

## Simple Diarrhoea is the Major Killer Force to Destroy Public Health and Economy

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### Abstract

The vicious cycle of poverty and health problem is now seemed to be a never-ending process in the developing and underdeveloped nations. Diarrhoea is one of the major contributor for propagation and maintenance of this cycle. As the whole medical research is eyeing towards the major killer pathogens, the potentially less severe diseases are often overlooked. One of such disease are the chronic diarrhoeal episodes caused due to parasitic infection or due to the disruption of normal gut flora. In this section, we have tried to correlate the relation between the occurrence of simpler or non-killer diarrhoea with the growth and economy of the nation. It is evident from our observation that nation with highest DALY rates due to diarrhoea showed lesser economic growth.

**Keywords:** Diarrhoea; DALY; Chronic; Economy

The high rate of global mortality due to diarrhoea is well known especially in developing countries [1]. Discovery of effective drug and rehydration therapy may have decreased the global mortality rate from 4.2 to < 2.5 million but the concern remains whether the number of diarrhoeal events decreased considerably? The morbidity rates of diarrhoeal diseases are still staggeringly high in developing and underdeveloped nations [2]. Lack of mass awareness and government policy may contribute towards this type of findings. As per the review by Richard., *et al.* 2002 [3] the morbidity rate of diarrhoeal illness is increasing despite the decrease of the mortality rate and there is a substantial increase in the numbers of diarrhoeal illness experienced by young children. The issue becomes far more complicated in developing nations when the disease is similarly common in case of adults. The overall increase of diarrhoeal morbidity is directly or indirectly affecting workforce of a community or a nation. In one hand, repeated diarrhoeal episode in adults is consuming valuable work time from their life that in turn is reflected in their decreased productivity. On the other hand, common, early childhood diarrhoeal illness hinders the normal growth, fitness and also decreases cognitive function [4]. In both the cases, the disease is acting as corrosive agent for nation's growth and prosperity. Interestingly, the hidden effects of this classic and historic diseases on nutrients and drug absorption may have an, even more, wide-spread impact for increasing the drug resistance in major pathogens like HIV or Tuberculosis [5]. In normal circumstances, diarrhoeal illness may be sporadic with sudden and heavy flushing of solutes from the body making it very weak and sometimes dead, or it could be persistent and chronic with irregular symptoms. Usually the data describing diarrhoeal illness deals with the deadly version that can drastically kill the patient. Whereas the chronic diarrhoea or diarrhoea like syndrome remains unnoticed mostly due to their less drastic effects or lesser killing potential.

**The burden of chronic diarrhoea:** Protozoan parasites, enteric worms and disruption of healthy gut flora are the usual cause for the chronic diarrhoeal syndromes [6]. It imparts to the illness which is usually not responsible for the sudden killing of the patient, rather persisting for a long period and make a diseases outcome in regular randomized intervals. Interestingly, the global burdens of these pathogens are usually concentrated in the underdeveloped and developing areas [2]. In these regions, the chronic diarrhoea is often described by the local population as "simple diarrhoea". But the word simple is the most dangerous expression among the infectious

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diseases. It reflects the neglect and thus allows the pathogen to propagate freely in the population. Several efforts have been made in the recent years to assess the impact of these diseases in a broader perspective. For example, QALY (Quality Adjusted Life Year) was devised to assess the qualitative and quantitative elements of healthcare in a single measure [7] but it failed to capture the wider perspectives of social and economic attributes. Calculation of DALY (Disability Adjusted Life Year) rates, proposed by Murray and Lopez [8] has made a path-breaking progress in the field of epidemiological research which enables us to assess the burden of particular disease in a broader perspective. It does not only capture the potential life lost due to a disease but also consider the amount of year lost from a particular lifespan due to the diseases, even if it is not fatal. DALY also enables the age weighting and standardized assessment of diseases burden along with its cost-effectiveness, comparative and effective intervention measures etc. After the popularization of this method, the chronic diseases came into highlights and the diseases with lesser killing potential but much higher disabling capacity were also taken into consideration [9]. DALYs from chronic diarrhoea usually showed more morbidity component i.e. YLD (Year lost to Disability) than mortality i.e. YPLL (Year of potential Life Lost).

**The vicious cycle of poverty, malnutrition, and chronic diarrhoea:** Previous studies have successfully proven the fact that malnourishment condition itself is a diseased state and its coexist with diarrhoea having a proportional relation. For example, continuous and long duration of malnourished status makes a population prone towards pathogenic invasion due to lowered immunity [10]. These conditions switch the outburst of opportunistic pathogens like Giardia, Helminths etc. and make the people more diseased and subsequently making them more prone towards other diseases. On the other hand, the chronic diseased condition like Helminthiasis or Giardiasis result into the making of a malnourished population and thus inviting other deadlier pathogens to propagate in the population. Interestingly, the cycle of poverty has perfectly fit itself into this chain of diseases and malnutrition [11]. Unavailability of proper nutrition due to a shortage of food has an inevitable role in impairing the absorptive capacity and directly lowering the immune defence system. So, it can be charted like, the repeated enteric infection results in the blunted absorptive capacity, which makes the population malnourished and that subsequently lowers the workforce or impaired cognitive function and that ends up towards increase in poverty. Similarly, the unbearable poverty also results in the shortage of nutrition that makes the population vulnerable to chronic disease and thus completing a never-ending process or a vicious cycle. The Global Health Estimate report from WHO also confirms this assumption where the regions with low average income such as the African and South-east Asian Region showed a high DALY rates due to diarrhoea (Figure 1) as compare to the high-income region like Europe and America. A comparative narration of GDP rate and DALY rates due to diseases will definitely support the fact that diarrhoeal diseases can be a major decisive factor of countries economic growth [12].

**Sensing the underlying danger:** Infectious Diseases still continues to be a major public health problem in today's world. Even with the eradication of diseases like smallpox and polio, many diseases still persist. With very little hope of complete eradication of infectious diseases the rate of emerging of new diseases or re-emerging of old ones are increasing year after year. 16 new infectious diseases have been identified by US National Institute of Health (Bethesda, USA) in the last two decades. Most of the etiology may have been long persisting in our nature but have recently started to emerge as pathogens. Mutations, environmental or chemical stress, behavioural attributes may contribute to this type of emergency. In fact, the return of infectious diseases and increasing complicacy of the disease expression has been now considered as a serious retribution as per public health and biological researchers. The impacts of these diseases are immense and are widely distributed around the world and affect much larger arena like economic status, social structure, political policies rather than only sticking to a particular patient. Diarrhoeal diseases are one of the front-runners among the infectious diseases, which contribute to a high percentage of total death as well as total affected among Infectious Diseases. Significant loss of qualified person due to infectious diseases like HIV, TB, Malaria etc. always created a serious impact on the economy of developing nation. But the other neglected infectious agents, which doesn't take a serious toll on human death but is equally potent in damaging the country's economic growth by reducing the workforce would be one of the major concern for development. Most important among them are chronic infectious diseases, which remains under the shed of deadly pathogens and act as a silent killer and thus hindering the growth of a nation without getting into notice.



**Figure 1: Death and DALY rates due to diarrhoeal diseases:**

(A) The six WHO region assigned as per World Health Organisation for the purpose of reporting, analysis and administration.

(B) The percentage of death cases due to diarrhoeal disease in the year 2015 in the six WHO region: The African region (48%) showed highest death toll followed by South-east Asian region (39%). The color code is maintained as per the figure 1(A).

(C) Distribution of DALY rates (%) due to diarrhoeal diseases among the WHO regions described in figure 1(A): Here the African region (52%) again showed highest DALY rates due to diarrhoeal diseases as compare to other regions.

(D) A comparative analysis showing contribution of diarrhoeal diseases in Death cases and DALY rates in different WHO regions in the year 2000 and 2015: The Y-axis of the graph shows the percentage count and the X-axis represents the regions starting from Global from the left towards six WHO regions. The result reveals that the percentage of Death cases and DALY rates have decreased in 2015 as compare to that in 2000. But the DALY rates due to diarrhoeal diseases showed a tendency to remain higher than the Death rates especially in global perspective. This proves that diarrhoeal diseases have more profound effect on the DALY rates rather than increasing the Death toll. But a positive sign is that the rate of death is decreasing gradually and gaps between DALY and death cases are also narrowing gradually.

(E) Comparative analysis of percentage of DALY rates in different WHO region as per income: Here it is evident that the diarrhoeal diseases contribute a large percentage of DALY in the low-income regions as per WHO. Whereas, it is not in the first 10 contributor of DALY rates in the high or middle-income regions. This proves that diarrhoeal diseases may directly or indirectly related with the economic growth of a particular nation.

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## Competing Interest

Author declares no competing interest for this particular manuscript.

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