

Development, Globalization and It's Impact on Health Status: A Study from Developing Countries Perspective

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Abstract: Sustainable Development Goals (SDGs) have identified specific health targets to improve the health status of the world. However, achievement of health-targets should not be looked at in isolation. Health status of an economy is directly or indirectly interlinked with several macro & micro-level factors. Developing countries are the hotspot for infectious diseases as a result of many socioeconomic, environmental and behavioral factors. However, recently, there is a large reduction in communicable diseases mainly due to antibiotic revolution and the non-communicable diseases as well as injuries and accidents are on the rise – typifying a country in epidemiological transition. On the other hand, the treatment received by any individual not only depends on the ailment he/she is suffering from but on the exact location of the individual in the economy and the society along with general development of the state of infrastructure in the system. Given this background, the paper aims to study the change in diseases pattern at different stages of development and its impact on different socioeconomic sections. The paper also attempts to analyze the interplay among stages of development, globalization, environmental degradation, socioeconomic background of individuals and health system.

Keywords: Epidemiological Transition, Biological & Environmental Risk, Globalization, Health status, Public health.

I. INTRODUCTION

Goal-3 of the Sustainable Development Goals (SDGs) has identified ensuring healthy lives and promote well-being for all as the essential to sustainable development. Efforts have been made to achieve the targets. However, achievement of health-targets should not be looked at in isolation. Health status of an economy is directly or indirectly interlinked with several macro & micro-level factors. In the literature of economic development, we often get reference to two categories of diseases: (a) infectious and communicable and (b) chronic. While the former is related to malnutrition, low level of sanitation, poor quality environment and lack of hygiene the latter refers to all life-style related disorder and pollution [1-2]. So, the former refers to the disease of underdevelopment and when the economy moves over the stages of development the share of disease burden due to the first category problems is likely go down and that of the second would go up. With the process of economic development, often the profile of epidemiology changes and the country experiences a transition [3]. This evolution of disease pattern is termed as Epidemiological Transition Theory [4].

II. HEALTH STATUS & DEVELOPMENT

Most of the developing countries are the hotspot for infectious diseases - in particular, zoonotic and vector-borne diseases - as a result of many factors including population growth, mobility, urbanization, environmental changes such as agriculture and livestock intensification, deforestation and climate change [5]. Interplay of socioeconomic, environmental and behavioral factors, as well as population movements, foster the spread of communicable diseases both within and across borders and threaten international health security. The situation is worsened by increase of inequity and polarization

followed by globalization and rapid economic activity, often unplanned and unregulated, and by the country’s considerable poverty, prevailing inequalities and inability to allocate increased resources for public health [6].

However, recently, there is a large reduction in communicable diseases as is reflected in sharp decline of mortality caused by killer diseases such as smallpox, malaria and plague that assumed epidemic proportions in the early to mid-19th and 20th centuries. The antibiotic revolution played crucial role in reduction of this type of disease morbidity. While the communicable diseases are diminishing, non-communicable diseases as well as injuries and accidents are on the rise – typifying a country in epidemiological transition. Moreover, new or emerging illnesses are often causing by organisms already in the environment and which become infectious due to altered conditions in the ecology. In the developing countries, given the poor defense mechanisms (as a result of malnutrition, poor living condition, inadequate sanitation, environmental pollution and finally weak enforcement of regulation) one cannot remain complacent even with diseases that have been reported as ‘under control’ [7].

However, the treatment received by any individual not only depends on the ailment he/she is suffering from but on the exact location of the individual in the economy and the society along with general development of the state of infrastructure in the system [8-10]. As the economy grows the pattern of access to medical care also undergoes some change. Nature of this change is contingent on the geographical location, economic organization and the interaction of these factors with demography, society and the polity. So, the pattern of morbidity is no longer an exclusive subject matter of medical science; the social science, and especially Economics as a discipline has a lot to contribute in this discourse in terms of the biases present in (a) the nature of exposure risk faced by different countries across the spectrum of economic development, different households located in different socio-economic stratum and different individuals within the household, (b) effect of this socio-economic locations on the pattern of reported morbidity, access to healthcare and distribution of benefits emanating from the public health related subsidies.

Frenk et al., [11] has discussed the important determinants of the health status of a country/ society/ community in terms of the health condition of the population and response to those conditions (Figure-1), while the former refers to the theory of epidemiological transition the latter talks about that of healthcare transition.

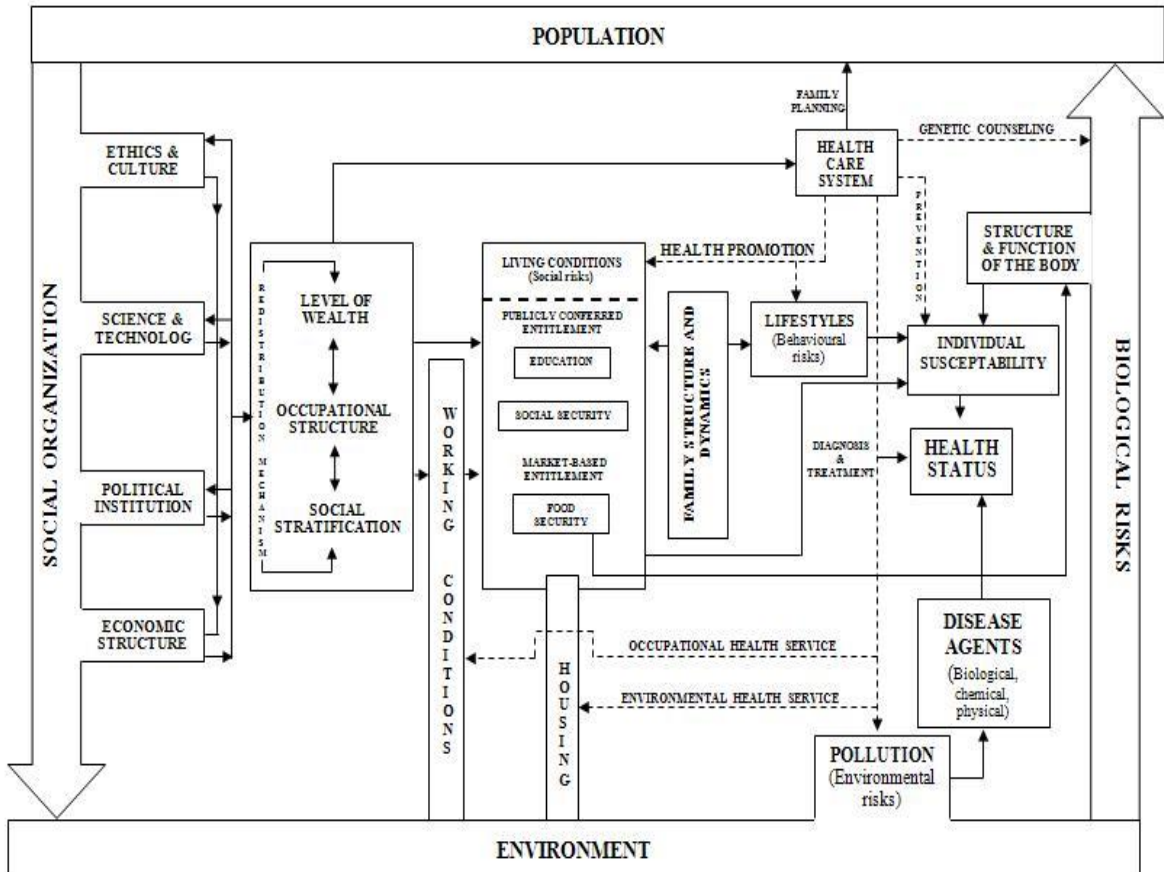


Figure-1: The Determinants of Health Status (Frenk 1991)

In Figure-1 it has been elaborated that how the health status of a given population gets determined through the interplay of *biological risks* and *environmental risks*, where these risks are influenced substantially by the specific nature of social organization represented by (i) ethics and culture, (ii) science and technology, (iii) political institutions and (iv) economic structure. All these factors affect redistribution mechanism working in a system through their impact on the (i) level of wealth, (ii) occupational structure and (iii) social stratification, which are the key determinants of the living condition indicating the extent of *social risk* to which a family is exposed in terms of its access to publicly conferred as well as market-based entitlements related to (i) education, (ii) social security, (iii) food security (iv) housing condition, and so on. The social risk has its influence on and influenced by the dynamics of family structure, intra-household resource allocation and lifestyle of the members generating *behavioral risks* at the individual level. Finally, the health status is the end result of cumulative influence of all these risks on the human system and the availability and access to the healthcare system.

These risks are all sensitive to the level of development and change in their magnitude over different phases of human civilization posed challenges to the society from the point of view of public health management. To study this interplay in the following sections attempt will be made to describe the evolution of the epidemiological transition theory and the impact of globalization on the enhancement of health risk.

III. DEVELOPMENT, TRANSITION AND EPIDEMIOLOGY

The epidemiological transition model describes the changing relationship between humans and their diseases. The advent of agriculture, industrialization and globalization has led to the emergence of new diseases as well as to the disappearance of others [12]. As originally formulated by Omran [4], it described the shift from mortality due to acute infectious diseases to death via chronic, non-infectious, degenerative diseases. It is an attempt to account for the extraordinary advances in health care made in industrialized countries since the 18th century. Epidemiologic transition theory is derived from demographic transition theory which is a generalized model of population structure based on the behavior of mortality and fertility rates over the phases of development [13-14]. Epidemiologic transition explains an important component of demographic transition by describing the varying patterns of disease that are important contributors to mortality [15]. According to Omran, all societies experience three *ages* in the process of modernization: the age of pestilence and famine, during which mortality is high and fluctuating, with an average life expectancy under 30 years; the age of receding pandemics, during which life expectancy rises considerably, from under 30 to over 50; and the age of degenerative and man-made diseases, during which the average life expectancy exceeds 75 years and the disappearance of infectious diseases increases the visibility of degenerative and man-made diseases [16]. Though all the countries do not experience exactly this sequence, there are frequent instances of stage-skipping and/or simultaneous presence of multiple stages among different factions of the same country/ society, the broad phases of epidemiological transition may be identified with the advent of agriculture, that of industry and finally with globalization of the world economy.

The *first epidemiological transition* occurred around 10,000 years ago with a major shift in the subsistence economy from foraging to agriculture, i.e., during the progress of human civilization from the Paleolithic to the Neolithic era. This transition was marked by the emergence of novel infections and nutritional diseases. As hunter-gatherers, humans moved around in small family groups and were dependent primarily on the direct availability of unmodified environmental resources. Thus, the major determinant of the disease burden was resource dearth, which could lead to hardship (lack of tools), exposure (lack of shelter or fuel), famine (lack of food) and local extinction (lack of healthy mates). With the more reliable food supplies provided by agricultural production, people were able to settle villages, towns, and later cities. Population size and density increased, as did the intensity of animal contact, setting the stage for infectious disease to take over as the major contributor to the human disease burden. The transition from a nomadic to a sedentary lifestyle resulted in greater potential for parasitic infections. The close relationships between humans and domesticated animals resulted in exposure to an array of zoonotic diseases. The milk, hair and skin of domesticate, as well as the dust they raised, transmitted anthrax, Q fever, brucellosis and bovine tuberculosis. Although tapeworm infection of humans may have arisen in the Stone Age, infection by parasites associated with domesticated animals must have been intensified during this period. Peri-domesticates, such as rats, who lived near human permanent habitats, must have also been a source of disease [17]. Independent of animal domestication, the actual practice of farming led to greater exposure to risks associated with insect bites (transmitting diseases like scrub typhus, etc.), mosquito bites (transmitting vector borne diseases like malaria, yellow fever, dengue, filariasis, etc.) and contact with non-vector parasites (transmitting diseases like influenza, measles, mumps, smallpox, etc.). Moreover, primary food production resulted in dietary deficiencies. This is because agriculturists frequently specialized in a single crop that narrowed down the dietary niche and caused nutritional deficiencies, which

enhanced the impact of infectious diseases. Since production in agriculture was seasonal in nature, the necessity of food storage increased the potential for food poisoning [18]. The combination of these newly emerging complex societies, increasing division by class, epidemic disease and dietary insufficiencies resulted in increased biological risks of infectious and communicable diseases.

In the last two centuries, a number of developed nations have undergone a *second epidemiological transition* characterized by a decline in pathogen induced infectious disease and rise in man-made degenerative disease. It was a period in which the development of medical practices, improved nutrition and public health measures resulted in a decline in early mortality resulting from infectious diseases. With industrialization came all the improvements in population health indicators associated with development: decreased child mortality, increased life expectancy, decreased birth rates and improved quality of life. Instead of infectious diseases the population began to experience a concomitant rise in chronic and degenerative disease. Death caused by heart failure, cancer and diabetes became much more common during this phase. As more and more countries experience this transition, the burden of mortality and morbidity increasingly shifts to such causes [12,15]. Alternative explanations are available in the literature regarding source of this transition, where all seem to have some definite contribution in explaining this improvement in the status of public health. The contesting hypotheses centered around the *germ theory* of disease that claims a better understanding of the causes of infection at this time helped in designing better checks and controls, the primacy of nutrition and standards of living, the hygiene hypothesis focusing on the improvements in hygiene and sanitation, and so on.

It should be noted that with the improvements in hygiene and sanitation as well as the availability of antibiotics to treat many bacterial infections, this decline in infectious and rise in chronic disease occurred only in certain high-income nations in Europe and North America following the Industrial Revolution in mid-nineteenth century. Many countries have never experienced the second epidemiological transition, and others experience it in varied patterns [19]. Even within more industrialized societies, socioeconomic, ethnic and gender differences appeared to be strongly associated with the difference in morbidity and mortality for both chronic and infectious diseases. Wilkinson [20] discussed the influence of income inequality on the morbidity profile of a country as according to him, it is the level of relative income (i.e., social advantage), and not the absolute one (i.e., material affluence), that determines the psychological stress experienced by a person, which has important bearing on his/ her perceived as well as realized health status. Following the Second World War, this second epidemiological transition made a more modest appearance in many less-developed nations and was marked by improvements in child survival and life expectancy at birth. This is the contemporary delayed model [4,21]. Biomedical innovations like oral rehydration therapy (ORT), immunizations and antibiotics played a pivotal role in lowering the infant mortality rates. However, rapid urbanization, combined with marked social inequalities and continued shortage of public health infrastructure have led to communicable diseases among the urban poor with chronic degenerative diseases among the affluent section. Such overlap of stages is mostly experienced by the developing and emerging economies where the extent of income inequality is growing over time [22-24].

With the Industrial revolution, coal was burned at an unprecedented rate and respiratory health was affected by the quality of outdoor air and the problem of bronchial asthma and chronic obstructive pulmonary disorder (COPD) developed into significant public health problem for the first time in our cultural evolution. The lead concentration in air, arsenic concentration in water and pesticide residues in food served as important causes for different novel sources of contamination. The global environment is changing rapidly with its associated influence on the morbidity pattern: there is resurgence of familiar infections accompanied by an array of novel diseases, which can be identified as the *third epidemiological transition* (Table-1). In most instances the appearance of new diseases and syndromes and resurgence of old can be associated with ecological changes that have favored increased vector densities. The existence of antibiotic resistant pathogens, including those resistant to virtually every agent available, portends the possibility that we are living at the end of the antibiotic era. Dam construction, irrigation and other development projects, urbanization and deforestation have all resulted in changes in vector population densities that appeared to have enabled the emergence of new diseases and resurgence of old ones. All of which have the potential to spread rapidly due to globalization. Greatly increased human travel has spread infectious agents, introducing them into areas in which they had been hitherto absent [25]. So, the third epidemiological transition is experienced in a global context where locally originated diseases are spreading globally because of enhanced mobility and greater connectivity and the required information, assistance and global knowledge to combat them also become readily available locally, within a very short period of time, but, of course, with differential access for different socio-economic groups. In fact, Farmer [26] asserted that we “discover” emerging diseases when they enter the consciousness of the wealthy. For example, hemorrhagic fevers including Ebola and viral encephalitis were

described long ago and in many cases their etiologic agents were identified decades ago; however, they are assuming the proportion of pandemic only recently. Sometimes in the literature reference of a *fourth epidemiological transition* is also found [27] where the age of onset of chronic degenerative diseases would be delayed further, but obesity and other diseases of affluence will assume fatal proportion.

Table-1: The Three Epidemiological Transitions (Harper & Armelagos, 2010)

Transition	Paleolithic Baseline	First Transition	Second Transition	Third Transition
Time Period	Pre-Neolithic Cultures; More recent hunter-gatherer cultures with little outside contact;	Neolithic cultures, Early Modern Times in Western Europe & United States; Still characterizes many low-income countries;	Early Modern times to 20 th century in Western Europe, United States; Occurred more recent in some other high-income countries & is in progress in lower income countries;	End of the 20 th century to the present, globally present;
Characteristic	- Pre-agricultural - Low mortality & fertility rates - Small population size - Varied diet	- Agricultural - High mortality & fertility rates - Large population size - Diet heavily reliant on crops	- Agricultural - Low mortality & initially high then low fertility rates - Large population size - Increased life expectancy - Varied diet, over-nutrition common - Discovery of antimicrobials & vaccines, improved hygiene	- Agriculture - Large population size - Failure of antimicrobials - Rapid spread of novel infections - Age of onset of chronic diseases delayed in high-income countries
Common causes of morbidity & mortality	Infectious such as tapeworms, body lice, pinworms, typhoid, staph & possibly yaws	- Infectious such as malaria, small pox, measles, tuberculosis - Nutritional deficiencies	- Degenerative diseases such as heart failure, stroke, diabetes, cancer - Allergies, asthma, autoimmune diseases - Sexually transmitted infections such as HSV-2, gonorrhea, HIV	- Those diseases present in the 2 nd transition (+) - Antibiotic resistant forms of tuberculosis, strep, staph, etc.

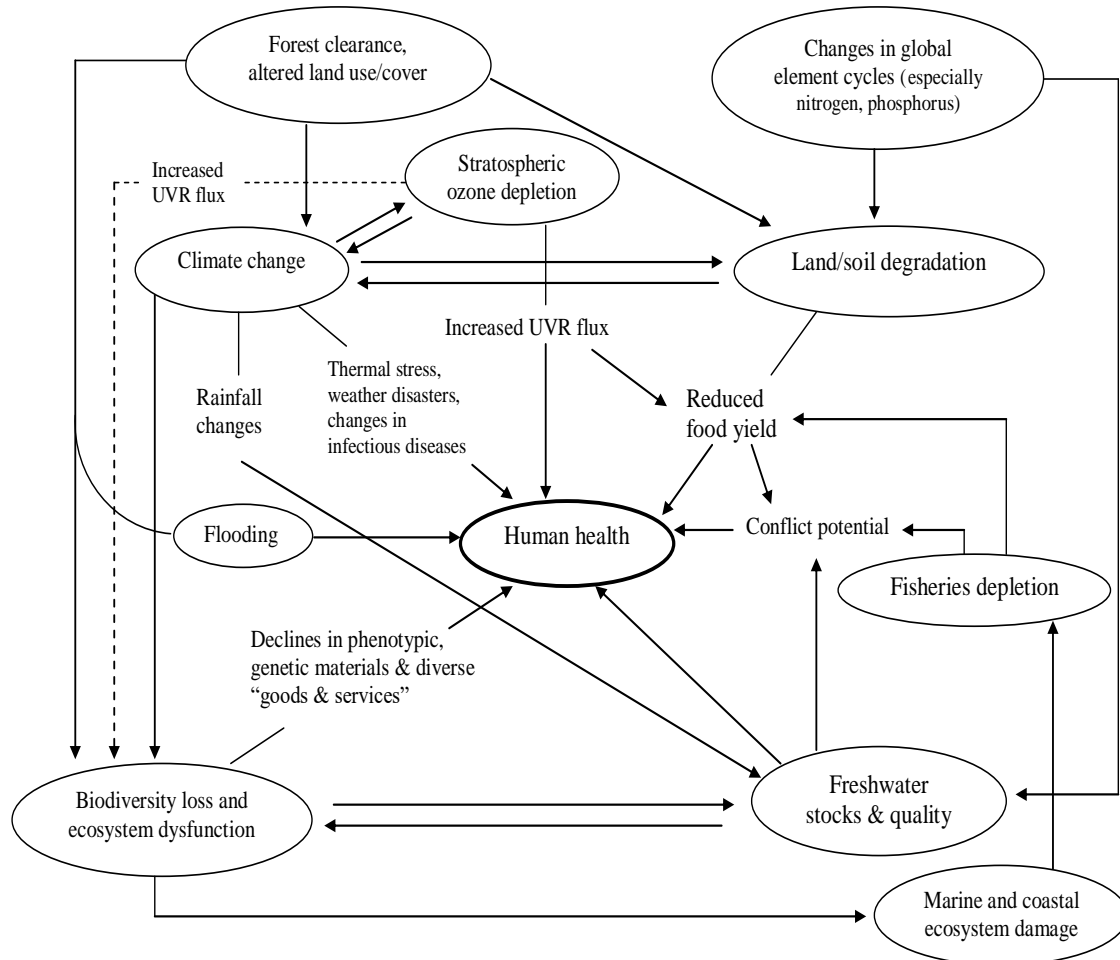
IV. GLOBALIZATION, ENVIRONMENT AND THE HEALTH RISK

Disease has traveled with goods and people since the earliest times. The black rats, which carried bubonic and pneumonic plague to Europe in 1347, were most likely carried by trading ships. Even today, cheaper and faster travel enhances the dangers of the spread of infectious diseases. When travel was by sea, most infectious diseases would pass through the incubation period during the voyage and the ship could be prevented from landing. But a traveler could go six times round the world during the incubation period of SARS (severe acute respiratory syndrome). Of course, the speeding up of communication makes the response to the disease faster and more effective [28-29]. However, a few more sources of health vulnerability induced by this global market mechanism deserve careful attention. The multinational pharmaceutical industries and their profit motives are sometimes under attack for their tendency to put profits ahead of lives. Other multinational corporations, particularly in tobacco and food are also seen as threat to public health.

Globalization influences the shift from infectious to chronic diseases in poorer societies, while increasing morbid obesity in emerging economies. Poorer countries have benefited from the global availability of vaccines and antibiotics, but have simultaneously been exposed as emerging economies subject to established lifestyle-related risk factors, to their probable long-term detriment. Today, although many broadly averaged measures of population health have improved, many of the determinants of global health have faltered. Many infectious diseases have emerged, and others are unexpectedly reappeared. Reasons include urban crowding, environmental changes, altered sexual relations, intensified food production and increased mobility and trade¹ [30]. Globalization is bringing greater interdependence among different parts of the

¹ The US Institute of Medicine has identified six principal factors contributing to the current problem of re-emerging infectious diseases: (1) ecological changes, (2) human demographics and behavior, (3) international travel and commerce, (4) technology and industry, (5) microbial adaptation and change and (6) breakdown in public health measures [31].

world, resulting in both positive and negative local effects. Inevitably, fast moving health threats like HIV and Avian flu pose new challenges. Poorer countries increasingly import occupational health hazards because their labor is cheaper and standards weaker. Moreover, increased labor mobility, migration and circulation along with steep economic gradients weaken family and community structures and promote inter-ethnic tensions. Many indices of inequality including that of health, income and environmental risk have gone up in recent decades. Gaps between rich and poor have grown internationally and intra-nationally, adversely affecting health and environmental conditions [32].



Source: McMichael and Butler (2007)

Figure-2: Major Pathways of Linkage between Health and Global Environment

Sustainable population health depends on the viability of the planet’s life-support systems. Today, however, human-induced global environmental changes pose risks to health on unprecedented spatial and temporal scales. These include climate change, biodiversity loss, downturns in productivity of land and oceans, freshwater depletion and disruption of major elemental bio-geo cycles. The combined impact will culminate into economic dislocation and population displacement with a consequent increase in the risk of violence, injury, infection, malnutrition, mental disorder, etc. (Figure-2).

The traditional concerns of environmental epidemiology have been the contamination of air, water and food. With rapid development of science and technology this known risk of direct contamination of environment has been controlled but the unanticipated risks induced by arsenic contamination, UV-B radiation, ozone layer depletion and other chemical and physical hazards have gone up contributing favorably towards the increased incidence of diseases like cancer, cataract, and many more. This change in physical environment has its impact on the social environment as well. It is important to note that this health burden from environmental change has a natural bias towards the poorer section whose direct dependence on the unmodified nature is more. Moreover, some of the major mitigation approaches to reduce the degree of warming may produce negative side effects disproportionately more among the poor. In today’s globalized world, eventually all nations will share some risk, but undeserved populations will suffer first and most strongly from climate change, their health vulnerability will shoot up manifold [33].

V. CONCLUSIONS

New imperatives of public health research arising out of globalization are experiencing challenge from unification of directly healthcare related planning with the concern for fair benefit distribution over the deserving sections of the society. From the foregoing discussion it is clear that not only the macro indicators like the level of economic development, degree of urbanization or extent of globalization explain the inter-country variations in health status, even within the same society there is observed variation in the disease-scape in terms of the pattern of morbidity and access to healthcare provisions. Major variations are noted with differences in the level of income, demographic composition, living condition, class, caste, ethnicity, gender, occupation, etc. at the individual as well as household level. So, even the conceptualization of any intervention strategy in the domain of public health needs to have a clear understanding of the channels through which all these socio-economic and cultural pre-conditions would erect barriers in the process of fair utilization of the benefits of public subsidy in health.

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