in chapters four to six, which conclude that structured observations are probably the most valid and practical tool available for recording hygiene practices.

We then go on to address the question of how hygiene was understood by mothers in Bobo-Dioulasso, and we conclude that mothers saw little connection between hygiene and diarrhoeal diseases, but that hygiene was very important to them as a positive social value. In the final chapters the lessons learned from the work in Bobo are fitted into a framework that can be used to design hygiene promotion programmes in the future. This employs a variety of qualitative and quantitative methods to carry out a systematic programme of formative research that combines what people know, do and want, with the available scientific knowledge. The results provide a rational basis for the design of hygiene promotion programmes. A trial of the effectiveness of this new approach to hygiene promotion is currently underway in Burkina Faso.

Preface

To work on human behaviour and its relationship to health requires that one learn from many disciplines. Anthropology, psychology, biology, history, epidemiology, public health engineering, marketing and consumer behaviour all have insights to offer about what it is that determines the behavioural choices that people make. To become an expert in all of these fields is, of course, impossible. Nevertheless, if the ultimate aim of research into health-related behaviour is to show routes to health improvement, then there is no choice but to venture beyond the relative safety of the academic tribe to which one belongs. As a member of the engineering tribe, I come to health problems with a mechanistic approach; if epidemiology can offer a spanner here, anthropology a bolt there, marketing some nails, then I have purloined them in an effort to build a working model for hygiene promotion. I hope that members of other academic tribes will forgive my forays into their territory. These raids were motivated by a belief that the only way that we stand a chance of making sense of human behaviour and its relationship with health is to pool our efforts and risk the transgression of boundaries, academic and otherwise.

The work described in this thesis originates from more than eight years of multi-disciplinary study of the problem of diarrhoeal disease and hygiene in Bobo-Dioulasso, Burkina Faso. First conceived in the mid 1980s as a study of risk factors for diarrhoeal disease, the work grew into a much wider investigation of the problem of hygiene and how one might go about improving it in this West African setting. Over the last three years we have been able to put our ideas about hygiene into practice, in the shape of a hygiene promotion programme that continues at the time of writing.

There are advantages to having the opportunity to pursue a particular problem over a long period of time in one setting. As one's understanding about the problem increases, so does one's insight about the social world, which is its context. As understanding deepens, so further connections are made. As research teams change and grow so new perspectives are added. As positive experience accumulates, so what is learned becomes more and more valuable, and the lessons more widely applicable. By putting the major products of this research work together under one cover, it is possible to see how our ideas evolved over time. It is also an opportunity to shape the work into a coherent whole, which should amount to more than the sum of its parts.

The main concern of the work in Bobo-Dioulasso has been to do something that has immediate practical significance. This concern can be detected in every chapter of the thesis. Indeed it is encouraging to see that some of the practical lessons from this work are already being applied in many countries and programmes.

Of course this work is the product of the efforts of many people in many countries. 'Projet Diarrhées' which began in April 1989 in Bobo-Dioulasso was a collaboration between the Ministère de la Santé du Burkina Faso, the London School of Hygiene and Tropical Medicine, the Centre Muraz in Bobo-Dioulasso, Burkina Faso and the Université de Bordeaux II, France. It was initially funded by the European Community's programme of Science and Technology for Development. Additional funding from the UK governments Overseas Development Administration provided salary support, and funding from the Ouagadougou office of UNICEF and the Community Water Supply section of the World Health Organisation (later the Rural Environmental Health division) allowed us to expand the scope of the work and to develop the practical lessons from our research findings.

The research was conceived from the beginning to be multidisciplinary and collaborative in nature. It benefited from the inputs of sociologists, anthropologists, statisticians, engineers, epidemiologists, clinicians, computer programmers, paediatricians, medical students, microbiologists, technicians, administrators, secretaries, extension workers and politicians. Many of these partners are co-authors of the published papers that form several of the chapters of this thesis. They are Bernadette Kanki, Etienne Traoré, Thierry Mertens, Simon Cousens, Ibrahim Diallo, Arlette Sanou and Francois Tall. I wish especially to thank the teams from the Direction Provinciale de la Santé du Houet, from the Direction de l'Education pour la Santé et de l'Assanissement in Bobo-Dioulasso, from the Service de Pédiatrie, Hopital Sanou Souro and the many collaborators at the Centre Muraz. Mesdames, Baro, Coulibaly, Lamien, Percoma, Sanou, Sirima, Tianou and Tiendrebeogo were the dedicated, good humoured and hardworking fieldworkers. Many of the mothers of Bobo-Dioulasso dedicated a good deal of time to helping us with our work, we owe them a debt of gratitude. This thesis has also benefited from the experience of a hygiene promotion programme run by Ankur Yuva Chetna Shivir in Lucknow, India and from discussions with colleagues and students in Europe, Africa and Asia.

I would especially like to thank my Promotors, Professor Dr Anke Niehof and Dr Thierry Mertens, readers Dr Sandy Cairncross, Professor Dr Corlien Varkevisser and Professor Dr Ir. Bert Brunekreef. The Department of Household Studies in Wageningen kindly hosted the writing of the thesis. The Centre Muraz in Bobo-Dioulasso provided an excellent base for work in Burkina Faso over many years. Many colleagues in the London School of Hygiene and Tropical Medicine provided moral and intellectual support. Bert van der Hoek and Peter Singer provided classical and anthropological insights. Margaret Curtis and Sara van Otterloo assisted with corrections to the manuscript. Moctar Sacande enriched this work, and my life during it, in ways beyond counting.

Emmanuel Nkobi and Mamadou Troaré did the sketches in chapters one and eight and the figures in chapter two are reproduced courtesy of the Wellcome Institute Library, London.

List of Abbreviations

CDD	Control of diarrhoeal diseases
UNICEF	United Nations Children's Organisation
WHO	World Health Organisation
LSHTM	London School of Hygiene and Tropical Medicine
κ	Kappa statistic
CI	Confidence interval
OR	Odds ratio
VIP	Ventilated Improved Pit Latrines

Chapter 1

Introduction: Cleanliness and Godliness

The picture on the cover of this thesis is an adaptation of a poster designed for Britain's Health and Cleanliness Council by the artist, Abram Games. The original version, shown in figure 1.1, is one of a series of posters that were designed to exhort the military and civil population to greater personal cleanliness during the period immediately following the Second World War. Games' poster resonates with threat, reminding us of our fear of disease, disorder and darkness.

But what is dirt and why is it so dangerous? This question turns out to be more complex than it might seem at first sight. Why, for example, is earth on the carpet dirty, whilst earth in the garden is wholesome and a source of plenty? Why is our own saliva fine in our own mouths, but evokes disgust if spat into our soup bowl? Why would we have difficulty drinking orange juice that has been stored in a brand new urine collection vessel (Pinker 1998)? Why does lipstick on a cup revolt but lipstick on lips entice? Why does contact with slimy, sticky substances make us feel dirty and polluted (Sartre 1943)? And beyond the physical manifestations of dirt; why is licentious gossip labelled dirty secrets, and why are sexual deviants labelled dirty old men?

Certainly ideas about dirt vary from culture to culture and have changed from century to century. What is dirty in one place is clean in another. What was seen as clean by our forbears is unacceptably dirty in the late twentieth century. The explanation offered by anthropology for dirt is that it is matter out of its proper place. As each society has rules that create order, violations of that order constitute a threat to society. As each individual makes sense out of reality by ordering and classifying, so anomalous or disordered phenomena threaten that structure. As physical objects which are in the wrong place, or hard to classify (is slime solid or liquid?) are labelled as "dirty", so the label "dirty" is given to marginal behaviours and social categories which provide a threat to the social order (Douglas 1966). Hence the lipstick has to stay in its proper place on the lips, and the dirty old man has to keep his behaviour within society's boundaries.

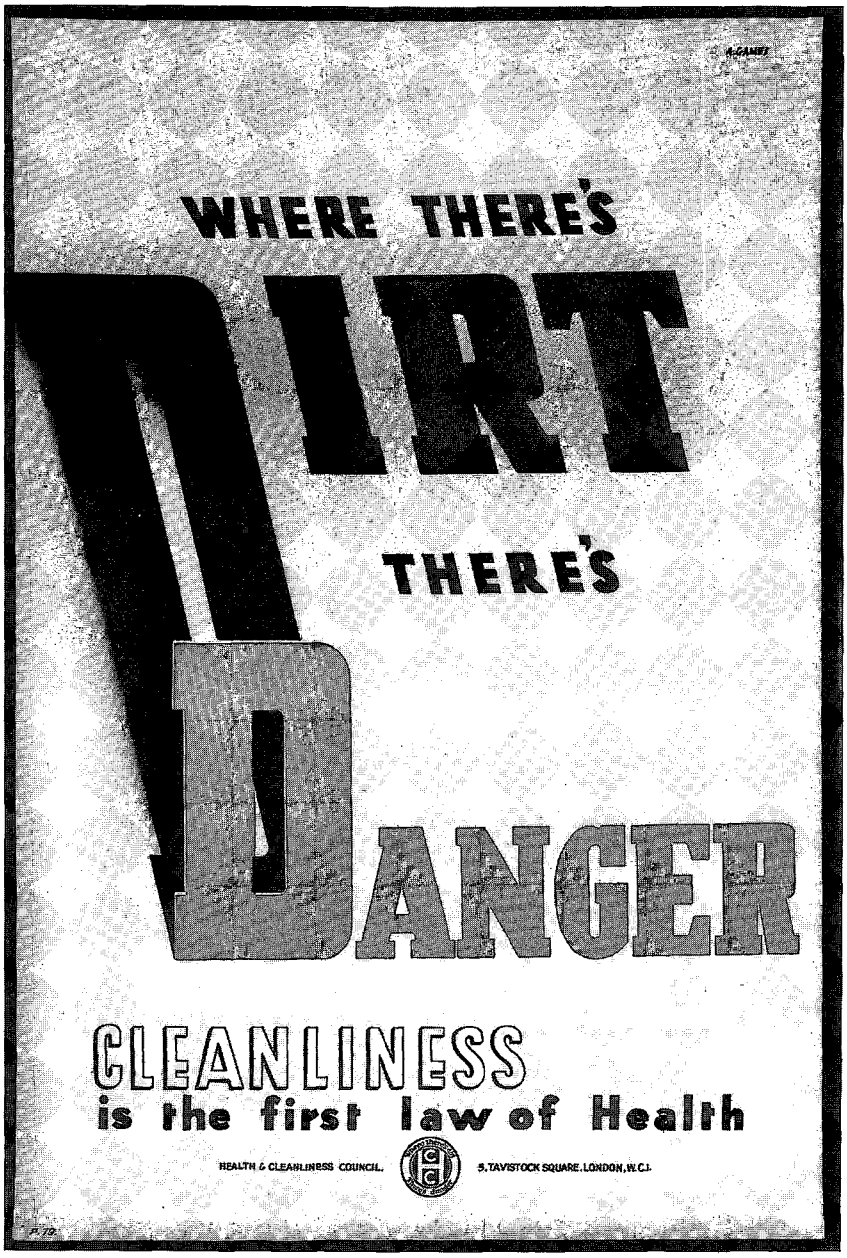


Figure 1.1 Where there's dirt there's danger

To combat the dangers of dirt there is hygiene, which serves to preserve order, to chase away dirt and to preserve health. As dirt is multiple in nature and ubiquitous, so is its corollary, hygiene. Rules about hygiene are to be found throughout every society. Hygiene is not only the private practices of individuals, but it is a requirement of each society. Hygiene is invoked not only in public health science, but it figures prominently in moral theology. Hygiene provides not only a barrier to the transmission of disease, but it also provides a barrier to disorder, chaos and social collapse.

The primary concern of this thesis is the role that hygiene plays as a barrier to disease. But if there is one lesson that we, the research team, have learned from our studies on this subject, it is that the biomedical perspective is too narrow. If hygiene is a social phenomenon, then it cannot be understood except in social context. And without methods for understanding hygiene in context, without analysis of the factors underlying and determining hygiene, efforts to encourage better hygiene for the sake of public health will remain ineffective.

Preventive public health in the West has undergone something of a revolution in the past twenty years. Dissatisfaction with the outcomes of Health Education, which was based on the assumption that teaching people about disease transmission would lead to health improvement, has led to its partial replacement with Health Promotion. This is defined by Green and Kreuter (1991) as:

> "the combination of educational and environmental supports for actions and conditions of living conducive to health".

In the spirit of this new approach, and taking lessons from a wide variety of fields including epidemiology, anthropology, marketing studies and communications, this thesis develops a new synthesis. To distinguish it from previous approaches I have labelled it '**hygiene promotion**'.

Changing behaviour

The problem of encouraging people to change their behaviour is as old as history. Aristotle believed in persuasion through Rhetoric (McGuire 1981) Pavlov in conditioning (1927), Skinner in the power of environment and events to effect behaviour (1938). McGuire showed that attitudes affect behaviour and that communication can affect attitudes (1964). Psychologists and consumer scientists stressed the importance of cognitive factors in behaviour change, leading to the Theory of Reasoned Action (Fishbein and Ajzen 1980). In this model attitudes and subjective norms, (self-efficacy has recently been added to the model, (Bandura 1997)) determine behavioural intentions, which determine behaviour.

The health belief model of Becker (1979) is the theoretical basis for the practice of health education. He proposed that health-related behaviour change comes from rational decision making, which balances perceived benefits, costs and threats, which themselves depend on demographic variables and existing beliefs. The role of health education is thus to change individual beliefs and perceptions about disease and to provide cues to action.

The PRECEDE-PROCEED model of Green and Kreuter (1980) is based on the health belief model and shows how to diagnose community needs for planning health education and promotion. More recently the transtheoretical, or stages of change model of Prochaska (1979, 1997) is in the ascendant. This model proposes that different types of action are required to move people through the different stages of behaviour change. A further contribution to the field comes from social marketing; Kotler 1989 shows that there is an 'feeling' component as well as a learning component in behaviour change. Andreason stresses the importance of 'putting the client first', and on using a strategic management approach to finding out about the clients of health programmes and then designing programmes to fit their needs (1995).

The field of health behaviour change thus has multiple and often contradictory theoretical models on which to draw (Bandura 1997). Our own model is proposed in chapter eight. Future research into this field needs to look beyond the narrow confines of health behaviour, and try to place it in the context of all the other goals, needs and drives that determine human behaviour in general. All recent models point us to the conclusion that health education, on its own, is not likely to be sufficient to change behaviour. This realisation is what has been driving the health promotion movement over the past 20 years.

Diarrhoeal Diseases, the Permanent Epidemic

In Europe an average of only about one child in a thousand children dies before reaching its fifth birthday, but in much of Africa and Asia the death rate is between one child in five and one in ten. Much of this difference can be explained by the high prevalence of infectious diseases in the poorer regions of the world, especially respiratory infections, diarrhoeal diseases and malaria. More than a quarter of all of the deaths of children under five in the world today are due to diarrhoeal diseases (WHO 1996). There are an estimated 3.3 million deaths each year from diarrhoeal diseases, including dysentery, cholera and typhoid, and there are at least a billion episodes per year (Bern et al 1992). Sub-Saharan Africa suffers disproportionately with a median number of 4.4 episodes per child per year, and a third of all deaths associated with diarrhoea (Kirkwood 1991). Whilst the majority of the toll of death and incapacity due to diarrhoeal infection is levied in developing countries, diarrhoeal pathogens also pose a threat to infants, the immuno-compromised, and

people using or living in institutions such as day-care centres and old people's homes in industrialised countries.

The response of the public health community to the challenge of enteric pathogens has been multiple. In the 1980s major investments were made in the construction of safe water supplies and sanitary excreta disposal facilities in developing countries. An estimated 73% of the world's population now have access to safe water supplies and 60% have access to sanitary excreta disposal facilities (World Bank 1993). Oral rehydration solutions to reduce mortality from diarrhoeal infection were promoted throughout the world, as was breast, rather than, bottle-feeding. Hygiene education has sometimes been coupled to these interventions, or carried out alone. What began as internationally supported campaigns for diarrhoeal disease control now continue as part of the routine of public service provision in developing countries. In addition, efforts are continuing to find new and more effective vaccines against the enteric pathogens.

WHO instigated a systematic review of interventions for the control of diarrhoeal diseases in 1982. The feasibility and effectiveness of a total of 18 interventions for preventing diarrhoea in both the public and private sphere were evaluated (Feachem et al. 1983). These included improved water supply and sanitation, breast feeding, supplementary feeding, immunisation and the promotion of personal and domestic hygiene. Feachem (1984) concluded that among the interventions of high potential effectiveness and feasibility was the promotion of personal and domestic hygiene. He suggested that there was some limited evidence that programmes aimed at improving hygiene could achieve reductions in diarrhoea incidence rates of between 14% and 48%. A recent update of that review suggests that interventions in personal hygiene can reduce diarrhoea morbidity by between 11% and 89% (median reduction 33%) (Huttly et al.1997).

However, if there is now a general consensus that safer hygiene can play a major role in the prevention of the diarrhoeal diseases, there is as yet, no consensus on what practices present risks to health or about how to go about changing these practices. The dangers presented by dirt remain remarkably non-specific.

Public and Private Spheres

Simply providing public services, whether in water supply, sanitation, curative services or health education does not, in itself, guarantee improvement in health status. Just because a service is there does not guarantee that it will be used, or that it will be used to the best possible health advantage. Some households contrive to preserve health even without these services. A framework that goes beyond the provision of services, beyond the standard public health perspective, is needed, if we are to find more effective ways of working. Berman et al.(1994) offer a solution.

They suggest that we focus on the household, because this is the level at which external conditions and internal processes come together to produce health. They propose that households combine their own knowledge, resources and behavioural patterns with available technologies, services, information and support from outside the home, to produce desired outcomes, one of which is good health. Similarly, in a milestone paper on the public and domestic domains of disease transmission, Cairncross (1996) points out that the endemic disease that is responsible for the vast majority of the toll of death and illness in developing countries, is largely transmitted within households. In this thesis our focus is on the household, and on what happens both within and without it. We look at what the mother and child pair within the household do, and why, and we examine how environments and events affect what happens within the household.

Hygiene: the Inside and the Outside View

It would have been possible, in a study such as the one described in this thesis, to confine ourselves to the standard epidemiological practice of collecting objective measures of events, practices and disease outcomes and to use statistical inference to relate them. However, the ambition of the research team was not just to look for the causes of diarrhoeal disease in one West African town, but also to develop interventions capable of preventing it. To do this we needed to be able to see hygiene as a social phenomenon in the context of the complex social reality of West African households. We needed other approaches, ones that used perspectives other than that of the detached scientific observer (the **etic** view). We needed to answer questions such as: what do people see, understand and know? How do people explain why they do what they do? We had to try to enter in to the life of the people of the town, trying to see the problem of hygiene and health from the viewpoint of the household. This is known as the **emic** perspective and it is one that is made much use of in this study. Figure 1.2 schematises the difference between emic and etic views of hygiene.

Before coming to the research study in Burkina Faso, we need to understand more of the complex and little researched subject of hygiene. What is it? How has it evolved? What functions does it serve? By trying to see hygiene as it has been seen from within a number of different societies (emic views), in chapter two we are able to find some common threads to answer our questions. We see that the wellspring of hygiene is a psychological and social need to create order by chasing out that which is 'dirty'. A concern with hygiene for the sake of disease avoidance is secondary, but often serves to rationalise the underlying concern, which is the search for order. We see that scientific knowledge about hygiene has been shaped by this search to prove what people already believe, to demonstrate scientifically the dangers of dirt and the merits of order and cleanliness. Chapter 3 then reviews what science currently tells us

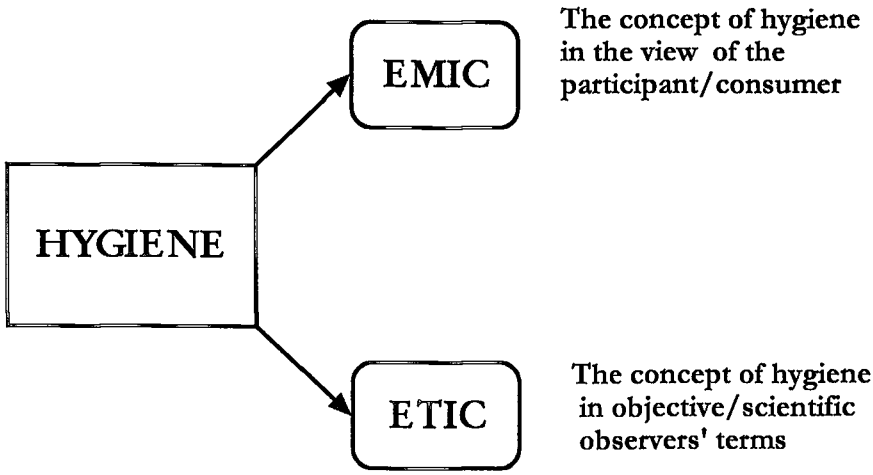


Figure 1.2 Emic and etic views of hygiene

about hygiene and its relationship with disease. We use the available biological and epidemiological evidence to try to resolve hygiene in more detail than has previously been done, finding that certain hygiene practices are more likely than others to be inculpated in the spread of diarrhoeal disease. We find that science has made great strides in the understanding of the causes of diarrhoeal diseases, but that large gaps remain. Progress towards closing these gaps can be facilitated by understanding that hygiene has both social and health value. By separating the social and moral aspects of hygiene from the science of disease transmission, both hygiene science and hygiene promotion are seen in clearer perspective.

Chapter Four introduces the field study that was carried out in West Africa to investigate the problem of diarrhoeal disease in young children and how to combat it, which is at the heart of this thesis. The work was carried out in the town of Bobo-Dioulasso, the second city of Burkina Faso. The site, the people, and the variety of methods that were employed in the study are described in this chapter. An epidemiological study of risk factors for diarrhoeal disease suggested that certain hygiene behaviours were responsible for much infection. Parallel research into perceptions about hygiene and disease showed how far etic and emic concepts of hygiene differed, and alerted us to the consequence that this would have for developing effective interventions to prevent diarrhoeal disease.

In the fifth chapter we explore how different methods give different perspectives on hygiene and conclude that valid results and practical insight into households' life come from combining a number of methods. The sixth chapter continues the methodological theme by comparing the use of questionnaires and structured observation to provide objective data about what people actually do in the privacy of their own homes. We conclude that structured observation can be a useful, if somewhat costly, technique for assessing the prevalence of risk practices and evaluating the impact of hygiene promotion programmes.

Chapter seven turns to our findings concerning emic perspectives of hygiene and disease in Bobo-Dioulasso, answering the question 'how do mothers in Bobo-Dioulasso perceive diarrhoeal disease and what do they think about hygiene?' We learned that though hygiene was an important positive social value, few mothers made any connection between stool related hygiene and child diarrhoea. Chapter eight combines quantitative and qualitative data to explore how environmental, social, and individual factors interact to determine the hygiene behaviours that women adopt in households in Bobo-Dioulasso.

Chapter nine moves on from the field research towards a more general question. If a broader and deeper understanding of hygiene is needed to develop effective hygiene promotion programmes, how, practically, can this be achieved? Drawing on the lessons from Bobo we propose a formative research protocol for use in other settings which aims to give planners:

> 'the ability to reach a rapid and adequate identification of crucial socioeconomic variables in a particular setting and the ability to translate knowledge into recommended action' (Niehof 1993)

The final chapter summarises the arguments for revising current approaches to hygiene education and proposes a new model, which is based on the insider/outsider understanding of hygiene and a synthesis of lessons from different disciplines.

Whilst the adoption of safer personal and domestic hygiene practices might hold the key to lowering the incidence of child diarrhoea, encouraging people to change the habits of a lifetime is no easy task. Standard approaches to hygiene education have been notable for their lack of success (Burgers et al 1988). Fortunately much has been learned about the process of encouraging behaviour change for public health reasons in the past decade, especially in developed countries (e.g. McDonald and Bunton 1992). The emphasis has switched from reducing the risks of disease by teaching about risk, towards an integrative approach that takes into account the physical and social environment. Progress has been substantial in other fields as well. In building a new approach we have taken lessons from epidemiology (risk analysis), from anthropology (the emic perspective), from marketing and consumer science (motivation studies) and communications (reach and effectiveness).

To this synthetic model myself and colleagues have given the name 'hygiene promotion'.

The key features of the approach are:

- Using formative research to find out what people do, know and want
- Identifying and targeting only those few hygiene practices which pose the most serious risk to health
- Working with the community to identify feasible and acceptable replacement practices
- Targeting the programme on well-defined audience groups
- Using positive, attractive messages to build on the existing social value of good hygiene
- Using channels of communication which are capable of reaching the target groups
- Setting behaviour change objectives and monitoring and evaluating progress by observing behaviour change.

The model places people at the heart of health programmes, using what they need, do and want as the basis of programme design. We suggest that this model offers a realistic hope of promoting hygiene behaviour change in wide populations.

Chapter Two

Body Boundaries And Invisible Monsters: The Social Significance Of Hygiene

> "Putting the same things together, separating like from unlike. It's what I've done all my life. People mix up everything. They throw everything away in the same place. That's how they make trash. There's no such thing as trash. Trash is the confusion we make throwing things out."
>
> (John Berger. To the Wedding, 1996).

Hygiene: Other Ways of Seeing

If changing human hygiene behaviour is a key to reducing the impact of gastro-enteric infection, the subject of hygiene remains clouded in confusion. Because hygiene is a complex idea that embodies a number of social values, clarity has often been missing, both in the understanding of how hygiene relates to health, and in the conception and execution of hygiene education programmes.

Throughout history people have been advised, exhorted, and ordered to conform to certain rules of hygienic behaviour. The explanations offered have included factors such as public and private morality, religious purity and the preservation of health. As the scientific understanding of disease transmission has advanced, so the case for hygiene for health reasons has come to dominate in our supposedly scientific societies. However, this chapter will argue that the underlying motivations for domestic hygiene, both in developed and developing countries, lie not in the avoidance of specific diseases, but in subtler social forces. Health scientists have not been immune to these social forces, and to this day continue to give advice about hygiene that has more to do with morality and social values than with a scientific analysis of the paths of disease transmission.

This study of hygiene begins with an overview of the complex notion of hygiene in society. Looking beyond the standard perspective of medical science, gives at least three practical lessons. Firstly, it is possible to see how our current understanding of hygiene has been shaped by social as well as scientific forces. Secondly, the social rationale which lies behind hygiene offers excellent opportunities for promoting hygiene. The final lesson is that efforts to promote hygiene which do not take into account the social values ascribed to hygiene, are at best, clumsy, and at worst, repressive and bad for public health in its widest sense.

What is Hygiene?

What image comes to mind when one thinks of hygiene? A European might think of a spotless bathroom, or of a child learning to put her hand in front of her mouth when she coughs. An African might think first of a well-swept courtyard and a child learning not to eat with her left hand, whilst someone from Asia might first imagine a veranda carefully smeared with dung and a child learning to brush her hair. Hygiene means different things to different people.

To understand the idea better I carried out a small study in the UK with a group of LSHTM students. We asked mothers of small children in North Yorkshire in focus group discussions to suggest objects and practices which could be regarded as unhygienic, dirty and unhealthy. The results, as classified by the students, are shown in figure 2.1. We found that there was a major area of overlap between objects and practices considered dirty, unhygienic and unhealthy. Whilst faeces and bodily emanations are seen as not only unhygienic, but dirty and medically unsafe, eating a main meal with one's fingers is seen as unhygienic but not necessarily dirty. Some respondents saw poor people as dirty and unhygienic. It is clear from the diagram that it is not possible to pursue the idea of hygiene without also pursuing the nature of belief about dirt, as well as the nature of belief about health and disease prevention.

Boot and Cairncross (1993) provide a useful definition of hygiene: "the practice of keeping oneself and one's surroundings clean, especially in order to prevent illness or the spread of infection." The idea of hygiene thus comprises two concerns, the **avoidance of dirt**, and the **prevention of disease**.

If ideas about hygiene are not absolute, neither are ideas about dirt or about disease. They vary from culture to culture and have varied through history. If we are to understand hygiene it is necessary to explain both dirt and concepts of disease causation. This is a major task. Luckily a number of authors have illuminated routes to take.

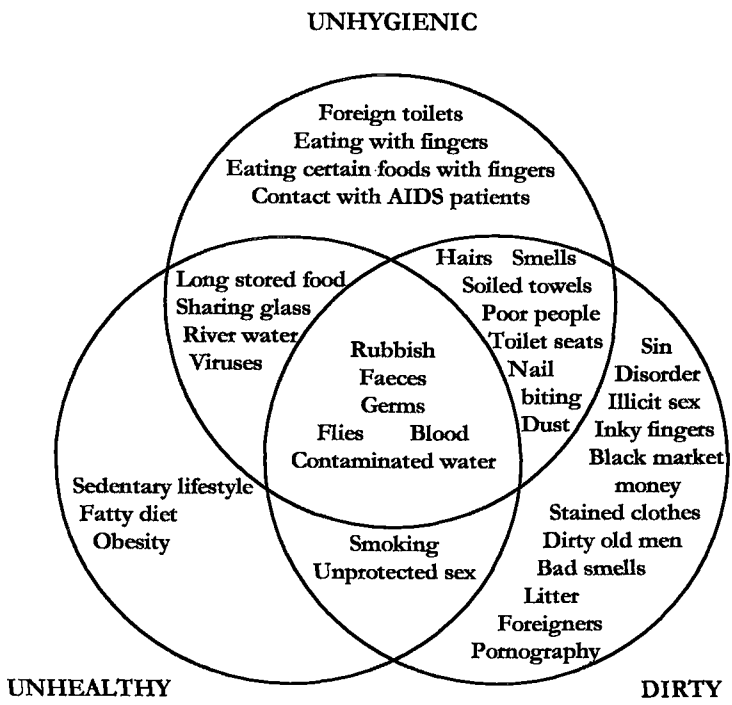


Figure 2.1 Unhealthy, unhygienic and dirty

According to MacLaughlin (1971) "dirt is the evidence of the imperfections in life". He suggests that there is no such thing as absolute dirt: soup on a plate before we eat it is food, the leftovers on the plate are dirty; lipstick on a girl's lips may make the boyfriend want to kiss them, lipstick on a cup will ensure that he does not drink from it. Sartre (1943) describes how sticky substances that attach themselves to us make us feel dirty and polluted: 'I want to let go of the slimy material and it sticks to me, it draws me, it sucks at me.' Secretions; sweat, pus, vomitus, urine and faeces are inescapably dirty. But as the investigation in Yorkshire shows, dirt is not just a physical condition or a soiled object; it also pertains to dirty behaviour; practices which are beyond society's pale such as paedophilia (dirty old men), pornography (dirty books), illegally obtained wealth (dirty money), as well as outsiders ('filthy foreigners') and the poor and marginalised (drug takers).

The anthropologist, Mary Douglas was one of the first to realise that dirt was the reflection of the culture which defined it. Her great insight was that dirt is a by-product of a systematic ordering and classification of matter. That which does not fit within the system is rejected and labelled as dirt. Douglas shows that hygiene is not a matter of mere health, but is a construct that can only be understood in relation to other fundamental social values; cleanliness, order, purity, sacredness, veneration and their corollaries: dirt, disorder, pollution, profanity, defilement.

> "Defilement is never an isolated event. It cannot occur except in view of a systematic ordering of ideas. Hence any piecemeal interpretation of the pollution rules of another culture is bound to fail. For the only way in which pollution ideas make sense is in reference to a total structure of thought whose key-stone, boundaries, margins and internal lines are held in relation by rituals of separation."
>
> (Douglas 1988).

Douglas suggests that it is hard for Westerners to see that their concern for hygiene is motivated by anything other than a narrow concern with the disease causing potential of dirt. We tend to rationalise all of our scrubbings, tidyings and orderings as a search for a germ-free life. We indulge in mental gymnastics to explain why stained clothes, or a hair in the soup, threaten health via the agency of germs, refusing to accept that other, less 'rational' forces may be directing our behaviour. We use this medical materialism to interpret the hygiene systems of other cultures; rationalising, for example, that the early Semitic proscriptions on consuming pork were for sanitary reasons, to avoid parasites.

It can be argued that difficulty in making the distinction between dirt avoidance for health reasons and dirt avoidance for cultural reasons is not unique to our post-Pasteur society. Every society develops its own coherent and internally consistent explanations for disease (see, for example, the 1984 review by De Zoyza et al. of concepts of diarrhoeal disease). Everywhere people explain their hygiene rules in terms of a search for health and the avoidance of disease, whether they believe in microbes or not. Arguments about the natural consequences of unhygienic acts are roped in to uphold existing beliefs about disease, whether they spring from pre-scientific, quasi-scientific or scientific understandings of disease causation. To elicit the emic view of hygiene in any society we have to scratch beneath this rationalist surface, to find the cultural and psychological foundations of hygiene.

The Functions of Hygiene in Society

So what are the cultural and psychological foundations of hygiene?

The culture of societies varies across the continents and has changed throughout history, but ideas about hygiene and dirt avoidance are to be found in every society and in every religious or ideological system (Brown 1991). The roots of belief about hygiene can be found in both human psychology and culture.

Though instinct is a controversial area for many social scientists, there is a growing body of opinion that evolution has equipped *Homo-sapiens* with the psychological architecture for a number of behaviours. An innate sense of disgust for that which is dangerous to health (faeces, vomitus, snakes etc) would have conferred an evolutionary advantage on the holder (See Tooby and Cosminides 1992, Nesse and Williams 1995, for example) and so be selected for. Babies are born with reactions that make them recoil from certain smells (Rozin and Vollmeke 1986).

Whether born with dirt avoidance instincts or not, children learn the distinction between 'clean' and 'dirty' at an early age. As they grow their social world teaches them how to conform to the ideals of their family, their immediate society and their culture. They learn specific hygiene practices such as how and when to clean teeth and where and when to defaecate. In many societies they also learn to think of the foreigner as 'dirty' and to value sexual 'purity' in women.

As children grow, they also learn to classify, order and make sense of their existence. From what they experience, observe and are taught, they learn to create an architecture of meaning that fills their individual and social life. Without such a structure it would be impossible to be sane or to interact with others. It was Douglas who first realised that emic views of dirt, hygiene and pollution constitute a privileged window onto the architecture of the social framework that binds individuals in society.

But why should hygiene and pollution rules be universal cultural values? Parallels can be drawn between biological evolution (change occurring over eons) and cultural evolution (change occurring over many generations of membership of a group) (Skinner 1981). Just as the individuals who make up the human species today are the products of evolution's long process of trial and error, so societies that are extant or were social enough to leave coherent records, have, by definition, to have succeeded. And success in building society requires the development of social frameworks for preventing both internal fracture and invasion from outside. These social frameworks, or cultures, serve a number of key functions in a well-ordered society. They encourage behaviours that are useful to maintain society and they offer sanctions against behaviour that threatens

society from within; they help to keep the hierarchy in place by providing justification for the inherent inequality; they offer a sense of social identity and encourage hostility towards outsiders; and they offer explanations for, and potential solutions to, the problems of living in an unpredictable world (Malinowski 1944). Societies which failed in any of these respects would not have held together for long, and so cannot be studied today (Diamond 1997).

Hygiene and pollution rules, because they are concerned with order, can be found threaded throughout these social frameworks or ideologies, underpinning, reinforcing and rationalising them. So, for example, religious hierarchies are given legitimacy by social rules that set pure apart from impure. Impure behaviour that threatens the social order, such as adultery, is discouraged by beliefs in the potentially dangerous consequences. 'Foreigners' threaten national identity and are classed as dirty. The poor (the 'great unwashed') need to be kept in order. Rules of hygiene offer the illusion or the real hope of the avoidance of calamity, pestilence and disease. Without this order the individual cannot function, without order society cannot function.

Figure 2.2 summarises the functions of hygiene in keeping order in society, with some examples. Below we develop these themes further, by looking at historical and modern instances of rules about dirt, hygiene and pollution.

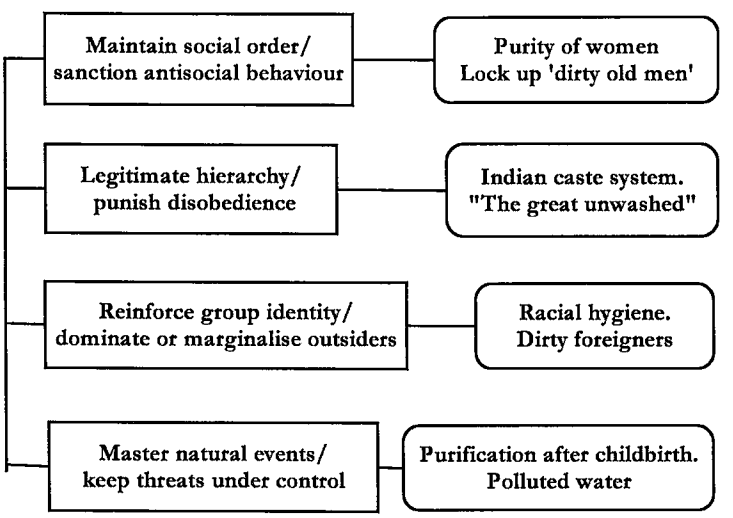


Figure 2.2 The Functions of Hygiene in Society

The Maintenance of Social Order

The first of the essential attributes of a successful society shown in fig 2.2 is to maintain order and to sanction antisocial behaviour. Societies need to balance the selfish needs of individuals with the good of the group. Social sanctions are applied to discourage behaviour which threatens the stability and cohesion of the group, whilst society rewards collaborative, society-building behaviour. According to Douglas "The ideal order of society is guarded by dangers that threaten transgressors,... [that] men use to force one another into good citizenship". Punishment can be inflicted by society (the stoning of adulterers, for example) or by God or natural law (through famine and disease).

In Ancient societies to offend against public order, was to create pollutions that risked bringing down the wrath of the Gods. In Sophocles' drama 'Oedipus the King', for example, Oedipus has murdered his father and married his mother. This brings down a plague on Thebes:

> "Oedipus. Who has defiled us? and how are we to purge it?
>
> Creon. By banishing or killing one who murdered,
> And so called down this pestilence upon us."
>
> (Sophocles 1994)

The stain (*miasma* in Greek) brought about by Oedipus' actions is purged by his blinding and exile. Orestes offended against social order by murdering his mother; his blood guilt could only be removed through a cathartic purification ritual (*kathairein* meant to clean or purify).

In Biblical times the blessing of the One God was needed to create order, through which men's affairs might prosper. Not living according to God's precepts brought the threat of being abandoned by God, and this could bring pestilence, floods and confusion. Moses said:

> "But if you will not obey the voice of the Lord your God or be careful to do all his commandments and his statutes which I command to you this day then all these curses shall come upon you and overtake you... The lord will smite you with consumption, and with fever, inflammation and fiery heat, and with drought and with blasting and with mildew; they shall pursue you till you perish...
>
> (Deuteronomy XXVIII, 15-24)

The early Christian Church found a more direct means of sanctioning threats to the social order. Offences were labelled 'sin' and sinful acts would be punished by eternal damnation or disease. Prayer, penitence and the invocation of saints could cleanse the stain of sin. Hygiene and morality were intimately related and the medieval monastic orders were responsible for producing many treatises and almanacs on hygiene, indicating how to care for every part of the body, as well as for the soul. The purity of the Virgin was invoked as an ideal, and sanctions were (and still are, in some countries) severe for Catholic women who led impure lives. 'Sins' such as female adultery are a constant threat to the order of (most) societies. Religion set society's moral rules, imposing order where selfish acts were likely to cause disruption

Rules of hygiene were symbolic of and reinforced socially acceptable behaviour; as Clerget said in 1843: "Cleanliness calls to cleanliness, clean houses demand clean clothes, clean bodies and in consequence clean morals." (quoted in Vigarello 1986). In keeping with its role in preserving social order, the church preached the virtues of hygiene and morality in the overseas colonies.

However, moral order was not a foreign concept in Indonesia before the missionaries intervened. Take, for example, this description of folk medicine in Madura, Indonesia:

> "the participants place the occurrence of illness and death in a context that embraces cosmological and supernatural forces. It is assumed that fortune and fate in human affairs may be anticipated and explained by divination. Maintaining a correct relationship with those natural and supernatural forces is indispensable to ward off adversities. Individual and community well-being are believed to depend on the observance of practices which regulate the course of human and social life. Rituals are important regulating activities..."
>
> (Jordaan 1985)

But religion was not the only well-spring for the moral order of societies. Hygienic ordered behaviour was also enforced by secular moral imperatives. The threat of disease remained potent whether originating from God's retribution or from 'natural causes'. Vigarello traces ideas about bathing and bath houses in European history. He suggests that though public bathing had been lauded in the 13th century, bathhouses had become houses of pleasure, entertainment and illicit sex by the 15th century. What was clean in a physical sense was no longer seen as clean in a moral sense and baths became dangerous in a less tolerant age (Figure 2.3). In Avignon in 1441, for example, married men were forbidden to take steam baths as these were recognised as places of prostitution.

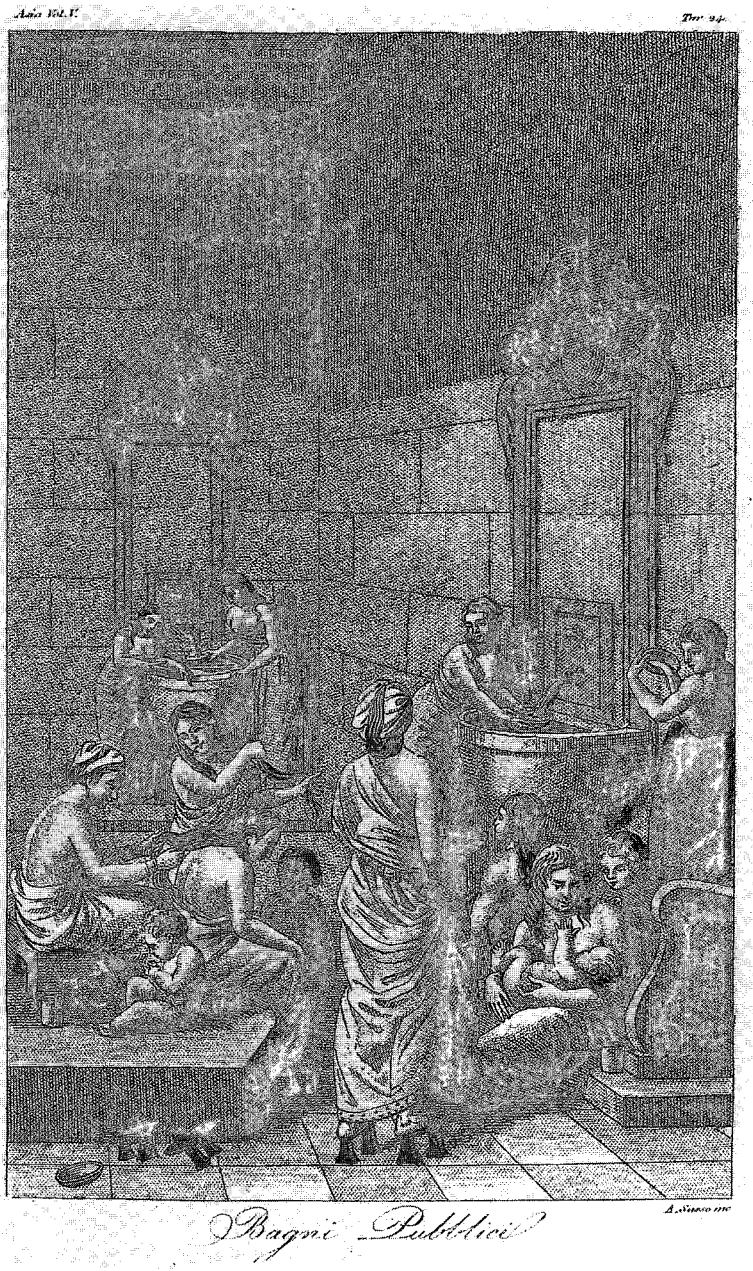


Figure 2.3 Bagni Pubblici

The reasons given for closing bathhouses were, however, related to public health rather than moral welfare.

> "Steam baths and bath houses should be forbidden because when one emerges the flesh and the whole disposition of the body are softened and the pores open, as a result pestiferous vapour can rapidly enter the body and cause sudden death, as has frequently been observed."
>
> (Paré 1568 quoted in Vigarello1986).

Corbin describes how the threat of the prostitute was rationalised by science as a danger to health via the mechanism of smell in eighteenth century France:

> "Excessive indulgence in coitus provoked a positive overflow of sperm into the woman's humors, putrefied the liquids and engendered an intolerable stench. That was how prostitutes became *putains*... "
>
> (Corbin 1996)

Eighteenth century moral order was underpinned by scientific concern for the avoidance of disease transmission by odour, miasma or contagion, as we shall discuss in more detail later. Morality supported science and science supported morality. The twentieth century moral order of Britain is underpinned by similar rules. If we return to figure 2.1 we find drug takers, pornographers, illicit sex and sin all classed as dirty. This classification helps to outlaw them and make them unacceptable, thus helping to uphold social order.

If all societies have a need for order, for unifying principles which allow things to be put in their proper places, then dirt is matter out of its proper place, causing pollution, defilement and disorder. Religion, science and morality all have at their heart the task of creating order in a disordered universe. Rules of hygiene are an essential part of this order, rules that serve to reward conformity and co-operation and to outlaw and punish sin and antisocial behaviour.

Legitimisation of Hierarchy

One aspect of social order that has special implications for hygiene is the way in which hierarchy is maintained. As societies grow in size so communal decision making becomes more and more complex. A large society must be structured and centralised if it is to reach decisions effectively. Societies above a certain size need a centralised authority to monopolise force and to resolve conflict. As Diamond points out "Tribes that resolve conflicts poorly tend to blow apart again into bands, while ill-governed

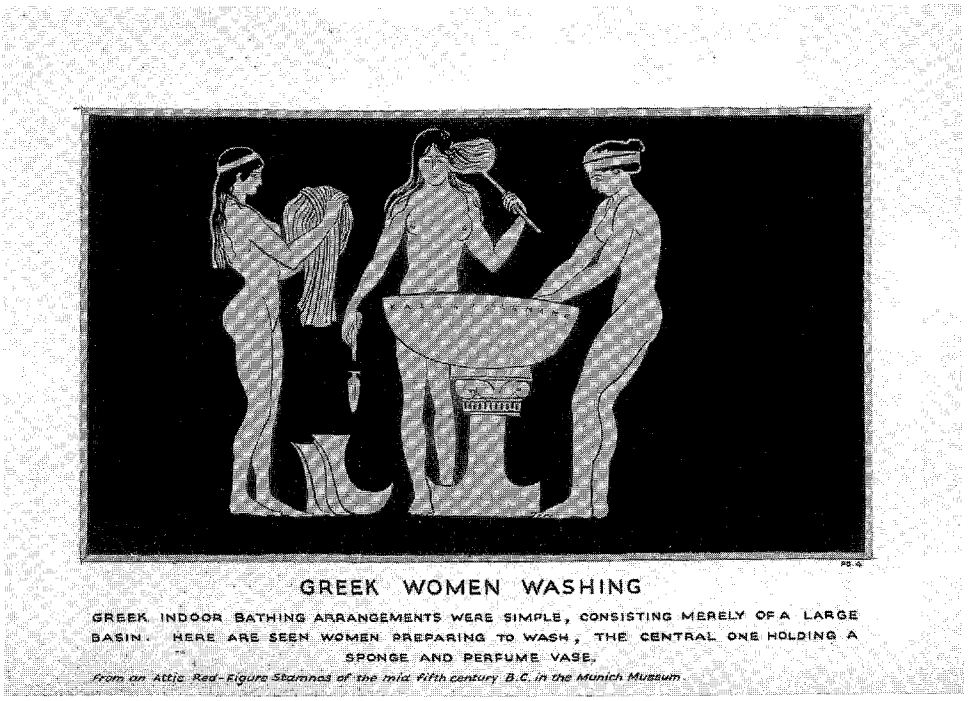


Figure 2.4 Greek women washing

chiefdoms blow apart into smaller chiefdoms or tribes. Societies with effective conflict resolution, sound decision making and harmonious economic redistribution can develop better technology,... seize larger and more productive territories and crush autonomous smaller societies one-by-one." (1997)

However, if hierarchy is inevitable, it is also unstable. Because of the unfairness of inequality, power is usually held precariously. Societies that have found strong arguments for the maintenance of these inequalities have tended to be more stable. Be it in the 'divine right of kings' or in a hierarchical caste system, religion is one of the cultural innovations that provides an ideology for the maintenance of power inequality. Political ideologies that elevate the noble above the commoner, and surround leaders with the trappings and symbols of power are secular means to the same ends.

Religion legitimates its own authority by making special claims of holiness. Fundamental to these claims is the need to separate the sacred from the profane. Magic rites required keeping separate things that cannot be brought together without danger. Durkheim claims these rules as the first form of hygienic interdictions (1961). In Ancient Egypt priests had to maintain immaculate purity by washing from head to foot twice every day and twice every night (Reynolds 1975). In Ancient Greece notions of hygiene were inseparable from religion. Ritual cleansing was required before making sacrifices, or after sex. Washing (*lustration,* see fig 2.4*)* and sexual abstinence before attendance at temple served also to demonstrate respect for religion and its claims to special authority.

The concern with ritual purity as an act of separation, to maintain the proper order by distinguishing sacred from profane, is one of the major concerns of the Semitic religions. The Jews, like the ancient Greeks, used separation rituals to purify themselves before contact with the holy. Figure 2.5 depicts Jews washing their feet and hands before the tabernacle as the glory of God appears, in a scene from Exodus. In common with their Semitic predecessors, Muslims perform ritual purification to rid themselves of the impurities of the profane world before approaching the sacred (Zeitlyn and Islam 1991). The Koran requires the faithful to be in a state of ritual purity before the five daily prayers. This involves the ritual bathing of head, hands and feet. Contact with polluting matter such as urine or faeces, or the breaking of wind, requires re-purification (The Koran 5:6).

The principles of the four sacred Sanskrit Vedas of the second and first centuries BC were laid down by spiritual leaders for their Brahminic pupils in works such as the Laws of Manu dating from 200BC-200AD. A large part of this work is concerned with pollution. For example:

Figure 2.5 Purification before the tabernacle

64. Those who have touched a corpse are purified after one day and night added to three periods of three days
65. A menstruating female becomes pure by bathing after the menstrual secretion has ceased to flow
109. ...as the body is cleansed by water, so the internal organs are cleansed by truthfulness
135. Oily exudations, semen, blood, ... urine, faeces, the mucous of the nose, ear wax, phlegm, tears, the rheum of the eyes and sweat are the twelve impurities of the body.

Many are the dietary prohibitions for Brahmins:

5. Garlic, leeks and onions, mushrooms and all plants springing from impure substances are unfit to be eaten by twice born men.
Rice boiled with sesamun, wheat mixed with butter, milk and sugar, milk rice and flour cakes...
Milk of a cow within ten days after her calving, that of camels, of one hoofed animals, of sheep, of a cow in heat or one that has no calf with her.
9. Let him avoid all carnivorous birds... one-hoofed animals...
12. The sparrow and ... the woodpecker, the parrot and the starling.
13. Webbed footed birds, those which dive and live on fish...
14. The raven, animals that eat fish, village pigs and all kinds of fish...
(Bühler in Dumont 1980).

The laws of Manu are part of the *Dharmashastras* that set out the ideals of Brahminic society. *Dharma*, or conformity to the world order, is the superior law. Brahmins set themselves apart by observing purity rituals.

In India, this religious conception of the pure/impure dichotomy subtends the whole hierarchical order of society. In his classic work, 'Homo Hierarchicus', Dumont (1966) states that the fundamental institution in Hindu India is caste: the caste system is based upon a hierarchical opposition of the pure and the impure, the superior and the inferior. If the ritual and purity of the Brahmin helped to set them apart from society, this would have also contributed to the legitimisation of the Brahmins' position at the top of the hierarchy. Eventually Brahmin religion became dominant throughout Hindu India, as did a rigid hierarchical ordering of society based on degrees of purity. Nowhere is it clearer that social rules which are founded on, and justified by, scriptural prescriptions about pollution and purity help to keep each group in their allotted rank in the social hierarchy. The relationship of one group to another is defined by their ritual purity, with Brahmins at the top of the purity scale and 'untouchables', who traditionally have

the polluting professions (leather work, garbage and night soil collection) at the bottom of the scale (Dumont 1980). Social sanctions, which work all the way up the edifice of caste, keep the system in place

The Indian case is the most flagrant example of the role that religion plays in keeping the social hierarchy in place. But secular morality often plays a similar role. Vigarello describes how elaborate courtly manners distinguished the nobility from the masses in fourteenth century France:

> "Enfant d'honneur lave tes mains
> A ton lever à ton dîner
> Et puis au souper sans finir"
>
> (Glixelli, manual of courtly behaviour, 14th century, quoted in Vigarello 1986).

Elaborate cleanliness, fresh clothes and perfume are not only more available to the rich, but serve to reinforce the distinction between rich and poor and thus perpetuate the inequality. "There is nothing more disgustingly dirty than these disgraceful poor" said one anonymous eighteenth century commentator. "Dirt is only the livery of vice" said another. The emphasis was on private responsibility for hygiene, and dirt as the result of idleness and sloth. Vigarello suggests that the need to prevent revolution and the need to protect the healthy and the wealthy from contagion from the poor underlay eighteenth century attempts to make cleanliness a moral issue.

Contemporary health science still falls into the trap of supporting those at the top of the heap in the name of hygiene. Nations and Monte give an instructive example from North-East Brazil (1996). Called in to investigate why *favela* dwellers were withdrawing their collaboration from the Ministry of Health's cholera prevention programme, they found differing interpretations of the idea of hygiene at play.

> "...mass media mentioned that faecal-oral contamination spreads cholera. What residents "heard" on radio and TV however, was a different and more damaging message: cholera is caused not by the water borne bacillus but by miasmic *imundicie*, a popular word meaning filthy squalor, the worst kind of dirtiness or pollution. The *mundo imunda*, the filthy world they were forced to live in, causes cholera... The generalizing... into *imundas* (filthy, dirty) persons was used to moralize cholera and to stigmatise infected persons by associating them with impurity, deviancy and disdain."

They conclude that "the morally disgracing and disempowering imagery of cholera is used to blame and punish the poor and to collectively taint and separate their communities from wealthy neighbourhoods."

If poverty and oppression can be justified on the grounds of a lack of hygiene, then we are dealing with a potentially explosive concept. Efforts to promote hygiene that are founded on the notion of the ignorance of the peasant or the shanty town dweller, are still the rule rather than the exception in India, Africa and Latin America. If hygiene is intimately related with power, rank and caste, then no effort to promote hygiene can afford to pretend to be dealing with a purely scientific issue.

Reinforce Group Identity and Dominate or Marginalise Foreigners and Outsiders

> "The worst quarters of all the large towns are inhabited by Irishmen. Whenever a district is distinguished for especial filth and especial ruinousness, the explorer may safely count upon meeting chiefly those Celtic faces which one recognises at the first glance as differing from the Saxon physiognomy of the native... Filth and drunkenness, too, they have brought with them. Their lack of cleanliness, which is not so injurious in the country, where the population is scattered, and which is the Irishman's second nature, becomes terrifying and gravely dangerous through its concentration here in the great cities... The filth and comfortlessness that prevail in the houses themselves is impossible to describe..."
>
> (Engels 1993).

This was how Frederich Engels characterised the Irish in his supposedly 'scientific' study of the condition of the working classes in England in 1844. Whilst it would be unfair to single out Engels for his racism, which has been the norm rather than the exception throughout history, we do need to better understand why such views are so common and the implications that they have for our actions.

Figure 2.2 suggested that the domination and/or marginalisation of foreigners or outsiders is one of the attributes of societies that have succeeded. Douglas shows that society needs structure, form and boundaries. Pollution rules police these boundaries, helping to define what is 'us' and what is 'not us'. The foreigner provided a concrete threat and so society needed ways of demonising him so as to allow his elimination or subordination. Similarly the dangerous outsider within society provides a threat to the current order and hygiene provides arguments for their ostracism or segregation.

Each society develops ideologies that classify and order, as we saw earlier. One effect is to differentiate the habits of the foreigner from the habits of the local. So, for example, the Jews set themselves apart from their Egyptian, Babylonian and Roman masters as the chosen people. The covenant of Abraham and his seed with God set rules that served to create and reinforce this distinction. What is pure and what is to be avoided because of pollution is laid out in scripture. The book of Leviticus prescribes the causes of spiritual and physiological uncleanness in great detail. For example:

> "And the swine because it parts the hoof and is cloven-footed shall be unclean to you. Of their flesh you shall not eat and their carcasses you shall not touch; they are unclean to you...
>
> ... But all other winged insects which have four feet are an abomination to you. And by these you shall become unclean; whoever touches their carcass shall be unclean until the evening. And whoever carries any part of their carcass shall wash his clothes and be unclean until the evening."
>
> (Leviticus xi 2-25)

It was Mary Douglas's great insight that these rules of hygiene owed nothing to primitive ideas about disease avoidance or 'medical materialism' (Moses cannot be seen as a 'great sanitary reformer' as Reynolds (1975) suggests). She proposes rather that the dietary rules develop the metaphor of holiness and that holiness requires wholeness, unity, integrity, perfection of the individual and of the kind. Animals which fall outside common well-recognised taxonomies are anomalous, symbolise disorder and therefore are dirty and to be avoided. Objects and practices that conform to the ideal order of society fall within it. Outsiders and foreigners, with their filthy habits, and foreign diseases fall outside the limits, threaten them, and therefore require special sanction.

In Ancient Greece wars with neighbouring states were pursued with the ostensible aim of driving out the pollution of sacrilegious acts of the enemy (Parker 1996). A 14th century Arabic traveller wrote of the numerous baths in Cairo and contrasted the cleanliness of the true believers with the dirtiness of the Franks (i.e. Western Christians) (Reynolds 1946). The 'civilising' mission of the Christian church overseas included teaching that there was an inevitable connection between immorality, ignorance, laziness, vice and dirt. According to Vaughan's history of syphillis in East and Central Africa "The essential sinfulness of African society was stressed and the connection between sin and disease was a central feature of medical missionary ideology" (Vaughan 1992). Armed with such views, expansion and dominion were legitimised and control established. Indeed hygiene was used as an explicit argument in the destruction of traditional settlements in order to gain political control of colonies. Buchholt (1994) relates how this happened in Indonesia:

> "the huge and irregularly arranged Minahasan houses which gave space for extended families were neither in accordance with Christian morality nor with the requirements of the Dutch colonial administration... Armed with the legitimation of the lack of Hygiene, the colonial administration destroyed a great number of settlements."

Not long ago in Nazi-Germany the 'science' of Eugenics supported the idea of racial hygiene, and sanctioned the destruction of the group that was designated 'filthy Jews' (Proctor 1988). In the pre-Civil Rights United States the hygienic doctrine of racial segregation required that 'Dirty Niggers' suffer appalling deprivation and discrimination. The scientific medical establishment collaborated with the apartheid system in South Africa by accepting the view that a transfusion of black blood would pollute or contaminate white recipients. Despite our best efforts to root out racism, the image of the foreigner as dirty is a hard one to shake off, as we can see from figure 2.1. The marginalised outsider still presents dangers; the 'sexual pervert' and the drug taker are still seen as dirty, and foreign toilets are, of course, highly unhygienic.

Gain Mastery Over Natural Events and Keep Threats Under Control

Every society constructs a set of explanations for visible phenomena, be they mythological, religious or scientific (Radley 1994). Humans find order in a disordered universe by looking for explanations for visible phenomena. Without some sort of agreement as to how to act to control the world, and how to keep external threat at bay, societies would be unlikely to survive or grow. Societies which failed to produce this consensus will have fractured, and thus be no longer extant or have left little trace. This is the fourth of the conditions for a successful society proposed in fig 2.2.

We have seen how hygiene plays a part in keeping societies in order, often under the threat that disease will follow transgression. But for such threats to be operational, the members of society have to believe them. What are the explanations offered to society's members? Why is disorder, lack of cleanliness and hygiene such a credible cause of disease and calamity? Society provides two categories of explanation for natural phenomena, such as birth, growth, the changing of the seasons, or disease, calamity and death. The first is the agency of some external force deriving its power from religion, magic or symbolism. The second is the agency of properties that are intrinsic to the natural world and designated as naturalistic or scientific. While it is commonly thought that societies have evolved away from mystical explanation and towards the scientific, the two categories cannot be separated so easily, as we shall see.

Disease was seen as having supernatural origins in Ancient Egypt: Skhmet, Goddess of pestilence, produced epidemics that she abated when she was correctly appeased (Rosen 1958). An ancient Mesopotamian text shows how an exorcist explained the sickness of a patient: "He has come into contact with a woman of unclean hands... or he has come into contact with a man of unclean hands...or his hands have touched one of unclean body" (Burkert 1985). Whilst it is tempting to imagine this text as an early medical treatise on contagion, it is clear that uncleanness here refers to moral states such as criminality or prostitution. However, a Babylonian letter of the seventeenth century BC shows that the infectious nature of disease was well known. The text counsels that since a lady was suffering from a contagious disease, no one should drink from her cup, sit in her seat, sleep in her bed, or visit her quarters (Biggs 1969).

In ancient Mesopotamia, transgressions against religion and the social order created pollutions which brought down disease on individuals, as well as on society. Burkert (1992) describes the works of ancient Mesopotamian seer-healers who divined the social and divine origins of diseases and cured them with purification rituals using water, blood and incantation, or by the application and wiping off of a flour paste. In fact, their word for wiping off, *kuppuru,* came to mean purification in general, as in the Hebrew word Kippur. (Yom Kippur means day of purification) (Burkert 1931).

Parker describes the early Greek religious purification ceremonies to counter the contagious pollutions arising from organic events such as birth and death. A disciple of Douglas; he suggests that such purifications were for society to commandeer the natural processes through ritual. Ritual purifications served to demarcate and separate, to recreate order and avoid the danger of marginal states, such as birth and death, that violate the normal social categories (Parker 1995). However, later works castigated purification ritual as superstitious nonsense. The Hippocratic text on 'the sacred disease' (thought to refer to epilepsy) rejects the notion of supernatural causes: "The disease is not any more divine or sacred than any other disease, but has a natural cause." (Hippocratic writings 1983). The Hippocratic text '*Airs, Waters and Places'* of the third century BC explains disease in secular terms. The explanatory factors were climate, soil, water, mode of life, and nutrition. Parker suggests that these views were motivated by a need to find scientific justifications for the ancient beliefs. There was no contradiction, for example, in *Miasma*, which originally meant stain or sin which offended the Gods, coming to be used as a term for the foul airs and atmospheres that caused disease.

After the Hippocratic canon came the works of Galen in the 2nd Century AD who developed and systematised the Hippocratic texts, placing balance and order in all things at the centre of a harmonious life. The various elements, humors or forces of the body had to be perfectly balanced. Disturbed equilibrium resulted in disease. Galen attributed virtue to the mean (*to meson*) and prescribed the ideal mode of life as one in

which nutrition and excretion, exercise and rest, pleasure and privation were perfectly balanced (1997). Concern with the pursuit of an orderly and virtuous life was thus as much the basis for early science as it was for religion. The works of Hippocrates and Galen served as the basic public health texts untill the development of bacteriology and immunology in the late nineteenth century (Rosen 1975).

The ancient Hindu science of health, *Ayurveda,* also does not separate the divine from the earthly. It gives a central role to the balance of the humors. Disease is but one consequence of offences against the natural order. Burkert suggests that to try to separate the divine from the earthly in early societies is wasted effort:

> "In archaic societies the social and physical ills were not clearly differentiated...the administration of justice and healing can be seen to fuse...An offence is the source of illness, illness is the result of an offence, be it in the personal, the social or the religious sphere. Even the Greek word 'Nosos' embraces both the physical and the social ailments and disturbances. "
>
> (Burkert 1992)

Throughout the Dark Ages in Europe the classical tradition continued to support and legitimise what people already believed. The monasteries of Christendom preserved Greek science and so were able to use Hippocratic knowledge in their quest to strengthen the body as the vessel of the soul, so it might better withstand the attacks of the Devil (Rosen 1975). Contemporary documents drew on the Hippocratic tradition: "In times of epidemic you must first avoid corrupted air which may come from marshy, muddy and fetid places, from stagnant water and ditches, from burial places, from stables of draught animals -avoid completely such places." (Anon quoted in Rosen 1975). Other types of natural phenomena influenced health: malign conjunctions of the stars caused the atmospheric corruption to become particularly virulent, causing mass outbreaks of disease.

The plagues of the Middle Ages were known to be communicable; by isolating patients in their houses it was hoped to preserve the healthy from the menace of the sick. The word *quarantine* originated from the 40 days isolation required for plague ships, first mentioned in Venice in 1127. But in this case religion was called on to support the science: the Bible was the authoritative source for the choice of 40 days.

The areas where society needs to provide explanation and therefore control are at the boundaries, as we have seen. Dangerous transitions such as birth, death and puberty need to be surrounded by special rules and given special explanations, whether religious or naturalistic. Substances which cross the body boundaries are especially fraught with

danger; food and drink often require elaborate purification and excreta and bodily emanations need to be handled with great care.

Blood is a powerful, dangerous substance because of its translation across body boundaries. Menstruation is particularly threatening. Spiritual uncleanness requires Hindu women to refrain from food preparation during their period, whilst the Koran proscribes that menstruating women, or those who had a urethral discharge were to be isolated from the rest of the community (The Koran 2:222). Archbishop Theodore of Canterbury (AD 668-690): required penances from any woman entering a church during menstruation, and 40 days of purgation after childbirth (Douglas 1988). Even today, menstruation is not a topic for polite conversation, and tampon advertisements have only recently been permitted on television in the UK.

Childbirth is the example of physical and social boundary crossing par excellence. Hedged about by ritual, and purification, even the pure Virgin Mary required purification after giving birth, as is suggested by the presence of the sacrificial sheep and the washed baby in the eighteenth century etching copy by Eredi of an earlier work by Vouet (figure 2.6). The water used for baptism today may have its origin as a symbol of purification after a birth. Women are segregated after childbirth in many present-day societies. Niehof describes how mother and baby are thought of as contaminated and contaminating and so should not come near the kitchen or participate in cooking or cleaning for 40 days after the birth in Madura, Indonesia (1988). The birth of a child in every society requires special secular or religious ritual. The rites make safe the boundary transgression and bind the new life to society.

Washing the body was an activity of some danger because body boundaries were seen as permeable in the European Middle Ages. Bathing opened up the skin to penetration; so baths were seen as potential sources of infection. Water began to be seen as dangerous and polite behaviour required a dry wash:

> "It is correct to clean the face every morning using a white cloth to cleanse it. It is less good to wash with water..."
>
> (de la Salle 1736 in Vigarello 1988).

Figure 2.7 shows an aristocratic French woman washing her hands in a bowl of water held by a maidservant in an engraving dated 1772. No such woman of that time would have dreamt of exposing herself to the risks of bathing her body, except perhaps on medical orders (Vigarello 1988). Texts on hygiene explained that linen absorbed body dirt. Changing the shirt made you clean, not washing. As usual, the texts followed and sought to legitimise the practice; hygienists were doing what they have always done best; providing 'scientific' rationalisation for what morals and manners had already invented.

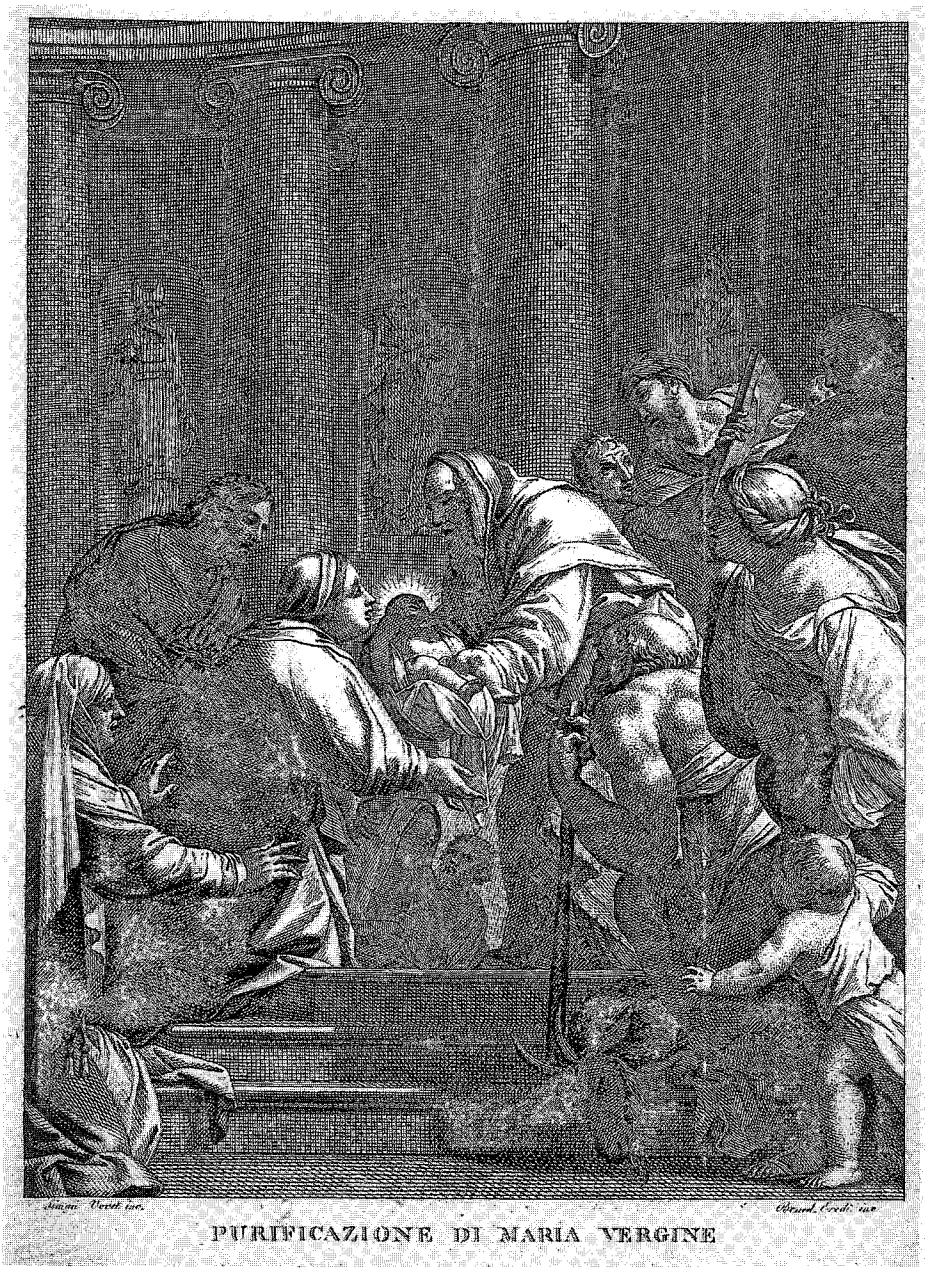


Figure 2.6 Purification of the virgin

In eighteenth and nineteenth century Europe scientists began to take a leading role in offering naturalistic explanations for visible phenomena. However, the search for coherent explanations of disease was still focused around the old concerns: social boundaries and body boundaries.

As urbanisation advanced, so came theories of contagion and miasma associated with overcrowding: disease was attributed to noxious gases, festering emanations from hospitals, dead animals, and purulent fogs. The disciples of town planning called for the clearing out the centres of cities to allow air to circulate. Measures began to be introduced for the circulation of air to reduce fetidness. One night in 1786 the Parisian dead were taken from the cemeteries of the city to a quarry, to remove the dangerous emanations (Corbin 1996). According to Corbin, references to the dangers of open fissures and the putrefied ooze of swamps became commonplace in the eighteenth century. Fear of escaping emanations, which could be inhaled, caused a dread of all faulty construction: cracked cesspools, badly joined floors, ill-secured paving, unsealed vaults and cisterns. Foul smells breathed in were a direct threat to health. Corbin records a number of accounts of people who died from the inhalation of putrefied odours.

Though the transgression of the body boundary by unhealthy substances was the underlying concern, the exact nature of these substances was a matter of scientific dispute. There were two schools of thought: the "miasmatists" who regarded miasmas as being responsible for disease; and the "contagionists", who held that disease came from bodily contact, sharing of substances such as food and water, or proximity. Edwin Chadwick (1800-1890), the great sanitary reformer, explained that epidemic fevers were due to miasmas arising from decaying animal and vegetable matter. John Snow, the father of epidemiology, was a contagionist whose classic studies of the transmission of cholera in the mid nineteenth centuery suggested specific contagia and excluded the possibility of 'foul airs'. Feachem (1982) traces the debates and court cases that took place between the protagonists of contagion and miasma in the years from 1866 to 1904. However, the debate remained largely in the sphere of the intellectuals. Popular explanations of disease combined miasma and contagion and often added immorality, laziness, foreignness and vice for good measure.

In the wake of industrialisation and urbanisation came the concern that urban population concentrations were the breeding ground for filth, epidemic and vice; all of which threatened the social order. In pre-revolutionary Paris Joseph Guillotin proposed the setting up a health committee (Comité de Salubreté) in 1790 to look into health conditions of the urban masses. Social unrest in England led to Edwin Chadwick's appointment to look into the conditions of the poor in England which led to the birth of the Sanitarian movement and the Public Health Act of 1848. Boards of Health were

Figure 2.7 17th Century Aristocratic hand-washing

set up in Philadelphia, Boston and New York and public health legislation was enacted throughout Europe. DeSwaan suggests that a collective effort to pacify the urban poor was required to maintain the social order in the interest of the elites (1988). But the stated concern of the sanitarians was that "epidemic disease was the product of dirt and decomposing matter." Pickstone points out that the 'expert' explanation of disease did not coincide with what the masses perceived; their emic view was that fevers and other diseases were due to privation and the high price of corn (1992). The elite used new theories about disease to explain their fear of the threat of the poor, the poor saw their disease as a consequence of their poverty.

Hamlin shows how the 'expert' scientist came to play a fundamental role in creating social order, because he was seen as neutral, able to adjudicate between rival claims of what was, and what was not, correct in public policy. His classic study of water analysis in nineteenth century Britain shows clearly that the scientific basis of these scientists' belief was, at best, poor, at worst, outright charlatanism. But such scientists had tremendous power because they were dealing with threats to the body boundaries, to the purity of the public water supplies that were becoming increasingly ubiquitous (Hamlin 1990). One could liken the role of the scientist to that of the priest of previous ages, prescribing the purifying ritual that was required to make safe that which was dangerous.

The primary concern of nineteenth century sanitary science was the danger of dirt passing into the body through the air, water or food.

> "[The principle] may truly be said to be the prevention of the pollution of Water and Air with filth and its products and the prevention of the consumption of particles of food deleterious to health."
>
> (Manual for medical officers of health by Fox, 1878, quoted in Armstrong 1996)

Though the existence of microbes had been discovered as early as 1676 by Anthony van Leeuwenhoek, it was only much later that they were incorporated into theories of disease. In the 1850s and 60s Pasteur found microbes at work in the brewing industry, pointing Lister to the importance of asepsis in the healing of wounds. During the last two decades of the nineteenth century the pathogenic organisms for most bacteriological infections were isolated and described. From Anthrax, Typhoid, Tuberculosis, Cholera by 1883, to Tetanus, Plague, Botulism and Shigella dysentery by 1898, scientific method showed clearly that specific contagia were at work.

However, British nineteenth century society was still not ready to take on board what science had to relate about microbes and disease. By the end of the nineteenth century

the sanitarian movement had run out of steam. Chadwick had been dismissed, Government was withdrawing from broad scale public intervention. The focus passed from the public to the private domain and it was left to the Domestic Sanitarians such as Benjamin Richardson and George Wilson to take up a crusade for personal hygiene. Huge numbers of books, pamphlets and newspaper articles were published about the 'house diseases', which were ascribed to noxious sewer gas and poor ventilation. Mass educational crusades were carried out as a response to cholera epidemics and there was a new emphasis on personal responsibility for health in cheap books, women's journals, weekly religious newspapers and missionary papers. Circulars and tracts were distributed *gratis*, and published in the daily newspapers. They stressed that careful home hygiene kept pure what was taken in (water, air, food), whilst what came out, namely; noxious expired air and sewage, had to be carefully removed (Tomes 1990).

This manual mania encouraged the adoption of a variety of protective rituals, including leaving windows open at night, and using chemical disinfectants. While both sexes had duties to perform in protecting the sanitary state of the home, the burden of daily watchfulness fell more heavily on wives and mothers. This gender- linked burden led women to play an active role in Municipal Sanitary Reform (Hoy quoted in Tomes 1990). The new standards of cleanliness required more work, more washing, disinfecting, and boiling. New technologies such as water filters and washing machines led not to a reduction in the burden for women, but to demands for higher standards. Though shirts could now be washed more easily, they also had to be washed more often, leaving little or no net time saving (Schwartz-Cowan 1983).

If recommended hygienic measures were not based on the germ theory, popularisers picked up on the dangers of the 'invisible monsters' to lend weight to their arguments. The germ theory was incorporated into advice literature at the beginning of the twentieth century because it supported what seemed to be common sense, that is the already 'proven' precautions of ventilation, disinfection, isolation of the sick and general cleanliness.

Even if miasma had been rejected as a scientific concept by the early 20th century this is not evident from the advice literature. As late as 1942, in a health manual for the War Department in the US, fresh air is counselled. Noxious vapours are a potential cause of death, and air conditioning is recommended to purify air, washing it of gases, smoke and dust (Diehl 1942)

Contagion was still, however, of great concern. A major focus of medical science in the mid 20th century in the UK and its colonies was 'social medicine' with its concern for sexual hygiene and the prevention of the venereal diseases (Armstrong 1996). Similar concerns can be discerned behind the current search to give a scientific basis to the belief

that poor sexual hygiene plays a role in HIV transmission (see e.g. Mertens and Carael 1995).

Though the abstract scientific logic of the germ theory is universally cited as the foundation for contemporary rules of hygiene, cultural values continue to play their part in western 'scientific' societies. Payer (1990) suggests that there are fundamental differences even between how the two supposedly scientific societies such as the French and the Americans understand hygiene. For example: where French dermatologists counsel the avoidance of soap and water for skin conditions such as acne, the American Medical Association recommends washing several times a day. Payer suggests that while Americans conclude that 'if it's clean it must be healthy', the French are quick to counter with scientific argument for the health advantages of tolerating 'dirt'. A French scientist warns about too much cleanliness in restaurants, water supplies and toilet seats:

> "The human organism is made to defend itself, said Dr Gilbert Martin-Bouyer, chief of the transmissible disease section of the Institut Nationale de la Santé et de la Recherche Médicale, who became practically livid when I brought up the question of restaurant inspections, particularly whether dirty toilets weren't a public health concern. "Name me one disease transmitted by toilet seats he challenged"."
>
> (Payer 1990)

The American penchant for cleanliness is rationalised in health terms, but public health officials admit that much of the concern is with aesthetics, not microbes: "We spend a lot of time looking for cockroaches and hairs, which have a very limited impact on health" (Kruse in Payer 1990). According to Robert Abrahams, a professor of folklore at the University of Pennsylvania, people protect themselves as individuals from malevolent forces. "In some societies it is witches. For Americans it is germs" (Payer 1990).

In this section I have suggested that societies require coherent explanations of natural phenomena, especially disease, to create order and to explain and control calamity and disease, thus keeping threats at bay. We saw that religious and naturalistic explanations have always overlapped and that one of the key concerns is with the policing of social and body boundaries. Any substances which transgresses these boundaries, which make the transition from without to within or from within to without are potentially dangerous and need to be hedged with ritual. Religious, symbolic and scientific ideologies are the way in which society makes sense of and controls disease. Of course,

we cannot exempt contemporary explanations for disease, such as the germ theory of disease. Corbin reminds us that what we know is a product of the same forces, "the passionate quest of scientists to give a scientific basis to their beliefs" (1996).

We can conclude that much of the history of hygiene is concerned with searching for rational, health-based explanations for the things which people believe to be dirty, polluting or threatening.

Implications for Public Health

At the beginning of this chapter we said that a better understanding of the nature of hygiene would help the quest for public health in three important ways. First of all, seeing clearly the social underpinnings of hygiene allows the science of hygiene more focus and precision. Secondly, understanding that the primary motivation for hygienic behaviour is order, and not microbe avoidance, is fundamental to the enterprise of encouraging change in hygiene behaviour. Thirdly, we need an understanding of the social and moral dimensions of hygiene, if we are to ensure that hygiene promotion does not become an exercise in victim blaming and oppression.

Modern health promotion programmes counsel hygiene, ostensibly for reasons of disease avoidance. But the multiple and confusing messages that are issues contain other values. Why do some programmes advise disinfecting vegetables and boiling drinking water, others concentrate on food storage and handling, and still others issue certificates to food vendors, advise cutting fingernails, disinfecting latrine slabs, or cleaning nipples before breast feeding? Perhaps concern with order, morality, or purification ritual to render safe that which crosses the body boundary can be discerned behind such counsel. Take, for example, hygiene education programmes that encourage the boiling of drinking water in developing countries. As we shall see in the next chapter, this may be misleading and costly advice for mothers, whose children could be getting much higher doses of intestinal pathogens from their domestic environment, than from the water they drink. But the fear of polluted substances crossing the body boundary, epitomised as microbes in the West, is such a potent threat that it is easy to see why hygiene educators tend to keep prescribing purification rituals such as boiling or filtering. It may also explain how marketers contrive to sell vast quantities of bottled water (which may even be less bacteriologically pure than tap water) on images of purity.

But the argument goes much deeper than to say that we should remove cultural prejudice from science to arrive at a real understanding of the role of human behaviour in disease transmission. In the following chapter we will try to map out the 'hard facts', but we soon find that there are large lacunae in our knowledge of the transmission of

gastro-enteric disease. Why these gaps? Take for example our lack of knowledge of how early contact with microbes confers immunity to gastro-enteric infection. If the French believe that exposure to some dirt is good for one, why does Western Science not have a clear view as to the merits and the limits of this argument, which could be fundamental for human health? Why are contaminated water, food and the environment seen as causing diarrhoeal infection, when the real culprit, human faeces, hardly ever get a mention? Is it possible that cultural taboos on even mentioning excreta get in the way of clear scientific thinking? Do the best scientists pursue 'purer' fields of study?

In the quest for the validation of contemporary belief, from where it has gaps to where it is well rounded, the foundations and the boundaries of science are shaped by the society that produced it. Future historians will, no doubt, find the beliefs and superstitions of late twentieth century science extraordinary. They will, however, also have to salute the achievements. Recent progress in public health science has been spectacular. Our argument is that progress might be even more dramatic if scientists were better at seeing their enterprise in a social perspective.

The second useful lesson we learn from this foray into the social construction of hygiene is that the well-spring of hygienic behaviour is order.

Hygiene springs from a need for individual and social order; good order creates harmony and health. Religion, natural philosophy and science have contrived to offer satisfactory post-rationalisations for what is a fundamental need for order. If we want to promote safer hygiene therefore, we do not need to confine ourselves to arguments about disease avoidance. For example, in India one could build on the existing idea that water possesses the power of purifying, revivifying, and regenerating, to encourage hand washing. In Burkina Faso smell is perceived as a nuisance and a cause of disease. Hygienic practice is important because it confers self-respect and dignity (Chapter 5). Smell avoidance is therefore a more potent appeal to behaviour change than lessons about invisible monsters. Indeed, if hygiene can confer self-respect and dignity, what better basis could we have for promoting particular hygiene practices?

The simplistic notion that microbe avoidance is the foundation of hygiene behaviour is as unlikely to hold true in pre-germ theory cultures as it is in contemporary popular culture. Marketers in the West have learned that lessons about health are ineffective in getting people to change their behaviour. Far more attractive is the promise of the sensual pleasure of a luxury soap, or the positive social values of being clean. Compare the appeal of two 1940s health education council advertisements (figs 2.8, 2.9) with a present day example from the commercial sector (Macleans advertising campaign by Grey's Advertising 1997, fig 2.10).

The third point concerns the practical implications of the moral dimension of hygiene. If the way in which dirt is construed reflects how we order and make sense of our world, then it is evident that the words dirty, clean, hygienic and unhygienic are not detached scientific concepts, but come laden with values. "Dirty" is often a term of abuse and "clean" a term of approval. Because of this, studying hygiene behaviour itself raises ethical questions. We have seen examples of how purity rules and hygiene promotion serve to keep the existing social order in place. In hierarchical societies this means keeping the poor weak and oppressed, keeping women under control and more often than not, adding insult to injury by blaming the weak and oppressed for their own ill-health. The poor and oppressed are dirty, therefore they suffer disease. Hygiene promotion can easily slip into a victim blaming mode, thus becoming yet another instrument of oppression. A hygiene promoter who cannot see and confront these tendencies is probably worse that no hygiene promoter at all.

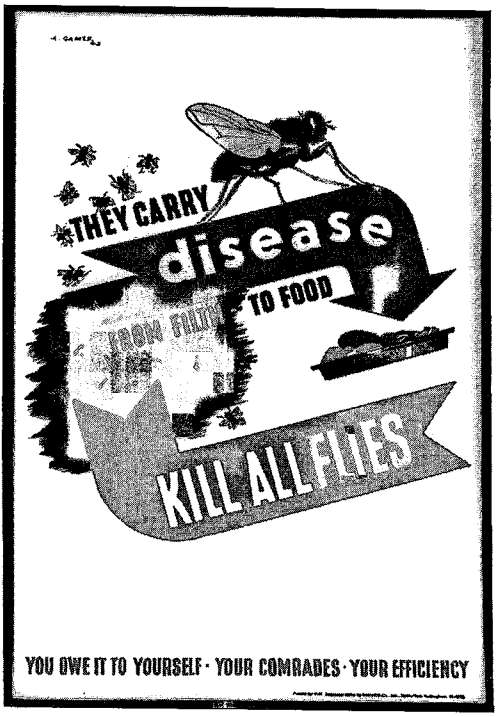
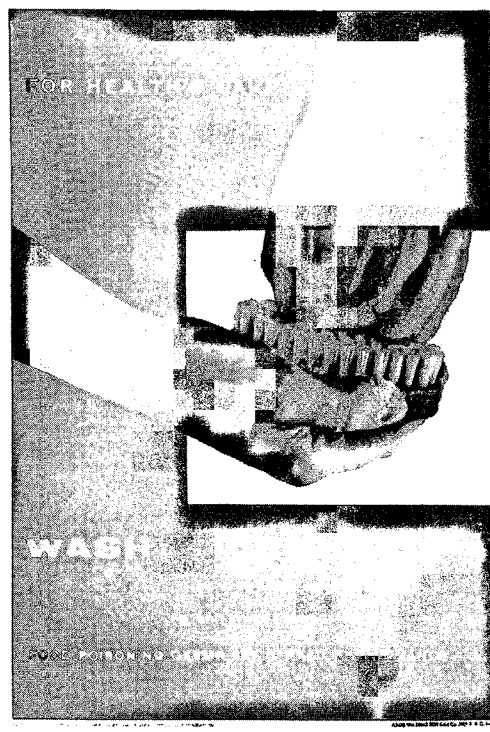


Figure 2.8 Health Education poster from the 1940s

Figure 2.9 Health education poster from the 1960s



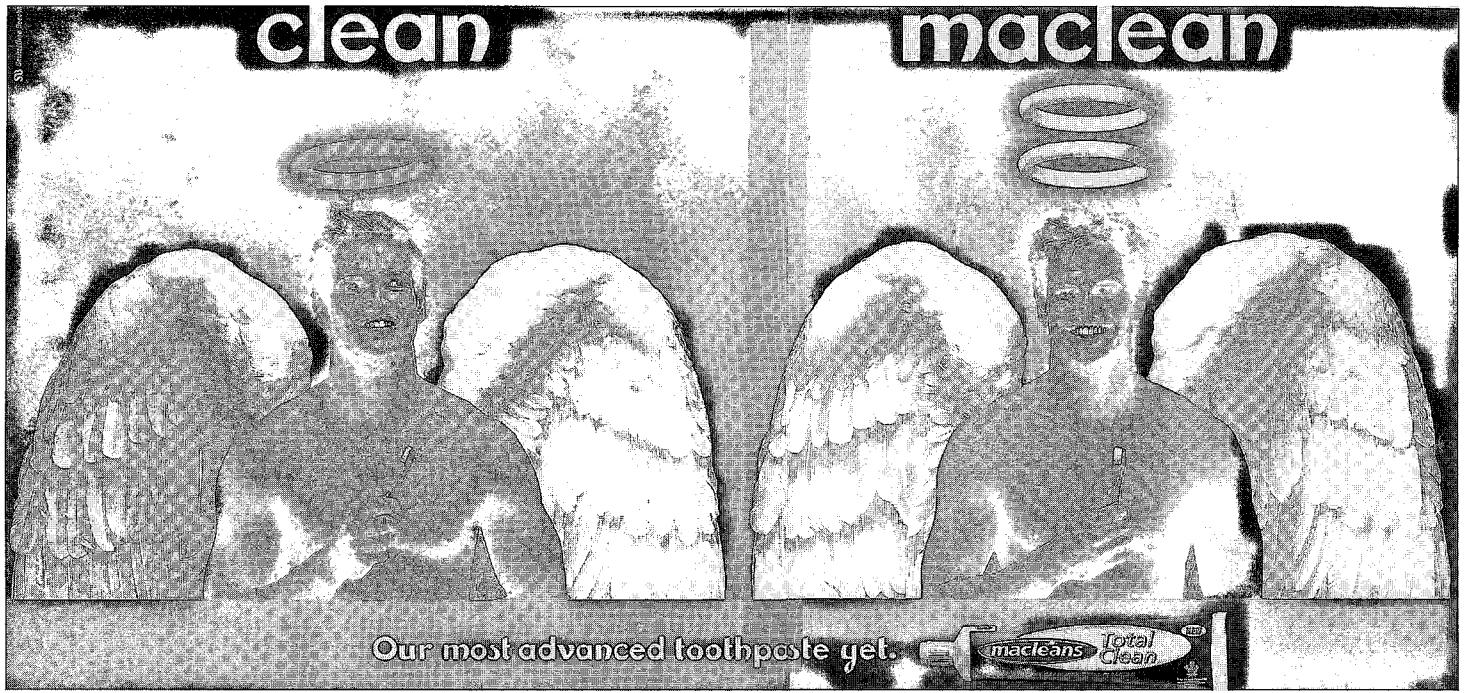


Fig 2.10 Poster for Macleans by Grey's Advertising, 1997

Chapter Three

The Dangers of Dirt: The Relationship Between Hygiene and Diarrhoeal Disease

Introduction: Clearing away the Fog

There is no society in the world today that does not obey some rules of hygiene, and whilst specific rules may vary according to the social, religious, cultural and physical environment, the fundamental principles of hygiene remain the creation of order and the avoidance of potentially noxious substances. Today, modern science has allowed us great insight into the substances and mechanisms of contagion. We know, for example, that it is not conjunctions of the stars that provoke epidemics, but micro-organisms that spread from person to person. We know that it is not foul air that causes cholera, but a bacillus that can spread through contact with the stools of people who are infected.

Our greater scientific understanding of the nature of disease-causing organisms and the manner of their transmission has led to great advances in the promotion of hygiene, from the invention of disinfectants to the Ventilated Improved Pit latrine. Considerable resources are being invested in hygiene education in the developing world. These activities are usually either coupled with programmes to improve water supply and/or sanitation, or contained within the diarrhoeal disease control programmes of the health sector. But these efforts remain unfocused and unsystematic; a plethora of messages are offered, objectives are 'foggily formulated' and few programmes have been able to demonstrate any positive effect, either on hygiene practices or on disease rates (Burgers et al. 1988). One reason for the confusion about hygiene lies in the complex and social nature of the subject. Hygiene educators often promote hygiene practices that they believe to be 'good' without making an assessment of the public health implications of their advice. This chapter suggests that it is possible to use our knowledge of the transmission routes of the diarrhoeal pathogens and of the epidemiology of diarrhoea to improve our decision-making about the changes in hygiene behaviour that are important to public health. If we can pinpoint which particular hygiene practices are likely to have the biggest impact on the incidence of diarrhoeal disease, then we can focus our efforts more effectively.

The object of this chapter is therefore, to review the evidence that is currently available about the transmission of diarrhoeal diseases and to try to pick out those practices that may be of particular concern. We begin by looking at the theory of the transmission of gastro-intestinal pathogens and then compare this with the epidemiological evidence that is available. We also highlight areas where further research is needed. For the purposes of this chapter we restrict our survey to developing countries. However, the distinction between developed and developing country is becoming ever-more blurred, and a global review of the problem of diarrhoeal disease transmission is one of the areas where further work is urgently needed.

Preventing Diarrhoeal Disease

As we saw in the introduction, diarrhoeal diseases are still one of the top three killers in developing countries. Clearly the substantial efforts deployed in recent years to control these infections are not proving adequate. Programmes to control diarrhoeal diseases (CDD) have had some success in reducing diarrhoea mortality through case-management using oral rehydration therapies, and, to a lesser degree through the encouragement of continued breast feeding during and after an episode of diarrhoeal disease (Bern et al. 1992). However, sustainable reductions in the incidence of diarrhoeal infections can only be brought about through disease prevention. Diarrhoeal diseases in children can be prevented in one of two ways. The child's capacity to resist disease can be strengthened through interventions seeking to promote breast feeding, better nutrition including vitamin A supplementation or protection from other infections such as measles and HIV. Alternatively diarrhoeal diseases can be prevented by interrupting the transmission of the organisms responsible for gastro-enteric infection. Human hygiene behaviour holds the key to interrupting transmission. This chapter aims to evaluate how we might best go about preventing the transmission of diarrhoeal pathogens.

What is Diarrhoeal Disease?

Young children throughout the world suffer from bouts of diarrhoeal illness characterised by the emission of frequent, liquid stools. The symptoms can be due to a number of causes including: inborn errors of metabolism, allergies, chemical irritation or osmotic overload in the intestine, systemic disease and hormone secreting tumours, disturbances of the population of indigenous micro-organisms, or infections with pathogenic micro-organisms. In developing countries the vast majority of cases of diarrhoeal illness can be ascribed to infection with pathogenic organisms. Giving an exact figure for the proportion of cases which are due to

intestinal pathogens is difficult: in 1984 Black et al. suggested that pathogens could be identified in an estimated 30-50% of all diarrhoea episodes and in 60-80% of the more severe cases. Improvements in detection techniques, especially for viruses and the continuing process of identifying new diarrhoeal pathogens mean that the percentage of cases of diarrhoea for which a known pathogen can be identified is rising continually.

The pathogenic agents of diarrhoeal disease include viruses, bacteria, vibrios and parasitic worms. When these agents first infect the intestines of a new host they may encounter a number of fates. The vast majority are killed by the acidic and cytotoxic secretions of the stomach (Drasar and Hill 1974). They may begin to colonise the gut and be successfully identified and killed by the body's immune defences. They may fail to establish themselves in competition with, or under attack from, already established microbial flora, or simply be washed out of the digestive tract alive. A number of the ingested pathogens will successfully colonise the intestinal lining, multiplying there and causing damage to the villi, secreting toxins or crossing into the blood stream.

Pathogen invasion and toxin production provoke the secretion of abnormal quantities of water from the gut lining. This leads to the emission of frequent liquid stools, characteristic of diarrhoea. There are a number of reasons why this may happen: the infection may interfere with the mechanisms of re-absorption of fluid; fluid loss may also be a mechanism of defence, helping to flush out the invading parasite.

Whilst the symptoms of diarrhoea may be human defensive reactions to the invasion of pathogenic agents, they may also be a part of the adaptive strategy of the invader. The emission of frequent watery stools is clearly advantageous to the parasite; helping it to reach new human hosts by contaminating the environment with a sticky substance containing huge numbers of offspring. As Nesse and Williams (1995) point out, any gut pathogen that did not encourage its child host to secrete large quantities of watery stools would have a much reduced chance of reaching a new host, and so of perpetuating itself. A similar hypothesis concerning the manipulation of the host's physiology by the parasite is that the invading pathogen secretes toxins that provoke diarrhoea, in order to flush out competitors, leaving the ground clear for the establishment of the new species of parasitic microbe (Ewald 1994).

Certainly not all intestinal infection is serious and not all gut parasites provoke medically significant diarrhoeas in their hosts. The long process of co-evolution between man and his parasites has left us with organisms that provoke a life-threatening dehydration in one child, may colonise another with no apparent effect, and may totally fail to establish themselves in a third.

Diarrhoeal Disease Transmission

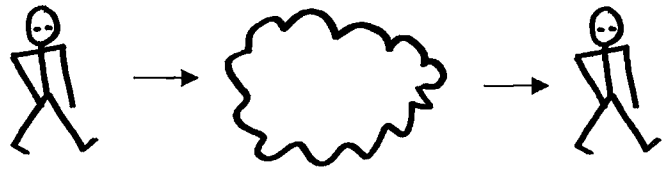
But how do the pathogenic agents of human diarrhoeal diseases reach their child hosts in the first place? Clearly if we understand this, we can also understand how to prevent disease transmission.

Figure 3.1 shows a number of potential transmission routes. The simplest option for the parasite (virus/bacterium/protozoan/worm) is to emit infective material into the environment in faeces in the hope that it will be ingested by a new human host (3.1a). Slightly more complicated, is the option for the progeny to multiply in the environment, thus increasing the chance of meeting and colonising a new human host (3.1b). A third possibility is for parasite progeny to leave a human host via faeces, multiply (or not) in the environment, be ingested by an animal host, colonise the animal host, release infective material back to the environment to multiply (or not), before being ingested by a new human host (3.1c). A fourth option is for parasites that normally cycle through animals to cross over to colonise humans via the environment (3.1d).

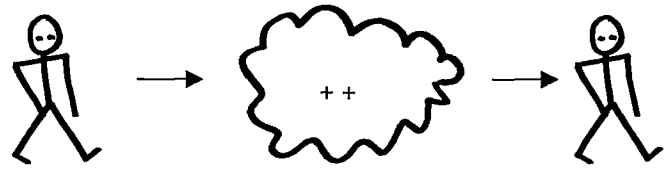
Examples of enteric pathogens for which man is the principal reservoir, and thus most transmission originates from human faeces (route 3.1a) are *Giardia lamblia, Entamoeba histolytica* and viruses such as Rotaviruses, Norwalk virus, Adenoviruses and Astroviruses. None of these can multiply in the environment. Other bacterial agents, can multiply, or not, as they transit through the environment (route 3.1b). Examples include serotypes of *Escherischia coli*, species of Salmonella and Clostridium and *Vibrio cholerae*. Other enteric pathogens including *Campylobacter jejuni*, Cryptosporidium spp, *Salmonella enteriditis, Yersinia enterocolitica, Citrobacter feundii* and *Balantidium coli* have been isolated from both human and animal faeces (Feachem et al.*a.* 1983, Crawford 1988) suggesting that there may be an animal reservoir (routes 3.1c and 3.1d).

The complexity of this picture, where myriad gut micro-organisms, with manifold life cycles, provoke a diversity of reactions in human hosts, goes some way towards explaining why much remains to be learned about the human diarrhoeal pathogens. However, it is possible to draw some general conclusions to help in the search for rational disease prevention interventions.

Though there are a number of gut pathogens which have found other routes of transmission (for example, hookworm is not ingested, but enters through the skin of the feet, rotavirus may be passed on in droplets of water breathed in after toilet flushing (Ho et al. 1989), the major medically significant gut infections use one or other of the four routes described above to reach human hosts. In developing countries few of the important human pathogens have an animal reservoir. Though

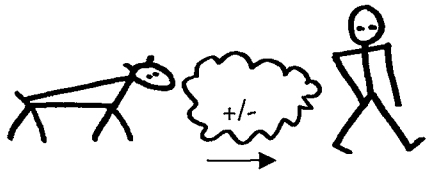


3.1a Human-to-human via the environment



3.1b Human-to-human multiplying in the environment

3.1c Human-to-animal-to-human via the environment



3.1d Animal-to-human via the environment

Figure 3.1 Alternative routes of transmission of diarrhoeal pathogens

there may be occasional cases of animal-to-human transmission, the vast majority of cases of endemic disease occur either by human-to-human transmission, or from the human-to-human transmission of pathogenic agents which have multiplied in the environment (routes 3.1a or 3.1b) (Feachem 1984). Even Cholera, a zoonosis that is pandemic in much of the developing world, relies on human-to-human transmission to maintain outbreaks (Said & Drasar 1996).

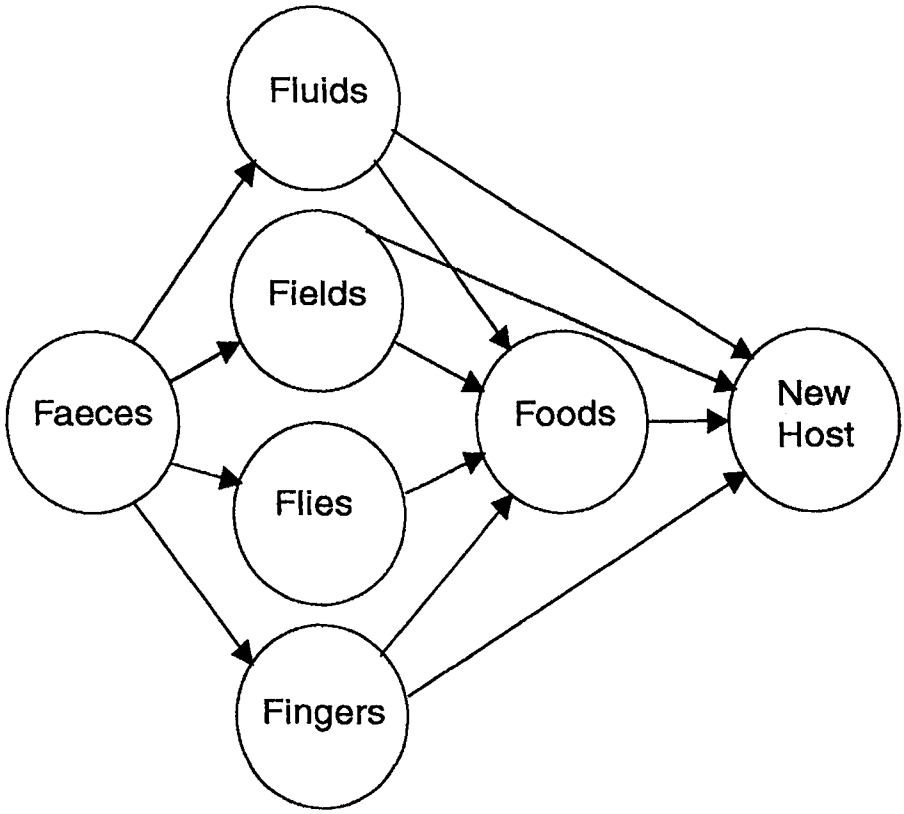
Mechanisms of Transmission

In all of the diagrams of potential transmission routes shown in figure 3.1, the pathogen has to pass through the environment. What do we mean by environment in this context? The 'F-diagram' of Wagner and Lanoix (1958) in figure 3.2 shows the routes that faecal pathogens take through the environment to reach a new host. Once in the environment, most of the pathogen progeny usually die. However, some may get onto fingers, into food or into fluids and are ingested by a new host. Flies landing on excreta can carry pathogens to foods or surfaces that are used for food preparation or eating. Human or animal feet that tread in faecal material deposited in the open, bring pathogens into the domestic environment, and children playing with, or eating, faecally contaminated earth can ingest pathogens. Excreta can contaminate water sources, the water from which is used in food preparation or drunk directly. For small children, the principle victims of diarrhoeal disease, the environment is usually therefore the domestic setting.

Transmission routes vary according to the character of the pathogen. Whilst viruses cannot multiply in the environment and some die quickly in hot, dry conditions, they are excreted in such huge numbers that the chances of some of them reaching a new host are multiplied. Bacteria are excreted in lesser number but some can multiply geometrically in the environment, especially when they have nutrients, liquids and warmth available (for example in a baby's bottle which has been kept at ambient temperature for an hour or so (Rowland 1985). They can survive for long periods in apparently hostile environments such as on fingertips (Hutchinson 1956, Knittle et al 1975). However, to cause disease, in general bacteria require to be ingested in higher doses than the other classes of pathogens.

The cholera vibrion is transmitted like other bacteria but differs in its capacity to maintain a reservoir in the environment; it is believed to live in the brackish water of estuaries in association with zooplankton (Benenson 1995). It can also multiply in the environment, as on warm rice for example (Glass et al. 1991). Parasitic worms and some protozoa such as Giardia can employ a strategy of encystation to survive for long periods in the environment in order to reach a new host. Ascaris eggs can survive in the environment for several years and still remain viable when ingested (Feachem et al. 1983).

Fig 3.2 'F-diagram' showing the transmission routes of diarrhoeal pathogens



Risk Practices: the Evidence

So how does hygiene relate to the transmission of diarrhoeal pathogens? The F-diagram shows how the micro-organisms which cause diarrhoeal infection are transmitted from person-to person by exiting in faeces and entering a new host through the mouth. Changing human behaviour, and domestic, personal and food hygiene in particular, holds the key to blocking these transmission routes and therefore to preventing infectious diarrhoea.

Any intervention which hopes to improve public health by encouraging changes in behaviour needs to be very specific about which particular practices to target. Loevinsohn's review of the published data concerning health education suggests that

the key to success is using few messages, of proven benefit, repeatedly and in many forums (1990). If hygiene promotion is to be used to reduce the incidence of diarrhoeal diseases, we need to be able to identify a small number of specific practices which carry the greatest risk in any particular setting. This requires both an understanding of the theory of enteric disease transmission and review of the available evidence. Armed with this understanding it is then possible to make a careful diagnosis of practices which may be putting children at risk amongst the population to be targeted.

Returning to the F-diagram, we can distinguish primary and secondary routes for the spread of diarrhoeal pathogens in the environment. Primary routes are those on the left of the diagram which allow infectious organisms to get into the environment in the first place. Practices which can prevent this happening we call **primary barriers.** The most important primary barrier to the stool pathogens is the disposal of stools in such a way that they are isolated from all future human contact (by the use of latrines, sewers, burying etc). Another primary access route for pathogenic organisms from stools into the environment is on hands after anal cleansing. Traces of faecal material have to be removed thoroughly from hands to prevent pathogens from using this route into the environment.

If pathogens, however, do get into the environment by using one of these routes they are then able to spread and to reach new hosts. **Secondary barriers** are hygiene practices that stop pathogens from faecal material that are already in the environment, reaching new hosts. They are also practices that prevent pathogens that have reached the environment from multiplying (fig 3.1b). These secondary barriers include washing hands before preparing food or eating, and preparing, cooking, storing and re-heating food in such a way as to avoid pathogen transmission and multiplication. They include ensuring that water supplies are isolated from faecal contaminants and employing water treatment such as boiling or chlorination. Other secondary barriers include keeping play spaces free of faecal material, preventing children from eating earth, and controlling flies.

It is clear that if primary barriers to the transmission of faecal pathogens were in place, the need for the secondary barriers would be less. In general, any intervention which can encourage the safe disposal of stools and adequate hand-washing after stool contact should pay greater dividends than those which concentrate on the secondary barriers.

Epidemiological evidence supports these conclusions: in 1992 the World Health Organisation organised a comprehensive review of the evidence concerning the links between these behaviours and diarrhoea from both observational and intervention studies (WHO 1993). Their evidence came from 33 published studies and review articles. Their findings did not highlight the difference between primary and

secondary barriers, but they concluded that the most important behaviours to be promoted in any setting were likely to be:

- safer disposal of human excreta, particularly the faeces of young children and babies, and of children with diarrhoea

- hand-washing after handling babies' faeces, before feeding and eating, before preparing food.

- maintaining drinking water free from faecal contamination, in the home and at the source.

We here review evidence from observational and interventional epidemiological studies about the potential of interventions to break the transmission routes shown in the F-diagram, taken both from the WHO review and more recently published work, including the review by Boot & Cairncross, (1993). The interventions which are reviewed here include safe stool disposal, hand-washing, fly control, water protection and disinfection, and safe food handling. Though the evidence comes mainly from developing countries, we conclude with some remarks about the relevance of the findings to developed countries.

Safe Stool Disposal

Since human stools are the source of almost all endemic diarrhoeal infections in developing countries, it seems likely that safe stool disposal is of major importance for the prevention of disease.

The link between safe stool disposal and child diarrhoea has been investigated in a number of epidemiological studies. Indiscriminate defaecation near the home or children defaecating in living areas were found to be associated with an increased incidence of diarrhoea (Han & Moe 1990, Clemens and Stanton 1987). Baltazar and Solon (1989) found a 64% increase in pathogen positive diarrhoea in families where children's stools were inadequately disposed of. Mertens et al. (1992) found that safe stool disposal was associated with a 35% lower diarrhoea risk in Sri Lanka and suggested that if unsafe disposal of stools could be reduced from 91% to 50% of the population, 12% of diarrhoeal episodes could be prevented. The results also suggested that latrine ownership on its own was not enough to prevent disease, unless it was associated with safe stool disposal behaviour.

The findings of our case-control study of the risk factors for diarrhoea in children under three in Bobo-Dioulasso (Traoré et al. 1994) were reported after the WHO review. We found that the unsafe disposal of child stools (left lying on the ground,

thrown on a heap or outside the compound) was associated with a 50% increase in the risk of hospitalisation with diarrhoea (95% confidence interval of the odds ratio 1.09-2.06). Children who lived in compounds where human stools were observed on the ground had about a third higher chance of being hospitalised for diarrhoea.

A further source of evidence for the importance of safe stool disposal is the studies of the effects of programmes to improve sanitation in developing countries. If the construction of latrines reduces diarrhoeal disease it might be supposed that the effect was due to the safe disposal of stools. However, few such studies offer data on the usage patterns of latrines and few can distinguish the health benefits of latrines alone, as most sanitation programmes were coupled with water supply and hygiene education. Moreover, most such studies involve self-selected exposure groups (In other words, people who had latrines were people who had chosen to build them and not a random sample of the population. They may thus have differed in a number of significant ways from the general population, including already having lower disease rates). Rahaman (1985) suggested that post-neonatal mortality rates were 68% lower in families with latrines after adjustment for confounding. Daniels et al. (1990) suggested that the presence of a latrine may reduce diarrhoeal infection by a quarter especially in households with good hygiene practices in Lesotho.

Whilst the epidemiological evidence appears to support our suggestion that safe stool disposal is one of the key barriers to the transmission of pathogens, the conclusions of such studies have to be examined critically. They all shared the difficulty of getting good measures of what people actually do about stool disposal. Finding out about the disposal of stools can be very difficult, and interview surveys may provide inaccurate and biased results, as we see in Chapters Five and Six. Such studies are also plagued by problems of confounding. For example, a study claiming to show that unsafe stool disposal was a risk factor for diarrhoeal disease might actually be picking up the effect of some other factor, such as wealth, or attitude to hygiene in general, which had ultimately determined both a child's diarrhoea status and the reported hygiene practice of the mother. Though most of the studies cited here attempt to control for confounding, some factors, such as 'mother's attitude to hygiene' for example, are difficult to control for effectively.

Though the arguments are complex, given the consistent nature of the above findings and the biological plausibility of the argument that human stools lying in the domestic environment are a source of diarrhoeal infection for small children, it seems reasonable to conclude that the safe disposal of stools should be one of the main foci of efforts to prevent diarrhoeal diseases.

Hand-washing

Hand-washing can interrupt several of the transmission routes in the F-diagram (fig 3.2). The primary barrier to transmission on the left of the diagram is the effective cleaning of hands to remove adhered particles, after coming into contact with stools. Such contact occurs after defaecation and when cleaning up a small child and disposing of his or her stools. Han et al (1986) showed that hands readily became contaminated after defaecation, even with the use of toilet paper. Observations in Africa and India by the author and a number of others, suggest that using bare hands to clean children's bottoms after they have defaecated is common practice. If hands are not washed following stool contact then micro-organisms in stools find an easy route into the environment.

Occasions when hand-washing constitutes a secondary barrier to disease transmission are after contact with what may be a faecally contaminated environment before preparing food, handling fluids or feeding a child.

There are a number of epidemiological studies that refer to the importance of hand-washing which claim substantial reductions in diarrhoeal morbidity. An intervention study by Khan reduced the incidence of shigellosis by 35% through hand-washing with soap after defaecation and before taking in food (1982). Han & Hlang claimed a 30% reduction in diarrhoea morbidity in Burma through hand-washing with soap (1989). Many studies have been carried out in Bangladesh where Clemens et al (1987) and Alam et al (1989) suggested that hand-washing was one of the factors which lowered the incidence of diarrhoea in interventions. Pinfold et al. (1996), found a significant reduction in hand contamination and in diarrhoeal disease from an intervention to promote hand washing and dishwashing. Hoque et al. (1996). found a reduction in diarrhoea prevalence associated with lower numbers of faecal colony-forming bacteria on hands, six years after an intervention to improve water, sanitation and hygiene in Bangladesh

Few studies made any attempt to distinguish between hand washing occasions. Our study in Burkina Faso concentrated on hand-washing after stool contact. We observed what a relatively small sample of 277 mothers did after their children had defaecated. Only 4% of these mothers used soap to wash their hands, after using their hands to clean the bottom of a child who had defecated. However, the children of soap-using mothers had about half the risk of contracting severe diarrhoea (Projet Diarrhées 1994). In a highly faecally contaminated environment, frequent hand-washing with soap can give a large measure of protection against diarrhoea as Lanata found in Lima, Peru (1994).

Boot & Caincross (1993) suggest that the agent of hand-washing may be less important than the time spent cleaning hands, as some effort is required to remove adhered particles. Kalthenthaler et al (1988), propose that unless the price or

availability of soap is a major obstacle, it is probably easiest to promote hand-washing with soap.

Water availability is likely to have an impact on the frequency with which a mother washes her hands (Chapter 8). When water is further than about a kilometre from the home, mothers tend to restrict the use of water for hand-washing. On the other hand, when water is freely available at close range, hand washing becomes more frequent (Cairncross 1997). This may provide at least a partial explanation for why interventions to improve water supply have been shown to have a health benefit in a number of settings (see reviews by Esrey et al. 1985, Huttly 1990 and Esrey 1991).

Though the evidence is not fully conclusive, it seems that promoting hand washing with soap after contact with stools should be an intervention of choice for the prevention of diarrhoeal disease. In circumstances of gross faecal pollution and where it is acceptable and feasible to promote hand-washing with soap at more frequent intervals, then this should also be considered.

Preventing Transmission Through Water.

Until the late 1980s, the assumption that poor quality drinking water was the primary source of diarrhoeal diseases was widespread (see the influential work of White, Bradley and White (1972), for example). One of the primary objectives of the Water Decade of the 1980s was the prevention of diarrhoeal disease through the widespread provision of pure water. The assumption that it is the quality of the water that is most important has undergone some revision in the last decades. As we have seen, there is another way in which improving water supplies can influence disease transmission: if water is more accessible and plentiful then it facilitates better hygiene in general and more hand-washing in particular, which can be highly protective.

It has not always been possible to distinguish between the two potential effects of improved water supplies. Many epidemiological studies have tried to evaluate the impact of water programmes on health and have provided confusing and contradictory results. Interpretation of the studies is further complicated by the fact that water programmes were often supposedly integrated intervention programmes, with sanitation and hygiene education components included. Nevertheless Esrey et al. attempted to distinguish the importance of water quantity from water quality in a review of 67 studies in 28 countries in 1985, and a further 17 studies in 1991, and concluded that improvements in water availability were probably more important than in water quality.

Of course water which is free of pathogenic agents at the source may become contaminated with faecal material as it is carried home from the source and stored in vessels until consumption. In Sri Lanka, for example, only about 5% of ground water samples were found to be contaminated with faecal indicator bacteria, but 50% of samples were contaminated during or after being drawn. However, there was no direct association between bacterial contamination of drinking water and diarrhoeal disease (Mertens et al. 1990). In 1982 Kirchhoff et al. found that heavily contaminated sources of water in the home had no effect on diarrhoea incidence, but Yeager found that diarrhoea incidence was lower in households where water was stored in a container with a tap in Lima, Peru (1991). In our study, we examined the relationship between the type of water source ranging from the relatively clean to the highly contaminated (standpipe in the compound, communal standpipe, communal well, private well) and diarrhoea. Despite having a large sample (3337 mother-child pairs) we found no clear relationship between the source of water and the incidence of severe diarrhoea. This suggested that the quality of the water had not played a part in the incidence of diarrhoea in 0-3 year olds.

Mertens et al (1990) and Van der Slice (1991), suggested that water contamination at source is more important than contamination in the home. This may be because new pathogens coming from outside the home may have more impact on health than pathogens that are being recycled through family members. It is common in hygiene promotion programmes to promote the boiling or other disinfection of water for drinking. There is little evidence for the usefulness of such practices unless there is reason to suppose that water supplies have been contaminated at source. Cairncross (1990) concludes that greater health benefits might be achieved by investing in making water more accessible and plentiful, thus facilitating better domestic hygiene practice, than by ensuring microbiological and chemical purity.

Keeping water supplies free of faecal contamination at source and in transit is clearly important for preventing diarrhoeal disease. However, the best way to do this is to ensure that human faecal material is not released into the environment in such a way that it can get into water supplies. The best way to do this must be to ensure that stools are disposed of safely, and for hands which have come into contact with faecal material to be carefully washed with soap, before they can come into contact with water in transit or in use in the home.

This is not to say that, where there is evidence of the faecal contamination of water supplies, it should not be dealt with urgently. Maintaining water supplies free of contamination from sewage can prevent outbreaks of the classic epidemic diarrhoeas such as typhoid and cholera, and the more recently identified cryptosporidiosis. Eliminating the transmission of diarrhoeal pathogens through safe water supplies is also important because it may help to reduce the virulence of the microbial strains (Ewald 1994). The breakdown of water purification for large populations during war, in refugee camps, during flooding or other disasters may, however, allow the

more virulent strains to prosper and cause epidemics. Even during such outbreaks, most secondary transmission will be through poor hygiene practice, especially the unsafe disposal of stools and insufficient hand-washing. Hygiene promotion is therefore a priority in potentially epidemic situations, as it is in the much commoner situation of endemic disease transmission.

Flies

The F-diagram shows how flies may play a role in the transmission of diarrhoeal disease by carrying pathogens from stools to food, into water, or onto other objects that may get into the mouth of a susceptible child. They become contaminated when feeding or laying eggs on faeces. They can transfer pathogens from the surface of the fly to food, to people or to surfaces, though few pathogens survive long enough to have much public health importance (Shigella is an important exception). A more important route for pathogen transmission is through fly vomit or faeces. When feeding flies deposit a solution of enzymes onto the food and then suck up the semi-digested products. Flies also defaecate every few minutes and their faeces may contain viable pathogens (Chavasse, in press). Esrey's review of studies of fly control showed that diarrhoea-causing pathogens can survive on flies, or in their guts for up to ten days (1991). A recent study reaffirmed that flies can be carriers of enteric bacterial pathogens such as Vibrio cholera, Salmonella and Shigella (Oo et al. 1989).

The evidence for a link between fly control and the incidence of diarrhoeal disease is, however, a subject of some debate. Feachem's (1986) review of interventions for the control of diarrhoeal diseases placed fly control in the group of interventions judged to be "ineffective or of limited feasibility and not likely to have a major role in control programmes". Chavasse et al. (1994 and 1996) dispute this classification, proposing that fly control can be both effective and feasible on a sustainable basis. They cite the findings of Cohen and his colleagues in Israel who demonstrated a significant reduction in diarrhoea incidence amongst soldiers following fly control using yeast baited traps (Cohen et al. 1991). Preliminary results from a fly control programme using insecticide in villages in Pakistan with heavy domestic animal and human faecal contamination, carried out by Chavasse et al (in preparation) suggest that fly control reduced the incidence of diarrhoeal disease by 23%.

Common house flies (*Musca domestica*) and the related *Musca sorbens* may breed in scattered human faeces. Only rarely do they breed in latrines. Blow flies can breed in latrines but are rarer. Blow fly infestation can be prevented by the use of covers or fly screens or, better, by building Ventiliated Improved Pit Latrines (VIPs). Though fly control may be desirable in settings where flies form a major nuisance and where there is substantial faecal contamination of the environment, the logic of the F-diagram again leads us to the conclusion that the primary need is to

prevent flies gaining access to stools in the first place. Safe stool disposal which removes faecal material from the domestic environment via sewers, well-designed latrines or burying, prevents pathogens of faecal origin from being picked up by flies and, in turn, prevents pathogens from reaching new hosts via food, water or other objects.

Food-borne Transmission of Diarrhoeal Diseases

The F-diagram shows food as a possible link in the chain of transmission of diarrhoeal pathogens from stools to new host. Potential interventions to break this chain include hand-washing before food preparation and handling, safe food storage, avoidance of potentially contaminated foods, adequate cooking and re-heating, keeping kitchens, surfaces and utensils clean, and hand-washing before eating. Food is potentially important for disease transmission because pathogens on food have an easy route into the digestive system, and because some gastro-enteric pathogens can multiply on food and thereby increase the dose ingested by the host. There are many other biological agents that cause food spoilage and the production of toxins, some of which can make the eater seriously sick. However, we classify such problems as food-poisonings of chemical origin, and not the gastro-enteric invasion of pathogenic agents of diarrhoeal disease, which is the subject of this chapter.

Esrey and Feachem (1989) reviewed seventy studies for evidence of the impact of food hygiene on diarrhoea morbidity and mortality. They found that there was evidence for the contamination of foods with agents including Salmonella spp., E.coli, and Klebsiella. They also found studies that had reported the presence of faecal indicator bacteria in food, indicating that there was contamination of food with faecal material. They also found evidence from a number of studies for the multiplication of bacteria during the storage of food, in particular in weaning foods. Though these findings indicated that it was highly plausible, from a biological point of view, that food contamination was linked to diarrhoea incidence, they found that evidence for the impact of safer food hygiene on diarrhoeal incidence in developing countries was sparse and inconclusive. Several studies suggested that improvements in food hygiene had led to reductions in diarrhoeal disease, but few could conclusively demonstrate that better food hygiene had been the cause of the improvement. Indeed, a number of studies which had specifically looked for links between bacterial contamination and diarrhoea were unable to show any significant association.

Motarjemi et al. (1993) reviewed the arguments that weaning foods are a particularly dangerous source of diarrhoeal pathogens for children and concluded that interventions to improve food hygiene should be a priority for diarrhoeal disease control. However, their review is based mostly on the biological plausibility of the argument, does not distinguish between pathogenic and non-pathogenic food

contamination, and does not address the concerns of Esrey and Feachem about the paucity and limitations of the evidence.

Seasonal patterns of diarrhoeal disease give a hint about the importance of the multiplication of bacterial pathogens in food. Many studies, ours in Burkina Faso included (Projet Diarrhées 1994), have shown a peak of bacterial diarrhoeal disease in the hot season. One explanation for this could be that pathogenic bacteria can multiply more readily on stored food in warmer temperatures (route 3.1b) (Cairncross 1979).

There are a number of reasons why using epidemiological techniques to find links between diarrhoeal infection and food contamination has proved problematic. Firstly, overall diarrhoea rates may not change when contaminants are reduced because they may already have been too low to show a significant reduction. Secondly, contamination from other sources may remain high enough to mask any potential effect. Thirdly, in a domestic setting, children may already be resistant to the pathogens that they meet in home-prepared food. However, most of these arguments also apply to the other potential pathogen transmission routes that we have evaluated here, but studies have been able to point to associations between behaviour and disease. One reason for the lack of convincing findings are the methodological difficulties of such studies, requiring as they do, a combination of expertise in epidemiology, food microbiology and behavioural research.

In the absence of conclusive evidence, one potential hypothesis is that the case for poor domestic food handling, preparation and storage as a major source of diarrhoeal pathogens has been overstated. It would be easy to see why this might be the case. Because food easily becomes spoiled, and because many micro-organisms have been demonstrated to be present in food, the assumption that the pathogens specific to diarrhoeal disease are just as ubiquitous is easy to make. Because large numbers of studies of outbreaks of gastro-enteritis in industrialised countries find (or assume) a common food source, extrapolations have been made to the endemic diarrhoeas of domestic settings in developing countries.

Further studies are certainly needed to clarify this issue. In particular, molecular biology now offers a number of new techniques such as plasmid profiling, which could help to separate the pathogenic strains and species from the myriad harmless microbes of everyday life. Such studies will be difficult because food handling practices responsible for food contamination may vary greatly and be very culture specific and food hygiene behaviour is also difficult to record. In the meantime, what can we conclude about the risk practices that we should target in our efforts to prevent diarrhoeal disease? Since food contamination with diarrhoeal pathogens can result only if stools are inadequately disposed of, or if hands are inadequately washed after stool contact, it would seem reasonable that these two primary barrier practices should be given priority, unless local evidence suggests otherwise.

Bottle Feeding

Another issue associated with child feeding that has been the focus of much work is the bottle-feeding of infants. Though now disputed in developed countries, many studies in developing countries have shown bottle feeding to be a major risk factor for diarrhoeal disease (see the review by De Zoysa et al. 1991). Breast-feeding not only protects against infection through better nutrition and supply of maternal antibodies to the infant, but also reduces the contact that the child has with milk and bottles which may have become contaminated with pathogenic agents. These pathogenic agents come from faecal material, so better hand-washing after stool contact and safer stool disposal are of especial importance for mothers who bottle feed for whatever reason.

Animal Faeces as a Source of Human Infection

We have so far considered only the prevention of the transmission of pathogenic agents originating in human faeces (routes 3.1a and 3.1b). Is this fair? Animal faeces have been shown to harbour a number of organisms that may be infective to humans such as Cryptosporidium, Salmonella, and Campylobacter. There are a few studies in developing countries that showed an association between animal faeces and human diarrhoea, two studies reported possible links between the presence of chickens in the home environment and an increased incidence in children (Georges Courbot et al 1990, Grados et al 1988). Other studies have noted the presence of animals where rates of diarrhoea were high without showing a specific link. Huttly et al (1987) surprisingly found that the presence of animals inside the house was associated with a reduced risk of childhood diarrhoea. In Bobo-Dioulasso, the presence of pigs or cows in compounds showed no association with hospitalisation for diarrhoea. One other potential problem associated with animals living in close proximity to human habitations is the opportunity that animal dung offers to flies. Dung can serve as a breeding and feeding ground, which may facilitate the fly-borne transmission of pathogens from human stools. The general dearth of evidence on this subject suggests either that the association between animal stools and diarrhoea is non-existent or weak, or that studies have not been well enough designed to detect an association.

Multiple Routes of Infection

Though it is important to evaluate the individual importance of different potential transmission routes it is clear that an intervention to improve one type of hygiene behaviour may be useless if children still receive infective doses of pathogens via other routes. We still have only a piecemeal understanding about the size of the

infective dose for most diarrhoeal pathogens. This makes it hard to pick out which routes may be most important for each pathogen. There is controversy as to whether the risk of disease is reduced proportionately by eliminating single transmission routes if other routes remain (Briscoe 1984, Cairncross 1987). In addition, human pathogens have myriad strategies for getting from one host to another, and some transmission routes are more important for some diarrhoeal pathogens than others. We know that Shigella, for example, is easily transmitted on hands (Khan 1982) whilst other pathogens cannot tolerate such inhospitable surfaces for long enough to infect new hosts. This may imply that we should tailor hygiene promotion efforts to local pathogen patterns. The development of cheap and simple pathogen detection techniques may facilitate such approaches in future.

Certainly a number of studies have concluded that several interventions at a time are more effective than one alone. Alam et al (1989), for example, demonstrated that a combination of clean water, absence of faeces in the yard, and hand washing resulted in 40% less diarrhoea than when one practice alone was observed. However, the experience of hygiene education programmes has shown the ineffectiveness of exhorting people to change a whole variety of behaviours at one time (see chapter 10 for more on this issue). Public health experts are required to make considered judgements about practices that are putting health at risk by weighing up the evidence and diagnosing conditions in the field, before choosing one or two key messages.

Taking all the evidence together and returning to the transmission routes shown in the F-diagram, it seems reasonable to conclude that practices of particular concern should be the unsafe disposal of human stools and inadequate hand-washing after contact with faeces. These are the practices that allow faecal material into the domestic environment of the susceptible child. Other hygiene practices can help to prevent faecal material from reaching the child, but keeping pathogens out in the first place must be the first priority. Other practices should be considered for intervention if local evidence shows that either, the first two practices are already being observed, or, there is solid local evidence for a problem, such as a major fly infestation, or serious faecal contamination in water sources.

Diarrhoea and Hygiene: What We Still Don't Know

There are still multiple lacunae in our knowledge about the transmission of diarrhoeal diseases. Though the F-diagram gives us a good basis for proposing interventions that should have priority for preventing diarrhoeal disease transmission, the epidemiological evidence is incomplete and inconclusive. Important questions about transmission remain to be answered: what is the realtive importance of animal faeces as a source of the pathogens of endemic diarrhoeas in developing countries? How important are other transmission routes? (There are some

hints, for example, that rotavirus can be passed through the air in droplets from flushed toilets (Ho et al. 1989); Mølbak et al (1990) have suggested the possibility of airborne transmission for Cryptosporidium.) How do pathogenic micro-organisms behave on food and on surfaces in domestic settings in developing countries?

The infectious diseases of poor countries have, on the whole, attracted less research funding than the chronic diseases of rich countries. The need for further research into the diarrhoeal diseases ranges right through from the level of the biochemical cell processes to the macro-issues of health promotion policy. Vaccine development has been the target of some research, but we are still a long way from the commercial availability of a vaccine that might confer resistance to the wide range of pathogens responsible for the endemic diarrhoeas amongst children in developing countries.

The issue of host resistance to infection has long puzzled scientists, and recent improvements in the understanding of the human immune system may go some way towards solving the puzzle. The folk wisdom found in many countries that a small amount of dirt may be good for one, may be borne out, if more can be learned about how and to what extent children in developing countries acquire immunity to diarrhoeal disease.

We have not yet identified all of the agents of diarrhoeal disease. In our study we found a pathogenic agent in 56% of children with symptoms of diarrhoea and in 40% of children with no signs of diarrhoea (Hien 1991). Studies in developed countries find pathogenic agents in a similar proportion of diarrhoeal cases. The failure to identify pathogens might be due to poor experimental technique, but at least some of the cases are likely to be due to, as yet, undiscovered agents that do not grow on the usual culture media, or do not respond to current tests for viral matter such as ELISA or PCR.

Most cases of diarrhoeal disease occur in children in developing countries. If the scale of the problem is less in richer countries, diarrhoeal pathogens also pose a threat to infants, the immunocompromised, and people using or living in institutions such as day-care centres and old people's homes (Gangarosa et al. 1992). Diarrhoeal diseases are primarily problems of the 40% of the world's population that lives in poverty (Hardoy 1990), and such conditions are increasingly found in all countries of the world. Rapid urbanisation and deprivation of urban under-classes is leading to a resurgence of infectious disease (Garret 1994). The adoption of new eating patterns in the West with less home cooking and greater use of pre-prepared food allow small lapses in excreta- related hygiene by food handlers to amplify into major outbreaks of infectious diarrhoea. New pathogens, which appear to be able to jump species, are becoming a major focus of concern (for example E.coli 0157 and the prions causing BSE and new variant CJD). Pathogens are also evolving rapidly and some can now evade previously effective treatment. One study in Canada, for example, showed that half of all Shigella infections were resistant to four or more antibiotics (Harnett

1992). The subject of hygiene in developed countries remains complex, and the advice given by specialists is complex and confusing. A review of the global importance of hygiene for the prevention of gastro-enteritis is long overdue. Certainly, if drugs to control enteric infection are becoming ineffective, then societies everywhere will have to learn or to re-learn safer hygiene practices.

However, the greatest need for further research is not in the lab but in the real world. We have enough information about diarrhoeal diseases to know that changes in hygiene practice are likely to be effective in their prevention. But encouraging people to change the hygiene habits of a lifetime is extremely difficult. To be able to do this we need to understand far better what underlies and motivates human hygiene behaviour. We also need good techniques for measuring and monitoring practices which are private and difficult to record, so that we can diagnose hygiene problems and evaluate the results of our efforts to change them. The following chapters address some of these issues.

Chapter Four

Complementary Methods: Investigating Diarrhoea and Hygiene in Burkina Faso

Hygiene is a complex subject with social, moral, aesthetic and religious connotations as we have seen. To treat the problem of hygiene and diarrhoeal disease as a simple health problem and to use only epidemiological techniques would be to miss out on all the other facets of the subject, facets which might ultimately provide clues as to how to go about promoting good hygiene. This was the idea that underlay our choice to use a wide variety of methods in our study of hygiene and diarrhoeal disease in Bobo-Dioulasso, Burkina Faso.

The objective of the work was to identify interventions for the control of diarrhoeal diseases in children. Work began on this research programme in April 1989, as a response to concern from the Ministry of Health of Burkina Faso about high rates of diarrhoeal diseases in children. Bobo-Dioulasso was chosen because the heterogeneous nature of the population offered the opportunity to explore a wide variety of contributing factors and because there was an opportunity to investigate the role of different types of water supply.

Set up by the Centre Muraz, a health research centre belonging to the West African health research network called the OCCGE (Organisation de Cooperation et Collaboration dans la lutte contre les Grandes Endemies), and the London School of Hygiene and Tropical Medicine in the UK the project team also included staff from the Ministry of Health of Burkina Faso, and the Université de Bordeaux II in France.

Bobo-Dioulasso: At the Cross-Roads of West Africa

Burkina Faso has one of the lowest per capita incomes in the world, estimated at $300 in 1996 and with under five mortality at 189 per thousand (WHO 1996).

Bobo-Dioulasso, the site of the study, is the second largest town in Burkina Faso. Situated in the relatively well-watered south-west zone of the country (average

annual rainfall 1200mm), the town has two main seasons; dry from October to May with a temperature maximum in May, and wet from June to September.

Situated at the cross-roads of the great empires of the Mossi, the Bambara and the Peulh; at the cross roads of the great West African trading routes for cattle, fish, kola nuts and cereals and sitting at the cross-roads between Côte d'Ivoire, Niger, Mali, Ghana and Ouagadougou, Bobo has often been said to be at the cross-roads of West Africa.

In common with other towns in West Africa, the population of Bobo-Dioulasso is growing rapidly, at an estimated annual rate of 6.7% (INSD 1988). The projected population of the town in 1990 was of some 320,000 people. Rural to urban migration accounts for more than half of this growth, as agriculture becomes less profitable, especially in the dryer northern zones of the country. Nevertheless, the inhabitants of the town retain close contacts with their villages of origin.

As one might expect with such a location, Bobo is a thriving commercial centre where trade in local products such as cotton, fruit and vegetables, irrigated rice and livestock as well as manufactured imports flourishes. At one time the industrial capital of Burkina, the centre of production has now shifted to the capital, Ouagadougou. Cotton fabrics, cotton oil, batteries, fertilisers, soaps, canned produce and tyres are still produced in the town. Much of the economy is in the informal sector, and over a half of all adult women have some form of economic activity, selling fruit or *pagnes* (richly designed batik cloth) in the market, hawking beauty products, or selling small mounds of peanuts from tables in front of the doorways to their compounds.

Fig 4.1 Selling fruit in the market

There are some sixty ethnic groups in Burkina Faso, all of which are represented in Bobo-Dioulasso. In addition, up to thirty other ethnic groups from all over Africa have been recorded in Bobo (Dubois 1990). The original populations, the Bobo and the Dioula, gave the town its name, but have now been outnumbered by Mossi from the central and northern regions of the country. The most numerous groups after the Mossi and the Bobo are the Samo, the Senoufo, the Dagari, the Toussian and the Peulh (Projet Diarrhées 1993). While each group has its own language, Dioula, the language of commerce, is spoken in the markets and, to a greater or lesser degree, by most women.

While the majority of the population describe themselves as Muslims there is a substantial Christian minority. When asked, few people say that they are animist, but traditional beliefs are still strong among both Muslims and Christians. About 30% of mothers live in polygamous marriages (Projet Diarrhées 1993). Officially 27% of the population of the province of Houet, which contains the town of Bobo-Dioulasso, can read and write, but the rate for women is much lower.

BOBO DIOULASSO	
Population	at the 1985 census: 228 668 by 2000: 500 000
Main ethnic groups	Bobo, Bwaba, Senoufo, Dafing, Mossi, Peulh, Bambara...
Main languages	Dioula, Moré, Bobo, Fulfulde, French...
Faith	Islam, Christian, Animist
Literacy rate	27%

Box 4.1 Bobo-Dioulasso; some statistics

At the time of the study each of the 25 administrative sectors of the town had elected groups of representatives. The town was governed by an elected Mayor and a centrally nominated High Commissioner. Over a half of all adult women belonged to a formal or informal women's group.

Bobo-Dioulasso is a Sahelian town where mud architecture still prevails. The French colonial legacy is visible in the administrative arrangements and the grid layout of the streets. The town is green and red; the green of the mango and kapok trees lining the wide avenues contrasting with the red of the roads and the mud walled compounds.

Each compound generally has several buildings set around a central, earth-floored yard as shown in figure 4.2. The compound may house one extended family, or many families (households) who pay rent to the owner of the courtyard. The average number of people per compound is about 13 (Projet Diarrhées 1993). Households are clearly demarcated in Bobo, organising themselves around a titular head *Sotigui* who is generally the oldest male. The average household size is 6-7, but can be as large as 50. The established household group is typically made up of the head, his wives, their children and often also grandchildren, as well as relatives from rural areas and perhaps a young female relative to help with domestic tasks. Recent migrants from rural areas are swelling the numbers of smaller family units. Often renting one or two room houses in a shared compound, these smaller families often consist of just a couple with their children. These are independent households separate from other households in the courtyard. In this study we have used the emic definition of household, that is the grouping which is represented by its *Sotigui*. In a few cases we found women acting as heads of households because of the absence of the nominated elder male relative. However, cases were there was no *Sotigui* at all, such as bachelors, students, migrant workers or widows living independently were very rare.

A typical compound plan of a polygamous family is shown in fig 4.3. Surrounded by a high mud or cement block wall, houses are typically built around the perimeter of the compound, leaving a communal central space. One corner is reserved for a walled area for bathing, which is either combined with, or next door to, a walled dry

Fig 4.2 View of a typical compound in Bobo

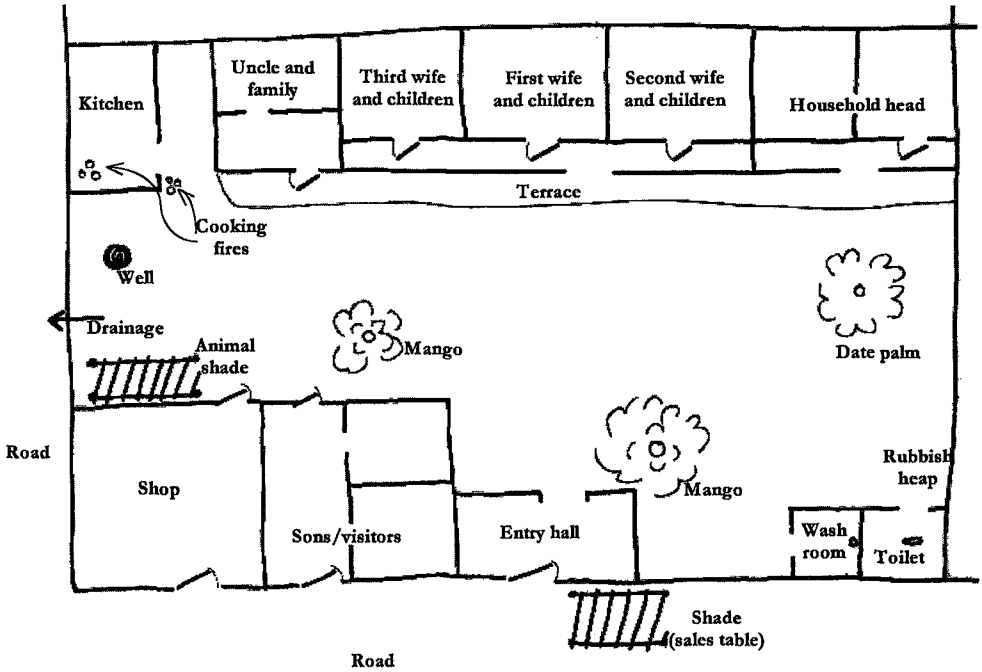


Fig 4.3 Plan of a typical compound

pit latrine. Far from the latrine area is the cooking area; if there is more than one household in the compound then each will generally has its own covered kitchen space. Cooking often takes place over a wood fire between three stones in the open or with an improved mud stove. A hand-dug well with, or without, a cover is found near the kitchen, alternatively a large barrel or jar serves for water storage. Each house has a terrace; a semi-private, often shaded space in front of the house where most domestic activity takes place. Larger houses have an interior living room; sleeping rooms are curtained off and private. Thirty percent of households in the town have electricity.

The main domestic water sources are public standpipes, communal taps within compounds and unprotected hand-dug wells inside compounds or in public spaces. Bobo-Dioulasso has a reliable and well managed public water supply, pumped from an artesian spring 15 km away. A few houses have taps inside, and some households use water from the seasonal streams which cross the town, although this water is not used for drinking. The chart in fig 4.4 shows the principal sources of domestic water. Supplies are generally regular and ample in the central zones of the town, it is only in

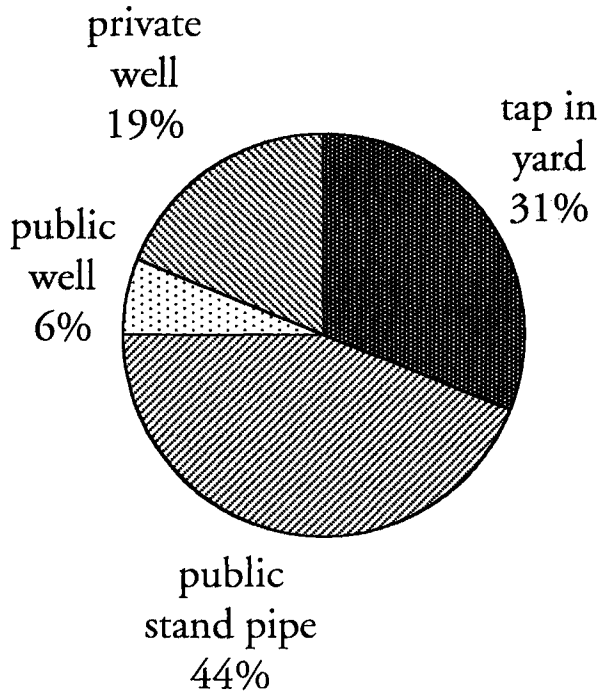


Fig 4.4 Sources of domestic water

the rapidly expanding outlying zones of the town that water has to be carried distances greater than about 500 metres. The cost of water varies from about 150 F CFA/m^3 payable monthly, for those who have piped supplies, to up to 300 F CFA for 200 litres charged by vendors selling water from drums on barrows, when the source is distant (fig 4.5). Water is often drawn and then stored by each household in a drum just inside or outside the house.

Nine out of ten compounds contain one or more dry pit latrines, often shared by the different families in the compound. Latrines are mostly kept in reasonable condition; they are cleaned regularly and emptied when they are full.

In the absence of a formal drainage system, waste-water may be thrown into the yard, or outside the yard - into the street or into rainwater drains where they exist. Rainwater drains are now falling into disrepair and stagnant waste-water is becoming a feature of parts of the town. Household rubbish may be thrown into a corner of the yard, buried in the yard, thrown into rainwater drains, or taken to open rubbish piles, situated throughout the town, for collection by the municipality.

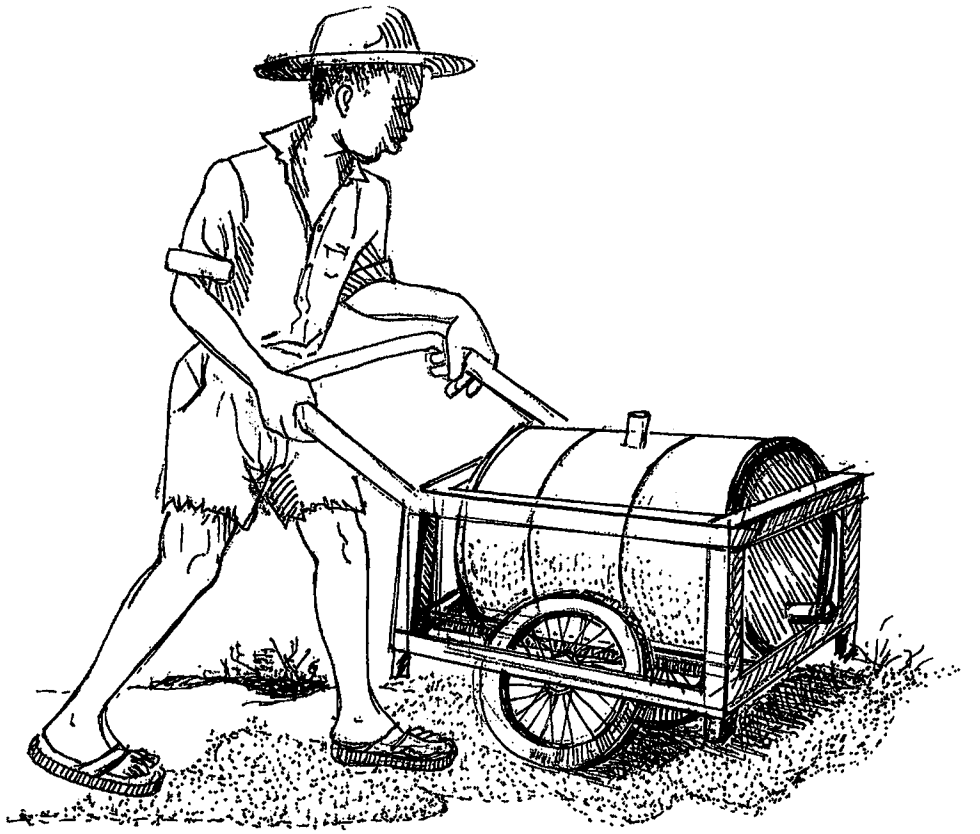


Fig 4.5 Water vendor in Bobo-Dioulasso

Though Bobo-Dioulasso was once renowned as one of the cleanest towns in West Africa, there has been a marked deterioration in sanitary conditions in the last five years. The World Bank is supporting a programme of urban development which aims, among other things, to improve drainage and rubbish disposal throughout the town.

Both traditional and modern health services are available in the town and many options for treatment exist. Most women have some knowledge of healing plants or they may ask a local wise woman or man for advice. Bobo has an association of traditional healers and herbalists; some 180 healers are registered with the provincial directorate of health. Figure 4.6 shows the stall of a *tradipracticien.* Alternatively, families can turn to the talismans and sacred writings of the Islamic *marabout.*

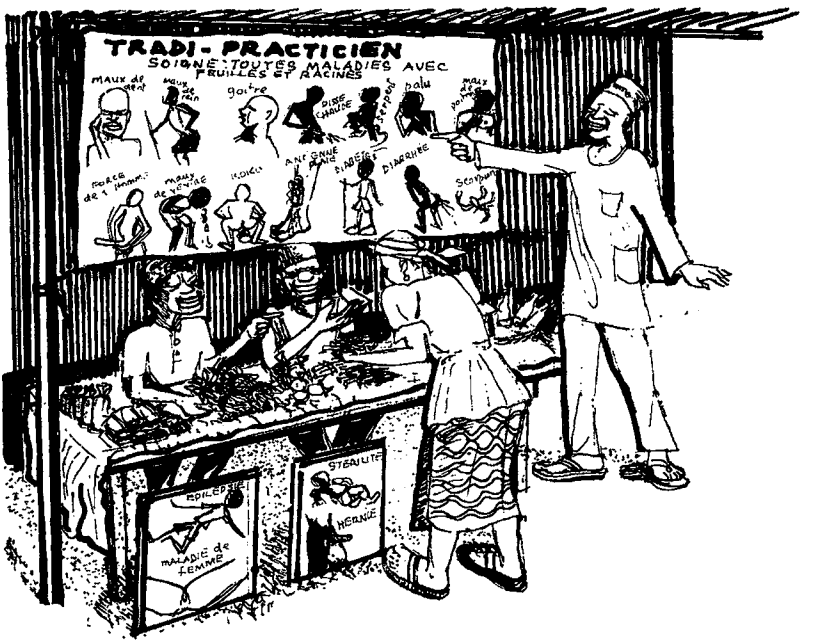


Fig 4.6 A tradipracticien at work

In the medical sector there are 26 health facilities, 13 of which are public and 13 private. These include mother and child health clinics, dispensaries, maternity homes and school and company run clinics. Bobo-Dioulasso has a national public hospital called the 'Centre Hospitalier National Sanou Souro' which includes a paediatric service with 138 beds. This was where the sick children were recruited for one part of our study. Some three quarters of children in Bobo-Dioulasso are born in maternity facilities and more than a half of the mothers in the town have taken part in at least two health education session during pre- or post-natal consultations. Although modern health services are widely available, they are not fully utilised. A major obstacle to their usage for curative care was the high cost of medicines, in the absence of a national essential drugs policy (Sauerborn et al 1989).

The Objectives of the Research Programme

The research programme to investigate potential interventions for the control of diarrhoeal diseases in Bobo-Dioulasso was motivated by a number of concerns. In the 1980s health programme planners gave a major priority to the reduction of the death toll from diarrhoeal diseases in young children through the widespread use of oral rehydration therapies. Feachem's major review of the subject, published during the period from 1983 to 1986, suggested that other interventions might be equally or more cost-effective. At the same time there was growing interest in the potential of case-control studies to elucidate the causes of infectious diseases, and diarrhoea in particular (Briscoe et al 1985). A series of case-control studies of the causes of diarrhoeal disease which were underway were beginning to show interesting results (Young & Briscoe 1987, Baltazar & Solon 1989, Victora et al. 1989, Mertens et al. 1990, Gorter et al. 1991, etc). There was growing optimism that this approach would prove to be not only an excellent source of high quality data, but a method with the potential for wide application to diarrhoea and other health problems in developing countries (Smith 1987).

At the same time, a small number of studies had been published which used anthropological techniques for investigating heath problems in detail (Dettwyler 1987). Social scientists were suggesting that research techniques which employed small samples, but looked at health problems in depth and in detail might have something to contribute to the formulation of health (eg Patton 1980, Scrimshaw & Hurtado 1987, Chambers 1989). However, few people were actually using social science techniques in the field of health enquiry in 1988 when we began our work. We felt that by adding such techniques to our epidemiological study of the causes of diarrhoeal diseases in Bobo-Dioulasso, we might gain important clues as to how best to combat the problem.

To achieve the aim of gaining a wider perspective on our problem we needed to bring together a multi-disciplinary group of researchers with skills in fields including epidemiology, sociology, biostatistics and engineering. The object was to bring together scientists from both North and South who would be able to share insider and outsider perspectives on the problem, and to translate results into action as speedily as possible. This work is thus a fruit of that collaborative approach, and the results belong to the whole team who were co-authors of the published papers.

The details of the case-control study and it' results have been published elsewhere (Traoré et al. 1994). Our findings, which demonstrated the importance of the safe disposal of child stools for protecting against hospitalisation with diarrhoea, confirmed what we suspected to be the case: that much diarrhoeal infection could be prevented through better stool-related hygiene. In this thesis we have not reported all of the work in Bobo-Dioulasso, but have concentrated only the aspects of the work that led us towards solutions to the problem of hygiene.

Projet Diarrhées: Multiple Methods

To achieve our aims of gathering a wide and multi-facetted appreciation of the problem of diarrhoeal diseases we used a variety of methods for the investigation of childhood diarrhoea and hygiene in Bobo-Dioulasso. These are summarised in box 4.2. The study was conducted over a period of 20 months beginning in July 1989 and used a variety of quantitative and qualitative techniques.

The field work was co-ordinated by a Burkinabé sociologist with a team of five health extension agents from the Ministry of Health. Over the course of the work three to six directly recruited extension agents replaced the Ministry of Health field staff. The work was overseen by myself with collaborators from the Ministry of Health and the London School of Hygiene and Tropical Medicine.

Method	Approach
Site study	Characterise each sector of the town. Meet with local authorities and women's groups Site visits
Focus group discussions	21 guided discussion meetings with women from different associations, ethnic groups, age groups, socio-economic group
Case-control study	'Cases' who were 1388 children under 3 living in Bobo, hospitalised between January 1990 and March 1991; 'Controls' who were 1405 children of the same age, neighbour of the cases
Structured observations	549 children's caretakers visited at home to observe hygiene behaviour
Structured interviews	50 local healers, 10 mothers with 'safe' hygiene practices
Cohort study	Follow up of 125 children from birth over one year
Communications study	Meetings with 16 community associations to explore channels of communication
Behaviour micro-trials	40 women asked to adopt 'safe' behaviours over 10 days

Box 4.2 The study methods used in Bobo-Dioulasso

1/ Site study

A preliminary series of meetings were held with the administrative authorities in each of the twenty-five sectors of the town. The aim was to present the study and it' objectives to the representatives to obtain their feedback, providing a background understanding of the issues involved in childhood diarrhoea in Bobo-Dioulasso. A profile of each sector was drawn up which covered the environmental, economic and population characteristics of each sector, along with information on history, ethnic origins, water sources and sanitation, health services (both traditional and modern), economic activity and social groupings. The participants in these meetings also discussed their perceptions of childhood diarrhoeas. Where possible, the research team carried out an 'environmental walk' with sector representatives to visit areas with special problems or needs.

2/ Focus group discussions

Using the contacts made during the site study groups of women were invited to participate in focus group discussions. The object was to create groups who were homogenous on one particular characteristic such as age, social standing or ethnic group to investigate emic understandings of diarrhoea and hygiene. Thus mothers who were Mossi or Bobo, who were from the Union des Femmes Burkinabés (the Women's Union of Burkina Faso) and other social groupings such as neighbourhood societies, ethnic societies, 'needy' women on the social services register and wives of civil servants were invited. About twelve women participated in each meeting. Sixteen meetings, each of two hours duration, were held during the preparatory phase and five further meetings were held during the course of the study to help clarify issues of interest.

Using a pre-prepared discussion guide a facilitator (sociologist or extension worker) introduced subjects of interest to the group who were encouraged to talk freely in their common language. Two recorders took note of what was said. Within two days of the discussion group the facilitator and recorder met together to create a transcript translated into French of what was said by the mothers. This method was judged less labour intensive than using a tape-recorder, followed by transcription into the local language, followed by translation into French but may have led to missing some points in the transcripts. Key terms were retained in their original language.

Subjects discussed in detail in these meetings included place of child's birth (at home or in a health facility), what children are given to eat and drink from the first days of life up to 36 months of age, where children defaecate, what is meant by hygiene and cleanliness, perceptions of diarrhoea and its causes, and the advantages and disadvantages of different forms of treatment.

The understanding gained from the first series of focus groups was essential in the construction of the study instruments for the case-control study and the structured observation which followed.

3/ Case-control study

The largest single component of Projet Diarrhées was the case-control study which recruited all children aged 36 months or less, living in the town of Bobo-Dioulasso, who were admitted to Sanou Souro Hospital between the 15th of January 1990 and the 31st of March 1991.

A detailed clinical profile of each of the sick children (the "cases"), of their symptoms and characteristics on admission and the diagnosis on discharge, was compiled. After discharge, the child was then visited at home by a field worker who carried out an extensive interview with the mother and observed environmental conditions in the courtyard. Information recorded included demographic, social and economic variables; factors relating to child care, feeding and domestic hygiene, and environmental factors such as the presence of a latrine, the type of water supply and the presence of animals in the courtyard. Questions on hygiene behaviours included "Where does your child usually defaecate?" and "How do you usually dispose of his stools?" Possible responses were pre-coded: for example the field worker could choose between "pot", "on the ground in the yard", "outside", "in cloths or pants" or "other" for where the child defaecates.

For each hospitalised "case" child, a "community control" child of the same age group was recruited. Field workers had a standard set of instructions as to how to recruit a "control" child from a compound in the vicinity of the "case". The same interview was carried out with the mother of this child. Once the interviews with the case-control pairs had been completed, the questionnaires were returned to the project office for checking. In total, 1388 cases and 1405 controls were recruited. (17 of the cases turned out to have not fulfilled the recruitment criteria, such as age <36 months, on final checking). Detailed descriptions of the methods and analyses of the results of the case-control study are not reported in this thesis but can be found in Traoré et al; 1994.

4/ Structured observations

When the household questionnaire had been completed for the case-control pair, those who had diarrhoea or an acute respiratory tract infection and their community control were revisited for observation. The median time interval between the interview visit and the observation visit was 25 days with a range of 2 to 100 days.

The three female observers were given directions to the households to be observed by the case-control field workers and were instructed to visit on the evening prior to the

observation to advise the mother that they would be coming early in the morning of the following day. Surprise visits were judged to be inappropriate in this cultural setting. Mothers were told that the purpose of the visit was to follow up the health of the child and the work of the mother. The next day the observer presented herself at about 6 a.m. (around the time when most mothers get up) and continued observations until 8.30-9.00 am, or until the mother left for the market. On arrival, the observer followed the normal rules of polite behaviour, greeting other members of the family, and was generally offered a seat in the courtyard. She again explained why she had come and asked the mother or caretaker of the child to carry on as normal, taking no account of the observer's presence.

The range of possible behaviours was defined in a short preliminary observation study. we were then able to produce a precoded data collection form. For example, the observer had six options for where the index child's stools were seen to be thrown: "in the latrine"; "buried in the yard"; "thrown in the yard"; "thrown outside the yard"; "not thrown away during visit/not seen"; and "other". The observer circled the number corresponding to the correct response as each behaviour was observed. If the behaviour was observed several times, only the first occasion was recorded.

If the child was seen to defecate, the site, the disposal, how the child was cleaned afterwards and how and if the mother cleaned her hands after cleaning up the stools were recorded in a similar manner. Most domestic activity such as washing, food preparation and child-care is carried out in the courtyard, making the observation of most behaviours relatively easy. Environmental conditions in the courtyard were also recorded. The observers were residents of Bobo-Dioulasso who spoke the local languages and dressed in the local manner. Given the repetitive nature of the work, women with only a primary level of education, who had already demonstrated their patience and dedication by working as unpaid volunteers in the hospital, were chosen.

Supervision visits to each observer were made once a week. One in ten observations was repeated; exactly the same observation schedule was completed by the same observer after a delay which varied from 4 to 60 days and which averaged 22 days. The observer did not have access to the first completed schedule when filling in the second. In addition, ten households were observed on six separate occasions to examine the repeatability of the observations in greater depth.

Observations were carried out in the courtyards of a total of 549 children.

5/ Structured interviews

In-depth interviews using pre-prepared discussion guides were held with fifty healers and herbalists who came to Bobo-Dioulasso to present their practices at a health fair. Topics covered included diseases and conditions related to diarrhoea, appropriate treatment and the referral structure.

During the preparation of the hygiene promotion intervention we identified ten women who already practised safe stool disposal and hand washing with soap. Using a discussion guide, field workers interviewed these mothers on the factors that had motivated them to adopt these behaviours and what benefits mothers felt that they gained from these practices.

6/ Cohort

A cohort of 125 children under the age of 36 months was recruited from among the neighbours of community control children. Each child was visited weekly by a field worker over a period of five to eight months. For each day of the child's life, a record was kept of what the child was being fed, whether she was ill, what the illness was according to the mother, and any action taken to treat the child. Children were weighed and measured bi-weekly. If the child was found to be ill she was referred to the project clinician who treated her and recorded his diagnosis. The cost of any prescribed treatment was covered by the project. Records were available for a total of 25,910 child days.

7/ Communications study

To prepare the intervention, during the second phase of work data was sought on how people communicate in Bobo-Dioulasso. 16 meetings were held with a variety of associations, religious and youth groups to discuss how they gathered and transmitted information and who the respected and influential 'opinion leaders' were. 213 women who were being interviewed for another study also answered questions about their exposure to radio and television.

8/ Behaviour micro-trials

Once potential safe target practices had been identified, their feasibility and acceptability were tested in small-scale trials. In four sectors local meetings were held to ask for volunteers to try out the target practices over ten days. Field workers visited the mothers on each of these days to learn how mothers had fared; what problems they had encountered, how neighbours and family had reacted and what were perceived as the costs and benefits of the new practices. Further unannounced visits were made three and six months later to see if changes had been sustained.

9/ Other sources of information

Whilst the main formal research techniques that were employed are described above, useful insights came from a wide variety of other sources. Fieldworkers, all women from the target communities, were full partners in the work and were invaluable sources of advice and interpretation. The Burkinabè and expatriate study team lived in and participated in the life of the town over the period of the studies. Results were discussed with women's groups, in workshops with health workers in Bobo-Dioulasso, with the national control of diarrhoeal diseases committee and with members of the donor community. A task force drawn from the study team and other groups and agencies then went on to use the study findings to design a public health communication programme for the town which is underway at the time of writing.

Chapter Five

Multiple Methods to Interpret Hygiene Behaviour[1]

Investigating people's intimate and private practices presents particular challenges to health scientists. In this, and the following chapter, we examine some of the methodological issues associated with studying hygiene behaviour, before going on to discuss the findings of the work in Burkina Faso in Chapters Six, Seven and Eight.

If our objective in studying hygiene behaviour is to use our knowledge in the fight against diarrhoeal diseases, then we are obliged to deal with the complex reality of how people live in their own homes. Epidemiological studies, however methodologically sound, cannot provide all the information that we need to design interventions to help people change their behaviour. We need to be able to understand what people do and why, and learn about the context of the practices that may be putting health at risk. We need to be able to paint a richer, fuller picture of - 'all that messy human stuff' - which is the everyday life of ordinary people. But more than this, we need to overhaul our top-down approach to designing health interventions by finding practical means of engaging with people as decision makers about their own lives and as consumers of health messages and products.

This chapter compares and contrasts the value of three of the methods employed in the study; interview, observation and focus group discussion. It suggests that a combination of methods can provide understanding and insight that would be missing if the subject were only investigated from a single perspective. Chapter 6 carries this methodological concern further by evaluating structured observation as a tool for measuring hygiene practices.

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[1]. This is a modified version of chapter 17 of *Studying Hygiene Behaviour*, by Kanki B, Curtis V, Mertens T, Cousens S and Traoré E. edited by Cairncross and Kochar, published by Sage, New Delhi in 1994.

Options for Studying Hygiene Practices

Health researchers and programme planners are always to some extent 'outsiders' to the communities with which they work. Any interaction between investigators and investigated involves mediation, filtration and interpretation. We know that respondents in household surveys may try to offer the 'right' answers, tending to 'adopt the perspective of the dominant ideology in society' (Radley 1994) or give answers which cohere with the person's own sense of their lives or to legitimate their situation (Potter and Wetherall 1987). In the same way, people have their own reasons for saying what they say in group discussions and their own reasons for behaving as they do when they know that they are being observed.

If these 'researcher' effects are important in health investigation in general, they are even more important when studying hygiene, which is not only a private affair, but is also a field in which people fear the moral judgement of outsiders. Responses in interviews and discussions, and behaviour under observation must reflect this fact and some thought is required to determine the impact this may have on the data that is gathered.

The Interpretation of Observational Studies

If we can go some way towards solving the practical problems associated with observation studies then we have a powerful tool for measuring hygiene behaviours. However, trying to record what actually happens is only a part of the equation. If we want to use studies to lead us to interventions to improve child health we need to know the reasons for specific behaviours and the constraints to change. We need to know how to interpret observational studies.

Observational studies on their own do not give us enough information to interpret observed behaviours. Different study techniques throw light on different elements of hygiene behaviours. We have tried to construct a model to show where we see the strengths and weaknesses of three of the different techniques that we have employed in Bobo-Dioulasso; focus group discussions, household interviews and direct observations.

In table 5.1 the elements of behaviour have been divided into three categories that we have called 'the ideal', 'the image' and 'the actual':

Elements of behaviour	Research technique		
	Discussion	Interview	Observation
The ideal (what mothers' real beliefs tell them that they should do)	XXX	X	X
The image (what mothers choose to present to field workers)	XX	XXX	XXX
The actual (what mothers actually do)	X	X	XX

Table 5.1 Strengths and weaknesses of different study techniques in understanding behaviour.

- **The ideal:** all of us have sets of beliefs about hygiene behaviours which originate from our life experience and culture. The beliefs of mothers in Bobo-Dioulasso derive from both traditional and modern influences. We have called this set of beliefs 'the ideal'.

- **The image:** each mother will wish to project an image to others which will be acceptable to members of the family, to health workers or to foreign visitors which may not be consistent with her real beliefs. Faced with a visitor representing the modern health sector, for example, she may choose to present an image corresponding to what she thinks that nurses or health agents might expect.

- **The actual:** is what the mother would do in normal conditions of relative domestic privacy and normal constraints and pressures of work.

As an example of this 'trichotomy' we can take a mother who has been taught since her own childhood of the value of forcing a child to drink plant infusions to make it grow. Her 'ideal' is therefore to do this every day. However, she may have heard that this practice is disapproved of in the modern medical sector and so does not wish to present an image of a 'backward' mother to visitors who are not from her own immediate society. In private the actual behaviour will depend on the availability of the relevant plants and of the time she has available to treat the child.

The 'ideal' and the 'actual' correspond roughly to the beliefs and behaviours that we are interested in studying. However, knowing about the 'image' can also provide important clues as to the way that beliefs and behaviours change.

In table 5.1 we have indicated which of the three study techniques we think are most effective in providing information on the different elements of behaviour:

- *Discussion groups*, if carried out well, can provide information about each element of behaviour, and provide clues as to the relationship between each element. Women in discussion groups will however, still want to present a 'good' impression to neighbours and outsiders. Discussion groups are unable to provide an assessment of risk associated with behaviours.

- If we content ourselves with *interviewing* only, then we are principally soliciting the response that the mother thinks that she ought to give on formal occasions. For less sensitive questions we may also get an idea of the ideal and the actual. The main advantage of questionnaire data is that it can be quantified, but we may be mistaken if we assume that the results reflect what actually happens.

- *Observations* of mothers' behaviour give results coherent with the image that the mother wants to project, however, we think that in many of our observations force of habit was such that actual behaviours slipped in frequently. Observations may reflect reality more closely than questionnaires, and in a way that can be quantified, but obtaining the information is more expensive.

The more socially sensitive the behaviour the more the 'image' and the 'actual' are likely to differ, and the more results from the different study techniques will vary. Clearly, we do not have a problem if the 'ideal', the 'image' and the 'actual' coincide. Discussions, observations and interviews will all give the same answers. It is only by comparing the results from different techniques that we can determine whether this is the case. When results are different we may often get important clues as to what interventions might be appropriate.

An example

This example from our study concerning stool disposal practices gives an illustration.

- **Observation.** A young mother of around 20 years of age has a one year old child. When the observer arrived at 6 am she was already up, had lit the fire and had swept the terrace in front of the house. The child defecated on the ground. When the mother noticed she covered the stool with sand, swept it up

and threw it away in the dry drainage channel behind the courtyard. The mother dressed the child in a pair of light cotton pants in which the child again defaecated. (Cotton pants are used in the same way that Europeans use nappies.) The mother rinsed the child's behind with water alone and rinsed the pants in water alone. The dirty water was then thrown on the ground in a corner close to the cooking area. The mother then went to wash herself with soap (very thoroughly judging by the cleanliness of her nails), dressed herself in clean clothes and bathed the child with medicinal decoctions. She then began to do the washing up with soap.

- **Interview.** The mother's response to the question in the household interview about the disposal of child stools was that the child defecated in a pot and that the stools were thrown in the latrine.

- **Focus Group Discussion.** In a discussion group we asked what a clean mother is. We were told that mothers all aspired to be clean, and that: "When you enter the compound of a clean woman you find that

  •the courtyard, the house and the kitchen area has been well swept
  •the plates, bowls and cups have been carefully washed
  •the children are clean and bathed
  •the mother is herself clean in clean clothes."

But when we asked more specifically about child stools we were told that child stools smell bad and should be treated so that they can no longer be smelt or seen. Not once was the presence of invisible dangerous stool particles mentioned. The discussion groups told us that mothers avoid children's stools but do not regard them as dangerous to health.

The different study techniques allow us to identify an approach to interpreting these results following table 5.1.

The ideal: discussion groups indicate that mothers do not regard children's stools as dangerous, only that they smell bad and are treated so that they are no longer 'smellable'. Observation tells us that this mother's ideal is meticulous cleanliness concerning washing herself and the child, and sweeping the courtyard. Discussion groups confirm this type of cleanliness as a generally accepted 'ideal'.

The image: The questionnaire response tells us that the mother has heard that it is correct to throw stools in the latrine and that she should answer that way in a health interview. However, in the presence of the observer stool disposal did not correspond to the answer given in interview. She has, nevertheless,

presented an 'image' of cleanliness according to her beliefs, i.e. washing and sweeping the yard.

The actual; in discussion groups mothers often said that though they themselves throw stools in the latrine, not all their neighbours do. Other mothers said that it depended if the toilet was free, or if they had the time. We cannot tell from the observation whether the mother usually throws stools into the latrine or not.

However, the interplay of all of these elements does allow us to draw an important conclusion with practical implications for health promotion interventions. Despite the mother being meticulously clean she has contaminated the cooking area with faecal matter. We can conclude that the way forward for an intervention programme is to find a way of convincing this very hygienic mother that child stools are dangerous and 'dirty' even when invisible and unsmellable.

The example shows that much that is useful can be learned from using a variety of methods at the same time. Chapters Seven and Eight provide further illustration of the benefits of using several methods in synergy. Though the costs for training, execution and analysis of data from multiple sources are higher than with classical approaches, the rewards well outweigh the additional costs. These rewards include getting a realistic picture of what people really do, learning how people make rational responses to their own culture and environment, discovering approaches to potential interventions, and involving people in developing appropriate strategies to solve their own problems.

Chapter Six

Structured Observations of Hygiene Behaviours: Validity, Variability and Utility[2]

Introduction

In a review of studies of the health impact of water supply and sanitation programmes in developing countries, Cairncross (1990) concluded that health benefits stem from changes in hygiene behaviour. He suggests that the measurement of such behavioural changes is likely to be easier and more reliable than the direct measurement of health benefits. It was, however, acknowledged that methods for the measurement of behavioural changes need to be developed.

The traditional household questionnaire, used alone, is limited in its efficacy, scope and accuracy (Kroger 1983, Pelto & Pelto 1979). The method of Structured observation of behaviour has been used by psychologists (Rogoff 1978), animal behaviouralists (Altman 1973), economists and anthropologists (Rappoport 1967, Johnson 1975), particularly over the last two decades. This type of observation is now becoming a popular tool in research into the associations between behaviour and health; for example, to measure water contact behaviour in investigations into schistosomiasis and wastewater use (Cheesmond & Fenwick 1981, Peasey & Blumenthal 1991), to describe water utilisation practices (White et al. 1972, Cairncross & Cliff 1987, Blum et al. 1987, to describe child feeding (Bentley et al. 1991) and to investigate associations between hygiene practices and diarrhoea (Alam et al. 1989, Stanton & Clemens 1987).

A number of questions remain, however, about the validity and repeatability of structured observations. Stanton et al (1987) have compared Knowledge-Attitude-Practice (KAP) questionnaires and twenty-four hour recall questionnaires with structured observations and found that the responses to questionnaires did not correlate with observed household practices. They concluded that such

[2] This chapter appeared as a paper in the *Bulletin of the World Health Organisation* with the same title, by Curtis V, Cousens S, Mertens T, Traoré E, Kanki B, and Diallo I. vol 71 pages 23-32 in 1993.

questionnaires should not be used as surrogates for direct observation of hygiene practices. This conclusion was, however, based on a single observation of each household and no data on the repeatability of the observations were presented. Therefore it is not clear whether the concordance between the observations conducted on separate occasions would have been greater than the concordance between questionnaires and observations.

By using a variety of methods to study hygiene behaviour in Bobo-Dioulasso, we were able to compare the results of interviews and structured observations. Since about 10% of observations were repeated and a small group of households were observed on 6 separate occasions it was possible also to compare observation with observation. In this chapter we present the findings on the concordance between responses to questionnaires and direct observations of behaviour, repeated observations of environmental conditions related to hygiene, and repeated observations of hygiene practices.

Methods

This chapter compares the results of the interviews undertaken as a part of the case-control study with the results of the structured observations of hygiene practices.

In the case-control study questions on hygiene behaviours included "Where does your child usually defaecate?" and "How do you usually dispose of his stools?". Precoded responses allowed the field worker to choose between "pot", "on the ground in the yard", "outside", "in cloths or pants" or "other" for where the child defaecates. Once the interviews with the case-control pairs had been completed, the questionnaires were returned to the project office. Children who had been admitted to the hospital with symptoms of diarrhoea or of acute respiratory disease and their neighbourhood controls were selected to be revisited for direct observation. The median time interval between the interview visit and the observation visit was 25 days with a range of 2 to 100 days.

Structured observation used a pre-coded format whose range of possible behaviours had been defined during the preliminary study to produce a data collection form. For example, the observer had six options for where the index child's stools were seen to be thrown: "in the latrine"; buried in the yard"; thrown in the yard"; "thrown outside the yard"; "not thrown away during visit/not seen"; and "other". The observer circled the number corresponding to the correct response as each behaviour was observed. If the behaviour was observed several times, only the first occasion was recorded.

If the child was seen to defecate, the site, the disposal, how the child was cleaned afterwards and how and if the mother cleaned her hands after cleaning up the stools

were recorded in a similar manner. Most domestic activity such as washing, food preparation and child care is carried out in the courtyard, making the observation of most behaviours relatively easy. Environmental conditions in the courtyard were also recorded.

Supervision visits to each observer were made once a week. One in ten observations were repeated; exactly the same observation schedule was completed by the same observer after a delay which varied from 4 to 60 days and which averaged 22 days. The observer did not have access to the first completed schedule when filling in the second. In addition, ten households were observed on six separate occasions to examine the repeatability of the observations in greater depth.

The degree of agreement between interview responses and direct observation and between repeated observations was assessed using the unweighted kappa statistic (Fleiss 1981). This takes into account the number of observations expected to be in accord if agreement is random, and is given by the formula:

$$\kappa = \frac{p(A) - p(E)}{1 - p(E)}$$

where p(A) is the proportion of occasions on which agreement occurs and p(E) is the proportion of occasions on which agreement would be expected to occur by chance alone. Perfect agreement between observations arises when $\kappa = 1$, while $\kappa = 0$ indicates that the agreement is no better than that which would arise by chance. By convention, values of κ in the range 0.01-0.39 indicate poor agreement, those in the range 0.40-0.75 good agreement and those above 0.76 excellent agreement.

The data were analysed using χ^2 tests for general associations and trends and also Mc Nemar's test.

Results

A total of 2775 interviews were performed with mothers of hospitalised children and mothers of neighbourhood controls. In addition, 548 of these households (20%) were visited for the purpose of direct observation. Of these households, 57 (10%) were revisited for a repeat observation, and ten households were observed on six separate occasions.

Table 6.1 Distribution of responses to questions about hygiene practices and observations of environmental conditions and of hygiene behaviours.

	No of households	
	Questionnaire (n=2775)	Observation (n=548)
Behaviours: interview versus observation:		
Where did the child defaecate?		
Pot	2068 (75)	183(66)*
On the ground	183(7)	22(8)
In a loincloth or pants	415(15)	61(22)
Outside the yard	98(4)	3(1)
Other	4(0)	8(3)
Where did the mother dispose of the child's stools?		
In the latrine	1855(67)	154(56)*
Buried in the yard	11(0)	2(1)
Thrown away in yard	186(7)	25(9)
Thrown outside the yard	716(26)	44(16)
Other	0(0)	7(2)
Not disposed of	-	45(16)
Does the mother purge the child?		
Yes	2151(98)	61(11)
No	616(22)	487(89)
Does the child eat earth?		
Yes	737(27)	42(8)
No	2028(73)	501(92)
Environmental conditions: interview versus spot observations:		
Were faeces present on the latrine slab?		
Yes	333(14)	95(19)
No	2128(86)	404(81)
Were faeces present in the yard?		
No	337(12)	148(27)
Yes, animal only	2057(74)	344(63)
Yes, human only	27(1)	11(2)
Yes, animal + human	346(13)	44(8)
Was stagnant water visible in the yard?		
Yes	910(33)	225(41)
No	1856(67)	323(59)

Figures in parentheses are percentages.

*The denominator for these behaviours is 277 since 271 children were not seen to defaecate

- **Comparison of interview data with observation data**

Table 6.1 summarises the distribution of interview responses to selected questions and of observations about environmental conditions for all the households visited. Shown also are the corresponding data from the 549 initial observations. A high proportion of mothers interviewed (75%) reported that their child defaecated in a pot while 66% of the 277 children observed in the act of defaecation actually did so. Similarly, a high proportion of mothers (67%) reported disposing of the child's stools in the latrine while rather fewer (56%) were actually observed to do so. The majority of mothers (78%) reported purging their child, (30% every day and 48% from time to time); however, during the 2.5 hour period of observation only 11% of mothers were actually observed purging their children. Human faeces were observed relatively rarely in the courtyard or on the slab of the latrine.

A paired analysis of the mother's response to the question "where does your child defaecate?" and direct observation of the child's behaviour is presented in Table 6.2. Of the children observed 277 (51%) were seen defaecating. 271 were not seen defaecating. There was no evidence that those seen defaecating differed from those not seen defaecating in terms of the mother's response to the interview response ($p>0.5$). Among the 277 children for whom a comparison was possible, there was agreement between the questionnaire and observation for 187 (68%). The kappa statistic was 0.25 (95% c.i. 0.14,0.35). This would generally be regarded as representing poor agreement between the interview and the observation.

Table 6.2 "Where does the child usually defaecate?" Comparison of the interview responses with direct observation of the same households

	Observation						
Interview	Outside yard	Loincloth/ pants	Pot	In yard	Other	Not seen	Total
Outside yard	2	0	1	1	0	7	11
Loincloth or pants	0	19	14	1	3	44	81
Pot	1	39	163	17	5	208	433
In yard	0	3	5	3	0	12	23
Other	0	0	0	0	0	0	0
Total	3	61	183	22	8	271	548

Table 6.3 shows a paired comparison of the mother's response to the question "where do you dispose of the child's stools" with direct observation of her behaviour. Again, there was no evidence that those children seen defaecating differed from those not seen defaecating in terms of the mother's response to the question ($p>0.40$). Among the 277 children who were seen defaecating, the mother's action was in accord with her response to the interview for 161 (58%). Exclusion of those mothers who did not dispose of the stools during the observation increased the proportion of agreements to 69%. If the mothers of children not seen to defaecate and those recorded in the category "other" are excluded and the the categories ""thrown away in yard", "buried in yard" and "not disposed of" are combined into a single category "in the yard" the resulting κ statistic is 0.28 (95% C.I: 0.19,0.36); if mothers who did not dispose of the stools during the course of the observation are excluded κ increases to 0.38 (95% C.I: 0.27,0.48).

Table 6.3 "Where does the mother usually dispose of the child's stools?" Comparison of interview responses with direct observation of the same household

	Observation							
Interview	In yard	Buried	Outside yard	In latrine	Other	Not disposed	Not seen	Total
In yard	1	1	4	5	0	3	21	35
Buried	0	0	0	0	0	0	0	0
Outside yard	8	0	26	15	4	13	60	126
In latrine	16	1	14	134	3	29	190	387
Total	25	2	44	154	7	45	271	548

For the data in tables 6.2 and 6.3 there was strong evidence that in the event of a disagreement between the interview response and the behaviour observed, the discrepancy was more likely to arise through the reporting of a 'good' behaviour (eg defaecation in a pot, stools thrown in the latrine) and the observation of some other behaviour rather than vice-versa ($p<0.0001$, McNemar's test).

The apparent levels of agreement between question and observation for the questions "does the child eat soil?" and "do you purge the child?" were poor ($\kappa = 0.16$ and 0.04 respectively). In interpreting these results, however, it should be recalled that the child was only observed for a period of 2.5 hours. Many of the children not observed eating earth, for example, may nevertheless have been regular earth eaters. Some support for the accuracy of the mother's responses to these questions may be drawn from the observation that 17% of children reported to eat earth were actually

observed doing so compared with 4% of those reported not to ($p<0.001$). Similarly, of those mothers who stated that they never purged the child only 1 (1%) was observed doing so, while of those who stated that they sometimes purged the child, 5% were observed doing so; and of those who said they purged the child every day, 27% were observed doing so (X^2 test for trend = 51.9, $p<0.0001$).

The levels of agreement between observations of environmental conditions at the time of the interview and at the time of the observation were generally poor (Table 6.4). The presence of excreta on the slab of the latrine appears to be relatively rare, and the repeatability of this observation was little better than might be expected to occur by chance. Conversely, the presence of faecal matter (usually animal) in the yard was relatively common but again the repeatability of the observation was poor. The presence or absence of stagnant water in the courtyard appears to be more consistent than the presence or absence of excreta.

Table 6.4 Comparison of spot observations of environmental conditions recorded at the time of the interview and at the time of the observation

	Observation					
	Excreta on the slab of the latrine		Excreta visible in the yard		Stagnant water in the yard	
Interview	Yes	No	Yes	No	Yes	No
Yes	15	41	380	120	143	60
No	78	351	17	27	82	263
κ-statistic	0.07 (-0.03, 0.16)		0.18 (0.10, 0.26)		0.46 (0.38,0.53)	

Figures in parentheses are the 95% confidence intervals.

- **Comparison of two consecutive observations**

Table 6.5 summarises the comparisons of consecutive observations of behaviours related to hygiene, ranked in order of decreasing κ statistics. Because not all behaviours were observed at all visits, the effective sample size for each behaviour varies. For some of the behaviours the sample size was very small and thus the results should be interpreted with caution. The place where the child defaecated, how the stools were disposed of, and whether or not the child ate earth, all had higher κ

Table 6.5 Repeatability of observations of behaviours performed on two separate occasions

Behaviour	% incidence of behaviour at first observation	Effective sample size	κ-statistic
Where child defaecates			
Pot	33	16	0.76
On ground	4		(0.48,1.05)
Loincloth/pants	11		
Outside yard	1		
Other	2		
Child eats earth			
Yes	8	55	0.73
No	92		(0.38,1.08)
How child's stools are disposed of			
Latrine	28	16	0.62
In yard	5		(0.28,0.96)
Outside yard	8		
Other	1		
Not disposed of	8		
Child given infusions			
Yes	12	55	0.56
No	88		(0.20,0.94)
Child bathed			
No	46	55	0.48
Water	6		(0.30,0.68)
Soap	35		
Infusion	14		
Hands washed before food handling			
Not washed	32	18	0.45
With water	13		(-0.01,0.91)
With soap	2		
Child purged			
Yes	11	57	0.44
No	89		(0.07,0.82)
How mother cleans her hands after cleaning child			
Nothing	17	17	0.33
Rinsed fingers	25		(-0.11,0.78)
Washed water	2		
Washed soap	4		
Wiped	1		

Behaviour	% incidence of behaviour at first observation	Effective sample size	κ-statistic
How child is cleaned after defaecating			
Nothing	2	16	0.33
Water only	37		(-0.07,0.74)
Soap	4		
Wiped	8		
Mother washes hands after latrine			
Not washed	21	11	-0.03
With water	18		(-0.46,0.40)

Table 6.5 continued
Figures in parentheses are 95% confidence intervals

statistics than for the comparison between interview and observation data. Observations of other behaviours showed moderate-to-good repeatability, except for the mother's action after going to the latrine for which the agreement was no better than chance. This finding is, however, based on a very small sample. In addition, the observer could not record whether the mother went to the latrine to defaecate or urinate; part of the variability in the mother's behaviour may have arisen because of this.

The inter-observation agreement for various environmental conditions, recorded at successive observation visits, was generally poor; whether the yard had been swept, whether meal plates had been washed, how food was covered, and how drinking water was stored each had κ statistics of< 0.4, indicating poor repeatability. Better agreement was obtained between two observations of whether and how the latrine hole was covered (κ = 0.59, 95% C.I: 0.39,0.80).

- **Comparison of six subsequent observations**

In 10 households the observation schedule was repeated on six separate occasions. Three children behaved consistently, using a pot only, on at least four occasions. Four children were not observed defaecating more than once, and thus contributed no information about behaviour variability. The behaviour of the remaining three children varied: two used a pot on early visits but defaecated on the ground at later visits. Such a pattern is consistent with the concept of 'reactivity' outlined in the

previous chapter; at first the mother makes an effort to appear hygienic in front of the observer but as she becomes used to the observer's presence she reverts to her normal behaviour.

The manner in which the mother disposed of the child's stools was fairly consistent. For only one mother were two different methods of stool disposal observed. Four mothers consistently threw stools in the latrine, while the stool disposal practices of the remaining mothers were observed at most once.

Analysis of the results of these 10 households revealed a pattern of repeatability consistent with that suggested by a comparison of two observations. The presence of stools on the latrine slab was rare and occurred at random. For four of the households faeces were never observed on the latrine slab, while for another four the faeces were observed on one of the six visits. In one household, faeces were observed on the latrine slab twice, while in the remaining households they were observed three times. The presence of faecal material in courtyards was much more common: for six households such material was observed every visit: for two households, on five of six visits; and for two households on only one visit. The presence of stagnant water in the courtyards did not vary at all over six visits: for three households stagnant water was always observed, while for the other seven it was never observed.

- **Inter-observer variation**

Inter-observer variation was difficult to assess since the allocation of observers to households was not random but based largely on the geographical location of the households. Thus, differences between observers could have arisen because of socio-economic and cultural variations between different areas of the town. Comparison of the initial observations by each of the three observers indicated that there were no differences for reports about the child's defaecation site ($P>0.10$) and child purging ($p>0.40$). For earth eating the differences approached statistical significance ($p = 0.06$), with one observer (A) reporting geophagy twice as often as the other observers (B and C). Observer B saw the mother disposing of the child's stools in the latrine or outside the courtyard more often than observers A or C, and in the courtyard less often than A or C ($p<0.01$). Observer A reported excreta on the latrine slab more often than observers B and C ($p<0.001$), while observers A and C reported excreta in the courtyard and stagnant water in the yard more often than observer B ($p<0.0001$ in both cases).

Discussion

Health researchers may be interested in studying behaviours for a number of reasons. They may wish to understand and describe what occurs within a particular community, and why; they may also wish to understand the links between these behaviours and health, and to plot changes in behaviours over time. Among the techniques available for this purpose are: participant observation, focus group discussions, key informant interviews, structured interviews with a sample of the population, structured observations of a sample of the population. Each technique can contribute to an understanding of behaviours but all have shortcomings in measuring what occurs in practice. Two areas of difficulty facing those wishing to measure behaviours can be identified; the *validity* of the method of measurement, and the *variability* of the behaviour itself.

Problems of validity arise when study techniques do not represent accurately actual behaviours. This is particularly likely when the area of behaviour under investigation is socially sensitive; for example, sexual behaviour. Some techniques may reflect what actually happens more accurately than others; for example, in a study of sexual habits in the Gambia, Pickering (1991) concluded that structured interviews with prostitutes produced less valid data than those obtained from key informant interviews. Although the social sensitivity of different behaviours varies from society to society, defaecation behaviour is probably less socially sensitive than sexual behaviour in most cultures. Women in Burkina Faso appear, in general, to be less reticent about revealing their personal habits than women in some Asian societies, although some ethnic groups in West Africa, such as the Peulh and the Dogon, have particular social codes that forbid any reference to defaecation.

Agreement between the interview responses and observations concerning child defaecation and stool disposal practices were relatively poor when chance agreement was taken into account (κ= 0.25 and 0.28 respectively). A higher proportion of mothers reported that their child used a pot, and that they then disposed of the faeces in the latrine, than were observed actually doing so. This suggests a tendency to over-report those practices that were perceived to be "good", although some of the disagreement could have arisen if defaecation and stool disposal practices changed according to the time of day or because of the long interval between the two observation visits. In Bangladesh, Stanton et al. (1987) also found evidence of over-reporting of "good" hygiene practices in interview compared with the distribution of observed practices.

A higher degree of concordance was found between repeated observations of child defaecation and stool disposal behaviours than between the interview response and the initial observation. For the site where the child defaecated, the confidence intervals around the κ statistics did not overlap ((95% C.I: 0.14,0.35) for interview versus observation and (95% C.I: 0.48,1.05) for observation versus observation).

However, because this behaviour was not observed at every visit, the sample size for the comparison of the two observations was very small and the κ statistic is, therefore, highly sensitive to changes in one or two observations. For the method of stool disposal, the two observations again showed a greater degree of concordance than the questionnaire and the initial observation, but in this case the confidence intervals around the kappa statistics did overlap ((95% C.I: 0.19,0.36) for questionnaire versus observation and (95% CI: 0.28,0.96) for observation versus observation). These findings together with the suggestion of over-reporting of "good" practices in interview are consistent with, the hypothesis that interview responses are less valid than data obtained by direct observation. It should be noted, however, that mothers were asked what usually happened when the child defaecated, other forms of question, for example, "what happened the last time that the child defaecated?" might have produced more valid responses.

In addition to the problem of validity, the variability of behaviours (and of the environmental conditions derived from those behaviours), causes difficulty in investigations designed to identify associations between behaviours and health. The use of a single observation to identify behaviours or conditions that are risk factors for a poor health outcome assumes that the behaviour is largely habitual (or the condition is largely constant). Thus, if there are two groups of mothers, one of which always throws the child's stools in the latrine, while the other always throws them in a corner of the yard, a single observation can discriminate between them. A study relying on a single observation will be able to detect whether one of these behaviours carries a higher risk than the other. If, instead, mothers cannot be divided into two distinct groups, but all sometimes throw stools in the yard and sometimes throw stools in the corner of the yard, a study relying on a single observation will have little power to detect a risk behaviour and may seriously underestimate the magnitude of the risk associated with that behaviour. Even a slight degree of variation in the risk behaviour being investigated can seriously bias the estimate of the risk ratio towards unity.

Our findings suggest that hygiene behaviours in Burkina Faso lie somewhere between the two extremes outlined above. There appears to be some consistency in most of the observed behaviours and conditions, but it is clearly not absolute, and the degree of consistency may vary from behaviour to behaviour.

Even a modest degree of variability in the behaviour/condition being measured may result in an estimate of the risk ratio which is seriously biased towards unity. (It is quite possible to imagine that many behaviours vary from the norm for more than 20% of the time.) The consequences of this bias may be twofold. First, the likelihood of detecting the behaviour/condition as a risk factor is enormously reduced. For example, a case-control study will require fewer than 100 cases and 100 controls to detect an exposure with a risk ratio of 3 and a prevalence of 50%. To detect an exposure with a risk ratio of 1.22 will require more than 2000 cases and

2000 controls. Second, even if the behaviour/condition is detected as a risk factor, its public health importance will be substantially underestimated.

Methods for the measurement of behaviour are a subject for much debate among epidemiologists and public health specialists who are attempting to improve health promotion activities. Structured observations have been promoted as one of the tools that seem best adapted to the measurement of hygiene behaviours. Some questions, however, remain to be answered. First, can hygiene behaviours be measured and summarised in any useful way? If so, can structured observations perform this task? If structured observations can perform this task, are they the best way of doing so?

The results of our study provide some tentative answers to some of these questions. Behaviours and conditions related to hygiene in Bobo-Dioulasso vary, both within and between individuals, and the within-individual variability may be substantial. In such circumstances, measurement of these behaviours and conditions may be useful for certain purposes, but not others. For example, observations may be useful to determine the incidence/prevalence of different behaviours in the community. Investigations designed to monitor changes in hygiene behaviours, perhaps by means of an education programme, could then use a series of cross-sectional surveys to do so. Individual behaviours may, however, be too varied to assign individuals to exposed and non-exposed groups for identifying links with health outcomes.

Our findings are consistent with, but do not prove the hypothesis that, in Burkina Faso, data collected through direct observation of hygiene related behaviours have greater validity than those collected through questionnaire interviews, which may tend to overestimate the frequency of 'desirable' behaviours. Studies whose aim is to describe the range and relative frequencies of different hygiene related practices should probably be based on direct observation rather than questioning. Structured observations are, however, expensive. In our study, 549 households were observed for a total of 1400 hours and data were gathered on defaecation behaviours on 277 occasions. Thus, approximately 5 hours of early morning observation was required to record one event of interest.

Chapter Seven

From Belief to Behaviour: Diarrhoea and Hygiene Practices in Bobo-Dioulasso[1]

Introduction

If improving hygiene practice is likely to hold one of the keys to the reduction of diarrhoeal disease in children in developing countries then we need to consider how changes in these practices can best be brought about. According to Coreil and Mull (1988) the induction of changes in behaviour is a complex process which is unlikely to be successful if programmes are not built upon a solid understanding of the existing beliefs and practices of the target population. To design a programme of interventions intended to improve hygiene behaviour, it is therefore essential to have a clear picture of beliefs concerning diarrhoea, its origins, causes and treatment. Local concepts of cleanliness and hygiene must be understood and the actual practices of the population need to be described. In addition, the links relating belief to behaviour need to be explored.

This chapter presents findings concerning beliefs and practices related to childhood diarrhoea and hygiene in Bobo-Dioulasso, using findings from the different research techniques which have been discussed in the last three chapters. The findings are used to suggest approaches to the design of interventions to induce changes in hygiene behaviour.

Methods

The results presented here come from the 21 focus group discussions, the key informant interviews, the questionnaire interviews with the 1405 mothers of the children recruited as community controls in the case-control study, data from the interviews in the hospital with 1388 mothers of sick children, the observations of

[1]. This is a modified version of a paper published under the title: 'Des croyances aux comportements; la diarrhée et les pratiques d'hygiene au Burkina Faso' by Kanki B, Curtis V, Mertens T, Traoré E, Cousens S, Tall F and Diallo I., in *Cahiers Santé*, volume 4, pages 359-366, 1994.

behaviour of 549 mothers of case and control children and the follow up of the 125 children in the cohort. The methods were described in detail in chapter four. Manual content analysis and tabulation was performed on transcripts from discussions, questionnaire data was analysed using DBase 3+ and Epiinfo v 5.0 and manual tabulations were performed on cohort data.

Results

- **Perceptions of diarrhoea**

In the initial series of 16 focus group discussions with different groups of mothers in Bobo-Dioulasso, we asked mothers to describe how they saw childhood diarrhoea. Mothers described a symptom known as *konoboli*, meaning literally running stomach, as a condition from which their children frequently suffer. However, *konoboli* is not generally regarded as an illness to be treated in itself, but is more often seen as a symptom of another illness. Table 7.1 shows a taxonomy of the diseases with which *konoboli* diarrhoea is associated, their causes, symptoms and treatments, compiled from focus group discussions and from key informant interviews with practitioners of traditional medicine. Agreement between different groups of respondents was surprisingly good; most respondents recognised most categories of illness and their causes and treatments. Concepts of illness did not differ in different social, ethnic or economic groups: a group of mainly professional women categorised diarrhoea in exactly the same way as did women from the most traditional part of the town.

The first six categories in table 7.1 are well-known diseases for which diarrhoea (*konoboli*) is seen as one of the symptoms. The classification of these diseases follows closely the perceived causes. The name itself usually gives some indication of the perceived aetiology:

Kolobo means "the coming out of the bones" and refers to teething,

Kolon means "deep" or "a well", and refers to an intestinal tract infection resembling candidiasis, which is thought to dig into the intestines,

Kotigue means "wounded (or cut) behind (or anus)", and refers to diarrhoea "caused" by anal fissures,

Wouna means "fontanelle",

Sere means "witness", and implies that this type of diarrhoea betrays the fact that the mother is again pregnant or having sexual relations,

Table 7.1. Summary table of different forms of diseases related to diarrhoea, their symptoms, causes and treatments.

Name	Symptoms	Causes	Treatment
KOLOBO	Green, frequent stools Vomiting, Fever Weight loss Child flaccid Teething age	Teething	Plant infusions for purging and 'gavage'
KOTIGUE	Small, mucoid stools Child flaccid Fever Cough Fissured anus	Carrying the child on the back too often Contact with damp ground or pants	Anal bathing with hot decoctions Suppositories of ginger Mentholatum
KOLON	Green, sticky stools Sores in mouth Fever, pale eyes	Many anal fissures Consumption of peanut paste	Rub dried powdered roots on the inside of the mouth
WOUNA (OR SIERO)	Whitish, liquid stools smelling of rotten eggs Vomiting Sunken fontanelle	Breast feeding mother steps on an egg 'Infection'	Purge with water and egg shell Apply a paste to the fontanelle Neck amulet
SERE	Thick, whitish, bad-smelling stools Child thin Child complaining	Breast feeding after having sexual relations Breast feeding while pregnant	See traditional healer who gives a pot with plant infusions or waist amulet
TOGO-TOGONI	Bloody, mucous stools Tiredness Loss of apetite	Dirty food, water Too much sugar Rotten fruit Badly cooked meat Untreated 'kotigué'	Give infusions of goyava leaves "Intetrix"
NENE (cold) FARIGUAN (Fever) SIIN COUMOUNI (sour milk)	Green stools Liquid, smelly stools White, milk smelling stools	Cold Mother has fever Mother's milk gone sour in the breast	{Rice water {Plant infusions {"Ganidan" {"Dialyl" {ORS {Activated charcoal
DIARRHEE DES BLANCS	Liquid stools Ballooned stomach	Dirt 'parasites/worms'	Go to the hospital

Togo-Togoni is onomatopoeic and represents the sound of stop-start diarrhoea associated with dysentery.

There also exists a group of diarrhoeas which are not regarded as a specific illness but as a short-term physiological reaction to external circumstances, corresponding roughly to the 'benign' transient diarrhoeas of western conception. These can be caused by Nene, meaning cold, Fariguan meaning fever, and Siin coumouni meaning sour breast milk. These diarrhoeas will stop if the cause is removed. If the episode continues, however, it will be reclassified as a disease and another cause will be sought. An additional category, diarrhoea caused by parasites or worms, appears to have been added to the taxonomy in the recent past. This has no name in Dioula and is often referred to as "la diarrhée des blancs". Table 7.1 shows how the different diseases associated with diarrhoea are classified according to their symptoms and to their perceived causes. Natural causes include teething, wind or cold and fever. Other types of diarrhoea are due to the irritation of another organ such as the mouth in kolon or the anus in kotiguè. Some diarrhoeas are due to transgressions such as allowing a child to breast feed after having had sexual relations which will have soiled the milk (séré), or stepping on a fresh egg which leads to the depression of the child's fontanelle (wouna).

The most serious diarrhoeas are those which are thought to be due to breaking the social rules *séré*, *wouna* and also *kolon*, whilst those due to transitory causes such as incorrect food and cold, and *la diarrhée des blancs* are seen as least worrying

Though sorcery and genies are regarded as important possible causes of illness in village life in Burkina Faso, they were infrequently mentioned as causes of diarrhoeas in our discussion groups in Bobo-Dioulasso. Sorcery generally belongs to the tightly knit village communities where people know each other well enough to cast spells. The ancestors who can cause illness inhabit the villages, and the genies who may want to recall a child to their spirit world, live in the bush. Townswomen are also more reluctant to talk about these aspects of illness because they fear being thought backward. However, if a child's illness becomes life-threatening and other cures appear not to have helped, the child may be returned to the village to look for a supernatural cause and cure.

- **Choice of treatment for diarrhoeas**

Therapies for different illnesses associated with diarrhoea as described by focus group discussion participants and key informant interviews are presented in Table 7.1. The therapies appear to follow the logic of the perceived cause of the diarrhoea. *Kotigué*, for example, is thought to occur when the anus has been allowed to become cold and damp. Thus, the prescribed treatment requires the application of hot infusions. Dried powdered roots are rubbed into the mouth of a child with mouth sores signifying *kolon*, and *wouna* (diarrhoea caused by stepping on an egg) can be cured

by purging with ground eggshell. Diseases caused by infractions of the social code are taken to a healer rather than to a doctor, since a doctor will be unable to diagnose the true cause. "La diarrhée des blancs", on the other hand, needs to be seen by medical personnel. The names of plants used in treatment are often descriptive; for example *sisegni*, literally chicken teeth and *gnikelen*, one tooth, are used for the treatment of *kolobo*, teething diarrhoea. Treatments may be accompanied by calls to supernatural forces through the use of amulets, ceremonies, incantations and prayer.

We recorded the treatments chosen by mothers of children in the longitudinal study who fell ill with *konoboli*. The different options were grouped into 5 categories; automedication with traditional remedies, automedication with modern drugs, seeking help from a traditional healer, consulting a doctor or para-medic in the modern sector, and doing nothing. A total of 219 separate episodes of *konoboli* were recorded over the 25,910 days of follow-up. If seasonal variation is ignored this is equivalent to 3.1 episodes per child year. The mean duration of each episode was 7.9 days. For 67 (30%) of the 219 episodes, the mother gave no special treatment. The most common treatment of first resort was the category of automedication with traditional remedies (21% of all episodes). The second most frequent choice of first treatment was to seek the help of a traditional healer (19% of all episodes). Using modern remedies and drugs at home was the third most frequent choice for first treatment (14%). Modern health services were only turned to as a first resort in 12% of episodes of diarrhoea. Only 18% of episodes were seen in a clinic at some point of the episode. This infrequency of use of the modern sector is remarkable in a cohort of children that was being regularly followed by health staff and for which the cost of all prescribed medicines was refunded. One choice of therapy did not exclude another. On average 1.3 different treatments were chosen per treated episode.

Table 7.2 presents a selection of comments from six discussion groups at which mothers were asked whether they preferred modern or traditional therapies and why. Mothers tended to agree that there were some types of illness that could only be treated traditionally and some that needed to be seen by a *doctoro*. (This term refers to any health worker in the modern sector.) Mothers were divided between those who preferred traditional treatments because of the low cost and availability and those who thought modern medicine more effective. The attitude of many was pragmatic; if the first choice does not cure the child within a few days the mother will shop around for another.

Mothers said that they were often guided in their choice by the older women of their social group who generally insist that plants have proved their worth. In addition, mothers often used drugs such as chloroquine syrup or mentholatum ointment, that were close at hand, available from the corner shop, or left over from a

Table 7.2 Extracts from focus group discussions: Choice of modern or traditional treatment for diarrhoeas.

"If you don't have much money you can go to the market and get plants, even for as little as 5F."
"Pharmaceutical products are effective but too expensive, and you have to go and wait at the hospital. The prescriptions can come to 5,000 CFA when you could have bought plants in the market for 100 CFA."
"We don't dispute the effectiveness of pharmaceutical products, but it's the [cost of the] prescriptions which frighten us."
"[Seeing a modern or traditional practitioner] is the same thing; when you see a healer you have to buy a pot, a chicken etc. You need money everywhere."
"Plants are easier and more practical because they are to hand. At the hospital you have to queue for ages while the child continues to dirty you, it would have been better to have taken a walk around your plot to find plants."
"I prefer the hospital because the treatment is quicker. With plants it can take time, meanwhile the child can get other illnesses."
"Plants have no complex instructions that we cannot read."
"Modern medicine is easier to follow because it's more practical, with plants you have to go and find them and then boil them, it's more tiring."
"It's not the prescriptions that they give you at the hospital that will stop the diarrhoea."
"Modern medicine is more efficient, they can do tests."
"Plants are better adapted to certain illnesses for which modern medicine does not understand the cause or the context."
"Modern medicine is better, they know how to diagnose an illness, they can rehydrate a child who is dehydrated."
"If it doesn't get better we go to the hospital where they give us vitamins for the child."
"Often when the diarrhoea starts we use plants and it stops quickly, so we don't think any more of going to the hospital."
"It depends on the illness and the person who is ill. Traditional or modern treatments don't always work for everybody."
"It's all good; we'll try everything."

previous prescription. It seems that mothers feel that modern drugs can be used independently of the nature of the illness because that is essentially how doctors treat illness. Doctors do not enquire into the real causes or the social circumstances surrounding the episode.

Some mothers complained that they were put off using modern health services because they find the regimented organisation and lack of a friendly welcome in health centres off-putting. Nevertheless, if other treatments fail, the mother will often decide to take the child to a dispensary or the hospital. A total of 1055 children were hospitalised with symptoms of diarrhoea during the case-control study. For more than 40% of the total number of children hospitalised with symptoms of diarrhoea the episode had already lasted more than 7 days by the time they reached the hospital. 94% had used at least one therapy before arriving and on average 1.9 different therapies had been tried. 66% had had medicines prescribed at a clinic or by a *doctoro*, 44% had used automedication with traditional remedies, 38% automedication with modern medicines and 42% had seen a traditional healer.

As a last resort, children who have not been cured by local healers or modern medicine, may be evacuated to the family village to be diagnosed and treated by the village healer/sorcerer.

- **Lavements and gavage**

Two traditional practices intimately linked with child health and children's defaecation are *lavements* and *gavage*. These are the preferred means of delivering curative and preventive treatments from the traditional pharmacopoeia. *Lavements* or anal purging involve the anal administration of plant decoctions and infusions, particularly those with an unpleasant taste. Originally, mothers administered the liquid by blowing it from their own mouth into the child's anus. However, this practice has been largely replaced by the use of small plastic bellows or *poire*. This purging is carried out to prevent illness, to encourage child development and to regulate the child's defaecation cycle; the child becomes used to defaecating only after being purged. This liberates the mother from the need to change nappies regularly. The first purging of a new-born baby has a special purpose; to remove the impurities of birth, to "remove the dirt that has built up in the child's umbilicus".

Gavage is the technique used to administer plant decoctions orally for both preventive and curative purposes. The child is forced to drink large quantities of the decoction that has been heated and allowed to cool. The mother holds the child on her knees and uses one hand to funnel the liquid into the child's mouth. For an infant, the liquid administered may be warm water alone, which is said to make a baby sleep well. This is important because "the child who does not sleep well does not get fat".

Seventy-seven percent of mothers interviewed reported using *lavements* at the time of the interview, while 43% said that they practised *gavage*. *Lavements* were performed on children of all ages up to 36 months, but became less frequent with increasing age; 51% of all children in the 0-5 months age group were reported purged every day compared with only 8% of two year olds. The practice of *gavage* followed a similar pattern; 45% of children under six months were reported to be force fed decoctions every day compared with only 3% of two year olds. There was, however, no evidence of any sex difference in the application of the two techniques (*lavements*, $p>0.5$; *gavage*, $p>0.8$) (Table 7.2). There was some evidence that the practice of *lavements* decreased as the mother's level of education increased ($p<0.01$, test for trend). However, almost a quarter of mothers with a secondary education still administered *lavements* daily. A similar trend was observed for the practice of *gavage*. The economic level of the family, as measured by the possession of certain consumer goods, appeared to have no bearing on either practice.

Of the 549 mothers visited for observation, 90 (16%) were observed administering a *lavement* or *gavage*. They were asked for their reasons. Forty-two (47%) said they did it to treat an illness; 20 (22%) to prevent illness; 14 (16%) to facilitate teething; others said it was to encourage the child to walk, to fortify the child or to give it an appetite. In focus group discussions mothers also suggested that *gavage* was effective in preventing *sogo* (resembling malnutrition), in making the child grow fat, strong and resistant to illness. *Lavements* were described as being an important treatment for colic and constipation. "Stools must not be left in the stomach". On the other hand, key informants in the modern medical sector saw both *gavage* and *lavements* as dangerous traditional practices; *gavage* because the method of administration could damage the respiratory tract and *lavements* because the products employed could irritate the digestive tract and cause lesions or even anal prolapse.

- **Stools, hygiene and diarrhoea**

For women in Bobo-Dioulasso, cleanliness is very important. In discussion groups mothers said that all women aspire to be clean and that:

> "When you enter the courtyard of a clean woman, the courtyard, the house and the kitchen must be well swept; the plates, the water jar and the dipper are thoroughly washed; the children are bathed and clean and the mother herself is clean and wearing a clean outfit."

The inverse of the above are considered 'dirty' and undesirable: an unswept yard, unwashed dishes, a mother who has not washed, an untidy kitchen area with unwashed pots, rubbish heaped in a corner and not thrown out. Discussions about stools revealed that they were felt to be dirty and to be avoided, but not particularly dangerous to health. Some mothers believed that, in certain circumstances, stepping

over the stools of a sick adult could cause an illness. In general, however, direct contact with stools was not suggested to put health at risk. Stools are to be avoided because of the smell which "stops you breathing", because they are "'heavy' and ugly to look at" and because they attract flies.

The mother's attitude to a child's stools changes with the age of the child. Discussion groups revealed that mothers distinguished between the stools of a breast-fed infant which have no smell or 'gas' and the stools of a child eating from the family plate, which have "a strong smell, like everybody else's". They described how the child begins by defaecating in linen or clothes, graduates to the pot, after which she will use the rubbish heap inside or outside the courtyard. When she is thought old enough, at about six, she will be allowed to use the latrine.

Pots were the preferred method for children of all ages over 2 months. First, the mother holds the child on the pot until he is old enough to sit unaided. After weaning at 18 to 24 months, the child may still use the pot, but mothers feel that he is old enough to go outside the yard, especially if there is a new baby to be attended to. Direct observations of children's habits confirmed this pattern. Table 7.3 presents a selection of comments, made by mothers during the course of the focus group discussions, concerning the site of defaecation. Two points of interest are worth noting here. First, mothers were not keen to let young children use latrines because of the danger that they might fall in, or dirty the latrine. Latrines are widely available in Bobo-Dioulasso; out of the 1405 courtyards of community control children, 1256 (89%) had a latrine. Our observations suggest that these latrines are generally well-kept (only 12.0% had excreta visible on the slab) and that most have concrete slabs with relatively small holes. The danger of a child falling into these latrines would appear to be minimal. This fear may thus be a hangover from the past when most latrine slabs were constructed from wood and earth. Second, it appears that in the town there is some social pressure on mothers not to allow their children to dirty public spaces such as latrines which are shared by several families.

The majority of mothers reported throwing children's stools in the latrine. Direct observations confirmed that this was a common practice, though not as common as reported. The younger the child, the less likely her stools were to be regarded as a nuisance and the more likely they were to be simply thrown somewhere in the yard.

Although mothers agreed that lack of cleanliness or dirty food can provoke "la diarrhée des blancs", the majority appeared not to have the medical model of the transmission of disease-causing microbes on in mind. The idea that invisible particles of stool can remain on the hands or in the environment and cause disease was not expressed in discussions. Though some mothers have heard of germs *'banakisè'* (lit. seeds of disease) they were not able to describe what these were. Mothers told us that a child cannot contaminate her mother, and that a good mother should be able to

Table 7.3. Extracts from focus group discussions: Site of defaecation

"The child needs to be accompanied by an elder brother or sister to go outside. If he is alone he needs to be at least two years old."

"If it is in the country the child can go outside at any age. But in the town there are problems if you let the child go outside because then you have to go and clear up. That's why the child needs to be at least three; he can choose a site where you don't have to go and collect the stools afterwards."

"The child can go outside at two years of age."

"My daughter is only 18 months old but she can go outside to the place where they defaecate."

"After about the age of 2 or 3 children can go outside, but they need to be accompanied by an older brother or myself."

"In the town a child cannot defaecate just anywhere, you have to sweep up and collect the stools, that's why a pot is more practical."

"The child can use the latrine at age 5-6."

"When the hole in the latrine slab is not large the child can use it from the age of 6 years; if the hole is large the child must be 9."

"Some children use the latrine at 4-5 years; others at 9-10. If the latrine is not in good condition, with a broken slab or a large opening it is risky, that's why the child should go on the rubbish heap outside beside the road."

"The latrine is dangerous for the child, he could fall in, that's why you should wait until he is 9 or 10."

"My child is only 4 but he can use the latrine; he's very alert and knows the risks."

"It's not good to let children go to the latrine because they don't know how to use it; they defaecate on the slab and dirty it, that's why I don't let a child use a latrine until he is at least 8 or 9."

"Children under 6 don't know anything; they like playing everywhere, even in the latrine, that can cause accidents especially if the hole is large. They try and see what is in the latrine and then they can fall in. It's better that they go outside on the rubbish heap."

tolerate all that emanates from her child, including stools and vomitus. In cleaning up stools, what is important is to "chase away the smell". Mothers said that they used soap to remove smells from the hands after handling stools. However, of the 266 occasions on which it was possible to observe how the child was cleaned after defaecating, the child's bottom was rinsed on 73% of occasions with water alone, a cloth was used in 14% and in only 8% was the use of soap observed. Over half of these mothers simply rinsed the fingers of their left hand with water after cleaning the child while more than a third did not clean their hands at all. Furthermore, on the 208 occasions on which the observer was able to note if, and how, the mother washed her hands after using the latrine, over half did not wash their hands in any way, while those that did, used water alone to rinse the left hand. None were observed to use soap

Discussion

- **Models of diarrhoeal disease**

Popular models of disease causation provide explanations, firstly for the aetiology of disease, of how and why the episode occurred, and secondly for the victim, how and why it happened to a particular person at a particular time (Davison et al 1991). The first element is constructed by analogy with familiar physical or material processes, which may or may not utilise modern scientific knowledge. The second element, which person falls ill and when, is explained in terms of risk behaviours, and often falls into the domain of the metaphysical or supernatural in both scientific and non-scientific societies (Evans Pritchard 1937).

Diarrhoeal diseases are seldom perceived as a single clinical entity with a single set of causes, and models of the aetiology of diarrhoea are very different in different societies. For example, popular models of diarrhoea aetiology in the West include a variety of causes such as 'food poisoning', fear or teething. De Zoysa et al (1984) reviewed six studies of diarrhoeal disease in Asia and Latin America and found that diarrhoea was ascribed to many causes. These included ritual pollution or excessive 'heat' in the body in South India; incompatible food and supernatural causes in Northern India; the evil eye, fright, intestinal heat and teething in Brazil; exposure to foods or conditions classified as 'cold' in Peru and contagion, grief, fright or unsuitable foods in Ecuador. Teething, 'cold' food, stale food, hot food and dirty water have been cited as causes of child diarrhoea in Nepal (Stapleton 1989).

In Africa, diarrhoea has also been ascribed to a variety of causes depending on the symptoms and the circumstances of the episode. In Uganda traditional healers give unclean water, "false teeth" and "ancestral wrath", worms, poor sanitation and contaminated foods as causes of diarrhoea (Anokkbongo et al 1990). In Kenya, Maina-Ahlberg (1979) found that the Akamba classify some diarrhoeas as amongst

"God's diseases" because they were seen to affect all children. Thus a child with 'teething' diarrhoea would not be classified as sick. Other diarrhoeas were caused by foreign bodies disturbing the "big worm" in the intestine. These diarrhoeas could not be prevented. Amongst the Masai in Kenya diarrhoea is believed to be caused by the 'bad spirits', raised by someone in the family doing something wrong, or someone wishing to harm the family. Predisposing conditions included bad food, teething, and 'hot' mothers milk (Patel et al 1988). In Zimbabwe the causes of diarrhoea were divided into two categories, those related to a child's physical environment and those associated with a child's social or spiritual environment. In the first category were flies, dirty water, poor or wrong diet, teething and climate. Social or spiritual causes included sex while breast feeding, bad mother's milk, and sorcery (De Zoysa et al 1984).

In Bobo-Dioulasso, as elsewhere, diarrhoea is not perceived by mothers as a distinct clinical entity with a single set of causes. As in Kenya, there exists a certain fatalism about diarrhoea; the sign is seen so often that it is felt to be an inevitable part of a child's development. Causes were not unlike those found in Zimbabwe; however we have used a classification following the mothers perception of the illness which differs from that employed in Zimbabwe. Mothers first look at the symptoms of their child's illness and then look for an appropriate event or sign which will be labelled as the cause. This cause may fall into the domain of poor child care practices or be an inevitable event such as the weather or teething. Sorcery appears to be a less important cause of illness in the town than in the villages, but this may have been underestimated in our study, which was carried out by representatives of the modern health sector.

Many studies of treatment-seeking behaviour have been carried out in developing countries, where the options are multiple. Determinants of the choice of treatment have been classified by De Zoysa et al (1984). Choices may be decided by the perceived aetiology of the disease, the apparent severity, features of the individual such as the sex of the child or the education of the mother, and the availability, cost and perceived effectiveness of the treatment.

In Bobo-Dioulasso we found that the treatments suggested by mothers followed above all the logic of the perceived aetiology of the disease. However, in practice there was serial use of many systems of treatment, the choice depending not only on the perceived cause but also on the expected cost and availability. A continuing episode suggested failure of one treatment and provoked recourse to another.

- **Hygiene behaviour**

Cleanliness and dirt avoidance are important to mothers in Bobo-Dioulasso. This appears to be primarily for reasons of etiquette and social acceptability, rather than to

avoid illness. Hand-washing before eating is the accepted norm of polite behaviour, even if not always practised. Stool avoidance is practised to some extent and the stools of older children lying outside the courtyard are perceived to be a social nuisance and mothers feel that they have to clean them up. What is classified as dirty appears to follow Douglas' definition of 'matter out of its proper place' (1966). Thus stools that have not been put in their correct place (the latrine or the rubbish heap in the corner of the yard, see fig 4.4) are classed as dirty. Stools which can be seen or smelled need to be removed, and the smell needs to be removed from the hands. However, infant stools smell less and look less unpleasant, so they can be treated with less caution.

Mothers go to great lengths to ensure that their child grows well and does not fall ill; their preventive hygiene behaviours include weaning the child if they become pregnant again, giving *lavements* and *gavage*, not leaving the child sitting on damp ground and avoiding giving wrong or 'dirty' food.

Conclusions

The understanding of diarrhoea and hygiene behaviour gained in this study allow some tentative conclusions to be drawn and some suggestions made regarding the planning of programmes aiming to change hygiene behaviour and thus reduce childhood diarrhoea in Burkina Faso.

1. Comprehensive local models of disease exist in Burkina Faso and appear to be adhered to by members of all sections of society. Diarrhoea is seen as a symptom of another disease and is not generally thought to be linked to poor hygiene behaviour. One new category of diarrhoea related to "dirt", parasite diarrhoea or "la diarrhée des blancs", has been introduced into the local taxonomy by the modern health sector.

2. Cleanliness is a positive social virtue. The purpose of cleanliness is to be socially acceptable rather than to prevent disease.

3. Current health education stresses the paradigm "dirt causes a child to fall ill with diarrhoea". With this message, however, the only benefit mothers may perceive to arise from changing their hygiene practices is the reduction of one type of disease; *la diarrhée des blancs*. This perceived benefit may not be sufficient to make the mother feel that it is worthwhile changing her behaviour.

4. Practitioners of modern medicine are felt to be incompetent in dealing with many categories of diarrhoea. Traditional healers and herbalists are trusted by people from all sections of society.

5. Practices which look likely to be responsible for diarrhoea pathogen transmission are:

    - the defaecation on the ground of children too old for the pot and too young for the latrine;
    - the unsafe disposal of stools;
    - the frequent failure of mothers to wash their hands after dealing with their children's faecal material.
    -

6. From discussions with mothers, the following reasons for the above behaviour may be advanced:

    - mothers are often afraid to let young children use the latrine for fear that they may fall in, or that they will dirty it;
    - faecal material, once invisible and not smelt, is not considered to be dirty. Thus, if a mother cannot actually see faeces on her hands she may see no reason to wash them.

7. From the above, it appears that some of the tasks that need to be addressed by a programme to reduce the incidence of childhood diarrhoeal diseases in Burkina Faso are to:

    - use the existing perceptions of the positive value of good hygiene as a basis for promoting safer practices and reinforce the existing notion that stool avoidance is socially desirable;
    - find a convincing way of demonstrating that minute particles of stools which are invisible exist, and should be removed, best with soap, as thoroughly as large portions of faecal material;
    - use the local terminology of different diarrhoeal illnesses to show that representatives of modern medicine are not ignorant of the 'real' causes of diarrhoea;
    - involve practitioners of traditional medicine in health promotion activities.

Chapter Eight

Potties, Pits and Pipes: Explaining Hygiene Behaviour in Bobo-Dioulasso[2]

Introduction

In the previous chapter we saw that by understanding belief and behaviour concerning diarrhoea and hygiene we could propose better ways of promoting safer hygiene practices. However, there is currently very little information available concerning the factors that contribute to whether a mother adopts 'safe' or 'unsafe' practices. This handicaps efforts to develop interventions to encourage changes in behaviours (Kapadia-Kundu 1994). In the study in Bobo-Dioulasso we had the opportunity to use the data from the 2793 household interviews to explore the correlates of reported child defecation and stool disposal practices. We propose a model of the cultural infrastructural and psycho-social proximate determinants of these hygiene practices and test some elements of the model. The data from the focus group discussions was drawn on for clarification of some of the findings.

Methods

- Data collection

To investigate the determinants of practices surrounding child defaecation and stool disposal we combined the data from the household interviews with the mothers of both cases and controls. This data was supplemented by the results of the structured observations of 549 of the early morning domestic practices of these mothers, by the results of the 21 focus group discussions and of key informant interviews with health personnel.

[2] The original version of this article by Curtis V, Kanki B, Mertens T, Traoré E , Diallo I, Tall F and Cousens S. appeared in *Social Science and Medicine*, volume 41 No 3 pages 383-393 in 1995.

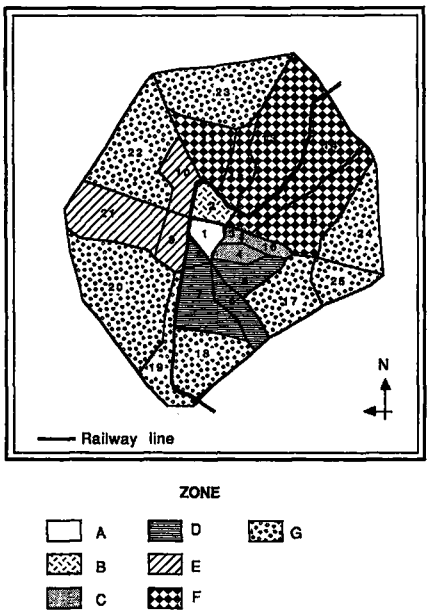


Figure 8.1 Bobo-Dioulasso, administrative sectors

We classified the town into seven zones corresponding to areas that were built up simultaneously during the historical expansion of the town. Zone A in figure 8.1 is the ancient nucleus of the town whilst zone G corresponds to the outlying areas which have been most recently settled.

- Data analysis

Three variables from the household questionnaire were selected as outcomes of interest. Two were practices related to child stools: where the mother reported that the child defaecated and where she reported that she disposed of the stools. As an indirect indicator of hygiene practices we also retained the presence of human stools on the ground in the compound, as noted by field workers. These variables were re-coded to produce three binary hygiene outcome variables (safe/unsafe) depending on whether the reported or observed practice or condition was likely to be associated with faecal contamination of the environment. Practices and environmental conditions re-coded as "safe" were, respectively: child reported to defaecate in a pot; child stools reported disposed of in a latrine and human stools not observed on the ground in the yard.

Table 8.1 P values for the crude associations between hygiene "outcomes" and potentially explanatory variables.

	Where child is reported to defaecate p<0.05	Where stools are reported thrown p<0.05	Stools seen in yard p<0.05
Child's age (0-5/6-11/12-17/18-23/24-36 months)	Yes	Yes	No
Mothers' schooling (none/primary/secondary)	No	Yes	No
Mothers' ethnic group (local/other)	Yes	Yes	No
Mothers' economic activity (salaried/small trade/none)	No	Yes	No
Fathers' economic activity (salaried/irregular/cultivator)	Yes	Yes	Yes
Size of the house (0-24/25+ m^2)	No	Yes	No
Owns cassette radio (yes/no)	Yes	Yes	Yes
Owns TV (yes/no)	Yes	Yes	Yes
Vaccination card (yes/no)	No	Yes	No
Health education sessions (0-6/7+)	Yes	Yes	No
Number of siblings (1/2-3/4+)	Yes	Yes	No
Principal water source (tap/standpipe/private well/public well)	Yes	Yes	Yes
Sector of the town (zone A/B/C/D/E/F/G)	Yes	Yes	Yes
Period of residence in the town (0-4/5-10/11+ years)	No	No	No
Season of recruitment (rainy/cool/hot)	No	No	No

Associations between these outcomes and a variety of socio-economic and environmental factors were then examined. Table 8.1 lists these hypothetically explanatory variables. First, the hygiene outcome variables and the "explanatory" variables were cross-tabulated and the chi-squared test used to identify crude associations. Logistic regression models were then developed in order to identify those factors which were most strongly linked with each outcome using the EGRET statistical package. All explanatory variables crudely associated with the outcome ($p<0.05$) were included in the model, then the least statistically significant variable in this model was dropped and the new model tested. This process was repeated until all variables left in the model had a statistically significant association with the outcome variable.

Results

A total of 1388 interviews with mothers of children recruited at the hospital and 1405 interviews with mothers of children recruited from amongst neighbours of the hospitalised children were carried out. Both populations were comparable on a wide range of variables; they were therefore combined to give a total of 2793 household interviews for analysis.

- **Where do children defaecate and why?**

Figure 8.2 shows how the reported site of child defaecation varied markedly with the age of the child. Linen use was mostly confined to infants; only 9% of linen users were aged over 12 months ('linen' here means underpants or strips of cloth cut up to serve as nappies). No children aged under 12 months went outside of the yard to defaecate. Pots are introduced early in Bobo-Dioulasso: 46% of children under 6 months and 82% of children over 12 months were reported to be placed on a pot to defaecate. Overall 75% of children were reported to use a pot.

Children who were reported to defaecate in a pot were compared with those who were reported defaecating elsewhere. The first column of table 8.1 shows that nine of the fifteen potential explanatory variables had a statistically significant association with the reported use of a pot at the 5% level.

Table 8.2 shows the factors that were retained in the final regression model. The likelihood that the child defaecated in a pot increased with age up to a maximum in the 12-17 month age group, and then decreased again as children began to use the ground for defaecation. Pot use declined with fathers' declining income category; the child of a cultivator used the pot half as often as the child of a father with a regular salary. Children of mothers whose ethnic origin was outside the region used the pot nearly twice as often. Use of the pot was associated with an increasing number of

Fig 8.2 Location of defaecation of 2779 children by age, Bobo-Dioulasso

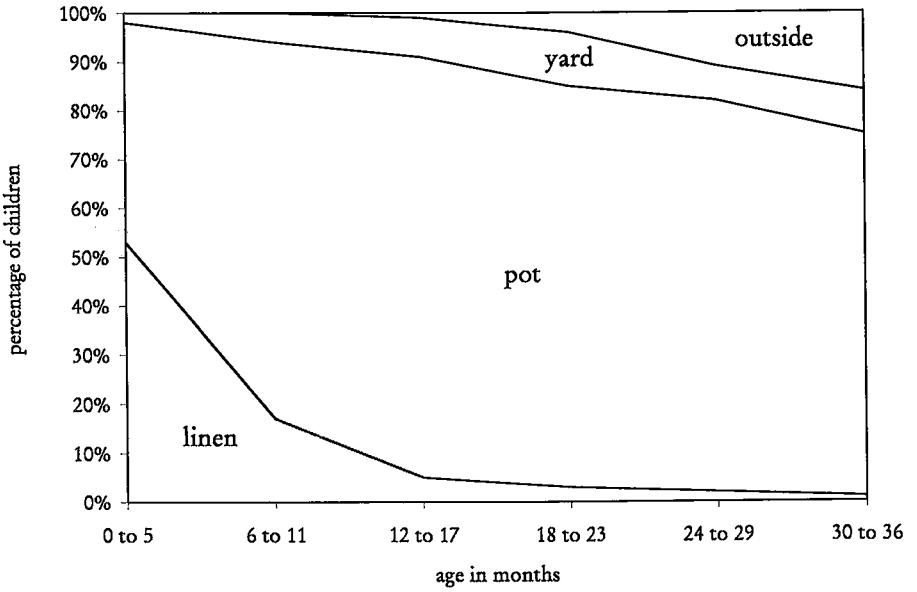


Fig 8.3 Stool disposal practices among 2783 mothers of children by age in Bobo-Dioulasso

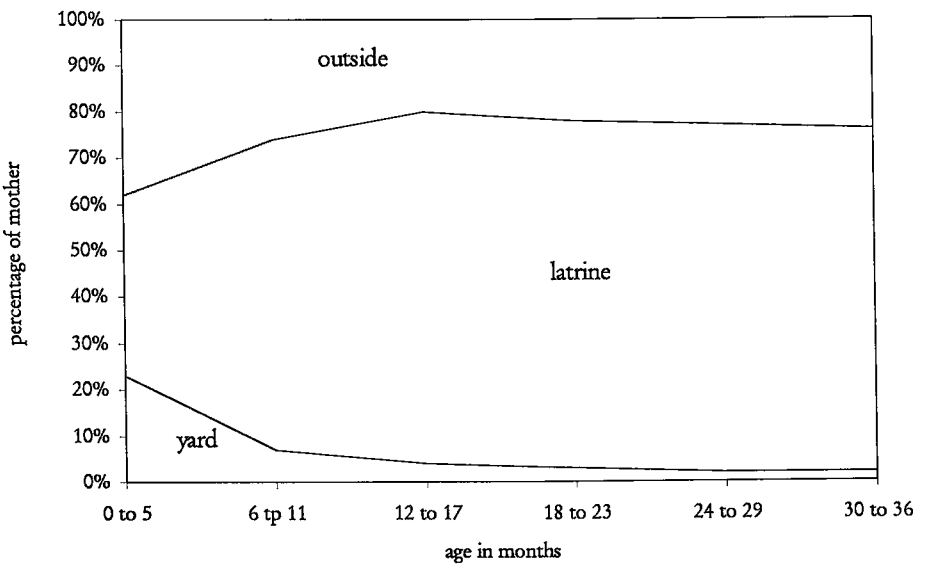


Table 8.2. Logistic regression model for where child defaecates.

	Child defaecates in a pot	Child defaecates elsewhere	OR	95% Confidence Interval
Child's age				
0-5	228 (11)	262 (37)	1.00	-
6-11	576 (28)	167 (24	4.44	(3.41,5.78)
12-17	496 (24)	75 (11)	8.39	(6.10,11.53)
18-23	333 (16)	73 (10)	5.95	(4.29,8.24)
24-36 months	449 (22)	124 (18)	4.61	(3.47,6.12)
Mothers' ethnic origin				
local	992 (48)	426 (61)	1.00	-
non-local	1090 (52)	275 (39)	1.70	(1.40,2.07)
Fathers' economic activity				
salaried	1431 (69)	408 (59)	1.00	-
irregular	442 (21)	160 (23)	0.81	(0.64,1.03)
cultivator	200 (10)	124 (18)	0.48	(0.37,0.64)
Health education sessions				
0	511 (25)	215 (31)	1.00	-
1-6	927 (45)	316 (46)	1.30	(1.04,1.63)
more than 6	608 (30)	156 (23)	1.54	(1.19,1.99)
Water source				
tap in yard	658 (32)	139 (20)	1.00	-
standpipe	712 (34)	276 (39)	0.52	(0.41,0.68)
private well	518 (25)	160 (23)	0.67	(0.51,0.90)
public well	189 (9)	125 (18)	0.33	(0.23,0.45)

health education sessions attended by the mother. The use of the pot decreased with decreasing availability of water: children of households who drew water from an external well used the pot a third as often as those with a tap in the yard.

- **Where do stools end up and why?**

67% of mothers reported throwing stools into the latrine, 26% throwing them outside the compound, 7% throwing stools into a corner of the yard, 0.4% burying them in the yard, and 0.3% of mothers reported that the child used the latrine. Figure 8.3 shows how the stools of older children are more likely to be thrown in the latrine than those of infants. Unsurprisingly, the reported site of defaecation was closely related to the method of disposal; children who defaecated in a pot were 26 times more likely to have their stools thrown into a latrine than elsewhere ($p<0.00001$).

Table 8.3. Logistic regression model for where child stools are disposed of.

	stools disposed of in latrine (%)	stools disposed of elsewhere (%)	O.R.	95% Confidence Interval
Child's age				
0-5	186 (10)	303 (33)	1.00	-
6-11	499 (27)	245 (27)	4.21	(3.23,5.49)
12-17	438 (24)	133 (14)	6.81	(5.07,9.14)
18-23	309 (17)	97 (11)	7.12	(5.15,9.82)
24-36	431 (23)	142 (15)	6.65	(4.97,8.90)
Fathers' economic activity				
salaried	1302 (70)	536 (59)	1.00	-
irregular	388 (21)	215 (23)	0.80	(0.64, 1.00)
cultivator	161 (9)	163 (18)	0.49	(0.37,0.65)
Owns a cassette radio				
yes	987 (53)	372 (41)	1.00	-
no	872 (47)	540 (59)	0.77	(0.64,0.93)
Health education sessions				
0	432 (24)	294 (32)	1.00	-
1-6	826 (45)	416 (46)	1.47	(1.19,1.82)
more than 6	567 (31)	197 (22)	1.93	(1.51,2.47)
Water source				
tap in yard	652 (35)	146 (16)	1.00	-
standpipe	639 (34)	349 (38)	0.42	(0.33,0.55)
private well	441 (24)	236 (26)	0.47	(0.35,0.62)
public well	126 (7)	188 (20)	0.18	(0.13,0.25)
Sector (zone)				
A	126 (7)	75 (8)	1.00	-
B	220 (12)	63 (7)	2.04	(1.28,3.25)
C	203 (11)	102 (11)	1.04	(0.68,1.58)
D	224 (12)	111 (12)	1.09	(0.72,1.64)
E	360 (19)	113 (12)	1.35	(0.89,2.04)
F	501 (27)	258 (28)	0.95	(0.66,1.38)
G	229 (12)	198 (21)	0.72	(0.49,1.06)

The second column of table 8.1 shows the thirteen variables that were associated with the manner of stool disposal at a level of significance of 5% or less.

A second regression model was constructed to investigate factors related to the site of disposal of excreta (table 8.3). The model suggested that child stools were disposed of in the latrine more often as the child got older, though after 24 months of age, the use of the latrine again declined as some children went outside to defaecate.

The type of water source showed the strongest association with where stools were disposed of; families with a tap in the yard used the latrine to dispose of stools five times more often than families who used wells outside the courtyard. Stools of the children of cultivators were disposed of in a latrine half as often as the stools of those whose fathers had a regular income. Families owning a cassette-radio used the latrine more often to dispose of stools and families living in zone B threw stools in the latrine twice as often as those living in zone A.

To investigate the possibility that the above associations were predictors of the ownership of a latrine, rather than of throwing stools in a latrine, the same analysis was carried out excluding data from the 11% of families who had no latrine in the compound. The model showed the same pattern as the previous one.

Table 8.4. Logistic regression model for whether human stools were noted on the ground in the compound.

	No stools in the yard	Stools in the yard	O.R.	95% Confidence Interval.
Source of water				
tap in yard	732 (30)	65 (17)	1.00	-
standpipe	826 (34)	162 (43)	0.50	(0.36,0.67)
private well	586 (24)	89 (24)	0.48	(0.34,0.69)
public well	258 (11)	57 (15)	0.36	(0.24,0.54)
Sector				
A	172 (7)	29 (8)	1.00	-
B	248 (10)	35 (9)	0.93	(0.54,1.61)
C	277 (12)	30 (8)	1.49	(0.85,2.56)
D	287 (12)	47 (13)	0.95	(0.57,1.59)
E	391 (16)	91 (24)	0.56	(0.35,0.92)
F	691 (29)	67 (18)	1.52	(0.94,2.44)
G	352 (15)	74 (20)	0.88	(0.55,1.41)

- **Stools on the ground**

Field workers observed human stools on the ground within the compound on 13% of visits. Stools were visible less often where the child was reported to defaecate in a pot ($p<0.001$) and half as often when the mother reported disposing of the stools in the latrine ($p<0.00001$).

Table 8.1 shows the five variables which had a crude association with whether stools had been seen in the yard. Table 8.4 shows the two factors that remained significantly associated with the presence of stools on the ground within the compound in the regression model. Stools were seen on the ground nearly twice as often in compounds in zone E than in zone A and two to three times more often when the source of water was a well or a standpipe rather than a compound tap.

Discussion

- **What determines hygiene behaviour?**

A multiplicity of theoretical models have been proposed to help explain, predict and change human health related behaviour. Early models proposed by Pavlov (1927) and Skinner (1938) suggested that environment and events affect behaviour; later models added cognitive factors (Becker 1974) and reasoning (Bandura 1977, Azjen 1985) as determinants of health protective behaviours. Recently McGuire's communication-behaviour change model (1981) and the Precede-Proceed model (Green & Kreuter 1991) have extended the scope of the models to include systematic approaches for the promotion of behaviour change.

Figure 8.4 presents a conceptual framework for categorising factors which are potential determinants of hygiene behaviours. The framework proposes a series of factors that may be proximate determinants of hygiene behaviour, which are in turn influenced by the social and physical environment. This framework takes elements from several of the above models, adapted specifically to hygiene behaviours, and inserts them into an hierarchical framework similar to that proposed by Mosley and Chen for the determinants of child survival (1984). The framework suggests that factors in the external social and physical environment influence factors that operate at an individual level to determine specific hygiene behaviours. The model implies that for behaviour to change, change in the physical and social environment is required. We cannot test all elements of this framework since data was not collected

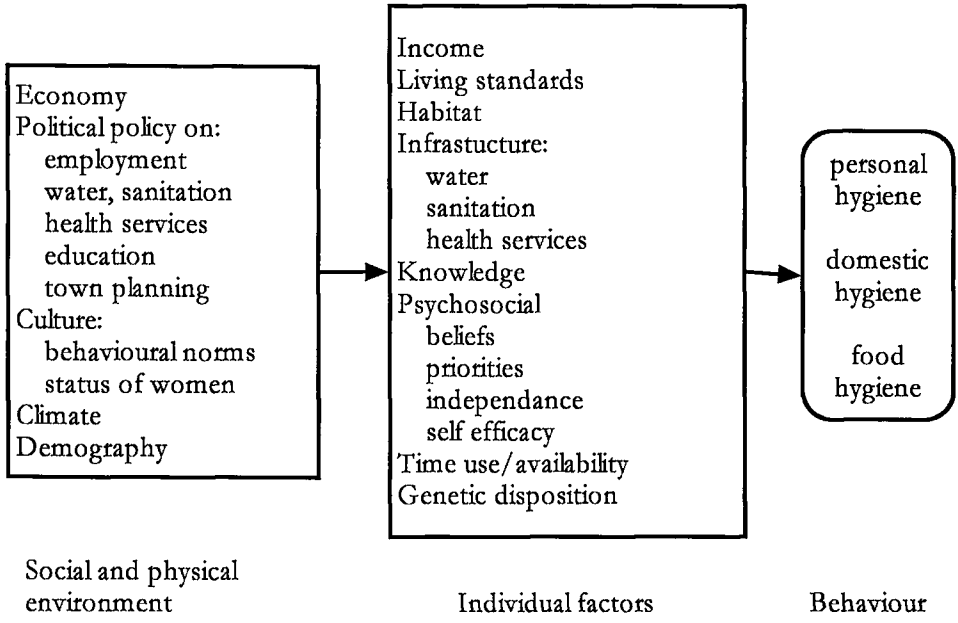


Figure 8.4 Determinants of hygiene behaviour

on all of the factors, and many may be beyond the capacity of measurement and statistical analysis. However, the present research has enabled us to investigate associations between family income, maternal education, availability of water supply and health education, habitat, climate, to some extent 'culture' and some specific hygiene practices. The qualitative research has provided insights as to the role of some of the other factors.

- **The role of water supply**

One finding stands out strongly in this analysis: there is a consistent relationship between the water source and all three of the hygiene outcome variables. Compounds with domestic water connections were most likely to report "safe" hygiene behaviours, they were less likely to do so when their water came from a well in the yard or was collected from a public standpipe, and safe practices were least often reported for households where water was collected from a well outside the compound. This apparent link may reflect a real association between the type of water supply and stool-related hygiene or it may have been due to bias or confounding in the study.

Confounding may have arisen if both water supply and hygiene behaviour are determined by a third variable. In figure 8.4 there are a variety of variables such as a mother's beliefs, priorities and "self-efficacy" (a term proposed by Bandura which

refers to a person's estimation of her capacity to effect change (1977)) which might determine both the hygiene behaviours that she adopts and the likelihood that she has a tap in the yard. However, in practice, families have limited control over the type of water supply that they use. The water source depends on geography; in some areas wells cannot be sunk, in others there is no standpipe or nearby ring main for domestic connections. Many families have little choice about which compound they live in and therefore what water supply facilities they have available.

Socio-economic status is another possible source of confounding. The type of water supply itself may have been a better predictor of the socio-economic status of families than the other indicators that we controlled for in the analysis. Whilst it cannot be discounted, this explanation seems unlikely. The models included a wide range of markers for socio-economic status: economic activities of the father and mother, ownership of certain valuable objects, size of house, sector of residence etc. Many of these factors dropped out of the logistic regression models whilst water supply remained significantly associated with stool hygiene.

The apparent association between reported stool hygiene behaviours and the type of water source could also be due to differential misclassification of the outcome variable. This could have arisen if mothers with a higher level of education were more likely to report their behaviour as safe, even when it was not, than mothers with less education. At the same time mothers with a higher level of education might also have been more likely to have had a better source of water. Comparing the results of the direct observations of stool hygiene with questionnaire responses for those with and without taps in the yard suggested that differential reporting bias can be discounted as the explanation for the observed association. For mothers who had a tap in the yard 17% of those who said that they disposed of child stools in the latrine were observed disposing of them elsewhere. For mothers without taps in the yard 26% of those answering "latrine" were seen to dispose of stools elsewhere.

If the observed association between the type of domestic water source and a mother's hygiene behaviours is not due to bias or confounding, then water availability may be a determinant of stool hygiene. It would be reasonable to suppose that hygiene behaviours requiring the use of water would be facilitated by improved access to water. Indeed crude analysis of the data from direct observations of hygiene behaviours related to the use of water by 549 mothers suggested this to be so; water related practices were better in compounds which had a tap than in compounds where water had to be either drawn from a well or brought from outside. For example, mothers were observed to wash their hands after cleaning a child's bottom nearly twice as often in compounds with a tap than in compounds without (crude odds ratio = 1.91, 95% c.i. 1.08,3.37, n=269). Mothers were observed to wash linen containing child stools immediately after having been dirtied more than twice as often in compounds with a tap than in those without (crude odds ratio = 2.24, 95% c.i. 0.74,6.85, n=79).

We can hypothesise two ways in which water supply may influence stool disposal practices. First, mothers who have more easily available water have more time to spend on better stool disposal practices. Second, mothers who have improved sources of water may feel the need to conform to different and safer norms of hygienic behaviour.

A number of studies have explored the time savings made by women who have improved access to water. In a review of the association between mothers' lack of time and the utilisation of child survival technologies, Leslie (1989) quotes a study in Kenya which suggested that increased availability of water did not save time because more trips were made to collect water and women were given less help by others in water collection. In Angola, Curtis (1988) observed that mothers spent less time collecting water when sources were closer but that this time was spent in increased agricultural activities and leisure, not in more 'housework'. However, it was impossible to separate child care from leisure in the data collection. In Mozambique, Cairncross and Cliff (1987) found that a better source of water allowed women to spend more time on leisure (mostly in the company of their children) and on housework. There is, therefore some evidence that in some settings improved water supplies may allow mothers to save time. This time may be re-deployed in safer hygiene related activity. However, when the findings of the study were discussed with a group of female health educators from Bobo- Dioulasso, they preferred the hypothesis that having a better source of water changes a mother's priorities with regard to hygiene. They suggested that a mother with a tap in the courtyard would be expected to conform to stricter norms of hygiene behaviour by family and neighbours, and thus to make more efforts to keep communal areas free of faeces.

- **Hygiene practices and demographic factors**

As we expected, the analysis confirmed that the age of the child was an important determinant of mothers' reported defaecation practices and stool disposal. The factors that contribute to the changes in practice as the child gets older were explored in the previous chapter. In focus group discussions mothers explained that whilst young infants defaecated in linen, once they were able to hold up their heads (4-5 months) children could be placed on a pot. Early pot use is facilitated by the use of anal purging, effectively placing the timing of child defaecation within the control of the mother. Mothers also explained that the stools of infants are often disposed of on the ground because they are not regarded as offensive or dangerous. However, by the time the child is eating a mixed diet (at 6-12 months of age) stools become offensive and need to be removed from sight and smell. Between the ages of about 2 to 8 years, children are generally sent to defaecate outside the courtyard in a drainage ditch or on a rubbish heap. Mothers explained that children in this age group could not be trusted to use a communal latrine without dirtying it or without running the risk of falling into the pit.

Though the crude analysis suggested that mothers with more children reported poorer hygiene behaviours, the multivariate analysis suggested that the number of children in the family did not play an important role in determining stool hygiene practices.

- **Health education and hygiene behaviours**

The logistic regression models of the factors associated with mothers' hygiene behaviours suggest that reported child defaecation and stool disposal is safer when mothers have attended more than six health education sessions. The explanation for this observed association may be that the health education has directly influenced hygiene behaviour or it may be due to confounding factors or to some form of bias. Health education sessions are offered to mothers attending clinics for antenatal screening and for child growth monitoring. Groups are large, the clinics are often understaffed and the sessions cover a large number of topics in addition to the transmission of child diarrhoea. The results presented in the previous chapter suggest that even mothers who have attended large numbers of such sessions give little credence to the germ theory of disease and do not believe that hygiene is directly related to child diarrhoea. However, it is plausible that mothers may follow the hygiene advice given at the health education sessions without believing in bio-medical theories of disease transmission. They may do it for a variety of reasons including wanting to be "modern", to improve their social status or because they expect a benefit to health in general.

It is possible that mothers who attend health education sessions are from a different segment of the population, one which tends to practice safer hygiene. Confounding by socio-economic status has, to some extent, been controlled for in the analysis, but we cannot rule out other factors acting in a similar way. For example, our conceptual framework suggests that "self efficacy"; a mother's belief in her own capacity to produce change, may determine her success in adopting new behaviours. Self efficacy may also determine the likelihood that she will choose to attend health education sessions. Dettwyler, writing about neighbouring Mali, has suggested a similar concept; that some mothers are more "interventionist" than others (1987). If this is so, then interventionist mothers may make more efforts to attend health education sessions and also may take more trouble over domestic hygiene.

- **Living standards, psychosocial factors, knowledge and hygiene behaviour**

As we have seen, the factors that may determine hygiene behaviour are complex, interlinked, and some are difficult to measure. If two factors have an equal effect on behaviour, inevitably the factor that is most accurately measured will appear to have the strongest effect. Similarly, factors that are closest to the outcome in the causal chain are likely to dominate in multivariate models.

Living standards are among those factors which are hard to define and harder to measure. However, possessing valuable objects such as a radio or television give some indication of standard of living, as does the size of the house occupied by the family. (TV and radio ownership may also be markers for exposure to health education and to "modern" ideas). We found consistently "better" stool hygiene with increasing regularity of income of father and mother, increasing house size and with possession of a television set or a radio. However, the regression models suggested that the economic activity of the father, categorised by the regularity of income, had the most direct relationship with the reported sites of child defaecation and of stool disposal. The child of a cultivator used a pot half as often as the child of a salaried father, and stools were thrown into the latrine half as often when the father was a cultivator than when he had a salaried job. The husband's occupation is likely to have been a determinant of the family's standard of living. His occupation may also be an indicator of certain psychosocial factors such as a mother's beliefs and priorities. For example, the wives of cultivators may have been more likely to conform to village norms of behaviour and find it acceptable to dispose of stools in the open rather than in the latrines that belong to an urban style of living.

Though there was a crude association between the educational level reached by the mother and where she reported disposing of the child's stools, mother's schooling was notable for its absence in all of the final models. As we saw in the previous chapter, mothers from all social groups, whether formally educated or not, had a consistent and coherent explanation for child illnesses which had diarrhoea among their symptoms. 'Dirt' was given as an explanation of only one out of ten distinct categories of diarrhoea related illness. This category; *la diarrhée des blancs* is the only one that resembles the western bio-medical conception of diarrhoea and is the only one for which modern remedies such as the use of oral rehydration or visiting a doctor were mentioned. Though this new category of diarrhoeal illness appears to have been added to the existing taxonomy, formal education seems not to have displaced traditional concepts of illness amongst mothers, neither has the germ theory of illness entered into the beliefs of the mothers in our discussions.

However, as we saw in the previous chapter, cleanliness is very important for women in Bobo-Dioulasso. It is considered 'dirty' and undesirable to have an unswept yard, unwashed dishes and pots and an untidy kitchen. Over 80% of mothers claim to bathe at least twice a day and mothers try to put on clean clothes to appear in public. Stools are avoided for their nuisance; because of the smell which "stops you breathing" because they are "heavy" and "ugly to look at" and because they attract flies which can then alight on food and lay eggs on it. In Bobo-Dioulasso, as in many other societies, hygienic behaviours are instilled in girls and young women during the process of socialisation and these norms are reinforced by their immediate society, mainly for reasons of social etiquette and acceptability.

Conclusions

Increasing awareness of the role played by human behaviour in the pathogenesis of disease has provided stronger motives to understand, predict and ultimately change it. Much research is now focused on behaviours such as those related to diet, sexual activity and substance abuse in developed countries. However, the literature concerning the behavioural components of the infectious diseases, which are the dominant pathologies in developing countries, is much less rich.

In this chapter we explored factors which may have determined some specific reported hygiene practices of a group of urban African women. The results support the notion that the type of domestic water supply is an important determinant of a mother's hygiene behaviour. Mothers with access to a tap in their compound reported using safe stool disposal practices three to five times more often than mothers whose source of water was a well outside their compound. Mothers with access to a tap used safer practices about twice as often as those whose water came from standpipes or private wells. We can therefore lend some support to the assertion made by Cairncross (1990) that, if improved access to domestic water supplies produces health benefits, this may be because better access to water leads to improved hygiene behaviour. This study did not allow us to distinguish whether the observed improvements in hygiene practices were due to mothers conforming to higher standards of hygiene when better water supplies were available or because mothers who spent less time collecting water had more time available in which to practice safer behaviour.

Other factors which played a role as predictors of a woman's hygiene behaviour were her husband's occupation, the number of health education sessions that she had attended, her zone of residence and family ownership of certain valuable objects. These factors are likely to be interrelated and to some extent, and to be proxies for factors which are the real determinants of her behaviour. These proximate determinants of hygiene behaviours (see figure 8.4) probably include cultural factors such as the prevailing norms of behaviour, psycho-social factors such as a woman's independence and "self-efficacy" and the impact of significant others in her social environment. Further research to refine and test explanatory models for hygiene behaviour such as the one shown in figure 8.4 would allow the development of more rational approaches to promoting behaviour change.

Any future programme to reduce the impact of child diarrhoea in Bobo-Dioulasso might usefully both help to make water more accessible (possibly through the use of simple water saving devices) and also use methods which encourage change in the norms of behaviour which are initiated and maintained by the prevailing culture. Intervention studies designed to improve hygiene behaviour are needed to test the effectiveness of such approaches.

Chapter Nine

Formative Research for the Design of Hygiene Promotion Programmes[3]

Introduction

Knowing something of the determinants of the hygiene behaviours that are employed by child carers gives us some clues as to how we might go about promoting safer hygiene practices. However, these insights are only a part of what a health planner needs to set up a programme to control diarrhoeal diseases through the promotion of safer hygiene. The planner needs answers to a few key questions cheaply, rapidly and reliably. He or she needs to know:

- What specific practices are putting children at risk of infection?
- What practices should replace the risk practices?
- Which members of the community should be addressed?
- How can people be motivated to change their behaviour?
- What channels of communication and what materials are likely to be most effective in encouraging behaviour change?

Most hygiene education programmes (indeed most health education programmes) do not consider how best to go about getting the answers to such questions before planning an intervention (van Wijk and Murre 1995). Plans are laid either on the basis of accepted wisdom, following what has been done elsewhere, or, more rarely, on the basis of the collection of large amounts of data, often using KAP studies, much of which is irrelevant or misleading. Many programmes have been ineffective because they have, for example, targeted practices which may not be the most prevalent risk factors for intestinal infection, or because they have assumed that educating people about microbes will automatically lead to changes in behaviour (Boot and Cairncross 1993). To avoid such waste of resources, planners need to

[3] A version of this chapter which was entitled 'Dirt and Diarrhoea: formative research for hygiene promotion programmes' by Curtis V Kanki B, Cousens S, Sanou A, Diallo I and Mertens T. appeared in *Health Policy and Planning*, volume 12 No 2 in 1997.

invest in a modest and carefully focused programme of formative research to learn from target populations and to provide objective data on which to base the design of an intervention.

At the end of the first phase of fieldwork in Bobo-Dioulasso, we realised that we had generated an enormous amount of information and insight, some of which was relevant to designing an intervention, and some of which was not. We therefore put ourselves in the shoes of a health planner with limited time and budget and tried to work out how the data gathering techniques could be tailored to producing the minimum essential information for designing an intervention. In this chapter we show how the research techniques that we used in Bobo allowed us to answer these questions and then we go on to propose a minimum package of formative research which can answer the key questions rapidly and reliably in health programmes. This approach has recently been tested successfully in a pilot hygiene promotion programme in Lucknow, India and is being described in practical detail in a series of manuals being prepared for Unicef.

Answers to the Key Questions

The methods employed in the study generated a wealth of both quantitative and qualitative information concerning different aspects of the problem of child diarrhoea in Bobo-Dioulasso. This section illustrates how the study methods provided answers to the five key questions for planning a hygiene promotion programme which were posed in the introduction.

1/ What specific practices put children at risk of infection?

Preliminary work (review of recent research, site surveys, focus group discussions, consultations with field workers, epidemiological common sense) led us to propose that the following might be related to the risk of diarrhoea in the town of Bobo-Dioulasso:

- type of domestic water source;
- animals in compounds;
- stool related hygiene;
- mode of child feeding;
- mothers' access to education and health education;
- environmental factors (excreta disposal, waste water evacuation).

Information about these factors was collected by questionnaire in the case-control study along with a large number of other factors that may have been associated (income, ethnic origin, etc). Using crude analysis and conditional and unconditional multiple logistic regression, where appropriate, the only factors that showed clear and

statistically significant associations with an increased risk of hospitalisation with diarrhoea were the reported practice of disposing of child stools other than in a latrine (Traoré et al.1994) and the use of a feeding bottle.

2/ Which practices are a priority for intervention?

Practices targeted for modification need not only carry a health risk, but also be sufficiently prevalent to make large scale intervention worthwhile. It is only likely to be possible to target two to three practices successfully. Whilst bottle feeding was strongly related to diarrhoea risk, only 5% of mothers used bottles, so this was not chosen as a focus for intervention. However, data from structured observation suggested that one third of mothers did not clean their hands after cleaning a child's bottom with bare hands (see fig 9.1) and only 5% used soap. In about a third of households child stools finished up on the ground and this rose to 60% in households where the child was aged under 6 months. In addition, defaecation by children aged from about 3 to 12 years in the open, on rubbish heaps or in drainage canals, was common and was cited as a major nuisance by mothers in focus groups.

Figure 9.1 Cleaning a child's bottom

We concluded that unsafe stool disposal and inadequate hand-washing after contact with stools were of sufficient importance and sufficiently widespread to warrant intervention.

The behavioural trials suggested that the adoption of the target practices: disposal of child stools in potties and latrines and hand-washing with soap after contact with stools, was both feasible and sustainable. The 37 women in the trials all succeeded fully or partially in adopting the new practices and were still practising them when visited three and six months later. We were told "once you've taken up hand washing with soap you don't feel clean without it".

3/ Who are the target audiences?

We selected as our primary target populations mothers and child-carers responsible for children aged under 3. However, during the behaviour trials the school age children became the most enthusiastic proponents of soap and latrine use. They complained that there was no soap in schools to continue what they had learned at home. This experience led us to also target children in primary schools.

4/ What can motivate behaviour change?

At the heart of any effort to change behaviour is the issue of motivation. What is it that might make a woman or a child want to adopt a new hygiene practice? This is referred to as 'positioning' in the language of marketing (Kotler & Roberto 1989).

To answer this question we began with how women understood diarrhoea in their children. We saw in chapter 7 that mothers in Bobo have complex and coherent models of the origins of diarrhoeal diseases in children and see no particular connection between stool hygiene and diarrhoeal disease. Even after their extensive training, paediatric nurses shared the local perceptions of diarrhoea causation, in parallel with their biomedical knowledge about germ transmission. We concluded that the existing perceptions of diarrhoea causation are so well grounded in the adult female population that trying to change them is likely to be fruitless (Kanki et al. 1994). We therefore needed to find motivations other than possible health benefits, for mothers to modify their hand washing and stool disposal practices.

Investigating the notion of hygiene in focus groups, we learned that it is an important social virtue, one for which women are admired and judged by their circle. Table 9.1 gives a sample of remarks concerning what volunteer mothers felt the advantages of the new practices were. In the light of these findings, it was decided that messages for mothers should be positioned around the social desirability and the reduction of nuisance that the new practices could bring.

Table 9.1. Selected remarks made by mothers in interviews after trying out the new hygiene practices for ten days

"There's a bad smell [from stools on the ground] which disturbs us and if a visitor comes to see you are ashamed that they see and smell the stools. You can't even eat nearby because it smells so bad."

"Stools outside, they bother you, they judge a mother by that."

"Mothers who let their children go on the ground are viewed badly and insulted."

"I've noticed that when I use soap I don't have smelly hands any more, that's good, especially when I go to pray."

"I like it because it gets rid of bad smells..."

"Our husbands like it and encourage us to keep it up"

"Washing hands is a good thing because it helps avoid illness. I do it because I'm convinced. What illnesses? Like coughs and malaria."

"Stools on the ground bother people. They walk in them. The motorbikes get dirty and have to be washed. Not to mention the smell..."

"Stools aren't nice to look at"

"We are proud and happy because our children are following [your advice]"

A trial programme to teach about disease transmission and to use soap in class was set up with the help of teachers, parents and the children in one primary school. A rapid evaluation suggested that these urban children had achieved a degree of understanding of the role of germs in diarrhoeal disease and that peer pressure might provide a motivation for sustained behaviour change.

5/ What communication channels and materials are likely to be effective?

To answer this question we needed two types of information: Firstly we needed to understand something of the structure and functioning of this urban society. Secondly, we needed basic data on the reach and the acceptability of different channels of communication for our target audiences. The first question was explored in the second series of focus group discussions, the second asked 213 women to

describe their use of TV and radio and other channels of communication in interview.

In discussions with groups from different 'communities' in the town, we were able to explore how traditional and modern systems of communication co-exist. We learned that Bobo is not one community, but rather contains a network of different overlapping subcultures based on different affinities or mutual interest, such as region of origin or age group. Word of mouth remains the most important source of information for many women, and social gatherings such as baptisms, weddings and funerals provide important opportunities for exchange of information. However, local radio plays a growing role in the diffusion of information, both through formal programming and in its use as a town 'bulletin board'. Two thirds of women interviewed claimed to listen regularly to the radio (though only 60% had a radio at home). Only 17% of households own a TV, but almost half of the women watched regularly.

Table 9.2. Hygiene promotion plan: example from Bobo-Dioulasso

Target practices
Hand washing with soap after contact with stools
Disposal of stools in potties and latrines
Primary target audiences
Mothers of children under 3
'Maids' and child caretakers
Children of primary school age
Primary positioning
For mothers/caretakers: hygiene is socially desirable
For children: hygiene is socially desirable and helps avoid the microbes which cause diarrhoea
Channels of communication // materials
Neighbourhood hygiene commissions // visual reminder sheets
Discussions in health centres and neighbourhoods // portable poster series
Street theatre // play outline & props
Local radio // micro-programmes, interviews
Primary schools // teaching pack, child centred posters

In discussion groups, mothers said that video and slide projections in their neighbourhoods were especially popular, as projections took place in the evenings when women could escape from their other chores. Local theatre was also seen as having the potential to contact 'hard to reach' groups such as child caretakers (maids, young cousins), who are often isolated from the different 'communities' of the town. We discussed with women the use and influence of print media, including newspapers, posters, billboards and brochures and concluded that they had little relevance to our, mainly illiterate, target groups.

The results from the above work were combined into a summary report. A detailed communication plan was then produced by a task force working with community groups and interested agencies. The hygiene promotion programme with the mix of approaches that eventually emerged is summarised in table 9.2.

A Tool Kit for Formative Research

Programme planners need rapid, reliable methods of obtaining a minimum of information to set up a hygiene promotion intervention. Whilst the study we carried out took several years, a small scale study focused tightly around getting answers to key questions can be refined for use over a three month period preparatory to an intervention.

Table 9.3 presents a plan of formative research designed to do this.

The first column shows the major decisions to be made, the second column outlines the main questions which need to be answered to make these decisions, and the third column lists research methods that can be employed to answer those questions. The same method can often be used to tackle a number of questions. The table does not set out the preparatory stage of holding meetings with the population and its leaders to share objectives, get permission and begin to build links with key groups and collaborators, which is essential to any development work.

Below we outline in more detail the implementation of this formative research plan.

- **Identify risk practices**

If the objective of a hygiene promotion programme is to reduce the incidence of childhood diarrhoea, then it must target practices that are risk factors for diarrhoea. It is not practical or advisable to carry out epidemiological risk factor studies, like the case-control study referred to earlier, within the time and resource framework of formative research. However, there is now a body of evidence suggesting that certain practices are likely to cause problems wherever they occur. These include the safe

Table 9.3. Plan of formative research for hygiene promotion

Objective	Questions to answer	Research methods
Identify risk practices	Which specific practices favour transmission of enteric pathogens?	Epidemiological common-sense Literature search, Unstructured observation
Select practices for intervention	Which risk practices are most widespread? Which risk practices are alterable?	Structured observation in representative sample of households Focus group discussions
Target audiences	Who employs these practices? Who influence the people that employ these practices?	Structured observations Focus group discussions (FGD)
Determine message positioning	Do target groups perceive a link between the risk practices and health? child diarrhoea? What motivates those who currently use 'safe ' practices? What advantages are perceived by those adopting safe practices?	Focus group discussions In-depth interviews with current user of safe practices Behavioural trials with volunteers, interviews with adopters.
Select communication channels	What channels are currently used for communication? What channels are trusted for such messages?	Interview representative sample of target audiences Focus group discussions
Design communications materials	What type of materials & events are likely to be attractive, understood, believed, remembered?	Focus group discussions trials in pilot programme: Revision and retest of materials Further FGDs if needed
Plan intervention	What is the likely reach and cost of each channel? What combination of channels is likely to be most cost-effective?	Results of above, consultation with community groups and collaborating agencies, cost estimates, review of pilot programme

disposal of human excreta, particularly of children, effective hand-washing and maintaining drinking water free of contamination (WHO 1993). Application of such existing knowledge and careful observation of local practices and conditions is probably now sufficient to identify effective preventive interventions in particular settings.

Investigations might usefully begin by making unstructured observations of likely risk practices in a selection of households representing different economic and social groups. Practices which require particular scrutiny include:

- Defaecation, stool disposal and cleansing;
- Practices which allow faecal material into the domestic environment, eg. children playing around defaecation sites, maintenance of latrines;
- Hand cleansing;
- Water collection, storage and use;
- Food preparation, storage and child feeding practices;
- Other hygiene related activity, eg yard, house, kitchen and utensil cleaning, bathing, rubbish disposal, infant supervision and cleaning.

Observers spend whole or half days with a household recording these practices, noting who does what, when, how, in association with what other events, and where. Analysis of these accounts in the light of knowledge about the faecal-oral transmission of enteric pathogens will generate hypotheses as to which practices are likely to be important sources of risk.

- **Select practices for intervention**

However, not all practices that put children at risk of infection are common enough to warrant a population-wide intervention. Estimates of the proportion of people in the target groups using risk practices can be obtained by structured observation in a representative sample of households. The size of the sample will depend on the scale of the programme that is being designed. A nationwide programme might require not less than 100 households in each distinct population group, whilst for a local programme a total of 100 randomly selected households with children under 3 should suffice. A schedule which records the occurrence of the likely risk behaviours is drawn up, based on the results of the unstructured observation, and is tested and revised. After training, observers spend fixed periods, say from 6am to 9am, with households carefully completing the formats. Additionally, spot observations of factors such as the presence and state of a latrine, the type of water source, the availability of potties and the presence of stools in and around living areas can add to the picture and give estimates for practices that cannot be observed.

Tabulation of the data then allows decisions to be made as to which risk practices are frequent enough to be worth targeting, and helps to determine which population groups should form the focus of the programme. Some practices may not be amenable to change, for example, mothers may feel that letting children use latrines is too dangerous. Light will be shed on these issues during focus group discussions and behavioural trials.

- **Select target audiences.**

Whatever the type of hygiene promotion programme that is eventually designed, planners need to know to whom they should address their messages. The structured observations will have revealed who carries out the risk practices: mothers, fathers, child caretakers or children themselves. These are the *primary target audiences.* However, these people live in households and societies that help to determine and condition their practices. They are unlikely to succeed in modifying risk behaviour without the support of their immediate entourage; neighbours, friends, relatives, etc. Such people may form a *secondary target group* for hygiene messages. The hygiene programme is also likely to benefit from the support of a *third target group*; influential people and opinion leaders. These may be leaders of community or religious groups, teachers, politicians or elders, for example. Such groups can be identified in the course of focus group discussions. In addition programmes may also need to build political support by communicating with national leaders and decision makers Each segment of the population may need its own set of messages, motivations and communication strategies.

- **Define message positioning**

Finding a motivation that will lead people to change their behaviour is a fundamental task of health promoters. Classic approaches that assume that it is enough for people to be told of the likely health benefits of a certain behaviour, for them to want to alter lifelong practices, are now understood to be simplistic. In the case of diarrhoeal diseases, studies from all parts of the world show that lay and bio-medical conceptions of causation rarely coincide (DeZoysa et al 1984, Coreil & Mull 1988, Yoder et al 1993). If little connection is perceived between hygiene and diarrhoea, even in well-educated groups, as is the case in Bobo, then teaching about microbes is unlikely to provide sufficient motivation for the modification of risk practices. Formative researchers need a basic understanding of how people understand and interpret diarrhoea-related illness and of the notion of hygiene and whether the two are related.

These issues can be explored in a series of focus group discussions with representatives of target groups. Ideally the series should continue with respondents from different backgrounds until no new information is generated. For a local programme with a relatively homogenous population a total of 6 to 10 groups

should suffice. Table 9.4 gives a sample guide for a focus group discussion on concepts of diarrhoea and hygiene.

Table 9.4. Sample focus group discussion guide

Greetings, introductions, explanations, procedure.
1/ Have your children had diarrhoea? (when, how often, how severe)?
2/ What do you think caused this diarrhoea?
3/ What else can cause diarrhoea (list illnesses)
4/ How do you recognise these illnesses?
5/ Can you tell me what it is that gives a child each of these illnesses?
6/ How do you recognise that somebody is a 'clean' person?
7/ Can you give me some examples of things that are dirty.
8/ How do you know if somebody is hygienic/unhygienic?
9/ Does dirt have anything to do with illness? What and which illness?
10/ Does hygiene have anything to do with illness? How?
11/ Cite risk behaviours; Why do people do this?
12/ Do you think people could be persuaded to change these practices?
13/ If so, what additional resources would they need?
Note: the process of translating words such as 'dirt' and 'hygiene' into local languages may provide insights into the way these concepts are perceived.

Other clues as to how to position key messages can be found by carrying out in-depth interviews with people who already employ the 'safe' target practices. Discussion then centres on where these practices were learnt, when and from whom, and what advantages the practiser feels that they confer. A final source of information concerning the benefits perceived by the adopters can come from asking volunteers to try out the new practices for a period and then interviewing them.

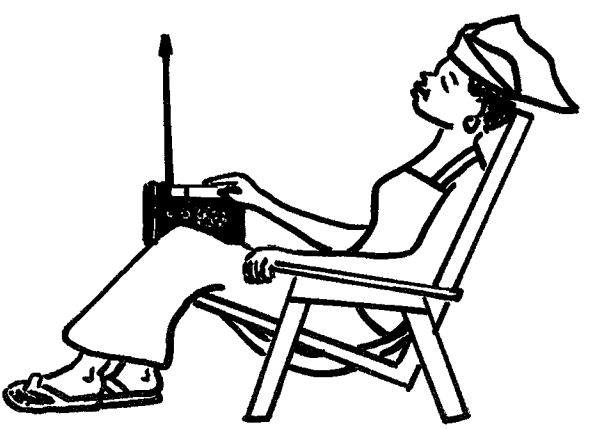
Finally, lists of the advantages that target populations feel that the key practices confer can be drawn up to help to produce a positioning statement and strategy for promoting the key practices.

For an intervention to succeed in creating sustained change in the key hygiene practices, it must find a means of changing social norms. A successful intervention should be able to create a situation where the new practices are rendered socially desirable whilst the risk behaviours become unacceptable. One way of achieving this is to work at extended family, compound or neighbourhood level, rather than seeking to target individual women, as western health promotion and social marketing has tended to do. It may be more effective to try and change social norms about what is seen as 'clean' rather than about what is seen as 'healthy'.

- **Select communication channels**

Understanding how a society communicates means having a minimum of understanding of how that society functions. Questions concerning social organisation can be added to focus group discussions. Participants are asked to describe the nature, organisation and functioning of formal and informal groups to which they belong. Opinion leaders can be identified by asking about the influence of different categories of people (religious leaders, football stars, traditional chiefs). The groups can also be canvassed as to their views on the acceptability and effectiveness of different channels of communication.

It is useful in designing the communication mix to have a quantitative estimate of such things as radio and TV usage, membership of community groups and literacy rates in target groups. If reliable data is not available from elsewhere, questions on these issues can be appended to the structured observation format, to be asked at the end of an observation session.



- **Design communication materials**

Materials that will be used in support of a hygiene promotion plan can only be designed once messages, audiences, positioning and channels of communication have been decided upon. However, clues concerning what materials are attractive to target audiences may emerge during focus group discussions. Whatever the materials that are designed to support the communication programme, they will have to be tested, redesigned and retested until they are satisfactorily understood, liked and remembered by target audiences. This may best be achieved in a small-scale pilot of the hygiene promotion programme. Once prototype materials have been developed, they can be evaluated in focus group discussions and modified accordingly.

- **Data analysis and reporting**

On completion of field work, data available for analysis for one region or locality might include:

- narrative of unstructured observation in 10 households
- transcripts of 6 focus group discussions
- completed formats from structured observations and interviews in 100 households
- transcripts of 10 interviews with people already using target practices
- reports of behavioural trials from 10 members of each target group.

Simple summaries and tabulations of quantitative and qualitative data are then produced. Results are returned to representatives of the community for discussion, interpretation, validation and recommendations. The final report will be of most direct practical use to programme planners and the community if it is structured around offering answers to the five key questions. The planning team can then make informed decisions on the form and content of the hygiene promotion programme. The final model that is chosen will, of course, depend on local preferences and experience, if there are synergies with other programmes such as sanitation and water supply, the availability of resources and the political options.

Possible Pitfalls

We have implied throughout this chapter that carrying out such a programme of formative research will ensure the design of an appropriate intervention, which can bring about widespread and sustained changes in hygiene behaviour in a large population. This assumption can be challenged on a number of theoretical and practical grounds.

Firstly, if there is no political commitment on the part of planners and sponsors to take on board the lessons of such research, then it cannot inform interventions. Secondly, putting together a team capable of such work is not always easy. A formative research team needs to be composed of both insiders and outsiders, some with training in social science, others with knowledge about hygiene and public health, all with sympathy for participatory approaches and a commitment to building interventions which are developed from the realities of the society in question. Such qualities may be hard to come by, but with guidance, social scientists and public health workers can learn the necessary skills rapidly.

Another threat to the usefulness of such work, especially with less experienced researchers, is the risk of sacrificing academic thoroughness for economy and speed. For example, too great a reliance on focus group discussions may lead to distortion, because there are limits to what participants are prepared to discuss in public. Neither is there a simple, universally valid method for quantifying human behaviour. People being observed will often change their behaviour in response to the presence of the observer (as, in the same way, responses in interviews will inevitably reflect what the individual concerned wants recorded). Data from Bobo-Dioulasso suggested that some hygiene practices can be recorded more reliably by observation than by interview (Curtis et al 1993). Nevertheless, the chief means of ensuring the validity of the data is triangulation; cross-checking that the key findings from one research method are borne out by those of others. Returning results to the communities concerned for discussion helps ensure validity and mutual understanding.

Whilst this chapter suggests that a hygiene promotion programme, or indeed, any health promotion programme, would benefit from a thorough and focused initial investigation, it does not address the issue of which theoretical model should be used for the intervention; a communication approach? a participatory approach? a local model such as the Indian theory of communication called Sadharanikaran (Kapadia-Kundu 1994)? a social marketing approach? a health education approach? There has been much debate in past years over the capacity of interventions based on the above models to produce sustained health behaviour change (Bunton & Macdonald 1992). In the absence of conclusive evidence for the long term superiority of one model over another, planners might do well to pick and choose what seems best from each approach.

However eclectic they may be, it is vital that such programmes monitor their impact on hygiene practices in the long term, to learn what works best and to substantiate claims of effectiveness. Whatever the model, a short focused programme of preliminary research, such as the one outlined in this paper, should pay dividends in programme effectiveness.

Culture is too often regarded as a barrier to effective development interventions; the reality is that programmes can only be effective if they stem from the culture in which they find themselves. To convert this idea from pious hope to reality, we need to develop "the ability to reach rapid and adequate identification of crucial socio-economic variables and the capacity to translate knowledge into recommended action." (Niehof 1993). The results from Bobo-Dioulasso showed how a using a variety of methods offered a well-rounded understanding of all that "messy human stuff" which underpins behaviour. Putting such methods together in a focused and systematic investigation, such as the one outlined in table 9.3, enables local and outside knowledge to be combined. Armed with this understanding, designing the hygiene promotion programme becomes a matter of interpretation, team work with the target community and their leaders and a large measure of common-sense.

Chapter Ten

Hygiene Education or Hygiene Promotion? Time for a Rethink

If diarrhoeal diseases still kill over three million children a year, then interventions to reduce this toll must be a priority for the public health community. Safer household hygiene practices hold one of the keys to preventing transmission of these diseases in developing countries. The main concern of this thesis has been to find practical ways of preventing diarrhoeal disease through promoting safer behaviour in the home. Because hygiene is a poorly understood and little researched area we have had to define the subject, and then explore it using a variety of methodologies and viewpoints both from the literature and in our field work. It appears that the approaches used to promote hygiene in the past require substantial rethinking. This concluding chapter summarises the arguments for a fresh approach to hygiene and proposes a new way forward. It highlights the practical and theoretical problems that still need to be solved. The chapter closes with a summary of the lessons learned from this work.

Hygiene education: time for a rethink

The standard model for encouraging changes in hygiene practices is hygiene education. Such programmes can be found throughout the world, mostly in the developing countries, often attached to diarrhoeal disease control programmes or figuring as a part of the 'software package' of latrine construction and water supply improvement programmes. However, hygiene education has had very disappointing results (Burgers et al. 1988, Boot 1995). We propose that a new approach is needed; one which is founded in the everyday reality of the concerned communities, which focuses systematically on practices which put children at risk, and which employs new insights into how human behaviour changes. To distinguish the new approach from the old we have given it the name 'hygiene promotion'.

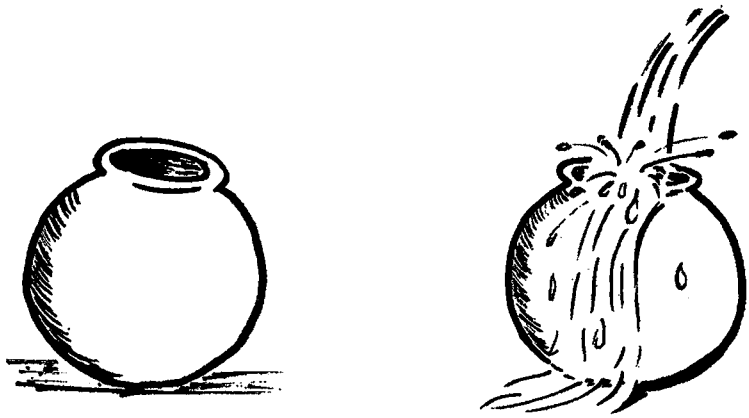
Increasing understanding of the mechanisms by which changes in human behaviour occur has led to the wholesale abandonment of 'health education' as an approach in developed countries (Tones 1983), and many developing countries are following suit. Preventive health care through health promotion is thought to be more effective than health education (Green and Kreuter 1991, McDonald and Bunton 1992,). AIDS prevention and reproductive health promotion programmes provide successful

examples (e.g Schopper 1990, Graeff et al 1993). However, in the field of hygiene, traditional educational programmes are still the rule. Below we highlight some of the reasons why hygiene education has failed to deliver convincing results. There are four typical fallacies in hygiene education programmes (adapted from Van Wijk 1993).

•Fallacy No 1: Adults are 'empty vessels' in which to pour new ideas

Hygiene education aims to teach adults about how microbes cause disease. It is assumed that this new knowledge will be assimilated. However, we know that all societies in the world (that have been investigated) have their own explanations for the appearance of diarrhoeal illness in children. In India, Africa and in Europe, mothers do not attribute diarrhoeal episodes to poor hygiene, but rather to a variety of social, climatic and environmental factors which include teething, evil eye, transgressing certain social rules, unsuitable foods and the presence of other concurrent illnesses (Chapter Seven, De Zoysa et al. 1984, Ankur 1996).

If we take no account of what adults already know and treat them as 'empty vessels' into which new ideas can simply be poured, then our wine will overflow. At best will we create confusion and incomprehension, at worst the teaching is entirely rejected: "these people, they have no idea what is really causing my child to get sick!"



•Fallacy No 2: adults have the time and the motivation to learn new ideas

Our understanding of how adults learn has improved dramatically in past years. Traditional school-type teaching, which is common in hygiene education programmes, may be appropriate to children, but be of little value to hard-pressed mothers, who have many other, higher priority uses for their time and energy.

•Fallacy No 3: New knowledge equals new practice

Even if the target audiences of hygiene education programmes assimilate the germ theory of disease, there is still no guarantee that changes in hygiene behaviour will result. Fear of germs possibly making a child seriously ill is unlikely to be motivation enough, in itself, to lead to the adoption of new domestic practices. Another reason why new behaviours are not adopted as a result of new learning, is that change may be too difficult. New practices may be too expensive or time consuming, appropriate facilities may not be available, and there may be no support, or even discouragement, from other members of society.

•Fallacy No 4: It is possible to get people to change a whole variety of hygiene practices

Box 10.1 contains a list of some of the practices commonly advocated in hygiene education programmes. But how much diarrhoeal illness can be prevented by the adoption of each of these practices? Whilst we cannot give a general answer to this question which is applicable in all circumstances, we can say that only a limited number of practices are likely to be responsible for the majority of diarrhoeal episodes (chapter 3). Hygiene education programmes rarely attempt to identify those particular risk practices and then target them specifically. Getting people to change the habits of a lifetime is extremely difficult; we cannot afford to dilute our efforts by targeting a wide variety of practices that are not major risk factors for diarrhoeal disease.

In addition to the four fallacies outlined above, hygiene education as an approach also suffers from a lack of strategic planning. Education sessions are often organised to fit in with other activities such as the construction of a well, or a mother's visit to a health clinic, and are often tacked to existing programmes as an afterthought. Little attention is paid to the cost, the potential population coverage and the effectiveness of the activity.

> "Compared with the clear quantitative objectives of technical programmes, the foggy formulation of hygiene education objectives increases the chance that programmes are poorly executed and treated merely as an add-on..." (in Burgers et al 1988).

Few hygiene education programmes set clear targets for the amount of behaviour change they aim to achieve. This leaves them aiming only at the nebulous and difficult–to-measure target of improving health. Even if diarrhoeal incidence or severity falls over the period of an intervention, it is difficult, and very expensive, to satisfactorily ascribe any changes to the intervention (Cairncross 1992). Ideally, hygiene promotion programmes would measure the impact that they have had on

Box 10.1 Some common messages in hygiene education

Cover water containers
Cover food
Use fly screens for food
Wash vegetables
Add disinfectant to vegetable washing water
Construct soakaways for waste water
Boil drinking water
Wear clean clothes
Do not spit in public
Filter drinking water with sand
Add disinfectants to drinking water
Place basins of water in the sun
Chlorinate well water
Keep finger nails cut short
Clean nipples with alcohol before breast feeding
Wash hands with soap
Wash hands with ash or mud
Do not wash hands with mud
Bury faeces
Spray insecticides
Construct water containers with taps
Wash hands before eating
Wash hands before preparing food
Wash hands before feeding a child
Wash children's hands
Wash hands after defaecation
Wash hands after contact with child faeces
Construct plate drying racks
Keep a special dipper for dipping drinking water
Sprinkle lime
Burn rubbish
Bury rubbish
Transport rubbish to a depot
Issue health certificates to street food vendors
Do not bottle feed
Do not store food
Reheat food
Comb hair
Wash latrine slabs
Disinfect latrine slabs
Wash well surrounds
Construct latrines

the key behaviours that they are aiming to change. One reason why this rarely happens in practice is that it is difficult to find reliable indicators of changes in hygiene practices. Chapters Six and Nine suggest that structured observation may be a suitable tool for measuring such private behaviours.

Hygiene Promotion: A New Way Forward

If hygiene education is built on a series of fallacies and a 'foggy' approach, then alternatives are needed which avoid these pitfalls. The alternative that we are proposing takes lessons from a variety of fields. From epidemiology we take the diagnosis of the practices that predispose to risk of diarrhoeal infection. From anthropology we take the emic viewpoint and the understanding that hygiene is not just 'for health' but is a fundamental social value. From social marketing we take the philosophy that no intervention will be successful unless it responds to the motivations of health consumers. Social marketing also gave us the strategic planned approach to behaviour change and term *formative research,* which deserves to gain wider currency. Communications science taught us about planning for reach and effectiveness with a variety of modern and traditional media.

We named the approach *hygiene promotion* to group it with the health promotion programmes that are gaining currency in developed and less developed countries. This signals the break with the educational approach, towards a broader view of the environmental and structural determinants of behaviour (Green and Kreuter 1991). In theory, health promotion uses public policy, strengthens community action, develops personal skills and creates a supportive environment as well as offering health education to reach gaols of better health (Nutbeam et al 1991). By adopting the term 'promotion' we are not signalling that we are adopting an individualistic, 'lifestyle' approach to placing the blame for ill-health with the person who carries out behaviours leading to poor health, as health promotion has often been accused of doing (see, for example, the 1998 review by Lindblagh). Health promotion still remains an ill-defined and disputed concept, which has considerable theoretical work to do before it can be called a discipline (Bunton and MacDonald (1992). In addition, the word 'hygiene' is so morally loaded that it may prove an impediment to the acceptability of intervention programmes. We have searched in vain for a better term. The use of the term Hygiene Promotion has proved acceptable in developing countries and is steadily gaining currency so we use it *faute de mieux.*

Below we set out some of the essential characteristics of **Hygiene Promotion.**

•Hygiene promotion targets a small number of practices that are likely to be major causes of diarrhoeal disease.

We know that small children mostly come into contact with the pathogens of the endemic diarrhoeas in their own households. We know that these pathogens multiply in the gut and are released into the environment in excreta. Each gram of human stool can contain billions of viruses and millions of bacteria as well as numerous parasite eggs and cysts. We saw in Chapter Three that any practices that prevent faecal material from getting into the domestic environment in the first place are likely to be especially beneficial; if such primary barriers were fully in place there would be less need for the practices that constitute the secondary barriers.

The two primary barriers that keep faecal material out of the child's environment are the safe disposal of stools, and the removal of faecal material from hands after contact with stools. Practically, this means building and using latrines for evacuating child and adult stools, or disposing of them well away from the home environment, or burying them. It also means using soap (or a scouring agent such as mud or ash) to remove particles adhering to the fingers after adults, children and child carers have come into contact with stools. Stool contact occurs during defaecation and during the cleaning up of a child and the evacuation of its stools.

A hygiene promotion programme needs to examine the potential risk factors for diarrhoeal disease which exist in the target communities and to pick out those which carry the greatest risk of disease transmission. Hand-washing with soap after stool contact and safe stool disposal are likely to be primary candidates for hygiene promotion. It is, of course, essential to work with members of the concerned communities to develop practical and feasible safe behaviours that can replace the existing risk practices. One option is to assist communities in acquiring infrastructure such as water supply and latrines, if it is not be universally available. (The way in which this can happen is greatly depended on local opportunities, existing programmes and political organisation. We have not dealt with these problems here, but they are covered in the extensive literature on water and sanitation.) However, if latrines are not immediately available mothers may find that getting their children to use potties, for example, helps them to keep the domestic environment free of faecal material.

•Hygiene promotion programmes target specific audiences

After deciding which practices are most in need of change it is then necessary to identify those people who are the target of the hygiene promotion programme. Are they mothers, children, fathers, the family, opinion leaders, several of these, or other social groups? How many are there in the target communities? Where do they live? Are they at home, at school or at work? Are they a coherent group or are they made up of many different groupings? Who is involved in child-care? Once the programme has chosen and described the main characteristics of its target groups, it is possible to make rational decisions about how many people can reasonably expect to be covered using the resources available.

•Means of motivating changes in hygiene practice come from an understanding of how the target audiences view hygiene

As every social group has internally consistent explanations of diarrhoeal illness, so every group also has coherent notions about hygiene. Though the details vary, every society regards cleanliness as a virtue and every society practices stool avoidance, however poor or 'ignorant' (Chapter Two). Hygiene promotion programmes need to investigate how target communities see hygiene and then use the positive value of cleanliness as the basis for positive messages promoting the target practices. Reasons such as 'My neighbours will respect me' or 'I will be purer and more auspicious' or 'my hands will smell nice' are far better motivators of behaviour change than some theoretical potential risk of children getting diarrhoea. By working with the target groups it is possible to discover their views of the benefits of the safer hygiene practices and what is socially desireable. This provides the basis for a motivational strategy.

•Hygiene messages are positive

We know that communication always works best in a positive atmosphere. People learn best when they laugh (see, for example, the work of Kapadia-Kundu 1994) and are prepared to listen for a long time to a lot of messages if they are entertained. Hygiene promotion needs to generate a feeling of 'the joy of cleanliness', the respect and self respect that it brings. If, on the other hand, hygiene promotion programmes attempt to frighten their audiences they will alienate and repulse them. Hygiene promotion programmes easily fall into the trap of accusing poor people of being dirty and thus responsible for their own illnesses. There is no surer way to wreck a hygiene promotion programme, as Nations and Montez (1996) showed in their investigation of how the inhabitants of a Brazilian shanty town refused to collaborate with a government cholera control programme which was seen as blaming and morally disgracing.

Using only positive messages ensures that the project team cannot fall into, or even appear to fall into victim-blaming mode. This is why we suggest that there be **no mention of doctors, death or diarrhoea** in hygiene promotion programmes. (Of course some specifically educational activities, in staff training or in schools, for example, require some mention of the overall objective of reducing diarrhoeal infection).

•Hygiene promotion programmes identify and use appropriate channels of communication

Achieving effective communication of the messages of a hygiene promotion programme requires an understanding of how the target audiences communicate. We need to know such things as what proportion of each of our audiences listen to the radio, attend social functions or religious events, or go the cinema. In some societies, women may have few channels of communication with the outside world, in which case house-to house-visits will be an essential component of communications activities. Traditional and existing channels of communication are always easier to use than setting up a new system, but the existing systems can only be used effectively if their nature and capacity to reach the target audiences are understood.

•Hygiene promotion programmes use a cost-effective mix of channels of communication

Several channels of communication used concurrently, but always giving the same messages, reinforce each other and are more effective than one used alone (Kotler 1989). There is always a trade-off between reach, effectiveness and cost. Though mass media may have the greatest reach for the least cost per capita, messages are soon forgotten and may have little impact on behaviour. House-to house, face-to-face communications can be highly effective in encouraging behaviour change, but are very expensive per capita. Judgements have to be made to plann a mix of mutually reinforcing media, capable of reaching a substantial proportion of target populations.

•Hygiene promotion is carefully planned, executed, monitored and evaluated.

Hygiene promotion programmes are like any other development programmes, in that they need to be planned, managed, monitored and evaluated. Each planned activity needs to have specific measurable objectives so that progress can be monitored and so that changes can be made as needed. At a minimum, information is required at regular intervals on the outputs of the programme (e.g. how many broadcasts, how many house visits), the population coverage achieved (e.g. what proportion of target audiences attended the street theatre, heard a broadcast?).

Finally, indicators of the impact of the programme on the target behaviours must be collected.

Practical problems

If hygiene promotion appears to be an advance on the way in which hygiene behaviour change has been encouraged in the past, in this form it still a new and relatively untested approach. If results in Burkina Faso and in India have so far been encouraging, hygiene promotion still needs trying and testing, refinement and evaluation. Hygiene promotion certainly faces serious practical difficulties in its application. We still know very little about how such approaches can be integrated with the Primary Health Care Programmes of national governments, requiring as they do, a very different approach to the standard model. If they cannot be integrated then they will be of an ephemeral 'campaign' style of intervention, lasting for a few years and then disappearing when funding fizzles out. We do not know if short campaigns can make lasting differences in social norms. This is one of the questions that we are exploring in the programme in Burkina Faso.

We still do not know how best to dovetail hygiene promotion with infrastructure provision programmes, since it is clear that promoting hygiene requires different skills from well digging or latrine construction. Hygiene programmes will also require management structures that are independent of hardware programmes because gaols and timetabling of activities are very different. Finding enough available, qualified people to carry out such programmes is a perennial problem, and one that will only be resolved if there is a massive shift of resources into training. Nonetheless, the presence of such difficulties does not mean that we should not innovate, or that third world countries should continue to use outdated models for preventive health. Wasting resources on ineffective approaches is even more serious if it happens in the context of severe resource shortages.

Whilst changing human hygiene behaviour is a long and difficult process, getting hygiene educators to change their established practices may be even more difficult. However, if we abandon our old "foggy" approaches to hygiene education and set up systematic and carefully managed hygiene promotion programmes instead, and if we can demonstrate their effectiveness and cost-effectiveness, then we stand a much greater chance that hygiene promotion will be able to contribute to defeating the diarrhoeal infections.

Research needs

If the approach requires practical refinement, it also needs more theoretical development. Three areas need more work: the behaviour of the diarrhoeal pathogens, the behaviour of the human actors and the cost-effectiveness of programmes in achieving behaviour change. Firstly we require a better understanding of the transmission routes of the diarrhoeal pathogens, their behaviour in the environment, and the relative importance of the specific practices that favour their transmission. Secondly, we need to know more of the motivations and goals driving human behaviour in everyday life to help to get health and hygiene behaviour into wider perspective. Finally we need to know about the potential effects of hygiene promotion. Sustained behaviour change can take a long time, though some people adopt new behaviours with instant enthusiasm, others take longer and some will never take them up. We need a basis on which to set quantitative behaviour change objectives and criteria for success and failure. Is a twenty percent increase in the incidence of hand-washing with soap after stool contact good or bad? And how long can we expect it to take for behaviour changes to become general, if ever?

The Dangers of Dirt: Conclusion

Encouraging changes in household practices that relate to the handling and disposal of human stools are potentially one of the most effective means of combating the scourge of diarrhoeal illness in children. Efforts to do this in the past have often been unsystematic and based on outdated models of how to bring about behaviour change in large populations. In this thesis we have tried to examine the subject in a systematic manner and to update our understanding of how we might promote behaviour change.

What then are the useful lessons that can be disseminated from this body of work? We have seen that the very idea of hygiene is a complex one that carries with it a whole collection of connotations and connections. Founded in the psychological and social need for the creation of order, human hygiene behaviour serves to create order and also to prevent disease. Diarrhoeal diseases claim the lives of more than one in four children in the developing world, the majority of these infections are caught in the household and could be prevented by a few simple hygiene practices. Stools are the source of infection, and practices that prevent faecal material from reaching the child, including safe stool disposal and hand-washing with soap after contact with faeces are a priority for behaviour change intervention. However, changing the habits of a lifetime of large populations is no simple enterprise. In this thesis we argued that we cannot succeed in this task if we continue to restrict ourselves to the narrow standard public health perspective on hygiene.

By using research methods that helped us to share how insiders view hygiene in Bobo-Dioulasso, we learned that the concern for hygiene is not primarily for the preservation of health. It is more an important positive social value that serves to enhance dignity, aesthetic values and the quality of life. We learned that mothers already had clear and coherent views about the causes of the diseases that give children diarrhoea. Stool hygiene was not among them. Consequentially, arguing that improving stool hygiene will prevent diarrhoea, as conventional health education does, is unlikely to be effective. However if we go outside the perspective of health and see hygiene from the mothers' point of view, we can use the positive, order creating, life enhancing values of hygiene to offer feasible, attractive and desirable hygiene practices that, if adopted, will lead to the improvement of health. Whilst households struggle for health, they often put a higher priority on their struggle for respect and for a better quality of life. Hygiene can contribute to all of these aspects life.

We also learned from the fieldwork that it is possible to get valid objective measures of human hygiene behaviour, and that structured observation is a useful tool for monitoring and evaluating the success of interventions designed to encourage change in hygiene practices.

Finally, we learned that we can only offer acceptable, feasible and desired behaviour change options if we know what people want. We saw that it is possible to do this relatively simply and rapidly, using formative research that puts together both emic and etic perceptions of hygiene. Interventions to improve public health will only be successful if they learn to combine the perceptions of the insider and the outsider and if they set what people know, do and want at the heart of programme design. Only then will we leave the behind the dangers of dirt in favour of the pleasures of cleanliness.

References

Ajzen I. From intentions to actions: A theory of planned behaviour. In J.Kuhl & J. Beckman (eds), *Action Control: from Cognition to Behavior*. Springer-Verlag, New York, 1985.

Alam N et al. 1989. Mother's personal and domestic hygiene and diarrhoea incidence in young children in rural Bangladesh. *International Journal of Epidemiology* 18 1 242-247.

Alam N, Wojtyniak B, Henry FJ & Rahaman MM. 1989. Mothers' personal and domestic hygiene and diarrhoeal incidence in young children in rural Bangladesh. *International Journal of Epidemiology* 18 242-47.

Altmann J. 1973. Observational study of behaviour: sampling methods. *Behaviour* 44 227-265.

Andreasen A. *Marketing Social Change: Changing Social Behaviour to Promote Health, Social Development and the Environment.* Jossey Bass, SanFrancisco 1995.

Ankur Yuva Chetna Shivir and London School of Hygiene and Tropical Medicine. Diarrhoea and hygiene in Lucknow slums. Lucknow. Unpublished report 1996.

Anokkbongo WW, Odoi-Adome R & Oluju PM. 1990. Traditional methods in management of diarrhoeal diseases in Uganda. *Bulletin of the World Health Organisation* 68 3 359-363.

Armstrong D. 1996. Purity, danger and miasmata. *European Journal of Public Health* 6 109-112.

Baltazar JC and Solon FS. 1989. Disposal of faeces of children under two years old and diarrhoea incidence: a case-control study. *International Journal of Epidemiology* 18 suppl: 16-19.

Bandura A. 1977. Self-efficacy: towards a unifying theory of behaviour change. *Psychological review*, 84 191-215.

Bandura A. 1997. The anatomy of stages of change. *American Journal of Health Promotion* 12 1 8-10.

Becker MH. 1974. The health belief model and sick role behaviour. *Health Education Monographs*, 2, 409-419.

Benenson AS (ed). *Control of Communicable Diseases Manual.* Sixteenth edition. American Public Health Association. Washington, 1995.

Bentley ME, Stallings RY, Fukomoto M, Elder J. 1991. Maternal feeding behaviour and child acceptance of food during diarrhoea, convalescence and health in the central Sierra of Peru. *American Journal of Public Health* 81 1 43-47.

Berger J. *To the Wedding.* Vintage Books, New York, 1996.

Berger P and Luckman J. *The social construction of reality: a treatise on the sociology of knowledge.* Penguin, Harmondsworth, 1967.

Berman P, Kendall K, Bhattacharyya K. 1994. The household production of health: integrating social science perspectives on micro-level health determinants. *Social Science and Medicine* 38 2 205-215.

Bern C, Martines J, de Zoysa I, Glass RI. The magnitude of the global problem of diarrhoeal disease: a ten year update. *Bulletin of WHO* 1992. 70 6 705-714

Biggs R. 1969. *Medicine in Ancient Mesapotamia,* History of Science 8.

Black RE, Brown KH, Becker S. 1984. Effects of diarrhoea associated with specific enteropathogens on the growth of children in rural Bangladesh. *Paediatrics* 73 6 799-805.

Blum, D. et al. 1987. The effects of distance and season on the use of boreholes in Northeastern Imo State, Nigeria. *Journal of Tropical Medicine and Hygiene* 90 45-50.

Boot M. *Hygiene Education in Bangladesh.* Unicef/IRC, the Hague, 1995.

Boot MT and Cairncross S. *Actions Speak: the Study of Hygiene Behaviour in Water and Sanitation Projects.* IRC International Water and Sanitation Centre, The Hague, 1993.

Briscoe J. 1984. Intervention studies and the definition of dominant transmission routes. *American Journal of Epidemiology* 120 449-455.

Briscoe J, Feachem RGF and Mujibar Rahaman M. *Evaluating Health Impact.* IDRC, Ottawa,1985.

Brown DE. *Human Universals.* McGraw-Hill Inc. 1991.

Buchholt H. The impact of the Christian mission on the processes of social differentiation. In: *Continuity, Change and Aspirations: Social and Cultural Life in Minahasa, Indonesia.* Buchholt & Mai (eds). Institute of Southeast Asian Studies, Singapore, 1994.

Bukenya GB and Nwokolo N. 1991. Compound hygiene, presence of standpipe and the risk of childhood diarrhoea in an urban settlement of Papua New Guinea. *International Journal of Epidemiology* 20 534-539.

Bunton R and Macdonald G (eds). *Health Promotion: Disciplines and Diversity.* Routledge, London, 1992.

Burgers L, Boot M, van Wijk C. *Hygiene Education in Water Supply and Sanitation Programmes.* IRC, the Hague, 1988.

Burkert W. *The Orientalizing Revolution: Near Eastern Influence on Greek Culture in the Early Archaic Age.* Harvard University Press, Cambridge USA, 1992. [First published 1931].

Burkert W. *Greek Religion.* Blackwell, Oxford, 1985.

Cairncross AM. 1979. Remarks on a paper by Lund E (1979) The survival of viral pathogens in water and waste in the tropics. Progress in Water Technology 11 1/2 387

Cairncross S. 1987. Ingested dose and diarrhoea transmission routes. *American Journal of Epidemiology* 125 921-925.

Cairncross A, Cliff JL. 1987. Water use and health in Mueda, Mozambique. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 81 51-54.

Cairncross AM. 1990. Health impacts in developing countries: new evidence and new prospects. *Journal of the Institution of Water and Environmental Management* 4 6 571-577.

Cairncross S. 1992. Control of enteric pathogens in developing countries. In: *Environmental Microbiology* pp 157-189 Wiley-Liss Inc, , 1992.

Cairncross S, Blumenthal U, Kolsky P, Moraes L and Tayeh A. 1996. The public and domestic domains in the transmission of disease. *Tropical Medicine and International Health* 1 27-34.

Cairncross S. 1997. More water: better health. *People and the Planet* 6 3.

Chambers R. *Rural Development: Putting the Last First.* OUP Oxford 1989

Chavasse D. 1998. Planning for fly control in sanitation programmes. In: *Sanitation Promotion Kit.* Eds Simpson-Hebert and Woods. WHO In Press.

Chavasse DC, Blumenthal U, Kolsky P. 1994. Fly control in prevention of diarrhoeal disease. *Lancet* 344. 1231.

Chavasse DC, Ahmad N, Akhtar T. 1996. Scope for fly control as a diarrhoea intervention in Pakistan: a community perspective. *Social Science and Medicine* 43. 1289-1294.

Chavasse DC et al. The impact of fly control on diarrhoeal diseases. In preparation.

Cheesmond AK and Fenwick A. 1981. Human excretion behaviour in a schistosomiasis endemic area of the Geizira, Sudan. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 84 101-107.

Clemens JD and Stanton BF. 1987. An educational intervention for altering water-sanitation behaviors to reduce childhood diarrhoea in urban Bangladesh. Application of the case-control method for the development of an intervention. *American Journal of Epidemiology* 125 2 284-291.

Cohen D, Green M, Block C, et al. 1991. Reduction of transmission of shigellosis by control of houseflies (Musca domestica). *Lancet* 337. 993-997.

Cohen ML. Epidemiology of drug resistance: implications for a post-microbial era *Science* 257 1992 1050-55.

Corbin A. *The Foul and the Fragrant: Odor and the French Social Imagination.* Macmillan, London 1996. [Originally published as 'Le Miasme et la Jonquille', 1982.]

Coreil J and Mull D. 1988. Anthropological studies of diarrhoeal illness. *Social Science and Medicine* 27 1 1-3.

Crawford FG and Vermund SH. 1988. Human Cryptosporidiosis. *CRC Critical Reviews in Microbiology* 16 113-59.

Curtis V, Cousens S, Mertens T, Traoré E, Kanki B, Diallo I.1993. Structured observations of hygiene behaviours in Burkina Faso, validity, variability and utility. *Bulletin of WHO* 71 1 23-32.

Curtis V, Kanki B, Mertens T, Traoré E, Diallo I, Tall F, Cousens S. 1995. Potties, pits and pipes: explaining hygiene behaviours in Burkina Faso. *Social Science and Medicine* 41 383-93.

Curtis V. Women and Water in Malange, Angola. MSc dissertation. London School of Hygiene and Tropical Medicine, 1988.

Daniels DL, Cousens SN, Makoae LN, Feachem RG. 1990. A case-control study of the impact of improved sanitation on diarrhoea morbidity in Lesotho. *Bulletin of WHO.* 68 4 455-463.

Davison C, Davey-Smith G, Frankel S. 1991. Lay epidemiology and the prevention paradox: the implications of coronary candidacy for health education. *Sociology of Health and Illness* 13 1-19.

De Swaan A. *In Care of the State: Health Care, Education and Welfare in Europe and the USA in Europe and the USA in the Modern Era.* OUP, Oxford, 1988.

De Zoysa I, Carson D, Feachem RG, et al. 1984. Perceptions of childhood diarrhoea and its treatment in rural Zimbabwe. *Social Science and Medicine* 19 727-34.

Dettwyler KA. 1987. Breast feeding and weaning in Mali: cultural context and hard data. *Social Science and Medicine* 24 633-44.

DeZoysa I. et al. 1991. Why promote breast-feeding in diarrhoeal disease control programmes? *Health Policy and Planning* 6 371-379.

Diamond J. *Guns, Germs and Steel: a Short History of Everybody for the Last 13,000 Years.* Johnathan Cape, London, 1997.

Diehl HS. *Elements of Healthful Living.* Published for the US War Department by McGraw-Hill, USA, 1942.

Douglas M. *Purity and Danger: an Analysis of the Concepts of Pollution and Taboo.* Ark, London 1988. [First published 1966].

Drasar BS and Hill MJ. *Human Intestinal Flora.* Academic Press Inc, London, 1974.

Dumont L. *Homo Heirarchicus: the Caste System and its Implications.* Complete revised English edition, University of Chicago Press, Chicago, 1980. [First published 1966.]

Durkheim E. *The Elementary Forms of the Religious Life.* Collier Books, New York 1961. [First published 1912.]

Engels F. *The Condition of the Working Classes in England.* Oxford University Press, 1993. [First published 1844].

Esrey SA, Feachem RG, Hughes JM. 1985. Interventions for the control of diarrhoeal diseases among young children: improving water supplies and excreta disposal facilities. *Bulletin of WHO* 63 757-772.

Esrey SA, Habicht JP. 1986. Epidemiologic evidence for health benefits from improved water and sanitation in developing countries. *Epidemiology Reviews* 8 117-26.

Esrey SA and Feachem RG. 1989. Interventions for the control of diarrhoeal diseases among young children: promotion of food hygiene. WHO/CDD/89.30.

Esrey SA, Potash JB, Roberts L, Shiff C. 1991. Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis and trachoma. *Bulletin of WHO* 69 5 609-621.

Esrey SA. 1991. Interventions for the control of diarrhoeal diseases among young children: Fly control. WHO/CDD/91.37.

Evans-Pritchard E. *Witchcraft, Oracles and Magic among the Azande of the Anglo-Egyptian Sudan.* Clarendon Press, Oxford, 1937

Ewald P. 1991. Waterborne transmission and the evolution of virulence among gastrointestinal bacteria. *Epidemiology and Infection* 106 83-119.

Ewald PW. *Evolution of Infectious Disease.* Oxford University Press, Oxford, 1994.

Feachem RG. 1982. Environmental aspects of cholera epidemiology. III Transmission and control. *Tropical Disease Bulletin* 79 1-47.

Feachem RG, Hogan RC, Merson MH. (a) 1983. Diarrheoeal disease control: reviews of potential interventions. *Bulletin of WHO* 61 637-640.

Feachem RG, Bradley DJ, Garelick H, Mara DD. (b) *Sanitation and Disease: Health Aspects of Excreta and Wastewater Management.* John Wiley and Sons, Chichester, UK. 1983.

Feachem RG. 1984. Interventions for the control of diarrhoeal diseases among young children: promotion of personal and domestic hygiene. *Bulletin of WHO* 62 3 467-476.

Feachem RG. 1986. Preventing diarrhoea: what are the policy options? *Health Policy and Planning* 1 2 109-117.

Fishbein M and Ajzen M. *Understanding Attitudes and Predicting Social Behaviour.* Prentice-Hall, Englewood-Cliffs NJ, 1980.

Fleiss, J. *Statistical Methods for Rates and Proportions.* John Wiley, New York, 1981.

Foucault M. *The Birth of the Clinic: An Archaeology of Medical Perception.* Tavistock, London,1973.

Galen: *The Medical Writings.* Trans Singer P. London 1997.

Gangarosa RE, Glass RI, Lew JF, Boring JR. 1992. Hospitalizations involving gastroenteritis in the United States, 1985: the special burden of the disease among the elderly. *American Journal of Epidemiology* 135 3 281-90.

Garret L. *The Coming Plague: Newly Emerging Diseases in a World Out of Balance.* Penguin, New York, 1994.

Georges-Courbot MC, Cassel-Beraud AM, Gouandjika I, Monges P, Georges AJ. 1990. A cohort study of enteric campylobacter infection in children from birth to two years in Bangui (Central African Republic) *Transactions of the Royal Society of Tropical Medicine and Hygiene* 84 1 122-125.

Glass RI, Claeson M, Blake PA et al. 1991 Cholera in Africa: lessons on transmission and control for Latin America. *Lancet* 338 791-5.

Grados O, Bravo N, Black RE Butzler JP. 1988. Paediatric campylobacter diarrhoea from household exposure to live chickens in Lima, Peru. *Bulletin of WHO* 66 3 369-374.

Grant FC. *Ancient Roman Religion.* Liberal Arts, New York, 1957.

Green LW and Kreuter MW, Deedes SG and Partridge KB. *Health Education Planning: a Diagnostic Approach.* Mayfield, Palo Alto, CA. 1980.

Green LW and Kreuter MW. *Health Promotion Planning: an Educational and Environmental Approach.* Mayfield, Mountain View, California, 1991.

Hamlin C. *A Science of Impurity: Water Analysis in Nineteenth Century Britain.* University of California Press Berkely 1990. [First published 1951].

Han AM and Moe K. 1990 Household faecal contamination and diarrhoea risk. *Journal of Tropical Medicine and Hygiene* 93 333-336.

Han AM et al. 1986. Personal toilet after defaecation and the degree of hand contamination according to different methods used. *Journal of Tropical Medicine and Hygiene* 89 5 237-241.

Han AM, Hlaing T. 1989. Prevention of diarrhoea and dysentery by hand washing. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 83 128-31.

Hardoy JE, Cairncross S, Satterthwaite D. *The Poor Die Young.* Earthscan London 1990.

Harnett N. 1992. High levels of resistance to Trimethoprim, Cotrimoxazole and other antimicrobial agents among clinical isolates of Shigella species in Ontario, Canada-an update. *Epidemiology of Infection* 109 463-472.

Hellman CG. 1987. Heart disease and the cultural construction of time: the type A behaviour pattern as a western culture bound Syndrome. *Social Science and Medicine* 25 969-79.

Hien FM. Etude des diarrhées aigues infantiles associés aux principales affections en milieu hospitalier pédiatrique de Bobo-Dioulasso (Burkina Faso). These No 10, Unversité de Ouagadougou, faculté des Sciences de la Santé, Ouagadougou, Burkina Faso. 1991.

Hippocratic Writings. Trans: Chadwick J and Mann. Penguin, Harmondsworth, 1983.

Ho MS, Glass RI, Monroe SS, et al. 1989. Viral gastroenteritis aboard a cruise ship. *Lancet* 2 8669 961-965.

Hoque BA, Juncker T, Sack RB, Ali M, Aziz KMA. 1996. Sustainability of a water, sanitation and hygiene education project in rural Bangladesh: a 5-year follow-up. *Bulletin of WHO* 74 4 431-437.

Hutchinson RI. 1956. Some observations on the method of spread of Sonne dysentery. *Monthly Bulletin of the Ministry of Health Public Health Laboratory Service* 15 110-118.

Huttley SRA et al. 1987. Observations on handwashing and defaecation practices in a shanty town of Lima Peru. *Journal of Diarrhoeal Diseases Research* 12 1 14-18.

Huttley SRA. 1990. The impact of inadequate sanitary conditions on health in developing countries. *World Health Statistical Quarterly* 43.

Huttley SRA, Morris SS and Pisani V. 1997. Prevention of diarrhoea in young children in developing countries. *Bulletin of WHO* 75 2.

INSD (Institut National de la Statistique et de la Démographie), Recensement Général de la Population 1985 Ouagadougou, 1988.

Johnson A. 1975. Time allocation in a Machiguenga village. *Ethnology* 14 301-310.

Jordaan RE. Folk Medicine in Madura (Indonesia). Doctoral thesis, Leiden University, 1985.

Kaltenthaler E, Chawira F, Waterman R. Traditional handwashing in Zimbabwe and the use of the mukombe: microbiological and behavioural aspects. Harare Zimbabwe, Blair Research Laboratory. Quoted in Boot & Cairncross 1993.

Kanki B, Curtis V, Mertens T, Traoré E, Cousens S, Tall F, Diallo I. 1994. Des croyances aux comportements: diarrhée et pratiques d'hygiène au Burkina Faso. *Cahiers Santé* 4 335-9.

Kapadia-Kundu N. An empirical test of the Sadharanikaran communication theory to defecation hygiene behavior: Evaluation of a child to community intervention in Maharashtra, India. Doctoral thesis, Johns Hopkins University, Baltimore, Maryland, 1994.

Khan MU. 1982. Interruption of shigellosis by handwashing. *Transactions of the Royal Society of Tropical Medicine and Hygiene.* 76 164-168

Kirchhoff LV et al. 1982. Feasibility and efficacy of in-home water chlorination in rural North-Eastern Brazil *Journal of Hygiene*, Camb. 94 173-180. In Boot & Cairncross 1993.

Kirkwood BR. Diarrhea. In *'Disease and Mortality in Subsaharan Africa'*. Feachem RGFand Jamieson DT (eds). OUP/World Bank, Oxford, 1991.

Knittle MA, Eitzman DV, Baer H. 1975. Role of hand contamination of personnel in the epidemiology of gram-negative nosocomial infections. *The Journal of Paediatrics* 86 3 433-437.

Kotler P and Roberto E. *Social Marketing: Strategies for Changing Public Behavior.* The Free Press, New York, 1989.

Kroger A. 1983. Health interview surveys in developing countries: a review of the methods and results. *International Journal of Epidemiology* 12 4 465-481.

Lanata CF. Problems of measuring the impact of hygiene practices on diarrhoea in a hygiene intervention study. In*: Studying Hygiene Behaviour: Methods, Issues and Experiences.* Cairncross & Kochar (eds). Sage, New Delhi, 1994.

Lang T, Lafaix C, Fassin D, et al. 1986. Acute respiratory infections: a longitudinal study of 151 children in Burkina Faso. *International Journal of Epidemiology* 15 4 553-60.

Leslie J. 1989. Women's time: a factor in the use of child survival technologies. *Health Policy and Planning* 4 1-16.

Lindbladh E, Lyttkens CH, Hanson BS, Östergren P-O. 1998. Equity is out of fashion? An essay on autonomy and health policy in the individualised society. *Social Science and Medicine* 46 8 1017-1025.

Loevinsohn BP. 1990. Health education interventions in developing countries: a methodological review of published articles. *International Journal of Epidemiology* 19 788-794.

London School of Hygiene and Tropical Medicine. Perceptions and practices relating to diarrhoea and hygiene in North Yorkshire. Unpublished report. London, June 1996.

Maina-Ahlberg B. 1979. Beliefs and practices concerning treatment of measles and acute diarrhoea among the Akamba. *Tropical and Geographical Medicine* 31 139-148.

Malinowski B. *A Scientific Theory of Culture and Other Essays.* University of North Carolina Press, Chapel Hill, 1944.

Martines J, Phillips M, Feachem RGA. Diarrhoeal Disease. In: *Evolving Health Sector Priorities in Developing Countries.* Jamieson DT & Mosley WH. (eds). World Bank , Washington DC, 1991.

Mcdonald G and Bunton R. 1992. Health promotion. In*: Health Promotion: Disciplines and Diversity.* Bunton and Mcdonald (eds). Routledge, London, 1992.

McGuire WJ. Inducing resistance to persuasion: some contemporary approaches. In Advances. In *Experimental Social Psychology.* Berkowitz, (ed). Academic Press, San Diego. 1964.

McGuire WJ. *Theoretical Foundations of Campaigns.* In Public Communication Campaigns. R.E. Rice & W.J. Paisley (eds) Sage, Beverly Hills, California, 41-42, 1981.

MacLaughlin T. *Dirt; A Social History as Seen Through the Uses and Abuses of Dirt.* Dorset Press, 1971.

Mertens TE, Fernando MA, Cousens SN, Kirkwood BR, Marshall T, Feachem RG. 1990. Childhood diarrhoea in Sri-Lanka: a case-control study of the impact of improved water sources. *Tropical Medicine and Parasitology* 41 98-104.

Mertens TE Jaffar S, Fernando MA, Cousens SN, Feachem RG. 1992. Excreta disposal and latrine ownership in relation to childhood diarrhoea in Sri Lanka. *International Journal of Epidemiology* 21 6 1157-64.

Mertens TE and Carael M. 1995. Sexually transmitted diseases, genital hygiene and male circumcision may be associated: a working hypothesis for HIV prevention. *Health Transition Review* 5 104-108.

Mølbak K, Hoyling N, Ingholt L, da Silva APJ, Jepsen S, Aaby P. 1990. An epidemic outbreak of cryptosporidiosis: a prospective community study from Guinea Bissau. *Pediatric Infectious Disease Journal* 9 566-570.

Mosley WH and Chen LC. An analytical framework for the study of child survival in developing countries. *Population and Development Review* 10 (suppl.), 25-45 1984.

Motarjemi Y, Käferstein F, Moy G and Quevedo F. 1993. Contaminated weaning food: a major risk factor for diarrhoea and associated malnutrition. *Bulletin of WHO* 71 1 79-92.

Nations M and Montez L.1996. "I'm not dog no" cries of resistance against a cholera control programme in North-East Brazil. *Social Science and Medicine* 43 6 1007-1024.

Nesse RM and Williams CG. *Evolution and Healing.* Weidenfeld and Nicolson, London, 1995.

Neu HC. 1992. The crisis in antibiotic resistance. *Science* 257 1064-73.

Niehof A. The problematic relationship between culture and development. In *Culture, Development and Communication,* eds Shadid WA and Nas PJ. Centre for non-Western Studies, Leiden, Netherlands, 1993.

Niehof A. Traditional medication at pregnancy and childbirth in Madura, Indonesia. In: *The Context of Medicines in Developing Countries.* Van der Geest S and Reynolds White S (eds). Kluwer Academic Publishers, Dordrecht ,1988.

Nutbeam D, Blakey V, Pates R. 1991. The prevention of HIV infection from injecting drug use-a review of health promotion approaches. *Social Science and Medicine* 33 9 977-983.

Oo Khin Nwe, Sebastian AA, Aye Tin. 1989. Carriage of enteric bacterial pathogens by house flies in Yangon, Myanmar. *Journal of Diarrhoeal Diseases Research* 7 3&4, 81-84.

Parker R. *Miasma: Pollution and Purity in Early Greek Religion.* Clarendon Press, Oxford, 1996. [First published 1983]

Patel VL, Eisemon TO, Arocha JF. 1988. Causal reasoning and the treatment of diarrhoeal disease by mothers in Kenya. *Social Science and Medicine* 27 111277-1286.

Patton MQ. *Qualitative Evaluation and Research Methods.* Sage, London, 1990.

Pavlov I. *Conditioned Reflexes.* Oxford University Press, London, 1927

Payer L. *Medicine and Culture.* Gollancz, London, 1990.

Peasey A and Blumenthal U. 1991. Use of time-point direct observation in the measurement of hygiene behaviour associated with irrigation with waste water. Paper presented to the Workshop on the Measurement of Hygiene Behaviours. Oxford. 8-12th April.

Pelto P and Pelto G, *Anthropological Research: the Structure of Enquiry.* Cambridge University Press, 1979.

Pickering H. 1991. Anthropological methods used in the Gambian MRC AIDS research programme. Paper presented to the Workshop on the Measurement of Hygiene Behaviours. Oxford. 8-12th April.

Pickstone JV. Dirt, dearth and fever epidemics: rewriting the history of British 'public health', 1780-1850. In: *Epidemics and Ideas: Essays on the Historical Perception of Pestilence.* Ranger T and Slack P (eds). Cambridge University Press, 1992.

Pinfold JV and Horan N. 1996. Measuring the effect of a hygiene behaviour intervention by indicators of behaviour and diarrhoeal disease. *Transactions of the Royal Society of Tropical Medicine and Hygiene.* 90 366-371.

Pinker S. *The Language Instinct.* Morrow and co, New York , 1994.

Pinker S. *How the Mind Works.* Penguin Press, Harmondsworth, 1998. (First published 1997)

Pollock K. 1988. On the nature of social stress: production of a modern mythology. *Social Science and Medicine* 26 381-92.

Popper KR. *The Logic of Scientific Discovery.* Hutchinson, London, 1959.

Potter J and Wetherell M. *Discourse and Social Psychology: Beyond Attitudes and Behaviour.* Sage, London, 1987.

Prochaska J. *Systems of Psychotherapy: a Transtheoretical Analysis.* Dorsey Press, Belmont 1979.

Prochaska J, DiClemente C. Stages of change in the modification of problem behaviours. In *Progress in Behaviour Modification* vol 28. Hersen, Eisler, Miller (eds) Sycamore, Terre Haute Indiana, 1992.

Proctor R. Racial Hygiene: *Medicine Under the Nazis. Harvard University Press,* Cambridge Mass, 1988.

Projet Diarrhées. Unpublished report 1994.

Radley A. *Making Sense of Illness: the Social Psychology of Health and Disease.* Sage, London, 1994

Rahaman M et al. 1985. Impact of environmental sanitation and crowding on infant mortality in rural Bangladesh. *Lancet* ii 28-31.

Rappoport, R. *Pigs for the Ancestors.* Yale University Press. 1967.

Reynolds R. *Cleanliness and Godliness.* Harvest, New York 1975. [First published 1946].

Reves RR, Morrow AL, Bartlett AV, Caruso CJ, Plumb RL, Lu BT, Pickering LK.1993. Child day care increases the risk of clinic visits for acute diarrhea and diarrhea due to rotavirus. *American Journal of Epidemiology* 137 1 97-107.

Rogoff B. 1978. Spot observation: an introduction and examination. *Quarterly Newsletter of the Institute for Comparative Human Development.* Rockefeller University 2 2C 21-26.

Rosen G. *A History of Public Health.* Johns Hopkins University Press, Baltimore, 1993. [First published 1958.]

Rowland MGM. Bacterial diarrhoeas: contaminated food and water. In *Diarrhoeal Disease and Malnutrition-a Clinical Update.* pp 47-62. Gracey M, (ed). Churchill Livingstone, Edinburgh,1985

Rozin P.and Vollmecke TA. 1986 Food likes and dislikes. *Annual Review of Nutrition* 6 433-456.

Said B and Drasar B. 1996. Vibrio Cholerae. In*: Cholera and the Ecology of Vibrio cholerae.* Drasar & Forst (eds). Chapman & Hall, London, 1996.

Santosham M, Sack RB, Reid R, Black R, Croll J, Yolken R, Aurelian L, Wolff M, Chan E, Garrett S, et-al. 1995. Diarrhoeal diseases in the White Mountain Apaches: epidemiologic studies. *Journal of Diarrhoeal Disease Research* 13 1 18-28

Sartre J-P. *L'Etre et le Néant: Essai d'Ontologie Phénomenologique.* Librairie Gallimard, Paris, 1943.

Sauerborn A, Nougtara A, Diesfeld HJ. 1989. Low utilisation of community health workers: results from a household interview survey in Burkina Faso. *Social Science and Medicine* 29 10 1163-1174.

Schopper D. 1990. Research on AIDS in interventions in developing countries: state of the art. *Social Science and Medicine* 30 12 1265-1272.

Schwarz-Cowen R. *More Work for Mother: the Ironies of Household Technology from the Open Hearth to the Microwave.* Basic Books, New York, 1983.

Scrimshaw S, Hurtado E. *Rapid Assessment Procedures for Nutrition and Primary Health Care.* UCLA Latin American Centre, Los Angeles 1987.

Sircar BK, Sengupta PG, Mondal SK et al. 1987. Effect of handwashing on the incidence of diarrhoea in a Calcutta slum. *Journal of Diarrhoeal Disease Research* 5 112-4.

Skinner BF. 1981. Selection by Consequences. *Science* 213 501-515.

Skinner BF. *The Behaviour of Organisms.* Appleton-Century-Crofts, New York ,1938.

Smith PG and Day NE. 1984 The design of case-control studies: the influence of confounding and interaction effects. *International Journal of Epidemiology* 13 356-365.

Sophocles. *Antigone, Oedipus the King, Electra.* Trans:Kitto. Oxford World Classics, 1994.

Stanton BF and Clements JD. 1986. Soiled saris: a vector of disease transmission? *Transactions of the Royal Society of Hygiene and Tropical Medicine* 80 485-488.

Stanton BF and Clemens JD. 1987. An educational intervention for altering water-sanitation behaviors to reduce childhood diarrhea in urban Bangladesh. II. A randomized trial to assess the impact of the intervention on hygienic behaviors and rates of diarrhea. *American Journal of Epidemiology* 125 2 292-301.

Stanton BF et al. 1987.Twenty-four-hour recall, knowledge-attitude-practice questionnaires, and direct observations of sanitary practices: a comparative study. *Bulletin of WHO* 65 2 217-222.

Stapleton MC. 1989. Diarrhoeal diseases: Perceptions and practices in Nepal. *Social Science and Medicine* 28 6 593- 604.

The Koran. Trans: Dawood NJ. Peguin, Harmondsworth, 1995.

Tomes N. 1990. The private side of public health: sanitary science, domestic hygiene and the germ theory, 1870-1900. *Bulletin of the History of Medicine.* 64 1990.

Tones BK. 1983. Health education and health promotion: new directions. *Journal of the Institute of Health Education* 23 16-21.

Tooby J and Cosmides L. The psychological foundations of culture. In*: The Adapted Mind: Evolutionary Psychology and the Generation of Culture.* Barkow JH, Cosmides L, Tooby J (eds). Oxford University Press,1992.

Traoré E, Cousens S, Curtis V, Mertens T, Tall F, Traoré A, Kanki B, Diallo I, Rochereau A, Chiron J-P, Megraud JP. 1994. Child defecation behaviour, stool disposal practices and childhood diarrhoea in Burkina Faso; results from a case-control study. Journal of *Epidemiology and Community Health* 48 270-275.

UNICEF. Planning for health and socio-economic benefits from water and environmental sanitation programmes: a workshop summary. April 21st-22nd, 1993, New York.

UNICEF. *The State of the World's Children* 1989. Oxford University Press, U.K. 1989.

Van Wijk C and Murre T. *Motivating Better Hygiene Behaviour: Importance for Public Health, Mechanisms of Change.* UNICEF/IRC, New York, 1995.

VanDerSlice J & Briscoe J. 1991. All coliforms are not created equal: a comparison of the effects of water source and in-house contamination on infantile diarrhoeal disease. *Water Resources Research.* Quoted in: Boot & Cairncross 1993.

Vaughan M. Syphillis in colonial East and Central Africa: the social construction of an epidemic. In: *Epidemics and Ideas: Essays on the Historical Perception of Pestilence.* Ranger T and Slack P (eds). Cambridge University Press, 1992.

Victora CG, Smith PG, Vaughan JP, Nobre C, Lombardi C, Teixeira AMB,Fuchs SC, Moreira LP, Gigante LP Barros FC. 1988. Water supply, sanitation and housing in relation to the risk of infant mortality from diarrhoea. *International Journal of Epidemiology.* 17 651-653

Vigarello G. *Concepts of Cleanliness: Changing Attitudes in France Since the Middle Ages.* Cambridge University Press, 1988.

Wagner EG and Lanoix JN.. *Excreta Disposal for Rural Areas and Small Communities,* WHO Monograph series No 39, Geneva. 1958.

Warren KS et al. Helminth infection. In: *Evolving Health Sector Priorities in Developing Countries.* Jamieson DT & Mosley WH. (eds). World Bank , Washington DC, 1991.

White GF, Bradley DJ and White, AU. *Drawers of Water: Domestic Water Use in East Africa.* Chicago University Press, 1972.

Wilson JM, Chandler GN, Muslihatun, Jamiluddin. 1991. Hand washing reduces diarrhoea episodes: a study in Lombok, Indonesia. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 85 819-21.

World Bank. *World Development Report 1993.* Investing in Health. OUP World Bank, Oxford, 1993.

WHO. Improving water and sanitation hygiene behaviours for the reduction of diarrhoeal disease: the report of an informal consultation. Geneva 18-20 May 1992, WHO/CDD/CWS Geneva, 1993.

WHO. *The World Health Report 1996.* WHO, Geneva, 1996.

Yeager B et al. 1991. Transmission factors and socio-economic status as determinants of diarrhoeal incidence in Lima, Peru. *Journal of Diarrhoeal Diseases Research* 9 3 186-193.

Yoder P, Oke E, Yanka B. Ethnomedical research for developmental purposes: Examples from Nigeria and Zaire. In*: Notes from the Field in Communication for Child Survival.* Seidel RE. (ed). Academy for Educational Development, Washington DC, 1993.

Young B, Briscoe J. 1987. A case-control study of the effect of environmental sanitation on diarrhoea morbidity in Malawi. *Journal of Epidemiology and Community Health.* 42 83-88.

Zeitlyn S and Islam 1991. The use of soap and water in two Bangladeshi communities: implications for the transmission of diarrhoea. *Review of Infectious Diseases* 13 (suppl 4) S259-64.

Résumé

Encourager les changements de comportement dans les pratiques d'hygiène, est potentiellement un des moyens les plus efficaces de réduction de l'impact global des maladies diarrhéiques qui tuent un nombre estimé à 3,3 millions d'enfants par an. Cependant, les efforts d'amélioration de l'hygiène dans les pays en voie de développement se sont soldés par un succès mitigé. On peut énumerer quelques raisons suivantes :
- la complexcité du thème de l'hygiène,
- la difficulté d'identifier et de cibler singulièrement quelques pratiques ménagères spécifiques à risque,
- le comportement hygiénique difficilement mesurable avec précision,
- les méthodes pour comprendre ce que signifie hygiène pour les populations n'ont pas été disponibles à grande échelle,
- les interventions ont rarement été planifiées de manière systématique.

Cette thèse présente les résultats de neuf ans de travaux dans la ville de Bobo-Dioulasso, au Burkina Faso (et ailleurs) sur ces problèmes. Le premier Chapitre détaille le sujet de l'hygiène en général et lui confère des origines duales dans la recherche de l'ordre individuel et social, et également dans le besoin d'éviter la maladie. Le second Chapitre évalue les pratiques probables à risque pour la santé. De la revue bibliographique, il est déduit des pratiques susceptibles de réduire la contamination fécale de l'environnement ménager, telles l'évacuation sauve des selles et le lavage des mains au savon après contact avec les selles, qui sont probablement d'une grande valeur protectrice. Le problème de mesure du comportement hygiénique est analysé dans les Chapitres 4 à 6, d'où nous en concluons que les observations structurées sont de loin les plus valables et constituent les instruments pratiques dont nous disposons pour enregistrer les pratiques d'hygiène.

La thèse développe la question de savoir comment l'hygiène était comprise par les mères à Bobo-Dioulasso et conclut que celles-ci percevaient très peu de connection entre maladie diarrhéique et hygiène, mais que l'hygiène était très importante plutôt comme une valeur sociale positive pour elles. Dans les derniers Chapitres, les leçons tirées des travaux de Bobo-Dioulasso sont assemblées dans un paradigme servant de modèle pour l'élaboration des futures programmes de promotion d'hygiène. Il définit une gamme de méthodes qualitatives et quantitatives à appliquer dans le cadre d'un programme systématique de recherche formative conduisant à la conception de programmes de promotion d'hygiène. Ce que les gens connaissent, font et veulent, y est combiné avec la connaissance scientifique. L'efficacité de cette nouvelle approche de la promotion de l'hygiène est actuellement en cours d'essai.

Samenvatting

Het stimuleren van hygienisch gedrag is potentiëel één van de meest effectieve manieren om wereldwijd levensbedreigende diarree te bestrijden. Naar schatting sterven er jaarlijks wereldwijd 3,3 miljoen kinderen aan ernstige diarree als gevolg van ziekte, waarvan de meesten in ontwikkelingslanden. Pogingen om hygiënisch gedrag in deze landen te bevorderen zijn echter weinig succesvol gebleken. Redenen hiervoor zijn:
- Hygiëne is een complex onderwerp.
- Het is moeilijk om uit het geheel van huishoudelijke praktijken de specifieke praktijken te identificeren en aan te pakken die een risico inhouden.
- Het is moeilijk om gedrag dat met hygiëne te maken heeft accuraat te meten.
- Methoden om inzicht te krijgen in wat hygiëne voor mensen betekent en hoe goede hygiëne kan worden bevorderd, zijn schaars.
- Interventies op het terrein van hygiëne zijn in het algemeen weinig systematisch gedaan.

Dit proefschrif presenteert de resultaten van meer dan negen jaar werken aan oplossingen voor bovengenoemde problemen in de stad Bobo-Dioulasso (Burkina Faso) en elders. In het eerste hoofdstuk wordt het onderwerp hygiëne in het algemeen besproken. Er wordt gesteld dat de motivatie voor hygiënisch gedrag voortkomt uit ten eerste de behoefte aan individuele en sociale orde en ten tweede de noodzaak van het voorkomen van ziekten. In het tweede hoofdstuk wordt aandacht geschonken aan praktijken op het terrein van persoonlijke hygiëne met een hoog gezondheidsrisico. Op basis van literatuuronderzoek kan worden geconcludeerd dat een tweetal handelwijzen bij uitstek dit risico lijken te verminderen en zekere bescherming tegen ziekte lijken te geven. De eerste is het veilig wegwerpen van faecaliën, de tweede het wassen van de handen met zeep na contact ermee. Het probleem van het goed meten van hygiënisch gedrag wordt in de volgende hoofdstukken besproken. Er wordt geconcludeerd dat gestructureerd observeren waarschijnlijk de meest geldige resultaten oplevert en de meest practische manier is om hygiënisch gedrag vast te leggen.

Daarna gaat het proefschrift verder met het aan de orde stellen van de vraag welke betekenis moeders in Bobo-Dioulasso aan hygiëne toekennen. De conclusie is dat zij weinig verband zien tussen hygiëne enerzijds en diarree bij hun kinderen anderzijds, maar dat hygiëne wel een positieve sociale waarde voor hen vertegenwoordigt. In de laatste hoofdstukken worden de lessen die kunnen worden getrokken uit het onderzoek in Bobo Dioulasso verwerkt tot een conceptueel kader dat kan worden gebruikt voor het ontwerpen van hygiëne promotieprogramma's in de toekomst. Het kader is gericht op het verzamelen van wetenschappelijke kennis over wat mensen weten, denken en doen met betrekking tot hygiëne. Het berust op een gecombineerde toepassing van kwalitatieve en kwantitatieve onderzoeksmethoden. In een lopend onderzoeksprogramma over hygiëne promotie wordt de effectiviteit van deze benadering momenteel getoetst.

About the Author

Valerie Curtis was born in Cumberland, England in 1958. She attended the Queen's School in Chester before going to Leeds University to study Civil and Architectural Engineering. On completion of her degree she worked for four years with a multi-disciplinary building design team in London and in Iraq. She then spent a number of years working on rural water and sanitation programmes in Eastern Africa with Oxfam, Save the Children and the Ethiopian Red Cross. She completed her MSc in Community Health in Developing Countries at the London School of Hygiene and Tropical Medicine in 1988 and has worked for the London School ever since. She was co-ordinator of a diarrhoeal diseases research programme in Burkina Faso and is Principal Investigator of a trial of a Hygiene Promotion Programme in Burkina. Now Lecturer in Hygiene Promotion she works on a number of research programmes concerned with hygiene behaviour and social marketing in Africa, India, the Netherlands and the UK. Apart from travelling and bringing up two children, Valerie enjoys climbing, gardening and reading about evolution.