Disparity in Methods of Life Expectancy for Different Genders in Punjab: A Study of Life Tables Using Local Cemeteries of Lahore, Kasur, and Gujranwala

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Abstract

There are several demographic indices (such as the crude death rate, the infant mortality rate, the age-specific death rate) that are used for the calculation of mortality in a population. Life table method is another more comprehensive method that is used for portraying mortality conditions in a population. A set of life tables are presented here, several methods such as Linear method, Farr's method, Chiang method, Greville's method and Fregany's method are used to estimate the "life expectancy" of both males and females. The methods of life expectancy analysis are applied on the cemetery data collected from different cities (Lahore, Gujranwala, and Kasur) of Pakistan. Moreover, the analysis is performed on the data of Pakistan; data is obtained from Pakistan Demographic Survey 2020 (PDS2020). It is observed that the life expectancy of females is higher than that of males. This scenario is observed in three cities and at national level by using different methods of life table. Interestingly, it is observed that the life expectancy of Lahore is much higher than the life expectancy of other cities, in the case of both males and females. Moreover, it is observed that different methods of life tables provide different life expectancies for same data. Therefore, further detailed and comprehensive study about life expectancy by precise methods is required to all the cities of Pakistan.

Keywords

Life table, Life expectancy, Cemetery data, Mortality rate, Age specific death rate.

1. Introduction

China and India are the largest countries in the world in terms of population, the population of both countries now having of well over a billion (Hubacek *et al*., 2007). In Pakistan, the first census was conducted in 1951, the 2nd in 1961 while the 3rd census was conducted in 1972 instead of 1971 due to war with India and political environment in the country. The 4th census was conducted in 1981 and 5th was held in 1998 due to some specific circumstances. The population of Pakistan is 207.68 million (207,774,520) according to the Census-2017 with 106.3 million (106,449,322) males, 101.3 million (101,314,780) females and 10,418 are transgender with population growth rate of 2.40% from 1998 to 2017 (History and data is obtained from the website Pakistan Bureau of Statistics in the section of "history of census"). Deaths, births, migration, marriages, divorces, etc. are the factors that cause to change in the size and composition of population.

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In Pakistan every birth or death that takes place is entered in national registration system. The report of birth and deaths is carried out separately for rural and urban areas in all provinces of Pakistan. But in many cases births are not registered, especially in rural areas (Yusuf, 1981). Many marriages, deaths and divorces also remain unregistered. The registration of birth varies from country to country and for completeness of this it must occasionally be checked. In Pakistan, there is no system for a dead body permit is to be issued before its burial. The registration of deaths can be improved by organized all the cemeteries and the requirement is to be filled before a burial permit is to be issued. In a complete life table, these defects in population census and mortality data have a marked effect.

The average time of an organism is expected to live, measured by a statistical tool which is called Life expectancy. Life expectancy is based on the year of its birth, its current age and many other demographic factors including the biological sex of that organism (Aslam *et al.*, 1967, Oeppen and Vaupel, 2017). For human beings, the Life expectancy could be defined as "the average number of years of a person in a population could expect to live after age *x*. The most common age used for comparison is 0.0 (i.e., birth), however, in many policy analysis and for many substantive, other ages such as 65+ and 85+ are used. (Manton, 2007).

There are many disproportions exist in life expectancy among gender, ethnic and socioeconomic groups (Crimmis and Saito, 2001). Social planning and public health decisions are making by knowing the magnitude and causes of life expectancy between the disproportion in rural and urban areas (Shahzad *et al.*, 2017). Since life expectancy is an abridgment index of mortality, so, it can be used to document both relative and absolute inequalities in survival between urban and rural occupiers. For metropolitan and nonmetropolitan areas, Singh and Siahposh, (2014) performed an analysis to calculate the life expectancies at birth. The areas are stratified by gender, income, and race. The results showed that the life expectancy was inversely related to the rural areas than urban. In 1969-1971, the life expectancy of metropolitan areas was 0.4 years greater than in nonmetropolitan areas (70.9 vs. 70.5 years). In 2005-2009, the life expectancy of metropolitan areas was 2.4 years greater than in nonmetropolitan areas.

A life table is a statistical tool used for comparing and estimating the mortality affect prevailing in the population. It is combination of information relating to the remaining life expectancy for people, the probability of dying at any age, and the probability of surviving at any particular age, etc. So, we can say that life table is a statistical tool that contains all information about population. The use of life table is on very large-scale. The life table is a product of actuarial sciences, but its applications are not limited. It is used to compute the insurance premiums, stochastic process is used to measure the length of life, handling life table is a valuable tool for demographers, physicians are used in health care departments, and research workers in other areas of public health (Wright, 1978; Bean, 1967; Yusuf, 1985; Vaupel *et al.*, 2011).

2. Data and methods

The life tables are calculated by using the ages of certain population. There are two types of data were used in this study named primary and secondary data. The secondary data of census reports 2017 was used for the calculation of life expectancy of Pakistan also the deaths of the Pakistan was obtained from the website of Pakistan Bureau of Statistics

(2017). The life expectancy on national level was calculated by many of the researchers but there is nothing to be seen on city level. Since, the deaths of cities were not available on websites or any other resource, so, we obtained the ages of population from the gravestones of graves. There were many Muslim's and Christian's graveyards in Lahore, Gujranwala and Kasur. Data was collected by taking snapshots of the gravestones from the graves. In gravestones, gender of the deceased, age at death, and date of birth of the deceased available on the graves. On many of graves, information was incomplete, for example, on some graves the date of death but not the age of deceased was written on the gravestones.

Data that are collected from cemetery contained the information regarding the date of birth, date of death, gender and ages of different cities (Lahore, Gujranwala, Kasur) of Pakistan, was collected from 3 March 2021 to 24 August 2021. Age groups were classified into sixteen categories ranging from 0-4 to 75+. The statistical software called Statistical Packages for Social Sciences (SPSS) version 23.0 was used for arranging the data and also Excel is used for the calculation of life table.

Figure 1: Graves of Gora and Firdosia graveyard Lahore.

The collection of data from the graveyard was a tough task as the graveyards are hallowed places. It is very important to note that graveyards are sacred places. So, do not disturb or disrespectfully the monuments or gravesites. During the collection of ages from the gravestones, we need to clean the gravestone because the information is hidden by dust. Please avoid such type of activities when other people were visiting the graveyard.

3. The Construction of life tables by using different methods

There are various methods available for the construction of life tables (Ramakumar, 2002). Due to lack of time, a few of the methods were applied for the calculation of life table.

3.1 Linear method

The age wise deaths and the corresponding population are required for the calculation of life tables. The age specific death rates are calculated as:

$$nm_x = nM_x = \frac{D_x}{P_x}$$

After calculating the age specific death rates, the first step in the construction of life table is to calculate the mortality rates (q_x) . It transforms the age specific death rate (m_x) into their death probability or mortality rate. When the data is available in the form of age interval [x, x+n) of n years, then it would be calculated as:

$$nq_x = \frac{2n(nm_x)}{2 + n * nm_x}$$

where, n denote the age interval (Ramakumar, 2002). If l_x is linear then the number of person years (nL_x) can be calculated as:

$$nL_x = \frac{n * (l_x + l_{x+n})}{2}$$

The number of person years lived after age [x,x+n) is obtained by cumulating L_x from x to ѡ.

$$T_x = \sum_{x}^{\omega} L_x$$

Finally, the average number of years of a person can expect to live is obtained as:

$$e_x = \frac{T_x}{l_x}$$

3.2   Farr's method

Instead of directly calculating the mortality, Farr calculated the probability of survival under the condition that l_x is linear (Ramakumar, 2002).

$$np_x = (\frac{2-nm_x}{2+nm_x})^n$$

This formula is applied when the data are in the interval [x, x+n).
The mortality rate (nq_x) can be obtained as
$nq_x = 1 - np_x$

3.3   Chiang's method

Chiang suggests the value na_x where, x denotes the age interval (Ramakumar, 2002). Thus, if there are E_x persons whose age is x and nD_x denotes the persons that dies during the interval (x, x+n), and na_x is the average fraction lived by the nD_x , then total number of persons works out to

$$(E_x - nD_x)n + (na_x)(nD_x)$$

Therefore, the age specific death rate is obtained as:

$$nM_x = \frac{nD_x}{(E_x - nD_x)n + (na_x)(nD_x)}$$

The probability of death rate q_x can be obtained as:

$$nq_x = \frac{n * nM_x}{1 + (n - na_x) + nM_x}$$

If $a_x = \frac{n}{2}$, and linearity assumption holds then mortality rate can be calculated as:

$$q_x = \frac{2n * nM_x}{2 + n * nM_x}$$

The number of person years (nL_x) can be calculated as:

$$nL_x = n * (l_x - nd_x) + na_x * nd_x$$

3.4   Greville's method

The age specific death rates are calculated as:

$$nm_x = B \; c^{x + \left(\frac{n}{2}\right)}$$

By simplifying it, it will be calculated as:

$$\frac{d}{dx} \log nm_x = logc$$

The values of mortality rate q_x can be calculated as:

$$nq_x = 1 - \exp\left\{-n * nm_x - n^3 * \frac{\log c}{12} (nm_x)^2\right.$$
where, $log\ c = 0.096$. So, $\frac{\log c}{12} = 0.008$

Greville suggested that the values of nL_x are obtained from the following relationship (Ramakumar, 2002).

$$nL_x = \frac{n}{2}(l_x + l_{x+n}) + \frac{n}{24}(nd_{x+n} - nd_{x-n})$$

3.5   Fregancy's method

Fregany's suggested a new method to convert the values of m_x into q_x

$$q_x = 1 - e^{(-n + m_x)}$$
where, n is the age interval.

The number of person years (nL_x) can be calculated as:

$$nL_x = n * (l_x - nd_x) + na_x * nd_x$$

4. Results

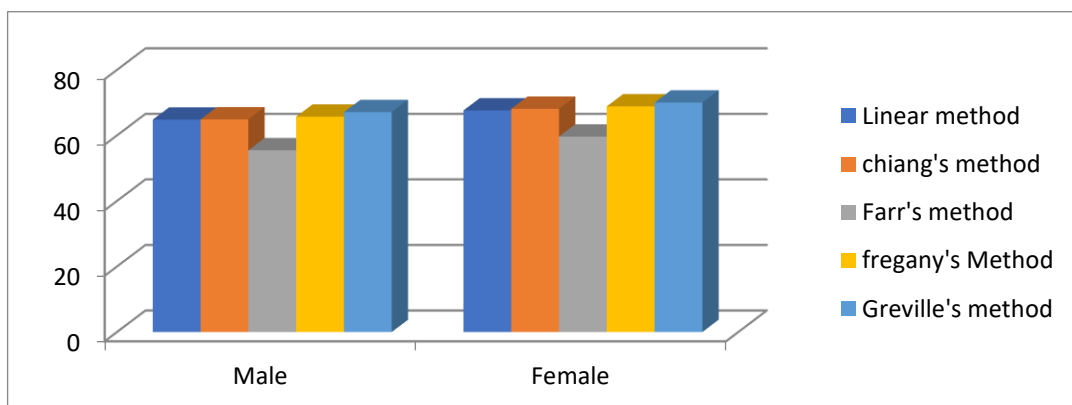### 4.1 Life expectancy of male and female in Pakistan using different methods

A huge work on life tables is available in the areas of demographers, statisticians, social scientists, and actuaries. There are certain types of method are applied on the national data, but the results of different methods show the different results on the same data.

The life expectancy of females of Pakistan was calculated 67.62 years by linear method, 68.12 years by Chiang' method, 59.65 years by Farr's method, 68.86 years by Fregany's method and the highest life expectancy of females of Pakistan 70.03 years was obtained by Greville's method (Table 1).

The life expectancy of males of Pakistan was calculated 64.83 years by linear method, 64.88 years by Chiang' method, 55.47 years by Farr's method, 65.73 years by Fregany's method and 67.11 years by Greville's method. The highest life expectancy of males of Pakistan 67.11 years of same data was obtained by Greville's method. The lowest life expectancy of males in Pakistan 55.47 years of same data was calculated by Farr's method (Table 1).

The results of different life tables that were calculated by different methods are not given the satisfactory results. Since the life expectancy is used as a measure of adaption of a population to environment and using expected life years, the lifestyle of a population is used as a measure of adaptive success.

The gaps in life expectancy can be seen in Figure 2. It shows that highest life expectancy of male and female were obtained by Grevile's method and the lowest one by Farr's method. The life expectancy of males and females in Lahore, Kasur and Gujranwala using different methods are also calculated below:

Figure 2: Life expectancy of males and females by different life table methods.
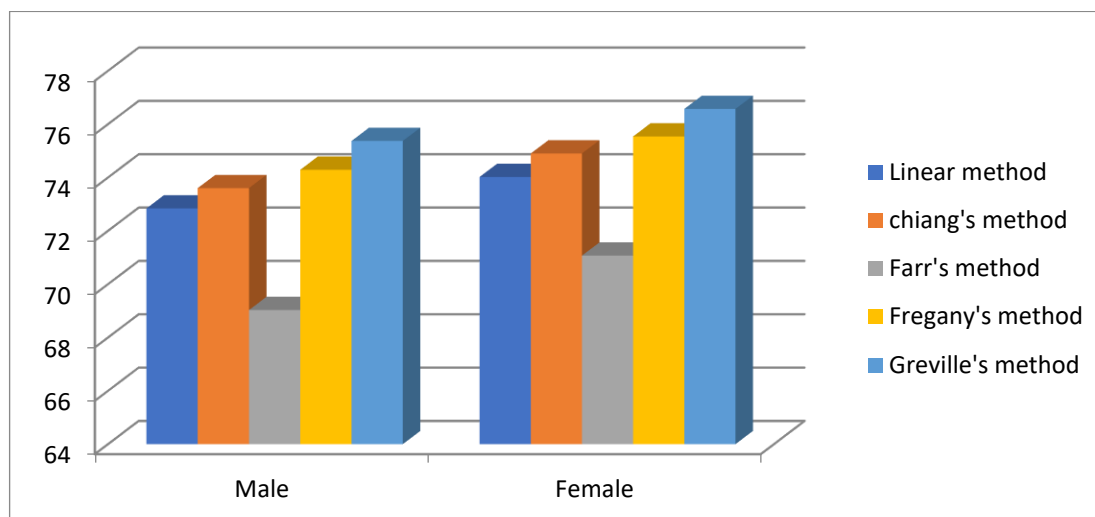
Table 1: Life expectancy of male and female in Pakistan using different methods.

Ages x-x+n	Age interval n	Linear method Female E_x	Linear method Male E_x	Chiang's method Female E_x	Chiang's method Male E_x	Farr's method Female E_x	Farr's method Male E_x	Fregany's method Female E_x	Fregany's method Male E_x	Greville's method Female E_x	Greville's method Male E_x
0-4	5	67.62	64.83	68.12	64.88	59.65	55.47	68.86	65.73	70.03	67.11
5-9	5	66.38	64.28	66.95	64.35	61.45	58.30	67.70	65.24	68.90	66.70
10-14	5	61.75	59.61	62.33	59.69	57.13	53.89	63.07	60.58	64.26	62.03
15-19	5	57.10	54.76	57.69	54.84	52.78	49.17	58.43	55.73	59.61	57.18
20-24	5	52.39	50.15	52.99	50.25	48.31	44.87	53.73	51.13	54.90	52.57
25-29	5	47.63	45.44	48.25	45.55	43.76	40.38	48.98	46.43	50.14	47.86
30-34	5	42.92	40.80	43.56	40.92	39.30	36.01	44.28	41.79	45.43	43.21
35-39	5	38.02	36.02	38.66	36.15	34.48	31.40	39.38	37.02	40.53	38.43
40-44	5	33.43	31.34	34.09	31.49	30.21	26.95	34.80	32.34	35.93	33.74
45-49	5	28.82	26.90	29.52	27.09	25.92	22.92	30.21	27.93	31.32	29.31
50-54	5	24.15	22.44	24.88	22.68	21.51	18.84	25.56	23.49	26.65	24.85
55-59	5	19.57	18.31	20.35	18.62	17.25	15.28	21.00	19.40	22.06	20.71
60-64	5	15.16	14.39	16.03	14.83	13.29	12.10	16.65	15.56	17.66	16.81
65-69	5	11.02	10.54	12.05	11.17	9.80	9.04	12.61	11.83	13.52	12.98
70-74	5	6.74	6.52	8.00	7.40	6.09	5.73	8.46	7.97	9.25	8.98
75 & above	5	2.50	2.50	4.26	3.94	2.50	2.50	4.54	4.32	5.05	5.04

4.2 Life expectancy of male and female in Lahore using different methods

The same trend can be seen in life expectancy of females of Lahore (76.57) years was obtained by Greville's method that is much higher than other methods. Life expectancy by other methods were also calculated, 74.02 years by linear method, 74.90 years by Chiang' method, lowest 71.07 years by Farr's method, 75.54 years by Fregany's method (Table 2). Moreover, the Greville's method gives the highest life expectancy of males of Lahore (75.37 years). Life expectancy of females by other methods were also calculated, 72.84 years by linear method, 73.60 years by Chiang' method, 69.03 years by Farr's method, 74.29 years by Fregany's method. The lowest life expectancy of males of Lahore69.03 years is calculated by Farr's method (Table 2).

Interestingly, it is observed that the life expectancy of Males and females is higher than other cities and by national. It may be due better housing, better medical facilities, better standard of living and many other factors that affect the life expectancy. Figure shows that the life expectancy by Greville's method is much higher than that of other methods and it is also observed that the lowest life expectancy is calculated by Farr's method.

Figure 3: Life expectancy of Lahore by different life table methods.

4.2 Life expectancy of male and female in Gujranwala using different methods

The life expectancy may vary from place to place due to many factors; this trend can be seen from the life tables of Lahore and Gujranwala (Table 2 and Table 3). The trend can be seen in life expectancy of females of Lahore 76.57years (Table 2) and 71.90 years (Table 3) was obtained by Greville's method but same as previous the Greville's method gives the higher life expectancy (71.90 years) than other methods (Table 3). Life expectancy of females by other methods were also calculated, 69.79 years by linear method, 69.81 years by Chiang's method, same as previous lowest 64.76 years by Farr's method and70.61 years by Fregany's method (Table 3). Moreover, the Greville's method gives the highest life expectancy of males of Gujranwala (70.63 years).
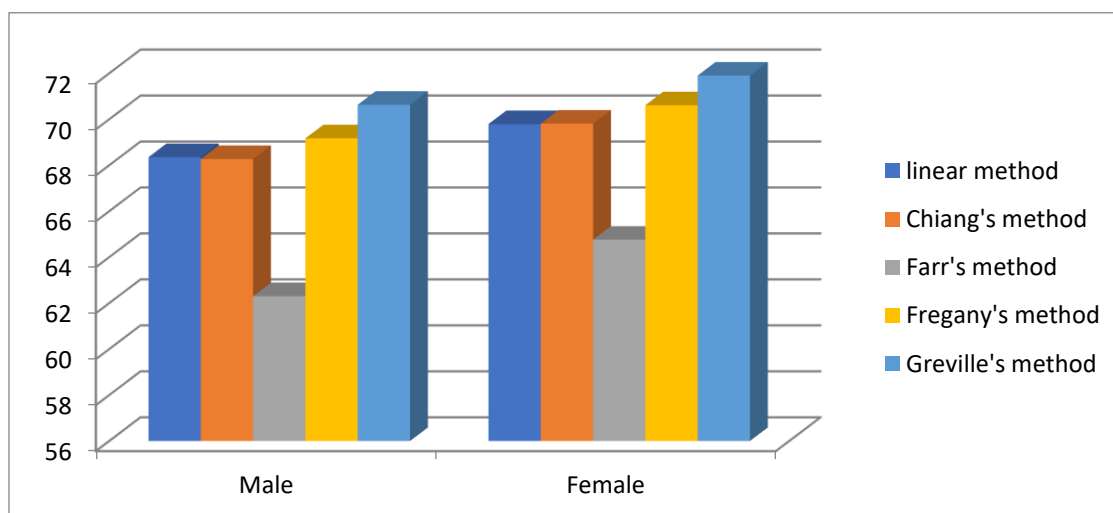
Table 2: Life expectancy of male and female in Lahore using different methods.

Ages	Age interval	Linear method		Chiang's method		Farr's method		Fregany's method		Greville's method	
		Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
$x,x+n$	n	E_x	E_x	E_x	E_x	E_x	E_x	E_x	E_x	E_x	E_x
0-4	5	74.02	72.84	74.90	73.60	71.07	69.03	75.54	74.29	76.57	75.37
5-9	5	69.07	67.96	69.96	68.73	66.18	64.25	70.60	69.41	71.62	70.49
10-14	5	64.13	63.01	65.01	63.78	61.28	59.36	65.65	64.47	66.68	65.54
15-19	5	59.21	58.08	60.11	58.85	56.44	54.48	60.74	59.53	61.76	60.61
20-24	5	54.28	53.19	55.18	53.97	51.57	49.69	55.81	54.65	56.83	55.72
25-29	5	49.36	48.28	50.26	49.06	46.73	44.85	50.90	49.74	51.91	50.80
30-34	5	44.44	43.46	45.34	44.26	41.87	40.19	45.97	44.92	46.98	45.99
35-39	5	39.50	38.59	40.41	39.39	36.99	35.43	41.04	40.06	42.05	41.12
40-44	5	34.59	33.79	35.50	34.61	32.15	30.80	36.13	35.27	37.13	36.32
45-49	5	29.68	28.99	30.60	29.82	27.31	26.15	31.22	30.47	32.22	31.51
50-54	5	24.90	24.26	25.84	25.12	22.72	21.64	26.46	25.76	27.44	26.78
55-59	5	20.23	19.71	21.22	20.63	18.33	17.45	21.81	21.25	22.77	22.23
60-64	5	15.71	15.38	16.77	16.40	14.19	13.63	17.34	16.97	18.25	17.90
65-69	5	11.34	11.17	12.53	12.35	10.33	10.03	13.04	12.86	13.88	13.69
70-74	5	7.03	6.99	8.45	8.43	6.61	6.53	8.87	8.84	9.58	9.53
75 & above	5	2.50	2.50	4.24	4.30	2.50	2.50	4.53	4.57	5.05	5.05

Table3: Life expectancy of male and female in Gujranwala using different methods.

Ages	Age interval	Linear method		Chiang's method		Farr's method		Fregany's method		Greville's method	
		Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
x, x+n	n	E_x	E_x	E_x	E_x	E_x	E_x	E_x	E_x	E_x	E_x
0-4	5	69.79	68.35	69.81	68.27	64.76	62.30	70.61	69.17	71.90	70.63
5-9	5	64.89	63.56	64.91	63.48	59.94	57.68	65.71	64.38	67.00	65.84
10-14	5	60.10	58.65	60.13	58.58	55.34	52.85	60.93	59.48	62.21	60.93
15-19	5	55.24	53.76	55.27	53.69	50.60	48.04	56.07	54.58	57.35	56.04
20-24	5	50.48	48.95	50.52	48.89	46.03	43.39	51.31	49.79	52.58	51.23
25-29	5	45.62	44.12	45.66	44.07	41.28	38.69	46.45	44.96	47.72	46.40
30-34	5	40.75	39.51	40.81	39.48	36.53	34.37	41.59	40.35	42.86	41.78
35-39	5	35.87	34.79	35.93	34.76	31.74	29.84	36.71	35.63	37.97	37.05
40-44	5	31.02	30.19	31.09	30.19	27.00	25.53	31.86	31.05	33.12	32.46
45-49	5	26.18	25.58	26.26	25.61	22.27	21.18	27.02	26.45	28.27	27.84
50-54	5	21.55	21.09	21.66	21.16	17.91	17.02	22.41	21.98	23.64	23.34
55-59	5	17.12	16.89	17.29	17.03	13.84	13.29	18.01	17.82	19.20	19.13
60-64	5	12.93	13.08	13.19	13.36	10.12	10.16	13.86	14.09	14.98	15.33
65-69	5	8.96	10.00	9.40	10.52	6.71	8.18	9.99	11.20	10.99	12.36
70-74	5	6.70	6.60	7.63	7.49	6.03	5.86	8.19	8.06	9.20	9.08
75 & above	5	2.50	2.50	3.89	3.91	2.50	2.50	4.28	4.30	5.04	5.04

Life expectancy of males by other methods were also be calculated, 68.35 years by linear method, 68.27 years by Chiang' method, 62.30 years by Farr's method and 69.17 years by Fregany's method (Table 3). The lowest life expectancy of males of Gujranwala (69.03 years) is calculated by Farr's method (Table3). Figure 4 shows that the life expectancy of Gujranwala by Greville's method is much higher than that of other methods and it is also observed that the lowest life expectancy is calculated by Farr's method.

Figure 4: Life expectancy of Gujranwala by different life table methods.
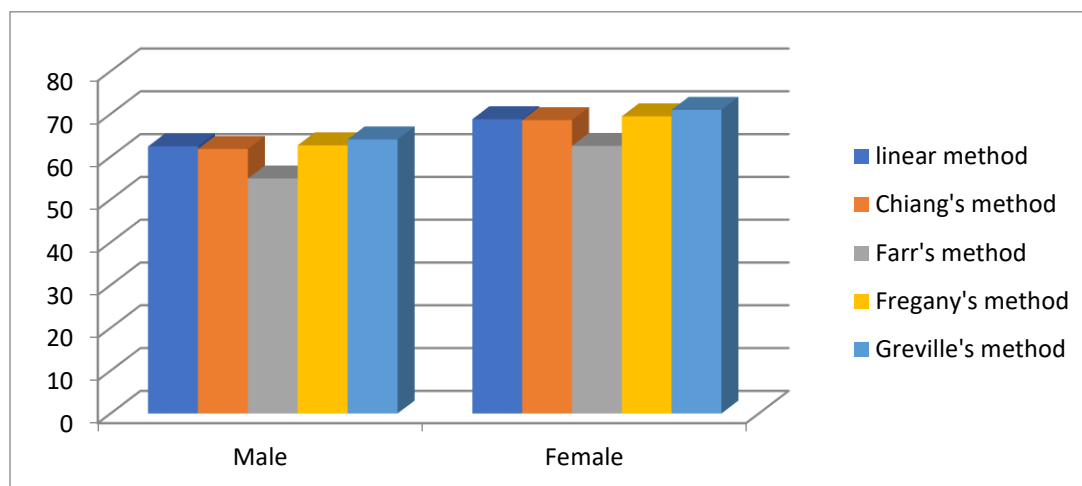
4.3   Life expectancy of male and female in Kasur using different methods

The results show that the life expectancy in different cities of Punjab varies to some extent. This trend can be seen from the life tables of Lahore, Gujranwala and Kasur (Table2, Table3& Table4). The trend can be seen in life expectancy of females of Lahore 76.57 years (Table2), 71.90 years (Table3) and 70.97 years (Table4) was obtained by Greville's method but same as previous results, the Greville's method gives the higher life expectancy for women of Kasur (70.97 years) than other methods (Table4). Life expectancy of females by other methods were also calculated, 68.78 years by linear method, 68.54 years by Chiang's method, same as previous results lowest 62.54 years by Farr's method and 69.44 years by Fregany's method (Table4).

Moreover, the Greville's method gives the highest life expectancy of males of Kasur (64.05 years). Life expectancy of males by other methods were also be calculated, 62.41 years by linear method, 61.80 years by Chiang' method, 54.93 years by Farr's method and 62.68 years by Fregany's method (Table 4). The lowest life expectancy of males of Kasur (54.93 years) is calculated by Farr's method (Table3). The analysis of three cities revealed that highest life expectancy can be calculated by Greville's method and lowest life expectancy by Farr's method. Figure 5 shows that the life expectancy of Kasur by Greville's method is much higher than that of other methods and it is also observed that the lowest life expectancy is calculated by Farr's method.

Table 4: Life expectancy of male and female in Kasur using different methods.

Ages	Age interval	Linear method		Chiang's method		Farr's method		Fregany's method		Greville's method	
		Female	Male	Female	Male	Female	Male	Female	Male	Female	Male
x, x+n	n	E_x	E_x	E_x	E_x	E_x	E_x	E_x	E_x	E_x	E_x
0-4	5	68.78	62.41	68.54	61.80	62.54	54.93	69.44	62.68	70.97	64.05
5-9	5	65.13	58.51	64.91	57.93	60.00	51.89	65.81	58.79	67.32	60.14
10-14	5	60.46	53.64	60.25	53.06	55.61	47.12	61.14	53.93	62.65	55.27
15-19	5	55.56	48.80	55.36	48.22	50.80	42.39	56.24	49.08	57.75	50.42
20-24	5	50.84	44.09	50.64	43.53	46.31	37.90	51.52	44.38	53.03	45.71
25-29	5	46.10	39.34	45.91	38.78	41.78	33.32	46.79	39.62	48.28	40.95
30-34	5	41.36	34.89	41.18	34.35	37.25	29.26	42.05	35.18	43.54	36.49
35-39	5	36.57	30.28	36.40	29.75	32.63	24.90	37.27	30.57	38.75	31.86
40-44	5	31.99	25.85	31.84	25.35	28.38	20.83	32.70	26.15	34.16	27.41
45-49	5	27.29	21.37	27.16	20.90	23.91	16.66	28.01	21.68	29.46	22.91
50-54	5	22.72	16.86	22.62	16.42	19.66	12.40	23.45	17.17	24.88	18.37
55-59	5	18.34	12.97	18.29	12.62	15.73	8.99	19.09	13.31	20.49	14.42
60-64	5	13.80	9.73	13.80	9.52	11.50	6.35	14.57	10.13	15.93	11.12
65-69	5	9.21	7.95	9.27	7.93	7.16	5.54	10.01	8.56	11.32	9.61
70-74	5	5.89	6.12	6.27	6.44	4.80	5.12	6.90	7.11	8.10	8.40
75 & above	5	2.50	2.50	3.58	3.41	2.50	2.50	4.04	3.90	5.00	4.97

Figure 5: Life expectancy of Kasur by different life table methods.

5. Conclusion

The objective of the present study is very simple in nature and to centers upon the determination of the life expectancy of male and female of different cities in Pakistan. This is the first study in which life expectancy in different cities is calculated for both genders. Different life tables methods such as Linear method, Farr's method, Chiang method, Greville's method and Fregany's method have been used to estimate the "life expectancy" of the male and female by using cemetery data of different cities (Lahore, Gujranwala, Kasur) of Pakistan. It is observed that the life expectancy of females is higher than the males. This scenario is observed in all cities and at national level by using different methods of life table. It is due to many indicators such as better housing, rising living standards, improved lifestyle and better education facilities than male. These indicators have positive effect on life expectancy and enhance it. Moreover, it is observed that the life expectancy of Lahore is much higher than the life expectancy of other big cities. This fact happened in both male and female cases. Life of Lahore is highest because in Lahore more education facilities and health facilities in terms of hospitals, doctors, medication etc. are available.

It is also observed that different methods of life tables provide different life expectancies for same data. The life expectancy of females of Pakistan was calculated 67.62 years by linear method, 68.12 years by Chiang' method, 58.06 years by exponential method, 59.65 years by Farr's method, 68.86 years by Fregany's method and 70.03 years by Greville's method. The life expectancy of males of Pakistan was calculated 64.83 years by linear method, 64.88 years by Chiang' method, 56.44 years by exponential method, 55.47 years by Farr's method, 65.73 years by Fregany's method and 67.11 years by Greville's method. These results illustrate that the life expectancy of both male and female is different for same data.

6. Recommendations

Like other studies on this topic, this study has also some research gaps. This study contains only three cities (Lahore, Gujranwala, and Kasur) of Pakistan so it cannot be generalized. This research work may be extended to the calculation of life expectancy of all cities of Pakistan. This will provide the real picture of the society for the policy makers. During

this study, it is observed that there is not a sufficient space for graves to all the population living in city. Policy makers should think about this and make the policy about recycle the graveyard after a specific time. Also, the methods used in this study are not capable to provide actual glimpse of life expectancy in simple manner. Therefore, new methods are required to fulfil this requirement and that covers all aspects for determination of life expectancy. Other methods of estimating life expectancy such as King's method and Keyfitz-Faruenthal's method are needed to apply.

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