Applied Mortality Proportional Rates on Testicular Cancer in Erbil and Sulaimani from (2000-2014)

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Abstract
Mortality rate of cancer is important for the sector of the health care, to use a graphical method developed by Gabriel to describe the row and columns of a matrix to tables of age and period. While, it is useful to use age specific rates changes with time by pattern. Trends in age precise rates and changes in the age specific distribution are defined as projections. we apply this model on fertility rates, mortality rates, and population base for a particular type, data was collected from learning science Hospital in Erbil and Sulaimani for testicular cancer (Secondary data ) between 2000 and 2014, and again we can use model of proportion growth rate. In addition, it can also be used as the model to determine if the mortality rates for age of a particular type will increase or decrease over a certain period of time. The age-standardised mortality rates from testicular cancer were significantly lower in Erbil and Sulaimani in 2000-04 compared to 2005-09 and 2010-14 related on Figures (9-14). On Erbil and Sulaimani testicular cancer, In 2000-04, the hazard functions rates were 0.08-0.1, whilst in 2005-09 they were 0.1-0.2 and 2010-14 were 0.12-0.32. While, the Easyfit and SPSS programs used for practical part for this study.

Keywords: Mortality Rates; Proportion; Age Distribution; Data Analysis; Trends; Testicular Cancer.

1-Introduction:
Testicular cancer is a paradox. It is one of the leading causes of death between the ages of 15 and 44, but it is one of the hardest curable cancers. In fact, despite the number of deaths from testicular cancer in young people, it has been suggested as a model for curable cancer. Trends in the mortality description of a disease are usually based on the age matrix and mortality rate determined over a period of time, and are derived from the number of deaths and years of vulnerable individuals. Testicular cancer research discusses testicular cancer facts for men and women. Our medical research book can write your project on every aspect of testicular cancer. For cancer testicular mortality in Kurdistan region this data was collected in regularly hospitals from Erbil and Sulaimani, for five years age groups and five years periods by Erbil hospital science between (2000-2014) and the average age groups from 15 and 64 years. Tables 1&2 shows testicular cancer mortality in Erbil and Sulaimani learning science hospitals.

Table1: Rates of Mortality from testicular cancer in Erbil, during 2000-2014, ages 15-64.

| Age at death | Period of death | 2000-2004 | 2005-2009 | 2010-2014 | Totally 2000-2014 |
|--------------|-----------------|-----------|-----------|-----------|-------------------|
| 15-19        |                 | 12        | 17        | 28        | 57                |
| 20-24        |                 | 20        | 19        | 36        | 75                |
| 25-29        |                 | 26        | 24        | 45        | 95                |
| 30-34        |                 | 38        | 29        | 41        | 108               |
| 35-39        |                 | 46        | 47        | 37        | 130               |
| 40-44        |                 | 43        | 52        | 46        | 141               |
Table 2: Rates of Mortality from testicular cancer in Sulaimani, during 2000-2014, ages 15-64.

| Age at death | Period of death | 2000-2004 | 2005-2009 | 2010-2014 | Totally 2000-2014 |
|--------------|----------------|-----------|-----------|-----------|-------------------|
| 15-19        |                | 8         | 11        | 20        | 39                |
| 20-24        |                | 13        | 14        | 28        | 45                |
| 25-29        |                | 7         | 19        | 33        | 59                |
| 30-34        |                | 20        | 27        | 35        | 88                |
| 35-39        |                | 31        | 36        | 39        | 106               |
| 40-44        |                | 37        | 44        | 44        | 125               |
| 45-49        |                | 31        | 36        | 28        | 89                |
| 50-54        |                | 33        | 42        | 33        | 108               |
| 55-59        |                | 22        | 30        | 36        | 88                |
| 60-64        |                | 39        | 36        | 38        | 113               |
| Totally      |                | 241       | 295       | 334       |                   |

Barrett 1973 and Osmond and Gardner 1982a, b, 1983 used the age range and cohort models to describe the trend of such matrices. If $M = k_{ij}$ is an $I \times J$ matrix with age as rows and points columns, which is they fit of the model

$$k_{ij} = h_i * b_j * C_{t+i+j} * \exp(e_{ij})$$

(1)

Take log for both of the side we get the following equation;

$$\ln k_{ij} = \ln h_i + \ln b_j + \ln C_{t+i+j} + e_{ij}$$

(2)

Where:

$h_i$ is the age value, $b_j$ the period value, $C_{t+i+j}$ the cohort value corresponding to the $i$th age group and $j$th period and $e_{ij}$ is an error term. There are three advantages with this model.

1-They adopt the same pattern of age-specific rates for all periods and regiments. Although this makes sense for many cancers, since mortality often correlates closely with age-stable capacity function, it is less suitable. For example, Table 1 shows that the age of the highest rate of testicular cancer has shifted from 55 and over in the first two periods compared to 35 and less in the last three periods.

2- Model 2 is not definable and needs some external constraints to provide unique parameter estimates. In fact, the linear displacement that is suitably applied to the logarithms of each set of values does not affect relevance quality. In particular, the equations determine the optimal solution.

$$\ln h_i = \ln h_i + \delta(I - i), \quad i = 1, 2, ..., I$$

(3)

$$\ln b_j = \ln b_j + \delta_j, \quad j = 1, 2, ..., J$$

(4)

$$\ln C_{i+j} = \ln c_i - \delta - \delta_i, \quad l = 1, 2, ..., I + J - 1$$

(5)

3- The model assumes that the period and the coefficients apply equally to all age groups. This is unlikely in some cases. For example, diagnostic improvements have allegedly caused an increase in age groups in deaths from multiple myeloma (Cuzick, Velez, and Doll, 1983). Such a process can produce artifact artifacts.

In this paper we show that the scatter plot presented by Gabriel in 1971 can be used to highlight trends and aging distributions without such definability. The graphical technique...
that combines the matrix \( R \) with four vectors instead of the three component age, period, and cohort models. Both methods require the estimate of the same number of independent parameters \( (2I + 2J - 4) \).

2- Methodology
The scatterplot technique generates two sets of points on the level, which first correspond to all ages shown in \( R \), and the others correspond to the periods. For each point we necessitate an \( x \) co-ordinate and \( y \) co-ordinate. We use the following notation:

\[
H_i = (h_i, d_i) \tag{6}
\]

Is the age point corresponding to age group \( i \);

\[
\beta_j = (b_j, \lambda_j) \tag{7}
\]

Is the period point corresponding to period \( j \). The biplot model is;

\[
k_{ij} = h_i b_j + d_i \lambda_j + e_{ij} \tag{8}
\]

Where;

\( e_{ij} \) is an error term. Thus each rate is fitted by the scalar product between vectors from the origin to its age point and its period point. The fitting is done by least square minimization. Specifically we seek to minimize.

\[
g = \sum_{i,j} e_{ij}^2 = \sum (k_{i,j} - h_i b_j - d_i \lambda_j)^2 \tag{9}
\]

Over the values of \( h_i, b_j, d_i \) and \( \lambda_j \), \( R \) is being approximated by a matrix of rank 2. Conditions are needed to determine a particular solution. The non uniqueness arises from the fact that we may introduce \( h_i', d_i', p_j \) and \( \lambda_j \), where;

\[
\begin{pmatrix}
  h_i' \\
  d_i'
\end{pmatrix}
=
\begin{pmatrix}
  \cos \theta & -\sin \theta \\
  \sin \theta & \cos \theta
\end{pmatrix}
\begin{pmatrix}
  \delta_1 & 0 \\
  0 & \delta_2
\end{pmatrix}
\begin{pmatrix}
  \cos \sigma & -\sin \sigma \\
  \sin \sigma & \cos \sigma
\end{pmatrix}
\begin{pmatrix}
  h_i \\
  d_i
\end{pmatrix}
\tag{10}
\]

After some multiplication we get the following equation;

\[
\begin{pmatrix}
  h_i' \\
  d_i'
\end{pmatrix}
=
\begin{pmatrix}
  h_i \delta_1 \cos \theta \cos \sigma - d_i \delta_2 \sin \theta \sin \sigma - d_i \delta_1 \cos \theta \sin \sigma - d_i \delta_2 \sin \theta \cos \sigma \\
  h_i \delta_1 \sin \theta \cos \sigma - d_i \delta_2 \cos \theta \sin \sigma + d_i \delta_1 \sin \theta \cos \sigma + d_i \delta_2 \cos \theta \cos \sigma
\end{pmatrix}
\tag{11}
\]

And

\[
\begin{pmatrix}
  b_j' \\
  \lambda_j'
\end{pmatrix}
=
\begin{pmatrix}
  \cos \theta & -\sin \theta \\
  \sin \theta & \cos \theta
\end{pmatrix}
\begin{pmatrix}
  1/\delta_1 & 0 \\
  0 & 1/\delta_2
\end{pmatrix}
\begin{pmatrix}
  \cos \sigma & -\sin \sigma \\
  \sin \sigma & \cos \sigma
\end{pmatrix}
\begin{pmatrix}
  b_j \\
  \lambda_j
\end{pmatrix}
\tag{12}
\]

Again some multiplication on the above formula we get the equation 13;

\[
\begin{pmatrix}
  b_j' \\
  \lambda_j'
\end{pmatrix}
=
\begin{pmatrix}
  b_j \delta_1 \cos \theta \cos \sigma - b_j \delta_2 \sin \theta \sin \sigma - b_j \delta_1 \cos \theta \sin \sigma - b_j \delta_2 \sin \theta \cos \sigma \\
  \lambda_j \delta_1 \sin \theta \cos \sigma - \lambda_j \delta_2 \cos \theta \sin \sigma + \lambda_j \delta_1 \sin \theta \cos \sigma + \lambda_j \delta_2 \cos \theta \cos \sigma
\end{pmatrix}
\tag{13}
\]

In geometrical terms this is acknowledging that the scalar products between the sets of points corresponding to age groups and periods are invariant under the following four transformations:

1- \( \sigma \) a rotation of the co-ordinate space through angle \( \sigma \).
2- \( \delta_1 \) a scale change, \( \delta_1 \) applied to the new \( h_i \) terms with the inverse applied to the new \( b_j \) terms.
3- \( \delta_2 \) a similar scale change in the \( y \) direction.
4- \( \theta \) a further rotation of the co-ordinate space through angle \( \theta \).
Collinearity is maintained by these transformations. None of the internal structures of the vector was changed from the model in contrast to the age period, cohort model non definition. The minimum function of decomposing the single value for $R$ or the same is obtained from the self-solution units $R^TR$ or $RR^T$ (both positive and quasi-positive and symmetric).

In practice for this estimate are available immediately. If they are less than $J$, $RR^T$ is more convenient and associate versa. In our example, the $R^TR$ is even less than half of this case. Four unusual vectors are obtained as follows:

1- $b_j$ is the $j$th component of the eigenvector corresponding to the largest eigenvalue of $R^TR$.

2- $\lambda_j$ is the $j$th component of the eigenvector corresponding to the next largest eigenvalue of $R^TR$.

3- $h_i = \sum_j k_{ij}b_j$, $d_i = \sum_j k_{ij}\lambda_j$ \hspace{1cm} (14)

We determine $\sigma$ and $\theta$ by requiring that $h_i$ ‘s and $b_j$ ‘s corresponding to the x-direction and the $d_i$ ‘s and $\lambda_j$ ‘s corresponding to the y-direction. The scale parameters $\delta_1$ and $\delta_2$ are determine by forcing the lengths of vectors in the same direction to be equal. Thus

$$\sum_i h_i^2 = \sum_j b_j^2 \quad \text{and} \quad \sum_i d_i^2 = \sum_j \lambda_j^2 \hspace{1cm} (15)$$

This is a sensitive special solution. Some modifications would be useful if both $I$ and $J$ are very different. Sibson, 1979) To present this method, other dimensions may be used, but it will be difficult to represent and rarely add significant descriptive power. For the most part useful property of the scatter polt is its capacity to represent age and period changes simultaneously via projections.

1- We consider rates for a specific age group. The estimates of these are proportional to the projection of the points on the line connecting the origin and age point of the corresponding age group. This property is a direct consequence of the use of the standard product. If the estimates move away from the asset over time, the estimates of interest rates will increase over time.

2- We would look at the age at which the deaths are reported for a given period of time, and find that the age-specific estimates meet the expectations of the age points on the line that connect the origin to the corresponding point. Therefore, the scatter polt light highlights different age distribution structures at different times. If the function exists, it will be determined by the need to accurately estimate large rates. The alternative could be a function of the rates, possibly a logarithm or logit. This would be disadvantageous in that it is less interpretable. Another formula for the dipole model is

$$\ln k_{ij} = \ln(h_i b_j + d_i \lambda_j) + e_{ij} \hspace{1cm} (16)$$

This is less easy to handle, but it offers another way to avoid the dominance of big rates. There are strong bipolar bonds and the corresponding analytical method has developed a graphical method of asymmetric matrix based on a point-oriented product instead of the standard product (Hill, 1974, Gower, 1977 and Gabriel, 1971).

3. Techniques and patients data

The data start 2000-2014 covers the testicular cancer patients and the data was collected from Rzgary Teaching Hospital in Erbil and Sulaimani city in Iraq. After we are organized the data and also we analyzed by using Spss and the Easyfit 5.6 standard Programming.

3.1 Statistical analyses

This paper considers apply on the secondary data based on laboratory investigations. These data are supplied by Rzgary Teaching Hospital, Erbil and Sulaimani, Iraq for the year 2000 to 2014. The data collected from existing databases in terms of the mortality time of death. The data includes the factors affecting the testicular which are age, hazard time, time inter and exit patient on hospital. The data translated into codes using a particularly designed coding sheet, after that converted to computerized database. The specific statistical advice was
required and EasyFit 5.6 standard program used. First all after the compare between mortality rates from patients in Erbil and Sulaimani from 2000-04 was stability by ages 15-40, but from 2005 to 2009 the hazard rates increased.

The following tables show descriptive statistics in testicular cancer patients from Erbil and Sulaimani hospitals between 2000 and 2014 for the ages 15-64 years.

**Table 3: Descriptive statistics for the testicular cancer in Erbil from 2000 to 2014, ages 15-64 years.**

| Years       | No. | Minimum | Maximum | Mean | Std. Deviation | Variance |
|-------------|-----|---------|---------|------|----------------|----------|
| 2000-2004   | 10  | 12      | 46      | 34.20| 11.593         | 134.400  |
| 2005-2009   | 10  | 17      | 52      | 35.30| 12.970         | 168.233  |
| 2010-2014   | 10  | 28      | 46      | 36.90| 6.523          | 42.544   |

**Table 4: Descriptive statistics for the testicular cancer in Sulaimani from 2000-14, ages 15-64 years.**

| Years       | No. | Minimum | Maximum | Mean | Std. Deviation | Variance |
|-------------|-----|---------|---------|------|----------------|----------|
| 2000-2004   | 10  | 7       | 39      | 24.10| 11.542         | 133.211  |
| 2005-2009   | 10  | 11      | 44      | 29.50| 11.511         | 132.500  |
| 2010-2014   | 10  | 20      | 44      | 33.40| 6.769          | 45.822   |

4- Result and discussion:

Tables 1&2 are used in these sections. Figures (1&2) show a plot of the age and period of death value obtained from model 2 using the identification described by Osmand and Gardner (1982b). The graphs contain age values scatterplot against at number of the death on the years logarithmic scale. The age value for the figures 1 & 2 are rise to a maximum for the 35-40 age groups, decline to the 50-55 groups and increased again.

Figure 1: Mortality rate from testicular cancer in Erbil during 2000-04 ages 15-64, age and period of death values are plotted.

Figure 2: Mortality rate from testicular cancer in Sulaimani during 2000-04 ages 15-64, age and period of death values are plotted.
Figures 3&4 demonstrate the biplot for the same data from 2005 to 2009 in Erbil and Sulaimani hospitals, from the ages 15-30 the value of the mortality rates increase sharply and start to raise from 35 to 40 years and then decline ages 40 after fluctuated until 60 years for the data years between 2004 and 2009.

Figure3: Mortality rate from testicular cancer in Erbil during 2005-09 ages 15-64, age and period of death values are plotted.

Figure4: Mortality rate from testicular cancer in Sulaimani during 2005-09 ages 15-64, age and period of death values are plotted.

Lastly, from 2010 to 2014 the figure 5 & 6 illustrated that the maximum rate for mortality at age group25 and 40 for the patient in Erbil which are these period more effected or work with cancer, but in Figure 6 the higher rates for hazard just at 40 and then decline until age 64. Finally, the age groups from 35 to 40 years for the testicular cancer were more death affected in this decease.

Figure5: Mortality rate from testicular cancer in Erbil during 2010-14 ages 15-64, age and period of death values are plotted.
Figure 6: Mortality rate for testicular cancer in Sulaimani during 2010-14 ages 15-64, age and period of death values are plotted.

The following figures 7 & 8 are shown the companied all years testicular cancer from 2000 to 2014 on Erbil and Sulaimani hospitals of Kurdistan Region of Iraq and ages 15-64 years.

Figure 7: Mortality rate for testicular cancer in Erbil during 2000-14 ages 15-64, age and period of death values are plotted.

Figure 8: Mortality rate for testicular cancer in Sulaimani during 2000-14 ages 15-64, age and period of death values are plotted.

To determine the hazard function for the testicular patients in the Rizgary teaching Hospital Erbil and teaching hospital Sulaimani. This is performed by finding the hazard functions curve for the selected time of death, beginning with first case depend on tables 1&2 observation, the P-value of Kolmogrov simirnov for the normal distribution data patients at Erbil and Sulaimani testicular cancer from 2000 to 2004 are equal to (0.226 and 0.132), which is greater than (0.05),. On the other hand, the data from 2005-2009 the P-value of Kolmogrove simirnov for the same distribution of both city are equal to (0.116 and 0.214), again is greater than (0.05). Finally, the P-value of kolmogrov simirnov for the data testicular cancer in Erbil and Sulaimani patients between 2010 and 2014 are
(0.135 and 0.176), again greater than the level value (0.05), which are statistical significant. while the value of the mean, variance and standard division are shown in tables 3&4. Know we are going to the second case which is the hazard rate function which are illustrate figures 9, 10, 11, 12, 13 and 14 from 2000-2014 in Erbil and Sulaimani teaching hospital for the testicular cancer patients, ages 15-64 years.

Figure 9: The hazard functions for the testicular cancer in Erbil City from 2000-04, ages 15-64.

Figure 10: The hazard functions for the testicular cancer in Sulaimani City from 2000-04, ages 15-64.

Figure 11: The hazard functions for the testicular cancer in Erbil City from 2005-09, ages 15-64.
Figure 12: The hazard functions for the testicular cancer in Sulaimani City from 2005-09, ages 15-64.

Figure 13: The hazard functions for the testicular cancer in Erbil City from 2010-14, ages 15-64.

Figure 14: The hazard functions for the testicular cancer in Sulaimani City from 2010-14, ages 15-64.

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