



Recent Mortality Trends in the Egyptian Population

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Abstract

Our research deals with the way that calendar time affects mortality patterns in the Egyptian population, and how this information can be used to elaborate predictions. A description of the observed mortality evolution has been worked out using data from 1975 to 1993. We have used Gompertz "law" and its subsequent that made by Makeham to model the evolution of Egyptian mortality over the period and using univariate time series analysis, we have obtained a prognosis for years 1948 to 2014.

Keywords: Graduation, Population projection, Gompertz, Makeham, Life Tables.

Introduction

Unfortunately in Egypt, there is no official national mortality experience available and therefore these rates have to be derived from other sources such as the United Nations model life tables or an investigation of past data. In this analysis, assumptions about future mortality improvements are obtained from investigation trends in past data and selecting a methodology to project future trends. The national mortality experience of Egypt is investigated over 1948 – 2014 and the main features over that period will be cleared by analyzing the following points:

1. Basis of analysis of mortality trends,
2. Trends in the male and female mortality, and

3. Trends in infant, childhood, middle adult life and advanced ages mortality.

Basis of analysis of mortality trends

The nature and features of the data can determine the appropriate methods that can be used for the analysis as well as the objective of the analysis itself. Mortality improvements can be analyzed and projected on the period basis (calendar year rates), cohort basis (year-of-birth specific rates). Mortality also can be analyzed in aggregate (all causes) or separately by cause of death for age and gender, but because of the complex nature of the last approach and the because of the unavailability of detailed data about the cause of death in the Egyptian population, and that's because



that there is no official national mortality experience available as mentioned before, therefore in this analysis, a period basis will be carried out.

1.1 Data

This investigation is limited to the available calendar years of national population mortality data over the years 1948 – 2014 for ages 0 - 74 subdivided by gender, and collected together in age groups as there is no available data for individual ages.

2 Mortality Trends

Mortality rates by age, gender, and year provide a valuable time series for investigating the trend of mortality rates over time and give a good picture of the future trends. Trends over the available data are obtained by comparing the mortality rates of the age groups for calendar years 1948, 1980, 2014. The rates are plotted on the log scale (which is more expressive than actual number scale) at 5-year age groups (except for ages 0, 1-4, and for ages 75 and over) for male and female.

The graphs in the next sections will exhibit that the changes in mortality in males and females are roughly similar with some changes in old ages. Trends of mortality have shown an overall improvements as the rates of mortality have a gradual fall at most ages for both male and female.

2.1 Male Trends

As shown in table 1, the greatest improvements of males mortality rates were at the very young ages (87.8% at the age group 0 – 1 and 94.2% in the age group 1 – 4). The second improvement of rates was between 5 – 34 (between 73.9% and 80%). Middle age groups (35 – 59) improved between 37.8% and 68.8% (declined with age), and old age groups (60 – 74) were less improved than the other groups (between 5.2% and 14.3%) also declined with age. Mortality for age 75 and over was improved by 39.1% in 2014 of that in 1948. In general, male mortality improved lessens with age between 2014 and 1948 with average improvement of 57.6%.

2.2 Female Trends

As shown in table 2, the greatest improvements of males mortality rates were at the very young ages (86.1% at the age group 0 – 1 and 93.7% in the age group 1 – 4). The second improvement of rates were between 5 – 44 (between 64% and 75.8%). Age groups (45 – 69) improved between 15.8% and 48% (declined with age), and old age groups (70 – 74) there was no improvement. Mortality for age 75 and over were improved by 49.8% in 2014 of that in 1948(More than males). In general, female mortality improved lessens with age between 2014 and 1948 with average improvement of 57.0% (almost the same as males).



Table 1: Male Mortality of the Egyptian population 1948, 1980, 2014.

Year Age	1948	1980	2014	Percentage improvement between 1948- 2014
0 – 1	0.217545	0.187356	0.026435	87.8%
1 – 4	0.043231	0.024484	0.00251	94.2%
5 – 9	0.00405	0.002486	0.000936	76.9%
10 – 14	0.003629	0.001976	0.000839	76.9%
15 – 19	0.004742	0.00234	0.001239	73.9%
20 – 24	0.005402	0.002835	0.00123	77.2%
25 – 29	0.006972	0.002926	0.001391	80.0%
30 – 34	0.007996	0.003736	0.001992	75.1%
35 – 39	0.008946	0.004806	0.002789	68.8%
40 – 44	0.012617	0.006808	0.004588	63.6%
45 – 49	0.014956	0.010342	0.007362	50.8%
50 – 54	0.020024	0.01551	0.01061	47.0%
55 – 59	0.027682	0.02364	0.017218	37.8%
60 – 64	0.034797	0.03236	0.029818	14.3%
65 – 69	0.05268	0.062992	0.04694	10.9%
70 – 74	0.076415	0.087059	0.072463	5.2%
75 +	0.236129	0.068526	0.143918	39.1%

Table 2: Female Mortality of the Egyptian population 1948, 1980,2014.

Year Age	1948	1980	2014	Percentage improved between 1948 and 2014
0 – 1	0.192602	0.21909	0.026677	86.1%
1 – 4	0.042293	0.031909	0.00268	93.7%
5 – 9	0.003122	0.002338	0.000755	75.8%
10 – 14	0.002626	0.001336	0.000641	75.6%
15 – 19	0.003115	0.001668	0.000867	72.2%
20 – 24	0.003411	0.001627	0.000831	75.6%
25 – 29	0.003946	0.001975	0.001059	73.2%
30 – 34	0.004769	0.002175	0.001288	73.0%
35 – 39	0.005068	0.003181	0.001926	62.0%
40 – 44	0.007037	0.003082	0.002535	64.0%
45 – 49	0.008321	0.005047	0.00433	48.0%
50 – 54	0.010615	0.007788	0.00702	33.9%
55 – 59	0.019478	0.011455	0.010374	46.7%
60 – 64	0.024103	0.016538	0.020289	15.8%
65 – 69	0.042207	0.03785	0.03213	23.9%
70 – 74	0.056369	0.060526	0.056777	-0.7%
75 +	0.303835	0.254364	0.152397	49.8%



2.3 Differences between Male and Female Mortality Improvements

Table 3 shows the percentage improvement in mortality rates over the period 1948 – 2014 for male and female experience. It can be seen that the percentage reduction in the mortality of males were slightly higher than that of females up to age group 50 – 54 (except for that age group 40 – 44). Female mortality improvements were higher than of males for ages 55 and over (except the age group 70 – 74). In general, male mortality improved better than females for young ages and female mortality improved better than males for old ages.

3 Mortality improvements over life-span

3.1 Infancy and early childhood (0 – 1) & (1 – 4)

Mortality at that young ages has a significant effect on the population number. These age groups in the Egyptian population had the largest improvement over all ages through 1948 – 2014.

From table 3, we can see that infancy and early childhood had improved around 86% under age 1 (which reflecting the increase of the standard of living in Egypt through that period), and around 94% for the age group 1 – 4.

3.2 Early and middle adult life (5 – 34)

The second largest improvement in mortality rates over 1948 – 2014 was for the age groups 5 – 34 (around 75%). It is also can be shown from table 3.

3.3 Advanced ages: The mortality improvement was less in these age

groups as it is shown in the next three figures (7, 8, 9). In the ages between 35 – 59

the improvement was around 49%, and between 60 – 74 the improvement was around 31%, and over the age 75 the improvement in the mortality was around 45%.

Mortality Projection

As it is impossible to predict the development of new medical technologies, the discovery of cures for particular disease or the appearance of new disease. Nor can one usually determine accurately the effect on mortality of current or proposed health measures. So the projection of the age-specific mortality rates of a population is therefore essentially a process of extrapolation. The extrapolated rates must of course be consistent with each other and with all the known facts about population involved.

The most common method of projecting, by extrapolation of the age specific mortality rates may be performed either graphically or by mathematical formula.



Table 3: Percentage Improvement in Egyptian Mortality between 1948 – 2014 for male and female.

Year Age	Male Percentage Improvement	Female Percentage improvement
0 – 1	87.8%	86.1%
1 – 4	94.2%	93.7%
5 – 9	76.9%	75.8%
10 – 14	76.9%	75.6%
15 – 19	73.9%	72.2%
20 – 24	77.2%	75.6%
25 – 29	80.0%	73.2%
30 – 34	75.1%	73.0%
35 – 39	68.8%	62.0%
40 – 44	63.6%	64.0%
45 – 49	50.8%	48.0%
50 – 54	47.0%	33.9%
55 – 59	37.8%	46.7%
60 – 64	14.3%	15.8%
65 – 69	10.9%	23.9%
70 – 74	5.2%	-0.7%
75 +	39.1%	49.8%

Graphical Method

Under the graphical approach, the mortality rates at a particular attained age are plotted according to year of occurrence (period approach) or year of birth (generation approach). A smooth curve is drawn through these points. Similar curves are drawn on the same graph for neighboring ages, and the curves are all then extrapolated to project future mortality rates by year of

occurrence or year of birth. Under the generation approach, the curves representing the observed rates for the different attained ages are the same as those under the period approach, but shifted sideways.

Mathematical Method: The usual method of projection adopted is to extrapolate past rates by mathematical formula.

- The most commonly used formula is

$$q_x(T) = R^T q_x(0) \tag{1}$$

Where: -

$q_x(T)$: The mortality rate at age (x) experienced in year T.

$q_x(0)$: The mortality rate at age (x) at the base year (T= 0).



R : The annual reduction factor, which will depend on (x) .

- Another method of mortality projection which has considered popular which involves the fitting of a single mathematical formula is the Gompertz "law" and its subsequent that made by Makeham, who adopted the formula

$$\mu_x = A + BC^x \quad (2)$$

The resulting series of fitted parameter values are then extrapolated to project future mortality.

- The Heligman-Pollard low number two is also one of the popular methodologies for mortality projection.

$$q_{x,t} = A_t^{(x+B_t)^{C_t}} + D_t e^{-E_t (\ln x - \ln F_t)^2} + \frac{G_t H_t^x}{1 + K_t G_t H_t^x} \quad (3)$$

The first right hand side term models childhood mortality, the second one captures the accident hump* and the third refers to the natural mortality caused by senescence (Heligman & Pollard, 1980).

2.4 Methodology

In this analysis, assumptions about future mortality improvements are obtained from the past trends investigation, means that it will be assumed that future mortality rates will improve in the same way it was in the past and equation (1) will be used by applying the following steps.

Step 1: Choose a base year and then calculate the annual reduction factor (R) for each age group and for each year after the base year with respect to that base year using the formula :

$$R = \left(\frac{q_x(T)}{q_x(0)} \right)^{\frac{1}{T}} \quad (4)$$

Step 2: Consider the series of resulting R 's of the last step as a sample of all R 's and use its arithmetic mean as an estimate of it.

Step 3: Use the arithmetic mean to project future mortality rates using formula (1)

$$q_x(T) = R^T q_x(0).$$



5 Mortality Projection of the Egyptian population

The year 1986 will be used as a base year and calculation of the annual reduction factor between 1987 and 2014 will be done for each age group and for each gender using formula (4), and the arithmetic mean will be used to project mortality rates to 2020.

5.1 Male Projection: Using formula (4); the resulting factors and their mean for each age group are shown in table 4.

Table 4: Annual reduction factor of mortality rates (R) for Egyptian males based on 1986.

	1987	1988	1989	1990	1991	1992	1993	1994	1995	2014	Mean
0-1	1.0160	0.9294	0.8875	0.8948	0.8983	0.8990	0.9014	0.9104	0.9142	0.9196	0.9171
1-4	0.9833	0.9416	0.9411	0.9153	0.9185	0.9217	0.9052	0.9058	0.9079	0.9072	0.9248
5-9	1.0202	0.9577	0.9580	0.9466	0.9417	0.9380	0.9398	0.9418	0.9399	0.9432	0.9527
10-14	1.0000	0.9501	0.9650	0.9545	0.9534	0.9488	0.9500	0.9572	0.9583	0.9607	0.9598
15-19	0.9536	0.9667	0.9779	0.9739	0.9577	0.9553	0.9664	0.9563	0.9688	0.9833	0.9660
20-24	0.9434	0.9374	0.9378	0.9403	0.9446	0.9327	0.9417	0.9551	0.9494	0.9597	0.9442
25-29	0.9256	0.9362	0.9401	0.9522	0.9444	0.9386	0.9365	0.9470	0.9436	0.9467	0.9411
30-34	1.0113	0.9646	0.9495	0.9694	0.9710	0.9632	0.9674	0.9714	0.9692	0.9719	0.9709
35-39	1.0149	0.9948	0.9840	0.9915	0.9953	0.9805	0.9793	0.9844	0.9816	0.9818	0.9888
40-44	1.0436	0.9937	0.9905	0.9996	0.9950	0.9956	0.9978	1.0016	0.9948	0.9961	1.0008
45-49	0.9458	0.9287	0.9410	0.9513	0.9605	0.9656	0.9750	0.9791	0.9876	0.9892	0.9624
50-54	0.9560	0.8786	0.9116	0.9235	0.9405	0.9378	0.9430	0.9510	0.9499	0.9563	0.9348
55-59	0.9851	0.8999	0.9180	0.9221	0.9347	0.9401	0.9465	0.9546	0.9583	0.9604	0.9420
60-64	0.9937	0.9682	0.9812	0.9744	0.9849	0.9859	0.9896	0.9936	0.9878	0.9854	0.9845
65-69	1.0114	0.9349	0.9643	0.9491	0.9591	0.9599	0.9657	0.9681	0.9748	0.9715	0.9659
70-74	1.0291	0.9497	0.9720	0.9770	0.9986	1.0022	1.0114	1.0173	1.0152	1.0052	0.9978
75+	0.9844	0.9542	0.9643	0.9508	0.9582	0.9573	0.9622	0.9710	0.9763	0.9699	0.9649



Table 5: Projection of the Egyptian Males mortality rates (1997 – 2020).

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
0 – 1	0.0236	0.0216	0.0198	0.0182	0.0167	0.0153	0.0140	0.0129	0.0118	0.0108	0.0099	0.0091
1 – 4	0.0028	0.0026	0.0024	0.0022	0.0021	0.0019	0.0018	0.0016	0.0015	0.0014	0.0013	0.0012
5 – 9	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0007	0.0007	0.0007	0.0006	0.0006	0.0006
10 – 14	0.0008	0.0008	0.0007	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005
15 – 19	0.0010	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007	0.0007
20 – 24	0.0010	0.0009	0.0009	0.0008	0.0008	0.0007	0.0007	0.0007	0.0006	0.0006	0.0006	0.0005
25 – 29	0.0012	0.0012	0.0011	0.0010	0.0010	0.0009	0.0009	0.0008	0.0008	0.0007	0.0007	0.0006
30 – 34	0.0019	0.0019	0.0018	0.0018	0.0017	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
35 – 39	0.0030	0.0029	0.0029	0.0029	0.0028	0.0028	0.0028	0.0027	0.0027	0.0027	0.0026	0.0026
40 – 44	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0049	0.0049	0.0049
45 – 49	0.0054	0.0052	0.0050	0.0048	0.0046	0.0044	0.0043	0.0041	0.0040	0.0038	0.0037	0.0035
50 – 54	0.0079	0.0074	0.0069	0.0065	0.0060	0.0056	0.0053	0.0049	0.0046	0.0043	0.0040	0.0038
55 – 59	0.0134	0.0126	0.0119	0.0112	0.0105	0.0099	0.0093	0.0088	0.0083	0.0078	0.0073	0.0069
60 – 64	0.0291	0.0286	0.0282	0.0278	0.0273	0.0269	0.0265	0.0261	0.0257	0.0253	0.0249	0.0245
65 – 69	0.0428	0.0413	0.0399	0.0386	0.0372	0.0360	0.0347	0.0336	0.0324	0.0313	0.0302	0.0292
70 – 74	0.0671	0.0670	0.0668	0.0667	0.0665	0.0664	0.0662	0.0661	0.0659	0.0658	0.0656	0.0655
75 +	0.1318	0.1272	0.1227	0.1184	0.1142	0.1102	0.1064	0.1026	0.0990	0.0955	0.0922	0.0889
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
0 – 1	0.0083	0.0077	0.0070	0.0064	0.0059	0.0054	0.0050	0.0046	0.0042	0.0038	0.0035	0.0032
1 – 4	0.0011	0.0010	0.0009	0.0009	0.0008	0.0007	0.0007	0.0006	0.0006	0.0005	0.0005	0.0005
5 – 9	0.0006	0.0005	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003
10 – 14	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0.0003
15 – 19	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
20 – 24	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003
25 – 29	0.0006	0.0006	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0.0003
30 – 34	0.0013	0.0013	0.0013	0.0012	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010	0.0010
35 – 39	0.0026	0.0026	0.0025	0.0025	0.0025	0.0024	0.0024	0.0024	0.0024	0.0023	0.0023	0.0023
40 – 44	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049
45 – 49	0.0034	0.0033	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026	0.0025	0.0024	0.0023	0.0022
50 – 54	0.0035	0.0033	0.0031	0.0029	0.0027	0.0025	0.0023	0.0022	0.0021	0.0019	0.0018	0.0017
55 – 59	0.0065	0.0061	0.0058	0.0055	0.0051	0.0048	0.0046	0.0043	0.0040	0.0038	0.0036	0.0034
60 – 64	0.0241	0.0237	0.0234	0.0230	0.0226	0.0223	0.0219	0.0216	0.0213	0.0209	0.0206	0.0203
65 – 69	0.0282	0.0273	0.0263	0.0254	0.0246	0.0237	0.0229	0.0221	0.0214	0.0206	0.0199	0.0193
70 – 74	0.0653	0.0652	0.0650	0.0649	0.0648	0.0646	0.0645	0.0643	0.0642	0.0640	0.0639	0.0637
75 +	0.0858	0.0828	0.0799	0.0771	0.0744	0.0718	0.0692	0.0668	0.0645	0.0622	0.0600	0.0579



Table 6: Annual reduction factor of mortality rates (R) for Egyptian females based on 1986.

	1987	1988	1989	1990	1991	1992	1993	1994	1995	2014	Mean
0-1	1.0296	0.9482	0.9000	0.9003	0.9010	0.8996	0.9017	0.9048	0.9086	0.9154	0.9209
1-4	1.0069	0.9655	0.9569	0.9125	0.9161	0.9265	0.9044	0.8987	0.9046	0.9040	0.9296
5-9	0.9728	0.9636	0.9732	1.0703	0.9310	0.9374	0.9310	0.9433	0.9314	0.9355	0.9590
10-14	0.9525	0.9573	0.9618	0.9639	0.9407	0.9477	0.9382	0.9608	0.9479	0.9517	0.9522
15-19	0.9494	0.9723	1.4788	0.9687	0.9538	0.9554	0.9541	0.9643	0.9511	0.9675	1.0115
20-24	0.9535	0.9604	0.9616	0.9512	0.9507	0.9422	0.9367	0.9454	0.9351	0.9480	0.9485
25-29	0.9736	0.9584	0.9673	0.9677	0.9544	0.9549	0.9488	0.9497	0.9495	0.9534	0.9578
30-34	0.9561	0.9474	0.9566	0.9514	0.9562	0.9495	0.9516	0.9563	0.9502	0.9579	0.9533
35-39	1.0474	0.9834	0.9763	0.9809	0.9804	0.9601	0.9667	0.9713	0.9627	0.9676	0.9797
40-44	1.0051	0.9623	0.9637	0.9725	0.9753	0.9811	0.9798	0.9786	0.9735	0.9785	0.9770
45-49	0.9858	0.9556	0.9616	0.9652	0.9681	0.9686	0.9737	0.9718	0.9751	0.9800	0.9706
50-54	0.9927	0.9069	0.9280	0.9356	0.9448	0.9495	0.9581	0.9647	0.9586	0.9667	0.9506
55-59	1.0077	0.8880	0.9160	0.9165	0.9310	0.9337	0.9395	0.9435	0.9473	0.9507	0.9374
60-64	0.9672	0.9644	0.9807	0.9782	0.9874	0.9845	0.9891	1.0189	0.9818	0.9876	0.9840
65-69	0.9932	0.9256	0.9422	0.9305	0.9415	0.9450	0.9517	0.9523	0.9564	0.9568	0.9495
70-74	1.0268	0.9555	0.9604	0.9602	0.9654	0.9692	0.9762	0.9804	0.9784	0.9777	0.9750
75+	0.9798	0.9528	0.9621	0.9534	0.9577	0.9574	0.9589	0.9595	0.9648	0.9590	0.9606

Table 7: projection of male mortality rate in Egypt

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
0-1	0.0236	0.0216	0.0198	0.0182	0.0167	0.0153	0.0140	0.0129	0.0118	0.0108	0.0099	0.0091
1-4	0.0028	0.0026	0.0024	0.0022	0.0021	0.0019	0.0018	0.0016	0.0015	0.0014	0.0013	0.0012
5-9	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0007	0.0007	0.0007	0.0006	0.0006	0.0006
10-14	0.0008	0.0008	0.0007	0.0007	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005
15-19	0.0010	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0008	0.0007	0.0007	0.0007
20-24	0.0010	0.0009	0.0009	0.0008	0.0008	0.0007	0.0007	0.0007	0.0006	0.0006	0.0006	0.0005
25-29	0.0012	0.0012	0.0011	0.0010	0.0010	0.0009	0.0009	0.0008	0.0008	0.0007	0.0007	0.0006
30-34	0.0019	0.0019	0.0018	0.0018	0.0017	0.0017	0.0016	0.0016	0.0015	0.0015	0.0014	0.0014
35-39	0.0030	0.0029	0.0029	0.0029	0.0028	0.0028	0.0028	0.0027	0.0027	0.0027	0.0026	0.0026
40-44	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0048	0.0049	0.0049	0.0049
45-49	0.0054	0.0052	0.0050	0.0048	0.0046	0.0044	0.0043	0.0041	0.0040	0.0038	0.0037	0.0035
50-54	0.0079	0.0074	0.0069	0.0065	0.0060	0.0056	0.0053	0.0049	0.0046	0.0043	0.0040	0.0038
55-59	0.0134	0.0126	0.0119	0.0112	0.0105	0.0099	0.0093	0.0088	0.0083	0.0078	0.0073	0.0069
60-64	0.0291	0.0286	0.0282	0.0278	0.0273	0.0269	0.0265	0.0261	0.0257	0.0253	0.0249	0.0245
65-69	0.0428	0.0413	0.0399	0.0386	0.0372	0.0360	0.0347	0.0336	0.0324	0.0313	0.0302	0.0292
70-74	0.0671	0.0670	0.0668	0.0667	0.0665	0.0664	0.0662	0.0661	0.0659	0.0658	0.0656	0.0655
75+	0.1318	0.1272	0.1227	0.1184	0.1142	0.1102	0.1064	0.1026	0.0990	0.0955	0.0922	0.0889
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
0-1	0.0083	0.0077	0.0070	0.0064	0.0059	0.0054	0.0050	0.0046	0.0042	0.0038	0.0035	0.0032
1-4	0.0011	0.0010	0.0009	0.0009	0.0008	0.0007	0.0007	0.0006	0.0006	0.0005	0.0005	0.0005
5-9	0.0006	0.0005	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003
10-14	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0.0003
15-19	0.0007	0.0006	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.0005
20-24	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003
25-29	0.0006	0.0006	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0.0003
30-34	0.0013	0.0013	0.0013	0.0012	0.0012	0.0012	0.0011	0.0011	0.0011	0.0010	0.0010	0.0010
35-39	0.0026	0.0026	0.0025	0.0025	0.0025	0.0024	0.0024	0.0024	0.0024	0.0023	0.0023	0.0023
40-44	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049	0.0049
45-49	0.0034	0.0033	0.0031	0.0030	0.0029	0.0028	0.0027	0.0026	0.0025	0.0024	0.0023	0.0022
50-54	0.0035	0.0033	0.0031	0.0029	0.0027	0.0025	0.0023	0.0022	0.0021	0.0019	0.0018	0.0017
55-59	0.0065	0.0061	0.0058	0.0055	0.0051	0.0048	0.0046	0.0043	0.0040	0.0038	0.0036	0.0034
60-64	0.0241	0.0237	0.0234	0.0230	0.0226	0.0223	0.0219	0.0216	0.0213	0.0209	0.0206	0.0203
65-69	0.0282	0.0273	0.0263	0.0254	0.0246	0.0237	0.0229	0.0221	0.0214	0.0206	0.0199	0.0193
70-74	0.0653	0.0652	0.0650	0.0649	0.0648	0.0646	0.0645	0.0643	0.0642	0.0640	0.0639	0.0637
75+	0.0858	0.0828	0.0799	0.0771	0.0744	0.0718	0.0692	0.0668	0.0645	0.0622	0.0600	0.0579



Table 8: Projection of the Egyptian females mortality rates [1997 – 2020].

	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
0 – 1	0.0261	0.0240	0.0221	0.0204	0.0188	0.0173	0.0159	0.0147	0.0135	0.0124	0.0114	0.0105
1 – 4	0.0033	0.0031	0.0028	0.0026	0.0025	0.0023	0.0021	0.0020	0.0018	0.0017	0.0016	0.0015
5 – 9	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0007	0.0007	0.0007	0.0006	0.0006	0.0006
10 – 14	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004
15 – 19	0.0014	0.0014	0.0014	0.0014	0.0014	0.0014	0.0015	0.0015	0.0015	0.0015	0.0015	0.0016
20 – 24	0.0008	0.0008	0.0007	0.0007	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0004
25 – 29	0.0011	0.0010	0.0010	0.0009	0.0009	0.0009	0.0008	0.0008	0.0008	0.0007	0.0007	0.0007
30 – 34	0.0012	0.0011	0.0011	0.0010	0.0010	0.0009	0.0009	0.0008	0.0008	0.0008	0.0007	0.0007
35 – 39	0.0021	0.0021	0.0021	0.0020	0.0020	0.0019	0.0019	0.0019	0.0018	0.0018	0.0017	0.0017
40 – 44	0.0024	0.0024	0.0023	0.0023	0.0022	0.0022	0.0021	0.0021	0.0020	0.0020	0.0019	0.0019
45 – 49	0.0038	0.0037	0.0036	0.0035	0.0034	0.0033	0.0032	0.0031	0.0030	0.0029	0.0028	0.0027
50 – 54	0.0056	0.0054	0.0051	0.0048	0.0046	0.0044	0.0042	0.0040	0.0038	0.0036	0.0034	0.0032
55 – 59	0.0084	0.0079	0.0074	0.0070	0.0065	0.0061	0.0057	0.0054	0.0050	0.0047	0.0044	0.0041
60 – 64	0.0192	0.0189	0.0186	0.0183	0.0180	0.0177	0.0175	0.0172	0.0169	0.0166	0.0164	0.0161
65 – 69	0.0283	0.0268	0.0255	0.0242	0.0230	0.0218	0.0207	0.0197	0.0187	0.0177	0.0168	0.0160
70 – 74	0.0539	0.0525	0.0512	0.0499	0.0487	0.0475	0.0463	0.0451	0.0440	0.0429	0.0418	0.0408
75 +	0.1487	0.1428	0.1372	0.1318	0.1266	0.1216	0.1168	0.1122	0.1078	0.1035	0.0994	0.0955
	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
0 – 1	0.0097	0.0089	0.0082	0.0076	0.0070	0.0064	0.0059	0.0055	0.0050	0.0046	0.0043	0.0039
1 – 4	0.0014	0.0013	0.0012	0.0011	0.0010	0.0010	0.0009	0.0008	0.0008	0.0007	0.0007	0.0006
5 – 9	0.0006	0.0005	0.0005	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004	0.0004	0.0004
10 – 14	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002	0.0002	0.0002	0.0002	0.0002
15 – 19	0.0016	0.0016	0.0016	0.0016	0.0016	0.0017	0.0017	0.0017	0.0017	0.0017	0.0018	0.0018
20 – 24	0.0004	0.0004	0.0004	0.0004	0.0003	0.0003	0.0003	0.0003	0.0003	0.0003	0.0002	0.0002
25 – 29	0.0006	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004
30 – 34	0.0007	0.0006	0.0006	0.0006	0.0005	0.0005	0.0005	0.0005	0.0004	0.0004	0.0004	0.0004
35 – 39	0.0017	0.0016	0.0016	0.0016	0.0015	0.0015	0.0015	0.0014	0.0014	0.0014	0.0014	0.0013
40 – 44	0.0018	0.0018	0.0018	0.0017	0.0017	0.0016	0.0016	0.0016	0.0015	0.0015	0.0015	0.0014
45 – 49	0.0027	0.0026	0.0025	0.0024	0.0024	0.0023	0.0022	0.0022	0.0021	0.0020	0.0020	0.0019
50 – 54	0.0031	0.0029	0.0028	0.0026	0.0025	0.0024	0.0023	0.0022	0.0020	0.0019	0.0018	0.0018
55 – 59	0.0039	0.0036	0.0034	0.0032	0.0030	0.0028	0.0026	0.0025	0.0023	0.0022	0.0020	0.0019
60 – 64	0.0159	0.0156	0.0153	0.0151	0.0149	0.0146	0.0144	0.0142	0.0139	0.0137	0.0135	0.0133
65 – 69	0.0152	0.0144	0.0137	0.0130	0.0123	0.0117	0.0111	0.0106	0.0100	0.0095	0.0090	0.0086
70 – 74	0.0398	0.0388	0.0378	0.0369	0.0359	0.0350	0.0342	0.0333	0.0325	0.0317	0.0309	0.0301
75 +	0.0918	0.0881	0.0847	0.0813	0.0781	0.0750	0.0721	0.0692	0.0665	0.0639	0.0614	0.0589

Conclusion

This study has presented a detailed analysis of the factors that affects the mortality rates in any population, and it analyzed difference between ages and sex.

A detailed analysis of the mortality trends of the Egyptian population through the period (1948 – 2014), end up with the following conclusions:

- Trends observed in the Egyptian population’s mortality had shown an overall improvement over the time period (1977 → 2014) better than that shown over the time period (1948 → 1976) for both genders as in that time period Egypt had three wars (1956, 1967, and 1973).
- Mortality fall greatest at younger and middle age groups with levels of improvement declining with increasing age.
- The causes of such improvements over the life span can be referred to :



1. Improvements in health care and treatment of some serious diseases (especially in infant and early childhood age group).
 2. Changes in lifestyle, living standards, and behavior.
 3. Improvements in economic circumstances.
 4. Improvements in social welfare and education.
 5. Reduction in the mortality of males were slightly higher than that of females up to age group 50 – 54 (except for that age group 40 – 44).
- Male mortality improved better than females for young ages and female mortality improved better than males for old ages.

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