

## Time Trend Mortality of Egyptian Major Non-communicable Diseases

Salah Mostafa, MD, FACE;\* Hanan Al-Gamal; PhD\*\* Reem Zakaria; PhD\*\*\* Kadrya Ali; PhD<sup>s</sup> Gehan Alshry; MD<sup>@</sup> Asmaa Zakareya; PhD<sup>#</sup>  
 \* Professor of Preventive Medicine, and Epidemiology, FACE [Follow of American College of Epidemiology \*\* Professor of Pediatrics, \*\*\* Lecturer of Preventive Medicine, Postgraduate Childhood Studies Institute, Ain-Shams University  
<sup>§</sup>CAPMAS Statistical Consultant, <sup>@</sup>Saudi Military Hospital, Elmadina, Saudi Egypt<sup>#</sup>Cairo University Hospitals

## Abstract

**Aim:** Was to examine the time effects on these leading causes of death from non- communicable diseases in Egypt.

**Methodology:** It is a cross- sectional historical National Egyptians secondary data [CAPMAS, Egypt] study along the years 2008 to 2014.

**Results:** Diseases of the circulatory system (48.1%, 2014) and GIT system, 11.1%, 2014 by far were the leading causes of death in Egypt. This study shows an escalation from 36.5% in 2008 up to 48.1% in 2014 in Egypt, with a notable increase in females more than males, 1.0 to 0.9 respectively. Second to cardiovascular diseases were GIT system leading causes of death in Egypt, raising from 9.3% in 2008 up to 11.1% in 2014 more predominantly in males (from 10.7% in 2008 to 12.3 in 2014) than females (from 7.5 in 2008 to 9.5 in 2014). Respiratory system diseases leading to death increased from 5.3% at 2008 up to 8% at 2014 in Egypt. The fourth leading cause in Egypt is cancers (about 6.7% at 2014). Moreover, the study provides information about the relative distribution of deaths caused by car accidents in Egypt from 2011 to 2015 per 100000 populations.

**Conclusion:** Deaths due to cardiovascular diseases [CVDs] make up around one half of the population mortality. GIT diseases come second in rank, followed by respiratory system diseases and cancers.

**Keywords:** CVDs Mortalities GIT Mortalities Respiratory Mortalities Cancer Mortalities

## الاتجاه الزمني لانتشار الأمراض المصرية الرئيسية غير المعدية

**الهدف:** دراسة الآثار الزمنية لهذه الأسباب الرئيسية للوفاة الناجمة عن الأمراض غير المعدية في مصر.

**المهجية:** دراسة مقطعية تاريخية لمصريين المعرضين للأمراض غير المعدية دراسة على مدى السنوات من 2008 إلى 2014.

**النتائج:** كانت أمراض الجهاز الدوري (48,1%، 2014) ونظام جيت (11,1%، 2014) حتى الآن من الأسباب الرئيسية للوفاة في مصر. وتظهر هذه الدراسة تصاعداً من 36,5% في عام 2008 إلى 48,1% في عام 2014 في مصر، مع زيادة ملحوظة في الإناث أكثر من الذكور، 1,0 إلى 0,9 على التوالي. وثانياً كانت أمراض القلب والأوعية الدموية هي الأسباب الرئيسية للوفاة في مصر، حيث ارتفعت من 9,3% في عام 2008 إلى 11,1% في عام 2014 (بشكل رئيسي لدى الذكور) من 10,7% في عام 2008 إلى 12,3% في عام 2014 (من الإناث) من 7,5 في عام 2008 إلى 9,5 في عام 2014. ارتفعت أمراض الجهاز التنفسي المؤدية إلى الوفاة من 5,3% في عام 2008 إلى 8% في عام 2014 في مصر. والسبب الرئيسي الرابع في مصر هو السرطان (حوالي 6,7% في عام 2014). وعلاوة على ذلك، توفر الدراسة معلومات عن التوزيع النسبي للوفيات الناجمة عن حوادث السيارات في مصر من 2011 إلى 2015 لكل 100000 من السكان.

**الاستنتاج:** وتشكل الوفيات الناجمة عن أمراض القلب والأوعية الدموية حوالي نصف الوفيات السكانية. وتأتي أمراض جيت في المرتبة الثانية، تليها أمراض الجهاز التنفسي والسرطانات.

**الكلمات الدالة:** وفيات الأمراض القلبية الوعائية وفيات السرطان وفيات الجهاز التنفسي وفيات الجهاز الهضمي

**Introduction:**

Mortality rate is defined as the number of deaths in a given population relevant to population size per unit of time. It is typically measured in deaths units per 1.000 individuals per year (Porta et.al., 2014).

Mortality rate is one of the major factors that contribute to the determination of the size and growth of the population of a given society and to realize the causes of death in this society. Scientific use of mortality rates is vital for communities that seek achievement in health and environment (United Nations, 2005).

Mortality rate, which provides annual numbers of deaths during a year per 1.000 individuals at midyear, is known also as crude death rate. Although death rate is considered a rough indicator of mortality status in a country, it indicates the effect of current mortality on growth of population. Age distribution significantly affects mortality indicator (Porta et.al., 2014).

Accurate information on the major causes of deaths and how they are changing is crucial to health policy making (Lozano et.al., 2012). According to the results of the Global Burden of Disease Study 2010, the prevalence of non- communicable diseases such as diabetes, cardiovascular disease, lung diseases, and cancer in the Arab countries has increased, with variations between countries due to income levels differences. Behavioral risk factors such as smoking, unhealthy diets, and physical inactivity are prevalent, and obesity in adults and children has reached an alarming level. (Rahim et.al., 2014)

The mortality rate in Egypt was 4.77 in 2014 compared to 5.09 in 2008, showing decrease of 0.32, according to the United Nations common database, code 13600 (Central Intelligence Agency (CIA) World Factbook, 2015). This rate needs to be studied to determine the leading causes of death and implement the necessary plans to prevent them, whether due to diseases or accidents.

This no review were given an overview of recent epidemiological and statistical parameters on major leading causes of death in Egypt through relating all death's in the population to an underlying causes of death from 2008 to 2014. The importance of this study was that it does not only show the leading causes of death, but also shows the detection of most of them in middle and old age, but their real beginning at childhood to develop progressively through years, such as atherosclerosis.

**Methodology:**

It is a cross- sectional historical National Egyptians secondary data [CAPMAS, Egypt] for all Egyptian population, study along the years 2008 to 2014 to show the time trend on the leading causes of death of non-communicable diseases in Egypt (Annual Bulletin of Birth and Death Statistics, 2014). Also, this study includes a snap shot for deaths in Egypt related to car and train accidents (Annual Bulletin of Car and Train Accidents, 2015). Statistical Analysis was done by Epi Inf 7, CDC 2013.

Ministry of Health and Population publish Annual Statistical Report for all Ministry and its agents activities, few tables of this big report 990 pages will be presented in this paper. This paper includes Table about

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general mortality for 2014 for all Ministry Health and Population activities, as well as mortality distribution according gender, and age groups, Annual Statistical Report 2014.

**Results And Discussion:**

Table (1) Frequency of Deaths According to Major Leading Causes of Deaths in Egypt from Non- Communicable Diseases from 2008 to 2014

Cause Of Death		Years						
		2008	2009	2010	2011	2012	2013	2014
Cancers	Total	32041	30454	30605	28063	24756	3534	33473
	M	18081	17099	17172	16089	14343	19600	18423
	F	13960	13355	13433	11974	10413	15749	15050
Card VD	Total	194264	178342	183152	190710	168665	254816	249307
	M	101993	93741	94233	97987	88584	134864	135437
	F	92271	84601	88919	92723	80081	119952	113870
Resp. Dis.	Total	30040	26746	26613	25305	24281	42294	41250
	M	16385	14593	14196	13627	13070	22820	22108
	F	13655	12153	12417	11678	11211	19474	19142
Git Ds.	Total	57088	54511	51588	48699	42973	58590	56538
	M	35464	34169	32705	30693	27438	36163	35203
	F	21624	20342	18883	18006	15535	22427	21335

Card VD, Cardiovascular Diseases; Resp. Dis., Respiratory Diseases  
GIT Ds., Gastrointestinal Diseases T= Total M= Male F= Female  
Annual Bulletin of Birth and Death Statistics in 2014, Issue: July 2015.

Table (2) Percentage of Deaths in Egypt According to Major Leading Causes of Deaths from Non- Communicable from 2008 to 2014

Cause Of Death		Years						
		2008	2009	2010	2011	2012	2013	2014
Cancers	Total	5.4	5.9	6.3	6.2	6.1	6.5	6.7
	Males	5.6	6.2	6.5	6.2	6.2	6.5	6.7
	Females	5.1	5.6	6.1	6.1	5.9	6.6	6.7
Cardio V. D.	Total	36.5	40.0	37.9	36.2	36.7	48.8	48.1
	Males	34.6	37.5	35.6	34.0	34.7	47.7	45.9
	Females	38.9	43.0	40.7	38.9	39.6	50.2	50.9
Resp. D.	Total	5.3	5.3	5.5	5.4	5.7	8.1	8.0
	Males	5.1	5.2	5.4	5.3	5.6	7.8	7.8
	Females	5.4	5.4	5.7	5.6	5.8	8.4	8.3
GIT Dis.	Total	9.3	10.2	10.7	11.1	10.8	11.1	11.1
	Males	10.7	11.8	12.4	12.4	12.1	12.4	12.3
	Females	7.5	8.4	8.6	9.4	9.2	9.4	9.5

Annual Bulletin of Birth and Death Statistics in 2014, Issue: July 2015

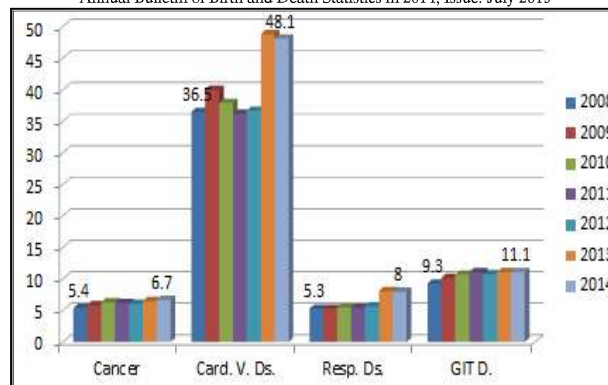


Fig.(1) Egyptian leading causes from non communicable diseases, by percent, p 0.000001

Table (3) Frequency of Mortalities and Injuries due to Car and Train Incidents in Egypt during 2011- 2015

Cause Of Death	Years				
	2011	2012	2013	2014	2015
Deaths Due To Car Accidents	7115	6431	6700	6236	6203
Deaths per 100.000/ persons	8.8	7.8	7.9	7.2	7.0
Deaths per 100.000 vehicles	111.7	97.3	95.2	79.3	71.8
Deaths Due To Train Accidents	489	447	781	1044	1235
Deaths	45	108	77	85	43
Injures	60	130	225	68	99
Passengers In Thousands	220048	234795	176295	175214	217411
Rate Per Million Passengers	2.2	1.9	4.4	6.0	5.7
Rate Per Million Deaths	0.2	0.5	0.4	0.5	0.2
Rate Per Million Injuries	0.3	0.6	1.3	0.4	0.5

Annual Bulletin of Car and Train Accidents in 2015, Issue: March 2016

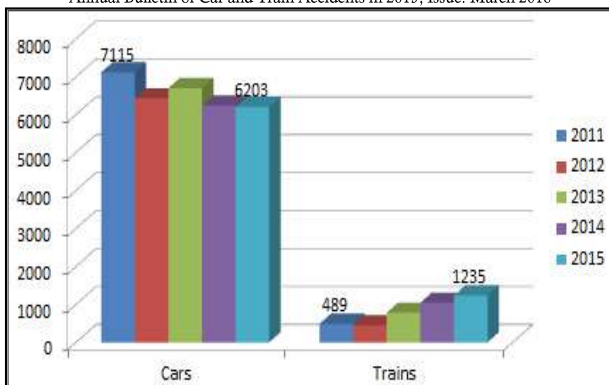


Fig. (2) Egyptian leading causes of death from cars and trains accidents, p 0.000001  
Table (4) Egyptian Ministry of Health and Population Total Mortality Rate for Egypt, 2014

Indicator	Rate
Crude Death Rate	6.1/ 1000
Infant Mortality Rate	14.6/ 1000
Under 5 Years Mortality Rate	18.9 [ /1000 live borne]

Sources; Governorates Health Directorates

Table (5), Distribution of Egyptian Deaths by Gender, and Age Groups, for Egypt, 2014

Age Groups	Males		Females		Total	
	n	%	n	%	n	%
New Borne	21251	7.2	18428	7.7	39679	7.5
- 1	6401	2.2	5287	2.2	11688	2.2
- 5	5509	1.9	3399	1.4	8908	1.7
15-48	44419	15.1	22978	9.6	67397	12.7

Sources; Governorates Health Directorates

Table (4) and (5) shows crude death rates, are 6.1/ 1000, infant mortality rate, 14.6/ 1000, and under 5 years mortality rate, 18.9/ 10000. Less than 5 years mortality rates for males are more for males 1.9% than females 1.4%.

The latest information from the annual mortality and morbidity report for 2014 released in 2015 [http://ec.europa.eu/eurostat/statistics-explained/Index.php?Glossary:EU-28 related to the causes of death is available for the years from 2008 to 2014](http://ec.europa.eu/eurostat/statistics-explained/Index.php?Glossary:EU-28%20related%20to%20the%20causes%20of%20death%20is%20available%20for%20the%20years%20from%202008%20to%202014) Table (1) shows that diseases of the circulatory system [48.1%, 2014], 2014 by far, the leading causes of death in the Egypt.

Circulatory system diseases such as rheumatic heart disease of the young, chronic coronary artery diseases and ischemic heart diseases of middle age, or valve calcification, degeneration, stroke, and heart failure of the elderly are the most leading causes of mortality (Pearson et al.,

1993). The table (1) shows an escalation from 36.5% in 2008 up to 48.1% in 2014 in Egypt, with a notable increase in females more than males.

In developing countries, the high morbidity rates of cardiovascular diseases are related to the increase in the incidences of atherosclerotic diseases. Urbanization and higher risk factor levels (such as obesity, diabetes, dyslipidemia, and hypertension) might be the cause of them. About half of the deaths attributable to cardiovascular diseases in the developing countries in 1990 occurred below the age of 70 years, while, in developed countries, this percentage is lowered to a quarter. Between 1990 and 2020, ischemic heart disease mortality in developing countries is expected to show a very high increase than in developed countries, 48% and 29% respectively. (Murray et al., 1996).

There is another similar predicted increase in cardiovascular diseases mortality (124% and 107% increases among men and women in developing countries versus 78% and 56% increases, respectively, in the developed countries). These predictions largely depend on the likely changes in the population demographics and risk factors potentials (Reddy et al., 1998), (Chockalingam et al., 1999).

Heart disease risk factors include patients' age, family history, hypertension, low HDL, elevated LDL, hypercholesterolemia, dyslipidemia, diabetes mellitus, obesity and smoking index (Wu, 1999). Smoking tobacco has been the most important and documented cause in cardiovascular diseases mortality (Fox, et al., 2004).

By 2020, cigarette consumption is expected to elevate between 6.7 and 6.8 trillion cigarettes as long as the current growth trends in population and smoking continue. This will be the situation in low and middle income countries, including Egypt (European Research Council (ERC), 2007) (Guindon and Boisclair, 2003) (Shafey et al., 2009).

Also rapid changes in dietary habits which are associated with nutritional transition, with a decrease in physical activity levels, also may be an important risk factor in the elevation of cardiovascular diseases in developing countries (Stein et al., 2005). Epidemiological evidence suggests that dietary habits changes, as the increasing in the use of energy-dense diets full of unhealthy fats, oils, and sugars, has contributed to an increase in cardiovascular diseases incidence in low and middle income countries (Hu, 2008).

Second in rank, after cardiovascular diseases, comes the GIT system as the main leading causes of death in Egypt, as per the table, raising from 9.3% in 2008 up to 11.1% in 2014 more predominantly in males (from 10.7% in 2008 to 12.3 in 2014) than females (from 7.5 in 2008 to 9.5 in 2014).

The most common cause of GIT morbidity leading to mortality is hepatitis C virus complications as liver cirrhosis, portal hypertension, esophageal varices and hepatocellular carcinoma. Hepatitis C is a global health problem. The World Health Organization (WHO) reported that 3-4 million people get infected newly with hepatitis C virus annually, while 130-170 million people are chronically infected. Approximately 350.000 die annually from hepatitis C- related liver disease, developing poor

countries report the highest prevalence rates in Asia and Africa, while developed countries in Europe and North America show low prevalence rates. Chronic infection highest rates are found in Egypt, Pakistan, and China (World Health Organization, 2010).

Unsafe injections in developing countries constitute the major transmission route, presumably due to the use of contaminated tools, as in the case of Egypt, where the HCV epidemic has been mainly attributed to the prolonged use of parenteral anti-schistosomal treatment (antimony potassium tartrate, tartar emetics) using non-disposable glass syringes over 30 years. Cirrhosis is caused mainly by chronic HCV, and is considered the most common leading cause for liver transplantation in Egypt (Seeff, 2002). Egypt reports the highest prevalence of HCV in the world from 6% to more than 40% (Lehman and Wilson, 2009).

Respiratory system diseases leading to death; dramatically increased from 5.3% at 2008 up to 8% at 2014 in Egypt, without any notable difference between both sexes. Deaths from respiratory system diseases in Europe made up about 8 per cent of all deaths in 2012. The percentage in the United Kingdom was higher than Europe at about 14.1%, while in Portugal, Ireland, Spain, Denmark, Belgium and the Netherlands had reached at least 10 per cent. In Norway, deaths from respiratory diseases hit 10.2%. (Decramer, 2011).

The most important respiratory diseases (Chronic Obstructive Lung Disease (COLD), asthma, lung cancer, pneumonia and tuberculosis) are responsible for about 20% of the mortality worldwide (Loddenkemper et.al., 2003). There are about 300 million persons have asthma and about 210 million people have COPD and millions more with a host of other lung diseases worldwide (World Health Organization, 2008).

COLD is considered according to Jemal et.al, 2005 study, the 4th cause of death and is predicted to be the 3rd cause of death by 2030 in USA. Smoking is a particularly pernicious behavior because of its high prevalence and mortality risk (Rogers et.al., 2005). A number of approximately 100 million people in the 20th century died from tobacco related morbidity worldwide and the number is expected to be ten times bigger in the 21st century where a large percentage of deaths due to tobacco will be among adults, males and females, especially from developing countries where rates of smoking among women is elevating (White et.al., 2007).

The fourth leading cause in Egypt is cancers (about 6.7% at 2014). The rates increased slowly year by year from 5.4 at 2008 to 6.7 at 2014, without any notable differences between both sexes. Egypt ranked 2nd in bladder cancer, 3rd in liver cancer, 15th in lymphomas and 19th in leukemia (World Health Rankings, 2014).

Several risk factors lead to cancer mortality. These include addiction, diet and physical activity, air pollution and sexual and reproductive health. The population attributable fraction for all cancer sites worldwide considering the joint effect of these factors is about 35% (34% for low- and middle-income countries and 37% for high-income countries) (Weiderpass, 2010).

According to the International Agency for Research on Cancer (IARC), there is a strong evidence of carcinogenicity in humans for human T-cell lymphotropic virus, hepatitis C virus, hepatitis B virus, human immunodeficiency virus (HIV), Epstein-Barr virus, and human papillomavirus (Blackadar, 2016).

Table (3) provides information about the relative distribution of deaths caused by car accidents in Egypt from 2011 to 2015 per 100,000 population and per 100,000 vehicles. The table also illustrates train incidents, deaths and injuries rates per 1000,000 each.

According to the table, from 2011 to 2015 the number of deaths per 100,000 people has declined from 8.8 to 7.0, and the number of deaths per 100,000 vehicles has also declined from 111.7 to 71.8. Although the number of deaths hasn't changed dramatically from 2012 to 2013, the table shows a notable decrease in 2015, compared to 2011, which indicates some efforts being exerted every year to reduce the risks caused by car accidents.

In an attempt to improve roads network, a National Project for Roads has been launched by the government. According to the Egyptian Ministry of Transportation, Approximately 22 billion Egyptian Pounds have been allocated for the project to accomplish 1470 km, including building and enhancing new and existing roads in various parts of the country. A large number of projects are also being implemented to develop old road network across Egypt's governorates at a large budget. Additionally, projects for building new 35 bridges on various roads across Egypt have been accomplished at an estimate of L.E. 2 billions (Egyptian Ministry of Transport, 2016).

Deaths caused by train accidents have also declined approximately by half from 2014 to 2015 at 0.2 per million deaths to reach the same rate in 2011. Despite the declining death rates, injuries seemed to increase from 2011 to 2015 by 0.2 per million at a considerable rate by 0.7 from 2012 to 2013 and decrease at a considerable rate by 0.9 from 2013 to 2014, Table (3).

The number of train accidents is elevating by 200-300 incidents from 2013 to 2015 while it was decreased by 42 from 2011 to 2012. However, and notably, deaths and injuries showed irrelevant rates to the number of accidents. For example, in 2011 and 2012, reported accidents were 489 and 447 respectively, while death rates were 0.2 and 0.5 respectively and injury rates were 0.3 and 0.6. Similarly, in 2013 and 2014, reported accidents were 781 and 1044 respectively, while death rates were 0.4 and 0.5 respectively and injury rates were 1.3 and 0.4. This suggests that the intensity of the incidents is what determines the number of deaths and injuries per each individual accident.

The table (3) also indicates that casualties due to train accidents in 2015 have become the same as 2011 at 0.2, although they tended to increase in 2013, 2014 and 2015 at 0.5, 0.4 and 0.5. This data indicates that railway services have improved in 2015 to overcome the problems that caused casualties during the period from 2012 to 2014. However, injuries rates in 2015 shows higher levels than 2011 by 0.2, although the

number of reported accidents and passengers were relatively higher than 2011. This supports the aforementioned conclusion that accidents were not too dangerous to cause casualties among passengers, instead, they caused injuries.

Several development plans have been implemented to enhance railroad services and safety including trains, stations, rails, tracks and signal systems on roads. Around 2100 wagon trains have been imported and improved. Also, 396 Railroad tracks have been implemented to improve the efficacy and accuracy of these tracks at an approximate cost of L.E. 550 billion (Egyptian Ministry of Transport, 2016).

**Conclusion:**

Non-communicable diseases tended to cause higher gradual mortality rates in Egypt annually from 2008 to 2014. Deaths due to cardiovascular diseases make up around one half of the population mortality. GIT diseases come second in rank, followed by respiratory system diseases and cancers. Respiratory system diseases have the most increase percentage among the other diseases in six years. On the other hand, mortality trends due to car incidents had a slower decrease by approximately 13% during 2011 to 2015 suggesting some improvements done to reduce the losses. Train incidents mortality rates in 2015 tended to stay the same as they were in 2011, although they elevated notably during 2012, 2013, and 2014, suggesting government's attempts to rectify the situation.

**Recommendation:**

It is recommended to update this study to include more Egyptian data that include main age groups and main types of these major non-communicable diseases.

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