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Demographic, socioeconomic and environmental changes affecting circulation of neglected tropical diseases in Egypt

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ABSTRACT

Egypt has been plagued by many neglected tropical diseases since Pharaonic time. These diseases are Schistosomiasis, soil-transmitted helminthiasis, lymphatic filariasis, leishmaniasis and fascioliasis beside the epidermal parasitic skin diseases. Indeed, these diseases still persist as public health problem in the country by the influence of demographic, socioeconomic and environmental obstacles. This study seeks for understanding the contribution of each factor in each obstacle in neglected tropical diseases perpetuation which in turn could help the governorate in planning integrated control strategies. It was found that poverty, unregulated urbanization and inadequate sanitation are important socioeconomic factors that have great effect on the transmission dynamics of the diseases. The environmental factors which affect the epidemiology of these diseases in the country are scarcity of water, construction of dams, land reclamation for agriculture beside the climate factors. Unfortunately, the panic increase in the population growth rate minimizes the efforts done by the governorate to elevate the public health services. These conditions also affect the transmission of epidermal parasitic skin diseases including scabies, head lice and hookworm-related cutaneous larva migrans. The control programs and the recommendations to combat the diseases were discussed. The present study showed that the ecological factors affecting each neglected tropical disease in Egypt are somewhat similar which makes it worthy to develop an integrated control approaches aiming at improving the leading factors of neglected tropical diseases circulation in the country.

1. Introduction

Neglected tropical diseases (NTDs) are a group of infectious diseases caused by parasites, bacteria and viruses affecting more than one billion people globally. They are called neglected because they persist exclusively in the poorest populations often living in remote, rural areas, urban slums or in conflict zones, inflicting tremendous disability and suffering. Few efforts have been done to control NTDs in comparison to those for malaria, tuberculosis and HIV/AIDS. However, NTDs can still be controlled and are largely eliminated from the more developed parts of the world, hence, they are often forgotten [1].

Egypt has been plagued by many NTDs since Pharaonic time. It is one of the nations that stand out for having suffered the highest rates of NTDs in the Middle East and North Africa region and these diseases constitute persistent public health problems in the country despite the continuing improvement in the economic status, standard of living, sanitation and ecology of the Egyptian society. The infection with more than one parasite (polyparasitism) is prevalent which has a great impact on the morbidity and increase the susceptibility to other infections. This leads to impaired physical and cognitive growth with subsequent decrease in worker productivity [2–4].

The present study will give an overview of Egypt's major obstacles and how each factor in these obstacles interact to influence the endemic state and the circulation of the NTDs transmission to the residences. It will also discuss how changes in these challenges may lead to emergence/re-emergence of these parasites in the country. Searching for the contribution of each obstacle in the disease transmission is essential to any intervention and may help finding alternative approaches for the control alongside the chemotherapy [5].

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2. Challenges affecting NTDs in Egypt

The demographic, the socioeconomic composition of the population and the environmental conditions are the main obstacles facing the development of the country. They lead to perpetuation of poverty, increasing unemployment rates and mismatching between graduates' degree and job market as well as high rates of illiteracy, severe stress on the public education, shortages in housing, food and water resources and environmental degradation. It is increasingly accepted that perpetuation of the parasitic diseases is influenced by these challenges. Any changes affecting these circumstances may have significant effects on the disease acquisition and control. Nevertheless, considering these disciplines in designing and planning control strategies is neglected. Recently, there is a trend to enroll these factors with the epidemiological surveillance [5,6].

2.1. Demographic condition: population growth, nature and composition

The determinant factor of most of the problems in the country are predisposed and related to the growth of the population, their nature and composition. The Egyptian population grows each year by approximately 1.5 million people. This unsustainable rate of growth leads the country to rank sixteenth on the list of the most populous countries worldwide. While the Egyptian government is struggling to provide even basic government services, Egypt's population will reach 91.8 million by 2015. The population shows unbalanced distribution over the land. The accelerating population growth rate causes a stress burden on Egypt Governorate to achieve the economical development and good services including health services [7].

2.2. Socioeconomic conditions

2.2.1. Poverty

Based on the World Bank classifications, Egypt is a lower middle income country. There are significant gaps in the income levels and living standards between different parts of the country and across different segments of the society. Egypt faces great challenges in coping with the negative effects of the current economic crisis resulting from the revolution. Currently, 40% of Egyptians live below the \$2 a day income poverty line. The 2010 Millennium Development Goal report highlights that poverty is one of the most critical areas of deficit in Egypt [8].

In Egypt, the NTDs are found to be highly relevant to poverty and that infection occurs in low income populations [4,9]. The long term helminths infection in children contributes to anemia and under nutrition which in turn can lead to growth stunting, poor school performance, poor work productivity and continued poverty [3]. Morbidity caused by such infections contributes to a vicious circle of infection, poverty, decreased productivity and inadequate socioeconomic development [4,9].

2.2.2. Population movement and unplanned urbanization

Unemployment and lack of job opportunities in Egypt are significant factors leading to population movement, usually to industrial cities or reclaimed agricultural areas; sometimes with their animals. There is also seasonal migration to the Delta and Nile Valley to work as laborers during planting and harvesting

periods. Various population and animal movement influences the disease dynamics and is highly relevant to many NTDs. It leads to exposure of migrating populations to new risks and environment and to the introduction of parasites via infected migrants into the new areas [10]. This leads to overcome the barriers for human infection with parasites which was considered to be geographically limited because of parasites' adaptations to specific definitive and intermediate hosts and particular environmental conditions [11].

The migration to large cities in Egypt together with the high population growth leads to creation of several unplanned urban squatter settlements and formation of unregulated slum areas. These areas constitute a nationwide problem, being unplanned, illegally constructed and under-served. They tend to be the least well served in terms of infrastructure and public services and the settlers suffer from poverty, unemployment, poor housing and sanitation, lack of clean water, poor accessibility and high levels of overcrowding. Settlers at these areas eat at street vendors and mobile carts that become the fast food restaurants for those urban poor. This rapid unplanned urbanization often leads to high prevalence of intestinal parasites especially among children with increase in vector breeding and in human vector contact [2].

2.2.3. Inadequate sanitation

The process of disposal of wastewater in Egyptian villages and unregulated slum areas represents a dangerous challenge to the environment and public health. The majority of people had individual trenches in their houses for sewage disposal with absence of public sewage system in addition to limitation of safe collection and treatment of wastewater [12]. However, sanitation conditions in general are better than other developing countries [13].

2.3. Environmental conditions

Parasites utilize different media to complete their life cycles and may need diverse vectors that have different ecologies. Hence, the changes in environmental and ecological conditions, due to both natural phenomena and human intervention, influence the transmission dynamics of the parasitic diseases. In this context, the major issues in Egypt are related to the hydrological system alongside the climate factors. There is shortage of water with deterioration of its quality and construction of water developmental projects to help in land use for agriculture.

2.3.1. Scarcity of water

Egypt is unique among other countries in its dependence on water from a single source; the Nile River which is the lifeline of the country. The other resources are represented in the scattered rainfall and the groundwater exists in Western Desert and Sinai. Egypt is now facing a water crisis. The country has reached a state where the quantity of water available is imposing limits on its national economic development together with deterioration of water quality. Egypt will need 20% more water in 2020 [14].

Being the most downstream country on the Nile, Egypt is affected by climate change impacts not only within its borders, but also within the whole basin shared with nine other countries. Economic developments in upstream countries and measures they might take to adapt to climate change are likely to put more pressure on water resources in Egypt. On the other hand, Egypt is one of the African countries that could be vulnerable to water

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