Pattern and Trend of Mortality among Males in Egypt from 2000 to 2015

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Background and study aim: Circulatory and respiratory diseases, neoplasms and external causes of death are the major clusters of diseases leading causes of death among males in Egypt. We studied the age- and cause-specific mortality among males in Egypt from 2000 to 2015. The study measured the trends in age- and cause-specific mortality and the recorded rates of the standardized deaths among males in Egypt.

Materials and Methods: We used data from the World Health Organization Mortality Database and United Nations Population Division to estimate the standardized death rates from circulatory and respiratory diseases, neoplasms, external causes and all other causes of death among males in Egypt for a period of 16 years.

Results: We found that recorded death rates from circulatory diseases were highest while death rates from external causes were the least. All the causes of death we studied were highest in ages 45 and above years. Youthful ages recorded the least mortality from all the cause of mortality we studied.

Conclusion: Health policies and programs should target circulatory diseases and its related mortality and the other causes of death in the adult and elderly years of male life in Egypt.

INTRODUCTION

Circulatory (CVD) and respiratory diseases and neoplasms are the most recurring clusters of non-communicable diseases in Egypt. Mortality from these diseases is overly burdensome in the country. Aside from these, deaths from external causes have been documented to increase annually [1,2]. In 2014, 85% of deaths in the country were caused by these non-communicable diseases [3]. Considering the major classes of death identified above, CVDs are the ultimate cause of death in Egypt. Approximately, 21% of all mortality cases in the country is attributed to morbidity from CVD diseases such as ischaemic heart disease. In recent times, the incidence and mortality from CVD have been found to have risen in Egypt [4]. Mortality from respiratory diseases in Egypt declined substantially between 2005 and 2015 [5]. Age-standardized neoplasms incidence rates were about 166.6 per 100 000 Egyptians [6]. External causes rank fifth among all causes of death in Egypt [1].

CVD, respiratory diseases and neoplasms are regarded as the primary causes of mortality among adults in Egypt [7]. More so, these causes of death are in particular common among males in Egypt [1,8]. Again, in the youthful ages, from 15 to 24 years, mortality from CVD, respiratory diseases and neoplasms are less prevalent in Egypt. Fouad et al. [9] attributed the divergence to tobacco smoking in the adult years than in the youthful ages. Further, the authors documented an increase in tobacco smoking and hypertension since 2010. The conventional risk factors associated with the incidence of diseases and mortality are categorised as behavioural, clinical and demographic factors. The

behavioural risk factors include unhealthy diet, inadequate physical inactivity, tobacco use and perilous use of alcohol [7,9-11]. The clinical factors manifest as limited health care infrastructure, inadequate health care facilities and lack of trained medical professionals to assist clients with the management of the diseases. Aging is a demographic factor the influences the onset of these causes of death [7,12]. Genetics also plays an essential role in the occurrence of these diseases and their related deaths in the early years of the life of a person [13].

Mortality from non-communicable diseases is higher among males than females in Egypt [6,14]. Also, the trend in causes of death among Egyptian males increased from 2000 to 2013 by about 51 to 54% [15]. 82.7% of all cases of accidents are recorded among males in Egypt. Moreover, males are twice as females at risk of mortality from external causes in the country. In the adolescent and youthful ages, the vulnerability of Egyptian males to external causes of mortality is heightened [16]. Consequently, single causes of death such as ischaemic heart diseases, diabetes, hypertension, road and traffic accidents, and chronic obstructive pulmonary disease but not the major clusters of causes of death among Egyptian males have been studied. Besides, most studies focus on both sexes instead of a single sex. That said, the trend in male mortality from CVD, respiratory diseases, neoplasm and external causes in Egypt have not been the focus of researchers. This lessens the details derived from the studies as the explanation of causal mechanisms as well as course of events are general than specific [17]. Thus, a detailed understanding of the sequence of pattern and trend in male mortality from these broad cause of mortality in Egypt is needed. The study, therefore, analysed the pattern and trend in male mortality from CVD, respiratory diseases, neoplasm and external causes in Egypt from 2000 to 2015. This study will assist policy makers in policy targeting when dealing with health promotion as well as disease prevention and control.

MATERIALS AND METHODS

Study Design
We employed a retrospective explorative time series design. The design assisted with the description and analysis of records of mortality among males over the period under study. Further, such study designs enhances the formation of practical administrative decisions. For the reason that the design serves as of hypotheses for decisions [18].

Data Availability
In our study, we used data from the World Health Organisation (WHO) Mortality Database and United Nations Population Division. The data used from the two repositories included the number of deaths by year, age group, sex, causes of death and the population size of Egypt. Information on the males, age variations and mortality from neoplasms, diseases of the circulatory system and diseases of the respiratory system, external causes morbidity and mortality and other causes from 2000 to 2015 as defined by the International Statistical Classification of Diseases and Related Health Problems 10th revision (ICD 10) were used for the study [19,20]. These groups of diseases were represented with the ICD codes; C00-D48 (neoplasms), I00-I99 (diseases of the circulatory system), J00-J98 (diseases of the respiratory system), V01-Y98 (external causes morbidity and mortality) and TOT (All Causes). Based on all causes (TOT), we defined all the other causes of death as the causes of death which exclude neoplasms, respiratory diseases, CVD and external causes [19].

Statistical Analyses
We estimated the age standardized mortality rate using the indirect standardization approach to enhance the description of trends in the major causes of mortality among males. For each period, the recorded number of deaths were for five-year age intervals except for age 75 and above. It was found that the ages above 74 years, on the one hand, were categorised as 75 and more years at certain periods and on the other hand, were extended to ages 95 and above years. Hence, the number of deaths at age 75 and above years were aggregated as age 75 and above for all causes of death categories and periods. This was done to help provide a useful and meaningful analysis. Also, for ages 0, 1, 2, 3 and 4 there were inconsistencies in the records. To alleviate these inconsistencies, we grouped the ages as 0 to 4 years. That said, all the ages were five-year aggregated ages groups ranging from 0 to 75 and more years. The number of deaths recorded by the unknown ages was not available in the data. Thus, the authors did not redistribute those rates to generate an equal number of deaths per case as according to the total number of deaths for each cause of death we studied. It was from these

outputs that we estimated age and cause-specific death rates $(_xM_x)$ among males from 2000 to 2015. The age-specific mortality rate for the CVD, respiratory diseases, neoplasms and external causes among males were standardized using the WHO standard population $(_xC_x)$ [21]. The age standardized death rates formula for the study was:

$$\sum_{x=i}^{\infty} _xM_x * _xC_x$$

This approach allowed the elimination of the effect of age composition on the causes of death among the male population of Egypt [22,23]. Again, it allowed for a critical, meaningful and detailed analysis of differences in the cause-specific age-standardized death rates among the Egyptian males [24]. Our analyses were undertaken in R Studio version1.1.456.
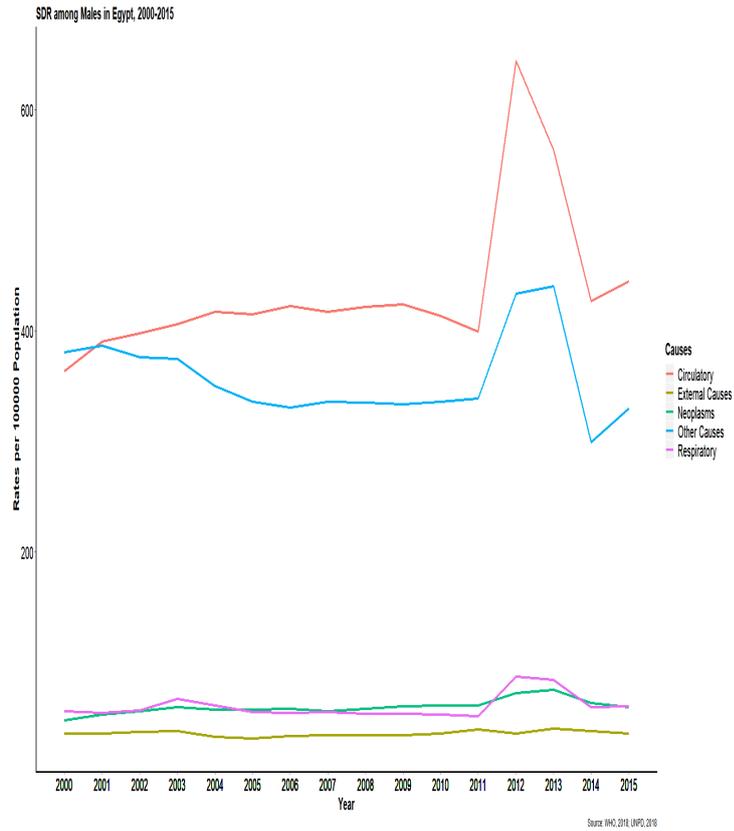
RESULTS

Trend Analysis
Figure 1 shows the trends in the age-standardized death rates from neoplasms, circulatory disease, respiratory diseases, external causes and other causes of death in males in Egypt, from 2000 to 2015. In 2000, all other causes of death exceeded CVD, respiratory, neoplasms and external causes. However, from 2001 to 2015 CVD became the leading cause of death of males in Egypt. It was about four times the deaths from respiratory, neoplasms and external causes of death. Conversely, from 2000 to 2015, external causes of death were fairly stable and the least recorded c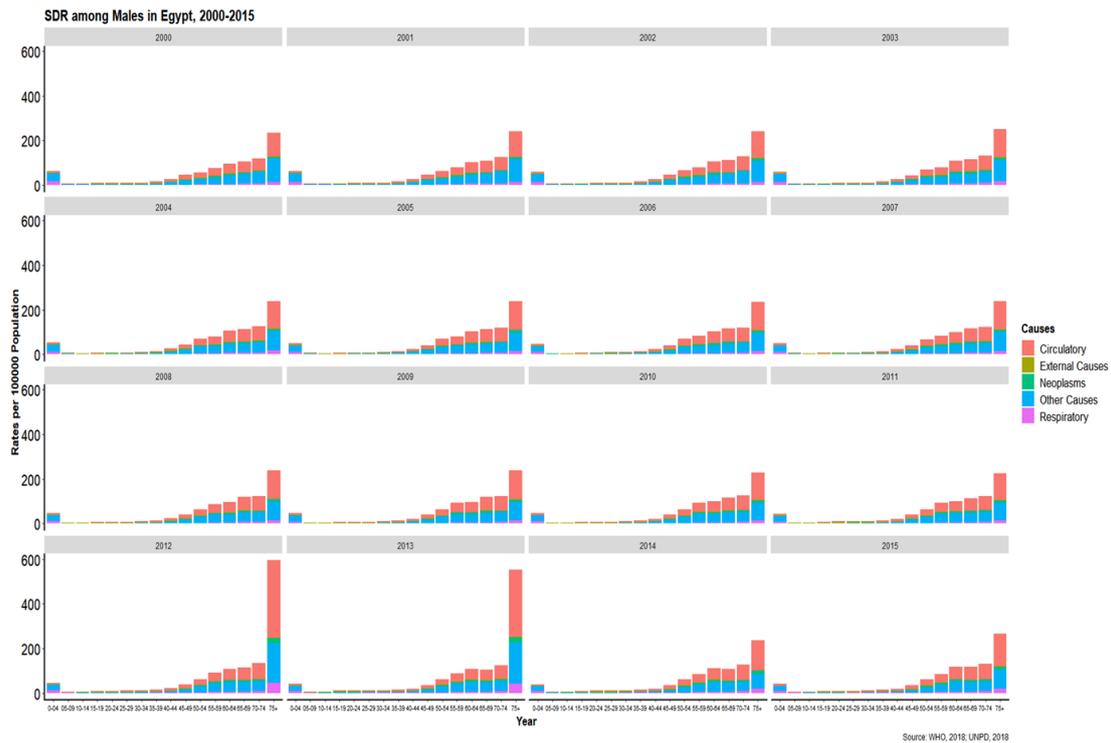ause of death among the five major classes of causes of death under study. From 2011 to 2013, deaths from all causes increased with the exception of mortality from external causes. However, all but external causes of death decreased in 2014. Whereas CVD spiked in 2013, respiratory diseases declined from 2005 to 2010, rose in 2011 and plateaued from 2012 to 2013. Moreover, in 2015, mortality from CVD and respiratory diseases increased among Egyptian males.

Age Pattern Analysis
Figure 2 shows the contribution of each group to the age-standardized death rates from neoplasms, circulatory disease, respiratory diseases, external causes and other causes of death in males in Egypt from 2000 to 2015. Generally, age groups 45 and above years recorded more deaths from circulatory (CVD), respiratory diseases and neoplasms whereas ages 5 to 24 years recorded the least. The recorded death rates from these diseases were highest in 2012 and 2013. In the initial years, other causes of mortality were the highest cause of death among males aged 45 and above years in Egypt. However, within time circulatory diseases became the highest while external causes remained the lowest. Mortality from respiratory diseases and neoplasms increased among the males aged 45 and above years. Males who were in the age group 0 to 4 years recorded higher death rates from CVD, respiratory and other causes than those aged 5 to 44 years. Over time, the recorded death rates from these diseases among males aged 0-4 years reduced. Until 2012, mortality from all the causes of death we studied was minimal among males who were 5 to 24 years of age.

Figure (1): standardized death rates (SDR) from neoplasms, circulatory disease, respiratory diseases, external causes and other causes of death in males (Egypt, 2000-2015)

Figure (2) : Age standardized death rates of major classes of causes of death to life expectancy by (Egypt, 2000-2015)

DISCUSSION

This is the maiden study to analyse the age- and cause-specific mortality of major classes of causes of death among males in Egypt from 2000 to 2015. Using data from WHO Mortality Database and United Nations Population Division for Egypt, we, on the one hand, studied the trends in standardized mortality rates from CVD, external causes, neoplasms and respiratory diseases for males and on the other hand, examined the occurrences of these causes of death in the age groups of the Egyptian males. CVD was endemic among these males over the period we studied. The number of deaths reported to be caused by CVD was about four times higher than deaths from respiratory, neoplasms and external causes of death. This finding affirms See, Jeppsson, Stafström [4] postulation that CVD is the leading cause of mortality in Egypt. Yet, neoplasms and respiratory diseases related deaths were also recurrent among these males although mortality from respiratory diseases declined than neoplasms. Our finding corroborates the assertion that mortality from respiratory diseases in Egypt has declined [5]. However, we found a contrary result to the trend in decline as specified by Morgan in 2017. In that respiratory diseases decline to about 2010, rose in 2011 plateaued in 2012 and 2013 and decline in 2014.

Our study revealed that mortality from CVD, respiratory diseases, neoplasms, and external causes were higher in the adult and elderly years, age 45 and above than in the youthful ages. This finding confirms the theory that CVD and respiratory diseases and neoplasms primary causes of mortality among adults than the youth in Egypt [7,8]. Besides, it affirms Fouad, Awa, Naga, Emam, Labib, Palipudi [9] finding that CVD, respiratory diseases and neoplasms were not common in the youthful ages of males in Egypt because of the decreased incidence of smokers in that age group. Also, the inadequate physical activities observed in the older ages among males in Egypt accounts for the higher rates deaths recorded from CVD, respiratory diseases and neoplasms in the elderly years of male life in Egypt [12,25]. Our finding that these diseases under study are relative higher in the under-five years of male children in Egypt corroborate the fact that during the under five years of life, poor dietary habits perturb the body's homeostasis and thereby creates a loop for CVD, respiratory diseases and neoplasms to manifest [26]and the research that under-five children can inherit the gene from a parent [13]. External causes were the least recorded causes of death among males. The position of external causes in our study is similar to Mahran and colleagues [1] declaration that external causes rank fifth among all causes of death in Egypt.

CONCLUSION

The major finding of our study is the quadruple difference in the increase in mortality from CVD as compared to respiratory diseases, neoplasms and external causes among males in Egypt from the years 2000 to 2015. This outcome is higher than expected. Therefore, health prevention and promotion programs should focus on CVD and the most at risk population, persons aged 45 and above years. Further research is need to quantify the gender differences in the death rates from these major classes of causes of death. These studies will be necessary for understanding of the phenomenon and covering the limitations of our methods.

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