

# HUMAN AGE DISTRIBUTION; A SAMPLE SURVEY

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## ABSTRACT

*A statistical investigation is made of the life spans of adult human beings of the previous two centuries, to look into their pattern of mortality. The life span, or age-distribution is revealed to be quadri-modal in nature, refuting the prevailing myth that all ages are equally susceptible to death. The major peaks of mortality, are found to be at 57,68,77 and 86 years, respectively.*

## INTRODUCTION

"Every soul will/must taste of death..." [Al Quran, 3.185, 21.35, 29.57]. These are the words, the Holy Quran uses to explain that every human being on the face of earth is to die. But when? At what age? Are all ages equally susceptible to death? If not, which are the ages that are more, or less, susceptible? Is it possible that a trend, or a probability distribution, can be observed for the ages, that can be used for prediction and forecasting? These are the questions that are being asked and partially answered in this article.

Human life and age has always been the centre of research. How can it be made long? How can the process of aging be delayed? Research Literature is replete with all sorts of struggles to de-engimatize these and related issues. But little is available to study human age with reference to forecasting, or a predictable, trend or probability-distribution for human age. Even the basic sources of such research, like Encyclopaedia Britannica, and Encyclopaedia Americana do not have any direct, or even indirect reference to this facet of human age. Qurashi & Shah [1983 & 1984], however, made attempts to model the creative span, total life-span, and month of expiry of early Muslim scientists and some eminent Pakistani scientists of the last hundred years. A similar analysis was later made by Qurashi [1993] for 31 eminent Pakistan scientists who died between 1970 and 1992.

The present author conducted a preliminary sample-survey in an attempt investigate more fully the relationship between human age and occurrence of

death. The survey unveils certain more susceptible-to-death ages and contrives a possible trend for some rough "prediction" about death.

## The Hypothesis

"All ages are not equally vulnerable to death": this is a general statement. It has already been established that infant mortality, child mortality and adult mortality rates are significantly different, so the scope of this hypothesis is reduced to adult mortality only. The qualified hypothesis is thus stated as: "all ages beyond 30 years are not equally vulnerable to death".

## METHODOLOGY

A sample of 5,000 celebrities, of the previous two centuries, from five different professions, i.e. show-business (named category # 1 - say C1), medicine (named category # 2- say C2), academics (named category # 3 - say C3), science (named category # 4 - say C4), and law (named category # 5 - say C5), is taken from different sources, like Encyclopaedia Britannica (1993, 94, 95, 96, 97, 98), Encyclopaedia Americana (1992, 93, 95, 96, 97, 98), Macmillan Encyclopaedia (1994), Encarta Multimedia Encyclopaedia 98, Groller Multimedia Encyclopaedia 98, and their dates of birth and death are recorded to study their ages. These celebrities are then classified into five classes, according to the five specified categories, such that each class has about 1,000 celebrities. Then 26 strata are made, for each of the 5 classes, according to 26 alphabetic characters (A through Z). A simple random sample is, then, selected from each stratum of a size proportional to the available celebrities in the stratum, so as to have a sample of size 60 for the particular class.

Thus, five proportional stratified random samples of 60 celebrities each, of the previous two centuries, and of five different categories are the result. It is thought that the results on the celebrities can be generalized for all human beings. In the following elucidation, some proof for this point shall also be provided. Furthermore, the celebrities who have been murdered or had an unnatural death are not included.

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This exclusion has to be taken, as the rate of being murdered in celebrities is understandably quite high, as compared to common populace.

Following are the compiled results of this recording, giving the number of celebrities dying in different age-groups at intervals of 5 years. The last column gives the number of deaths recorded from a corresponding sample taken from all of the 5,000 selected celebrities.

**Table 1. Data on Life-Span for Five Different Categories of Celebrities**

Age Groups	C1	C2	C3	C4	C5	Whole
Less than 30	1	1	0	0	0	1
31-35	1	3	0	0	0	2
36-40	0	3	1	1	1	2
41-45	1	1	1	1	1	1
46-50	1	1	2	2	4	2
51-55	2	3	1	5	6	3
56-60	7	1	5	9	4	5
61-65	2	5	6	0	1	2
66-70	9	7	12	7	10	9
71-75	7	12	7	8	6	7
76-80	13	8	9	10	7	9
81-85	9	5	5	8	7	7
86-90	5	7	7	7	9	7
91-95	1	1	2	1	4	2
Above 95	1	2	2	1	0	1
Total	60	60	60	60	60	60

A shaded area frequency-curve (contrived with the help of MS Excel 97) for this table, giving a cumulative effect for all the categories is shown in Fig.1.

Here are some of the main features of the above shaded-area frequency-curve, drawn for Table 1:-

1. All classes of the celebrities behave almost identically, as the up-down formation is almost identical for all the individual curves of the composite. In other words, the death-pattern in all the investigated five professions is almost the same. So, it can be said that the age at death is indifferent to profession.
2. Numbers of celebrities dying in different age-groups are not the same and all classes of celebrities are corroborating this fact. This is establishing the considered hypothesis that all ages are not equally vulnerable to death.
3. Thorny peaks are observed for some age groups (especially for the groups (56-60), (66-70), (76-80) and (86-90)) where most of the classes show abnormal conic pattern, indicating a high vulnerability

for deaths at these ages.

4. These peaks are observed for approximately the same age-groups in all the five classes.

5. There are some relatively safe ages, especially in between the thorny peaks.

So, it can be inferred that the human age is not equally distributed over all age-groups, beyond 30 years, but there are some groups that are more vulnerable than others. This characteristic is observed in all the five categories of celebrities. As the death-pattern is indifferent to the profession - as established in above stated feature # 1, so the results may easily be extended and applied to common populace.

To eradicate the grouping error in the data, let us arrange the data again in age groups with a difference of four years, instead of five years. The following are the results, which show maxima identical with those in Table 1:

**Table 2. Frequency Distribution of Ages of Celebrities of Five Different Fields (Group Difference is 4 years)**

Age Groups	C1	C2	C3	C4	C5	Whole
Less than 30	1	1	0	0	0	1
31-34	1	2	0	0	0	1
35-38	0	4	1	0	1	2
39-42	1	0	1	0	2	1
43-46	1	1	1	0	1	1
47-50	2	1	2	2	3	2
51-54	3	4	1	5	6	3
55-58	4	2	5	7	3	4
59-62	1	1	3	2	2	2
63-66	1	4	5	1	2	5
67-70	8	7	10	8	8	6
71-74	7	10	6	7	6	8
75-78	9	5	4	10	5	7
79-82	8	4	7	4	5	6
83-86	7	6	5	9	6	4
87-90	4	5	5	3	7	5
91-94	1	1	2	1	3	1
95-	1	2	2	1	0	1
Total	60	60	60	60	60	60

## CONCLUSION

Explicitly, the modified frequency-distribution, and the corresponding shaded area frequency-curve, for human ages tells the same story as for the graph with an age difference of five year between groups. Again, there are four thorny peaks observed for almost the same age- groups, or ages, as indicated in the

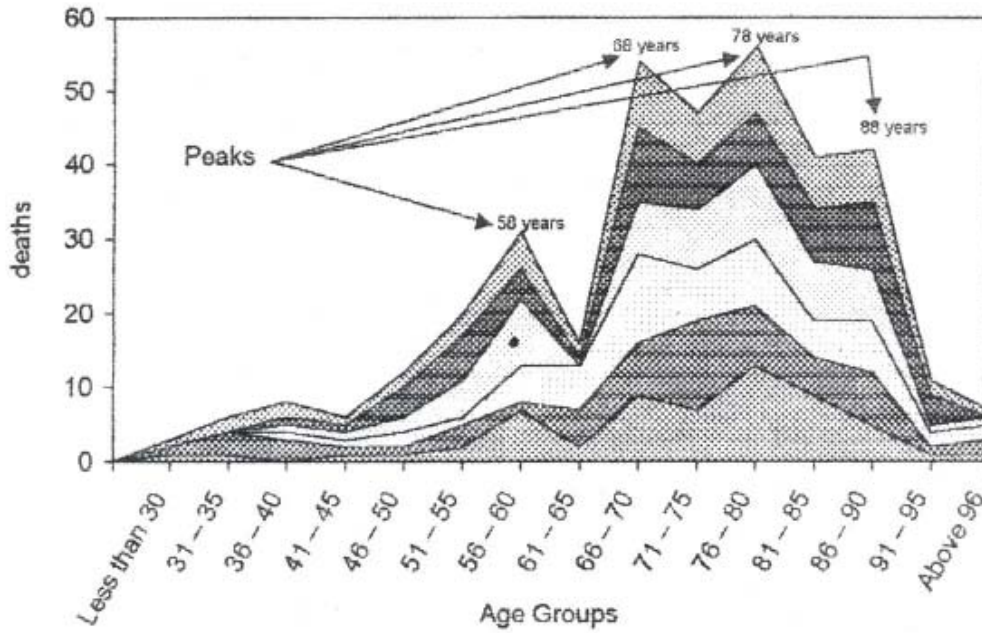


Fig.1 Shaded Area Frequency-Curve for the Ages, when the Group Difference is 5 years. Thorny Peaks are indicated

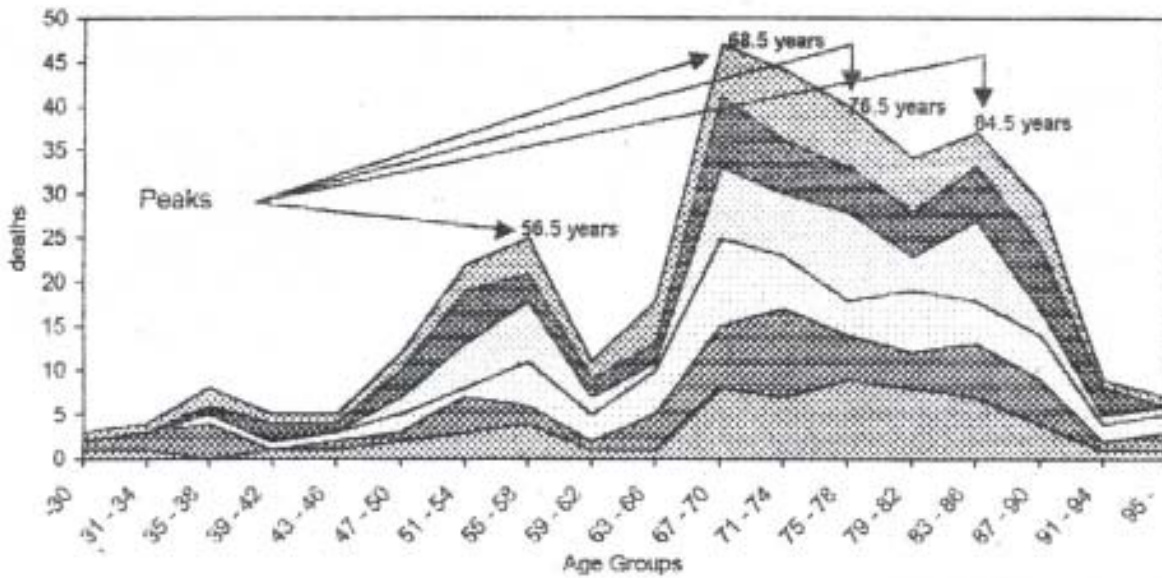


Fig.2 Shaded Area Frequency-Curve for the Ages, when the Group Difference is 4 years, with Thorny Peaks indicated

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Fig. 2. This is shown in Table 3, below:-

**Table 3. Comparison of 4 Major Thorny Peaks, giving ages with maximum vulnerability to death**

	Position of Thorny Peak (in years)			
	Peak1	Peak2	Peak 3	Peak 4
Group Difference = 5 years (Fig.1)	58	68	78	88
Group Difference = 4 years (Fig. 2)	56 1/2	68 1/2	76 1/2	84 1/2
Means	57 1/4	68 1/4	77 1/4	86 1/4

Note: There are traces of a small peak around 37 years in both Figs. 1&2, as also another one around 100 years.

This survey was conducted to look into the veracity of a prevalent myth that the chances of dying are equal at all ages, especially beyond 30 years. The survey revealed that these chances are not equal, but some ages are considerably more vulnerable to death and some are less. These ages for high vulnerability can now be given as  $57 \pm 1$ ,  $68$ ,  $77 \pm 1$ , and  $86 \pm 1$  years (refer to Table 3, above) for these four major peaks identified in the present analysis.

These compare with the peaks found in an earlier analysis of a small sample of eminent Pakistani scientists (died between 1970 and 1992) published by Qurashi [1993], which were at 51 years, 63 years, 77 years, and ~85 years. Giving agreement to within  $\pm 3$  years on the average, this data tends to confirm further our hypothesis that persons at these special ages are highly susceptible to death. Further statistical and physiological studies should be of interest.

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