

Epidemiological perspective of domestic and personal hygiene in India

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When the application of epidemiology moves from mass phenomenon in a society or community to the specific family or individual level occurrences, new vistas unfold. The classical epidemiological triad, with its multi-mode influences and interactions, becomes modified as a result of several lifestyle factors coming into operation. It is well known that even under severely adverse climatic conditions, microbes are able to survive, and even propagate, if an appropriate micro-climate is encountered. This principle also applies to human beings. Many incidences of disease or ailments, occurrence or absence, can be traced to the home habitat, micro-ecosystem, human behaviour and lifestyles. Hygienic practices are largely a matter of behaviour and usually have biological and social origin. Human behaviour is influenced and determined by social traditions, customs and culture. Furthermore, factors such as health consciousness, practical knowledge of health sciences, motivation and concern for taking steps for promoting health and preventing disease, can change behaviour and make the lifestyle conducive to health. In a village or slum area, families live in more-or-less the same environment. However, in the event of an outbreak of a communicable disease, many escape the attack. While some experience frequent episodes of illness, others continue to live fairly healthily. Obviously, several social and cultural factors and associated human behaviours seem to make the difference between health and disease. This discussion examines the domestic and personal hygiene in its epidemiological perspective.

Keywords: Epidemiology; lifestyle factors; human behaviour; hygiene; sanitation; health; disease.

Introduction

Hygiene is not just about cleanliness, but also about the conditions, activities and practices which protect health and prevent diseases. Association between hygiene and epidemiology is close for two reasons: (a) both share a common objective of health protection and disease prevention; and (b) by finding determinants of health and disease, epidemiology helps to rationalise hygienic practices. The environment contains much that can be harmful to humans, such as the disease-producing or pathogenic micro-organisms, vectors like mosquitoes, infected animals, and water and air contaminated with harmful germs. Domestic and personal hygiene creates a kind of a sanitary barrier and helps to prevent infectious diseases. This paper will focus on preventive rather than the promotive aspects of hygiene.

Epidemiology of infectious diseases

Infectious disease is the deleterious effect of interaction between humans, infectious agents and the environment. Unless these interactions and inter-relationships are properly understood, it is

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not possible to undertake effective, feasible, cost-effective and socially agreeable measures to prevent infectious diseases (Fig. 1).

The multitude of infectious agents includes viruses, bacteria, cocci, amoebae and worms. Their ability to produce disease depends on their potency, how favourable the environment is and the individual's susceptibility. The state of environmental sanitation influences both the infecting agent and any of the individuals exposed to that environment. The significance of hygiene becomes greater when environmental sanitation is poor and *vice versa*. Provisions, such as safe water supply, sanitary disposal of excreta and other wastes, good housing, genial climate, and pollution-free surroundings, provide effective barriers to the spread of infectious diseases. There are many human-related factors that determine whether a person is susceptible or resistant to an invading infective agent. Susceptibility to infection rests on lifestyle, behaviour and mind-set. Lifestyle factors that provide protection from infectious diseases include: positive health behaviour, healthy housing, safe occupation and work place, interest in health preservation and disease prevention, sustainable income, nutrition security, food hygiene, sanitary facilities such as for excreta disposal and safe drinking water, personal hygienic practices including washing hands before meals and after using the toilet, and good public health services. Protection has to be provided at the community, family and individual level.

Domestic and personal hygiene

On a personal level, hygiene consists of health consciousness, cleanliness, handwashing, safe drinking water, sanitary disposal of waste, freedom from addiction to tobacco and/or alcohol. Domestic and personal hygiene and the behaviour, habits and practices of its members determine the health of a household. Hygiene practice involves active efforts by every individual and family and is best instilled early on in childhood. Fig. 2 shows various conditions, habits, behaviour and practices that influence domestic and personal hygiene.

Hygiene is largely a matter of human behaviour, which is determined by social traditions, customs and culture. Furthermore, health consciousness and awareness of factors injurious or conducive to health, and motivation and concern for taking steps to protect health and prevent disease, can change behaviour and promote a healthy lifestyle. In everyday life many harmful conditions threaten exposure to infective agents but steps can be taken to limit these.

Washing hands before eating has been shown to reduce the spread of dysentery through contact by 85% (Mosley 1985). Active efforts are possible only with the proper mind-set and if there is motivation to keep disease away. Habits such as defecation in the open are cultural. With urbanisation, modern housing, health development and national sanitation programmes, the use of sanitary latrines are on the increase. Such environmental adaptations at domestic or

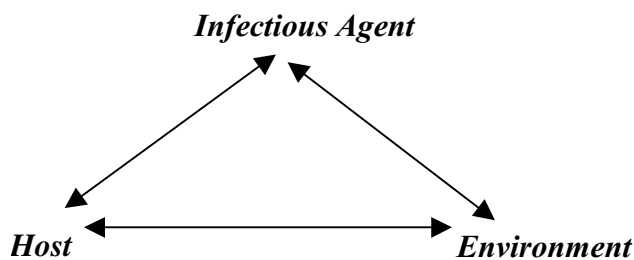


Fig. 1. Classical epidemiological triad.

household situation result in variations in the degree of exposure to the risk of infection and other epidemiological factors which are locally significant and determine the state of familial and individual health or disease. What are these new parameters?

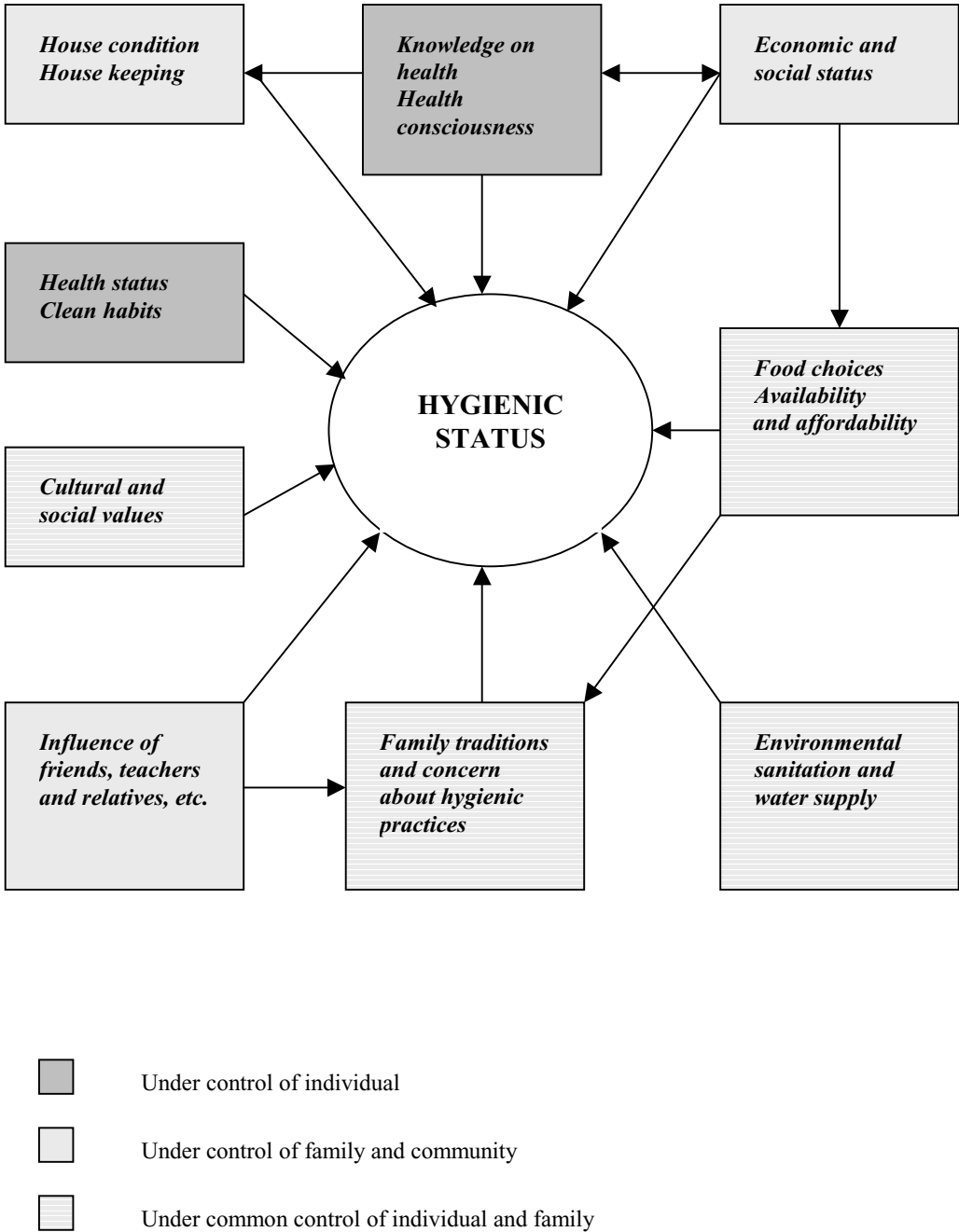


Fig. 2. Determinants of domestic and personal hygiene.

Infectious disease epidemiology at the basic level

Ultimately, the most important determinant of disease is the body–brain–mind complex and not pathogens *per se*. This is *Ayurveda* theory of causation of disease, which is found in ancient literature and has long been recognised in India. Everybody is exposed to disease-producing agents but only a few become infected with disease, and in this regard hygiene seems to play an important role. Whenever health is undermined, we become vulnerable to infectious diseases.

Life and behaviour of an individual who is health conscious will be quite different from that of another person who is indifferent to health or personal hygiene. An enlightened person acquires knowledge, seeks advice, and makes an effort to improve hygiene and health behaviour, while a person or family who is apathetic does not care about what happens to them or their surroundings. Every community has these two kinds of people and the magnitude of prevalence of infectious disease in any community depends on the proportion and distribution of these two types of people. Therefore, it is not uncommon to encounter unaffected persons or families, even in an event or outbreak of infectious disease in the locality. It is important to note that a community which observes simple rules of hygiene is more healthy and free from infectious disease than one which does not. Provision of a free water supply, immunisation services, sanitary conveniences, or health education, may not necessarily benefit people, if these facilities are used indifferently or not at all.

Infectious diseases amenable to hygiene

The causal relation between environment and infectious disease is shown in Table 1. Priority given to an infectious disease depends on severity, morbidity, mortality, socio-economic impact and amenability to public health measures. Below is a list of diseases which can be reasonably controlled by hygienic practices:

- Water- and faecal-borne diseases: diarrhoea, cholera, poliomyelitis, dysentery, typhoid fever, infectious hepatitis, amoebiasis, food poisoning and intestinal worms.
- Contact infections: sexually transmitted diseases, trachoma and scabies.
- Zoonotic infections: rabies, tetanus and leptospirosis.
- Arthropod-borne diseases: malaria and dengue fever.
- Airborne diseases: tuberculosis, pneumonia in children, measles, whooping cough, diphtheria, mumps, etc.

Table 1. Causal relation between environment and infectious diseases

Exposure item	Relationship to infectious diseases			
	Respiratory	Diarrhoeal	Vector-borne	Other
Polluted air	✓			
Excreta and household wastes		✓	✓	✓
Polluted water or poor water management		✓	✓	✓
Polluted food		✓		✓
Poor housing	✓		✓	✓
Global environmental change		✓	✓	

These infectious diseases cannot be prevented through hygiene alone—there are other measures to prevent infectious diseases.

Epidemiology of domestic and personal hygiene

When epidemiology moves from a population phenomenon to the specific family or individual level a unique process of socialisation of epidemiology begins. People are no longer mere 'subjects' for study; the families and individuals become the targets to improve hygiene and prevent infectious diseases. The classical epidemiological triad is modified as a result of lifestyle factors like hygiene coming into operation. The macro-environment withers into the immediate surroundings, micro-habitat, micro-climate or micro-ecosystem, and even the distinction between agent and host becomes blurred. The issues become pre-eminent and not the methodology.

Even under severely adverse climatic conditions, microbes are able to survive and even propagate, if an appropriate microclimate is encountered. This rule also applies to humans. At the family level, interactions between the individuals and their surroundings become distinct and specific. Physical aspects of interactions between individuals and their surroundings govern familial and personal behaviour. Thus, availability, instruction and common use of facilities, such as washbasins or latrines, will encourage people to wash hands or stop indiscriminate defecation. Correspondingly, psychological and spiritual aspects of exchanges and interactions evolve into a mind-set, e.g. taking a bath, use of soap or abstention from alcohol. Similarly, some individuals, for instance, become highly health conscious as soon as their diabetic state is detected and observe strict regularity and moderation. The mind-set decides—some individuals prefer home food because they know it is 'safe' and wholesome, while others relish café cuisine for the service, pomp and taste. On the other hand, when obliged to eat food outside the home, an individual who is health conscious will be particular in selecting appropriate foodstuffs. Fig. 3 depicts this evolutionary process of spin-off of exchanges and interactions influencing occurrence of infectious diseases at the fundamental level. Several lifestyle patterns emerge depending on the influence of different factors listed in Table 2.

Many traditions and customs have become ritualistic or meaningless and the hygienic principles behind these practices lost. For instance, indiscriminate spitting is largely due to the lack of aesthetic and civic sense, rather than a deliberate act to pollute the environment or promote the spread of infection. Similarly, many people do not spit simply because they regard it as unstylish or a sign of backwardness, and not because of an awareness of the risk of tuberculosis. Merely telling people that the habit is unhygienic will have little impact. On the other hand, factors such as health awareness, knowledge of health and disease, and willingness to take steps to prevent diseases, do change behaviour. A good example is the increased use of bottled mineral water for drinking while on travel or eating out. This type of behavioural change helps to prevent alimentary infections.

Health behaviour is modified by a change of mind-set. An individual may use a particular health facility or follow a hygienic practice, but this does not guarantee that they will necessarily continue to use the available facilities. Many incidences of disease or their absence are due to differences in micro-ecosystems, human behaviour and lifestyles. Improvement in public health will certainly prevent infectious diseases in some families, but unfortunately this may not be universal for everybody. The focus of epidemiology at the domestic and personal level has to remain finding the causal factors operating in a particular family or individual so that appropriate corrective measures can be applied, and ensuring that these measures are

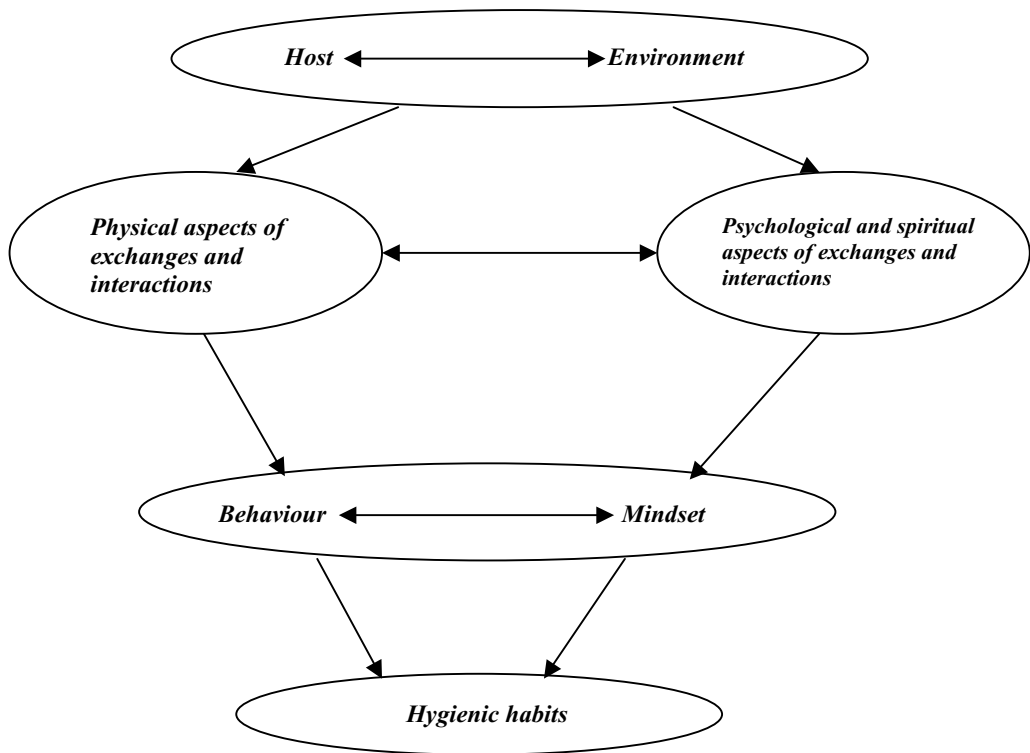


Fig. 3. Spin-off of host and environment exchanges and interactions influencing occurrence of infectious diseases.

Table 2. Behavioural and mind-set factors determining lifestyle: domestic and personal hygiene aspects

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- Self-influence because of understanding, information, knowledge and skills acquired either actively or received passively
 - Family life and upbringing, examples set by parents, schooling, role models and ideals
 - Community life and influence of friends and other people
 - Standard of cleanliness, housekeeping, and environmental health sanitation
 - Influence of religious and traditional practices in vogue, aesthetics and custom
 - Quality of sanitary facilities at home and in public places, and public health services
 - Mind-set, insight, information, knowledge and skill acquired actively or received passively
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effective in a given community setting. Because of these social aspects, epidemiology studies cannot remain purely observational but must be participatory.

Epidemiological implications of lifestyle with respect to hygiene

Lifestyles vary between people and may not bestow protection from infectious disease. However, those lifestyles that are not so well balanced can be remodelled to make them safer.

For modifying a lifestyle and making it conducive to prevention of infectious diseases, current style of living should be studied in relation to hygienic practices. Elements which will have to be taken care of include:

- *Regularity* synchronises daily routines and habits to the body cycles and rhythms. Regularity prevents functional imbalance of various systems and enhances body defence mechanisms. Modern life has become hectic and irregular, especially in urban life, which makes people more susceptible to infectious disease.
- *Moderation* of food, work, recreation or rest is another golden rule of hygiene. Avoidance of extremes has even been advocated in Indian scriptures that advise *ati sarvatra varjayet* (discard excesses universally). The stresses the body is exposed to in modern life are due to immoderation rendering it vulnerable to infection and disease.
- *Housing* condition and the neighbourhood influence hygiene. This includes poor ventilation and overcrowding which facilitate the spread of airborne infections (Fig. 3). Dampness in the home predisposes the occupant to rheumatic fever, while internal air pollutants such as dry sweepings, poor ventilation, and incomplete combustion of domestic fuels like wood, coal and cow-dung can also be harmful. In India, 80% of households use solid fuel and about a half million Indian children die annually from indoor air pollution, especially from acute respiratory infection (WHO 2000).

The homes and surroundings of those of higher socio-economic status are usually hygienic, spacious, adequately lit, and well ventilated or air-conditioned, providing a good barrier to the spread of infectious diseases (Fig. 3). Internal pollution is less because of use of gas stoves or electrical heaters instead of solid fuels, and the use of a vacuum cleaner to control dust. A study by NASA reported that houseplants improve the quality of indoor air. Household plants purify and revitalise air by removing the key pollutants, including volatile organic compounds (New Indian Express 2001).

- *Cleanliness* is a protective measure to minimise health hazards by providing an effective barrier against the risk of exposure to the disease-producing agents. Generally, the environment is full of the disease-causing germs. The hands, skin, body discharges and expired air should all be considered as potentially contaminated with harmful germs. Uncleanliness and dirty habits cause much morbidity and mortality, especially with respect to diseases of the digestive system. Washing feet or removing footwear before entering the house, washing hands thoroughly with water after using the latrine, and before cooking, handling or eating food, and cutting nails short to keep them clean, are all hygiene measures that reduce the risk of acquiring and transferring infections, particularly when used in conjunction with soap.

In India, most people eat with fingers, and naturally, thorough washing of hands with soap and water assumes as great a significance as disinfecting cutlery items. Washing hands before eating food has been shown to reduce the spread of dysentery through contact, and hygienic preparation and storage of food can eliminate outbreaks of food poisoning. Dry sweeping is a common household practice but disturbs dust leading to respiratory infections such as pneumonia and tuberculosis. Families from higher socio-economic groups do not dry sweep floors much preferring to use wet mops. Use of vacuum cleaners can prevent the accumulation of dust air pollution on carpeted areas, and coughing and sneezing that spread airborne diseases such as tuberculosis, common cold and influenza. In India, most work performed in the home is at the floor level, and indeed, food is prepared and eaten sitting on the ground. Naturally, cleanliness of the

floor in this instance is as important as that of a dining table (Fig. 3—transformation from negative to positive mode). Care should be taken when considering well covered or packed foods as these may not necessarily be safe unless precautions are taken to guarantee hygienic preparation, packing and storage.

- *Sanitation* is a social and public responsibility. Faeces, animal excreta, urine and other kinds of waste often contain pathogens, necessitating proper modes of sanitary disposal. However, health authorities in India often give hygiene and sanitation a low priority. Most villagers, slum dwellers, and domestic servants, even those working in more affluent areas, have to resort to passing urine or defecation by the roadside or in open spaces. Efforts to discourage these bad habits and promote the use of sanitary latrines and urinals are worthwhile and necessary in the prevention of disease.

In the practice of public health there are many issues that have not drawn the attention of epidemiologists. Villagers and slum dwellers live in unhygienic conditions and are exposed to the same health hazards, but many families and individuals manage to avoid the effects of diarrhoea and other infections. Even if slum dwellers receive a supply of safe drinking water, many suffer alimentary infections more frequently than those who live in adjacent communities with a higher socio-economic status. Why is this? At the basic level circumstances vary. Water may be safe at source but become contaminated by handling, introduction of unclean hands and use of a drinking container shared between all members of the household. On the other hand, the source of water may be unsafe but some people may boil or chlorinate it. With respect to food, contamination may not be homogeneous but limited to a small portion or food type. Stored food can become contaminated with pathogens but the incubation time may not be adequate to produce toxin sufficient to cause disease. Local conditions also dictate the extent of exposure.

- *Understanding and knowledge* provide the best defence against disease, and experience enables the adoption of a guide to better, more effective ways of hygienic living. India is experiencing a high burden of disease on several levels—diseases of poverty and affluence, infectious and non-infectious diseases, and newly emerging infections. Culture, health and hygiene practices have to be blended with developments in health-related science and technology. Ultimately, humans suffer from one or other type of disease by playing host to harmful agents either directly or indirectly. Unhygienic practices and harmful habits become the inroads to disease. Infectious diseases are relatively easy to prevent by pursuing domestic and personal hygiene. Many people are aware that they live in a polluted environment and select and use things, such as food and water, on hygienic criteria.
- *Personal habits.* Measures on a more personal level can be adopted. For example, regular use of proper footwear not only protects feet from injury, but also to a certain extent from diseases such as tetanus, hookworm and snakebites. Habits such as indiscriminate spitting and littering help in spreading diseases like tuberculosis and diarrhoea. Open defecation and tolerating dirt in the environment too are examples of negative health behaviour that should be eliminated as much as possible.
- *Nutrition* is essential for protection against infections. The immune mechanism of the body is dependent on an adequate and balanced diet. In order to avoid the risk of infectious diseases, observance of food hygiene is essential. Secondly, if the intake of food is just adequate or marginal, once infection is introduced and caloric requirement goes up, a vicious cycle of malnutrition and infection may become established. The effects are particularly serious in children aged between 6 months and 2 years of age.

- *Exercise*, if regular and moderate, tones up the various systems of the body and helps to maintain good health and fitness. Healthy body and mind provide strong non-specific immunity and defences against infectious diseases.
- *Positive thinking*, attitude and mind-set are beneficial for health and social values. Worry and anxiety are non-productive, while optimism strengthens our power to defend against infections.
- *Occupation* is essential for health and livelihood. However, certain occupations expose people to infective agents that may lead to diseases such as leptospirosis, brucellosis and anthrax. Sewage workers, for example, and sweepers are exposed to pathogenic germs unless they use protective clothing and proper tools.
- *Basic emotional needs* such as love, security, creativeness, faith, companionship and sex should be satisfied. Happiness in life is not so much dependent on money, social position or material possessions but on the balance of physical, social and spiritual needs. Unmet basic needs can be the root cause of sexually transmitted diseases (STDs) like syphilis and AIDS, because if family life and spouse relationship are not satisfying, moral values are lowered, and circumstances favour promiscuity and the opportunity for likely spread of STDs. We observe such change in captive animals (Fig. 3 – psychological and spiritual aspects).
- *Health and medical care*. Illnesses, whenever possible, should be recognised early and promptly and treated appropriately, as many diseases can be cured if diagnosed early. Immunisation of infants and young children against childhood infections needs to be made available to all. Children are more susceptible to infection than adults and should take precautions when coming into contact with individuals who are ill.
- *Social factors* including working conditions, family life and friends influence domestic and personal hygiene (Fig. 3 – Mind-set). A high tolerance to a dirty environment is an invitation to infectious diseases and vectors like houseflies. Vegetables, food, faecal matter and any other decaying organic matter provide all the material that flies require to breed, and are readily available because people are indiscriminate in disposal of these items. Breast-feeding provides immunoprotection for the baby against diseases, while bottle-feeding on the other hand is frequently linked to contamination that causes diarrhoea in infants.
- *Financial status* has a significant impact on lifestyle and hygiene. Many cities and towns in India are without sewerage, and most municipal corporations discharge raw sewage without proper treatment directly into rivers thereby polluting the water. At the family level, economic status shows a direct relationship with health status.

Equity in health with respect to hygiene

Scientific advance, in itself, will not promote the health status of the population unless there is political will to promote and support interventions. Unless the problems of poverty and inequality are effectively resolved, risk of infectious diseases will continue to persist (Table 3).

The primary objective of social epidemiology is to bring the benefits of new knowledge and skills to every household. Interventions based purely on scientific and technical knowledge may not be effective in diverse societies, unless appropriate consideration is given to local cultures, values and practices and how these interact. Local groups, as in Dehu, a town in the Pune District of Maharashtra, India, were encouraged to find their own solutions to problems and

Table 3. India 1992–1993: health, nutrition population by socio-economic status

Indicator	Socio-economic status		
	Most poor	Most rich	Average
IMR/1000 births	109.2	44.0	86.3
< 5 Mortality rate	154.7	54.3	118.8
Total fertility rate	4.1	2.1	3.4
Immunisation			
for all vaccines (%)	17.1	65.0	35.4
not immunised (%)	48.4	78.7	30.0
Delivery attended by a trained person	11.9	78.7	34.3
Use of contraceptive by married women	24.9	50.6	36.5

initiated a programme to construct pit-latrines for individual families. This reform, which was fully supported by the people, eliminated the practice of open defecation in Dehu.

To ensure the success of health reforms, it is essential to have an open mind and a flexible approach. At the basic level, the efficacy, feasibility, cost-benefits and effectiveness of alternative approaches and innovative ideas should be assessed and demonstrated. If the new preventive intervention programme is to be extended to cover larger areas, further validation of the programme through proper community-based studies is essential. A high level of public awareness may also generate public pressure groups like those in Pune. As an outcome of public litigation filed by the Citizen's Forum, the Pune Municipal Corporation has already approved tenders for installation of four sewage treatment plants, one of which will have a capacity of 130 million litres, the largest in India.

Conclusion

Epidemiological considerations of domestic and personal hygiene will help in finding why there are apparent contradictions at a basic level in public health practice. The primary objective of social epidemiology is to disseminate new knowledge and skills to families and individuals. The focus of epidemiology at the domestic and personal level is to find the causal factors which operate in a particular family or individual, and the specific corrective measures required. In essence, the virtues of hygiene were praised by Mahatma Gandhi when he said that: 'there is another type of medical relief which is a boon. It is given by those who know the nature of the disease, who will tell the patients why they have their particular complaints, and will also tell them how to avoid them. Such discriminating relief is an education in hygiene, teaching the people how to observe cleanliness and to gain health.'

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