

Ecological Model for Public Health Interventions in India

Authors

- **Corresponding Author: Sayani Dutta**

Doctorate Scholar, Bharati Vidyapeeth Deemed University, Institute of Environment Education & Research, Pune.

Email ID: sayanidutta7@gmail.com

- **Co-Author Erach Bharucha-**

Director, Bharati Vidyapeeth Deemed University, Institute of Environment Education & Research, Pune

Email ID: bharucha.erach.k@gmail.com

erach.bharucha@bvieer.edu.in

Abstract

India is a nation of environmental and social diversity which is responsible for its diverse epidemiological profile. Risk factors of diseases present in India encompass the environment, both immediate and non-immediate as well as behavioral factors. Policy makers therefore need to consider the role of environment in designing health interventions. The study discusses Ecological Model of Behavioral Change in the Indian context. An ecological perspective offers a way to simultaneously emphasize both individual and environmental systems and its interdependent relations. The model emphasizes on multi-environmental influences on health related behavior to promote and sustain a healthy environment and behaviour.

Key Words: Ecological Model, India, Health Interventions

1. Introduction

Health is inseparable from behaviour¹. Health behaviour is a key determinant in the prevention, management and treatment of diseases & health conditions. However, the initiation and maintenance of positive behaviour change is difficult as its formation is complex and takes place through various kinds of interactions over one's life time². Behaviour change interventions form health positive habits by getting people to act in consistent ways that can be repeated frequently. Habits develop gradually through experience, as people repeat a rewarded action in a stable place, time, or other context³. Many health behaviour theories have been used in public health interventions across the world such as Isfahan Healthy Heart Program (Iran), Minnesota Heart Health Program (U.S.A), Pawtucket Heart Health Program (U.S.A) and the Stanford Five City Project (U.S.A)^{4,5,6,7}. However the use of such theories is limited in India which is an epidemiologically and environmentally diverse nation where behaviour is developed through interactions among different levels of the environment both at the interpersonal level and at the policy level.

India faces multiple health challenges. Besides diseases common to all countries, such as diabetes and cancer, India faces burden related to tropical diseases, such as malaria, dengue fever, diarrhea etc.⁸. From an economic stagnation in the colonial period India has emerged as one of the fastest growing economies in the world. Even though, life expectancy of India is considerably higher compared to colonial times, disease burden exists from past infections as well as emerging lifestyle based illnesses.

In 2017, there were about 9.7 million deaths and 486 million disability adjusted life years (DALYs) in India. The top conditions that accounted for the most DALYs were attributed to ischaemic heart disease (9.6%), perinatal conditions (8.5%), chronic respiratory diseases (5.7%), diarrhoea (4.7%), respiratory infections (4.5%), cancer (4.0%), stroke (3.6%), road traffic accidents (3.3%), tuberculosis (3.1%), and liver and alcohol-related conditions (3.0%)⁹. Therefore the current burden of disease exists from both communicable and non-communicable.

In developed nations, public health interventions were responsible for the eradication of infectious diseases. In India however, this reduction was predominantly brought about through discoveries in the field of biology and surgery which were curative instead of being preventive in nature, and therefore did not result in the complete elimination of disease risk factors. Risk factors, according to the World Health Organisation is 'any attribute, characteristic or exposure of an individual that increases the likelihood of developing a disease or injury'. They can be present at the biological, psychological and socio-cultural levels¹⁰. Upon closer introspection it has been

found that policy level interventions have also contributed in the development or introduction of risk factors. They lie outside the purview of the health care system and cover factors such as inadequate sanitation, water, drainage, waste removal, housing and household energy as well as behavioural factors, such as personal hygiene, driving habits, alcoholism and tobacco smoking and can only be eliminated through focused approach of public health interventions¹¹. Risk factors translate into disease, disability, and death—therefore addressing risks rather than specific diseases is cost-effective because one risk factor can result in or worsen several diseases¹².

A health intervention is defined as an activity performed for, with or on behalf of a person or a population whose purpose is to improve, assess or modify health functioning or health conditions¹³. Due to the diverse nature of risk factors of communicable and non-communicable diseases, interventions need to be implemented that can be directed at eliminating these risk factors. Evidence suggests that public health interventions that are based on social and behavioural science theories are more effective than those lacking a theoretical base¹⁴.

2. The Ecological Model of Behavioural Change in India

India has a diverse epidemiological profile with the presence of both communicable and non-communicable diseases. This implies that the nature of risk factors is also varied. Risk factors of NCDs are mainly endogenous in nature and include social attributes such as income, education, risk habits and diet whereas those of CDs are mainly exogenous and include factors present in the external environment such as water sanitation and hygiene, air pollution, water pooling habitats and solid waste. The presence of these risks in the individual as well as in the environment can be attributed not only to the behaviour of the individual but also due to the interactions taking place in the various levels of the environment. There are multiple behavioural change theories that health scientists have used for designing interventions such as The Health Belief Model, Theory of Planned Behavior, Transtheoretical Model, Social Cognitive Theory and Theory of Reasoned Action which are some of the popular theories. However, the Ecological Model of Behavioral Change makes use of context, or in other words, one's environmental characteristics or background settings that the individual is embedded in, to understand behavioral change. Developed by psychologist Urie Bronfenbrenner, ecological systems theory explains how human development is influenced by different types of environmental systems. Theories of human development propose that development occurs over time as part of a complex process involving a system of interactions within the individual and between the individual and the environmental contexts of which the person is a part of. Bronfenbrenner's theory of Ecological Change discusses four interrelated types of environmental systems i.e. the micro, meso, exo and macrosystems. A microsystem is the complex of relations between the developing person and environment in an immediate setting containing that person (e.g., home, school, workplace, etc.). A mesosystem comprises the interrelations among major settings containing the developing person at a particular point in his or her life (e.g. a 12 year boy's interaction with his school). An exosystem includes the major institutions of the society the world of work, the neighborhood, the mass media, agencies of government (local, state, and national), the distribution of goods and services, communication and transportation facilities, and informal social networks¹⁵.

In the Indian context, the ecological model can be applied to a wide array of prevalent risk factors such as water sanitation and hygiene, occupations, risk habits, education, water pooling habitats, pollution.

For example, the risk of smoking or chewing of tobacco. Tobacco consumption is a huge public health issue in India and its impact is especially devastating among the poor. It is an important but modifiable risk factor common to major non communicable diseases (NCDs)-cancer, cardiovascular diseases, chronic respiratory diseases and diabetes, causing 1 in 6 of all NCD deaths¹⁶. Factors on which tobacco consumption depends are not only at the individual level but also on marketing strategies, price etc. and is a multifaceted process contributed by a varied range of factors such as social, environmental, psychological and genetic which are all inter-linked¹⁷. Porter et al., 2021 used the ecological model to explore facilitators and deterrents of tobacco use among airmen in technical training and found that personal choice, lifestyle, associations with the tobacco experience, occupation, peer influence, leadership influence, normative beliefs and pricing, promotion and access to tobacco influenced tobacco use. These factors were present at the personal, interpersonal and environmental levels. Other factors that determine tobacco usage are parental use, peer usage, advertisements, lack of awareness of health hazards, low income, educational status, taxation and anti-tobacco policies¹⁹. Therefore tobacco cessation can be brought about by interventions at the individual level through counselling, pamphlets books, videotapes, education, community awareness etc., at the organisational level through prevention of smoking at the workplace, promotion of smoke free environments, increasing tobacco prices through excise taxes. At the national level combination at all levels of ecological model can significantly bring down smoking rates such as dissemination of individualized smoking cessation programs, nicotine replacement therapy, counselling by health professionals (individual level), workplace and community-based programs, as well as programs tailored to reach different groups (social/cultural and organizational levels), news coverage, government reports, anti-smoking campaigns of various health agencies (population-level mass

communication), clean indoor air restrictions (physical environment and policy levels), and restrictions on access to cigarettes and tax increases on their sale (policy level)^{20,21}.

Water, sanitation and hygiene is a very important risk factor for infections such as water borne illnesses. Clean water along with adequate sanitation facilities and hygiene practices is essential for good health²². Contextual, psychosocial, and technological factors influence the adoption and use of adopting proper water, sanitation and hygiene at several aggregate levels. In India, water, sanitation, and hygiene (WASH) practices are a significant public health concern because the urban resident has more adverse exposure to WASH practices and there is a severe crisis of demand and supply²³. The different facilitators and influencers of uptake of WASH interventions at the interpersonal level are perceived susceptibility i.e. fear of the disease, level of knowledge and awareness, at the organisational facilitators include funding of sanitation initiative and barriers include ownership and sustainability of interventions and at the public policy level facilitators include formations and enforcement of laws and bylaws²⁴. A study by Tamene, 2021 found that there were multilevel factors that determine the adoption of latrine usage; for instance at the community-level contextual predictors include distance from farming fields to homes and unhygienic conditions of shared facilities. At the societal level, soil stability, population density, and status of land ownership were identified as the key contextual barriers. For some communities, constructing latrines in unstable soil conditions was found to be taxing, community-level laws that forbade community members from practicing open defecation. Psychosocial element, include cultural norms, beliefs, habits, and attitudes. In India, to reduce gastro-intestinal diseases, the Government of India started the Total Sanitation Programme in 1999 throughout the country in rural areas where the objective was to increase the usage of private latrines among those who had to resort to open defecation. To monitor its effects a cross-sectional study was conducted after three years of its implementation. The impact was measured with the help of three indicators; latrine coverage and characteristics, latrine use and perceived benefits by the people. The post- intervention survey showed that of the 72% households sampled that had a latrine, more than 39% were not in use and 8% reported using them only occasionally. More than 28% households still did not have latrines. The reasons for lack of success of the Total Sanitation Campaign are many and one of them was the failure to address customs and beliefs of people. Poor sanitation, especially preference for open defecation among rural folks are deeply rooted in cultural norms²⁶. A study carried out in Bali, Indonesia, that determined the uptake of sanitation, revealed that that perceived risk, perceived barriers, priorities and perceived role, are influenced by cultural perspectives, although each individual is influenced to a different extent. Different individuals have a variety of considerations and motives, based on local cultural values of harmony and purity, which can modify perceived risk, barriers and set priorities in regard to acceptance, construction and maintenance of toilet facilities. In addition, a community's particular definition of community roles could affect the methods for involving different role players in effective participation. Any sanitation programme needs to work with these values and norms²⁷.

3. Conclusion

World renowned economist Prof. Amartya Sen has very aptly described the situation in India in his book *An Uncertain Glory: India and its Contradictions*, in the following sentence

“...unequal patterns of development are making the country look more and more like islands of California in a sea of sub-Saharan Africa.”²⁸

This description makes one envision a scenario of disparity because of the stark socio-environmental difference, a very evident feature of this country. One's physical environment is, to a great extent the result of human behaviour. Human behaviour, to a great extent is influenced by awareness and education. Due to both social, environmental and epidemiological heterogeneity in India the nature of risk factors is also very diverse, thus health interventions designed only on the basis of disease outcomes will achieve little.

Health risks are systemic in nature and are multifaceted. Their introduction, both in the environment or in an individual and their elimination are therefore complicated as there are various other factors operating at different levels of the environment that have an indirect effect on their prevalence. Thus, response to risks should be seen as an ecological process²⁹. They cannot be managed and controlled solely through actions of governments or other lead agencies in isolation, instead, collaborative action amongst all stakeholders is required most of whom lie outside the purview of the healthcare sector^{30, 31}. Increasing evidence suggests that public health and health-promotion interventions that are based on social and behavioural science theories are more effective than those lacking a theoretical base³².

Ecological models help us to understand how people interact with their environments. That understanding can be used to develop effective multi-level approaches to improve health behaviours. The basic premise of the ecological perspective is simple, i.e. there is a need to provide individuals with motivation and skills to change behaviour cannot be effective if environments and policies make it difficult or impossible to choose healthful behaviours. Rather, we should create environments and policies that make it convenient, attractive, and economical to make healthful choices, and then motivate and educate people about those choices. The challenge

for health promotion researchers and practitioners is to be creative and persistent in using ecological models to generate evidence on the roles of behavioural influences at multiple levels, and on the effectiveness of multi-level interventions on health behaviours, and to translate that evidence into improved health.

Ecological models of health behaviour emphasize on the environmental and policy contexts of behaviour, while incorporating social and psychological influences. Ecological models lead to the explicit consideration of multiple levels of influence, thereby guiding the development of more comprehensive interventions³³. No single factor or set of factors adequately accounts for why people eat as they do, smoke or do not smoke, and are active or sedentary³⁴.

Many social, cultural, and economic factors contribute to the development, maintenance, and change of health behaviour patterns³⁵. Public health and health-promotion interventions are most likely to be effective if they embrace an ecological perspective. Interventions should not only be targeted at individuals but should also affect interpersonal, organizational, and environmental factors influencing health behaviour^{36,37}.

Programs to influence health behaviour, are most likely to benefit participants and communities when the program or intervention is guided by a theory of health behaviour³⁸. Ecological models of health behaviour emphasize the environmental and policy contexts of behaviour, while incorporating social and psychological influences. Ecological models lead to the explicit consideration of multiple levels of influence, thereby guiding the development of more comprehensive interventions.

This delay in eradication of infectious diseases has given rise to a double disease burden as chronic/lifestyle/non-communicable diseases for example hypertension, diabetes and cardiovascular diseases have also started increasing. Therefore, Behavioural solutions in India need thoughtful adaptation and successful interventions from elsewhere cannot be directly implemented in the Indian context.

4. References

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