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Analysis of All-Cause Mortality Population of Insurance Applicants

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

Background: The risk of all-cause mortality is assessed in the study from factors consisting of BMI, medical history, socioeconomic status etc where factors are available in the life insurance organization data and submitted at the time of registration and subsequently in the death claim papers which gives detail about the state of health and cause of death.
Methods: A retrograde study has been carried out of 300 deceased life insured (2005-2014) from the data of a life insurance organization in Pakistan about all-cause mortality from the available factors in death claim files. The research instruments were consisting of death claim register, proposal forms, medical reports and death claim papers.
Results: The results indicate maximum deaths found due to Cardiovascular causes (43.34%) followed by Cancer (9.00%) while minimum found in, Endocrine disorders(0.33%)followed by Respiration(0.67%). However significant causes of death occurred due to Accident, Liver, CNS, Multisystem involvement, Natural disaster and Un- natural. The correlation co-efficient found as '0.07' for all-cause mortality indicating positive relationship between BMI and Life Expectancy.
Conclusion: Medical history plays an important but not a compulsory role in mortality. Since BMI (WHO) showed higher mortality with normal BMI whereas BMI (Asia) showed it at-risk value therefore WHO should make separate criteria of standard of BMI as being different for different ethnicities. In Insurance organization NT-proBNP and BMI of ethnic area be used to asses life expectancy in applicants. Necessary measures should be opted for implementation of "The Sendai Framework for Disaster Risk Reduction 2015-2030".

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Keywords: Policyholder; deceased; insurance; BMI; Proposal Form; Medical Report; claim form.

1. INTRODUCTION

Pakistan is the 6th most populous country of the world with a total population of 21,27,42,631 in census 2017(pbscensus). Although male and female life expectancy has increased up to 62.6 years & 67.8 years respectively in the year 2010 as compared to 61.5 years & 64.5 years in the year 2000, still the years of life lost due to premature deaths is a great loss for the country. The increase in life expectancy is also increasing the exposure to the risk of non-communicable diseases (NCD). Globally, the NCD contributed to the 63% of the total 57 million deaths in 2008 and almost 80% of these NCD related deaths were in low and middle income countries. The three major NCDs with highest mortality rate are cardiovascular diseases, cancers and chronic respiratory diseases. The leading NCDs are preventable and share some common modiable risk factors like smoking, alcohol, diabetes mellitus, hypertension, dyslipidemia, overweight/obesity, unhealthy diet and insufficient physical activity [1]. Estimates of the relative mortality risks associated with normal weight, overweight and obesity may help to inform decision making in the clinical setting. Relative to normal weight, obesity (all grades) and grades 2 and 3 obesity were both associated with significantly higher all-cause mortality [2]. Body Mass Index derived from a simple math formula and was devised in the 1830s by Lambert Adolphe Jacques Quetelet (1796-1874), a Belgian astronomer, mathematician, statistician and sociologist. Body Mass Index (BMI) is said to estimate how fat you are by dividing your weight in kilograms by your height in meters squared [3].

WHO estimates that more than 1.3 billion adults worldwide are overweight, defined by WHO as a body-mass index (BMI) of 25–<30 kg/m^2, and a further 600 million are obese (BMI ≥30 kg/m^2). Appropriate analyses of large-scale prospective studies with prolonged follow-up generally indicate that both overweight and obesity are associated with increased mortality, as is underweight (defined conservatively by WHO as BMI <18 · 5 kg/m^2). Estimation of the relationships between BMI and mortality in various populations can help to assess the adverse physiological effects of excessive adiposity [4]. The overall average BMI is highest in Nauru(32.5) while lowest in Eritrea(20.5). The average BMI in males is highest in Nauru(32.1) while lowest in Eritrea (20.1).In females BMI is highest in Tonga & Samoa(33.5) while lowest in Ethiopia & Eritrea(21).Pakistan is at 145th number with overall average BMI of 23.8 while it is found as 23.3 in males while 24.4 in females [5].

BMI is one of the important predictor in life insurance where increase or decrease in weight could affect the life expectancy. Nutrition of an individual has an impact on BMI which ultimately affect the life expectancy in community. The mortality data of the deceased insured individual can give an analysis about cause of death from available health status of an individual which is disclosed at the time of registration in insurance organization. The mortality data of life insurance has been selected for retrograde study to conclude the outcome from different factors consisting of age, gender, marital status, BMI, medical history and socioeconomic conditions about cause of death. It has been hypothesize that individual with increased BMI is associated with increased mortality

2. RESEARCH METHODOLOGY

A retrograde study has been carried out on the mortality data of insured population who died between 2005-2014.Mortality data of 300 death claims from 2005-2014 has been taken from insured population whose age was 40-60 at inception of the insurance proposal. Data was randomly collected through non-probability sampling technique The original policy files were seen and incomplete cases were deleted and replaced with other randomly selected cases. The research instruments were consisting of Death Claim Register, Proposal Forms, Medical Reports and Death Claim Papers. The proposal was completed by the deceased during their life time while medicals were completed by the medical examiners.The claim forms were completed by the claimants and attending physicians. Where required enquiry was conducted by an enquiry officer. Initially the details of policy number were collected from computer and afterward the data was compiled on spread sheet from policy files/death claim registers. The file with incomplete record was not considered and replaced again by randomly selected cases from policy record. After insertion of data in spread sheet the data was again rechecked for correct entry to eliminate the

element of bias in collected data. The data was sorted separately on the basis of the cause of death.

3. RESULTS

Table -1 indicate analysis of data on the basis of individual causes for age, sex, income, marital status, medical history, BMI (WHO) and BMI (Asia).

The mortality ratio showed increased in frequency in lower income group and is seen that on increasing income mortality cases found to be decreasing. Although history plays an important role in mortality but data have shown that significant mortality is seen among the deceased having no medical history. The analysis of the different causes of mortality has shown maximum number of deaths due to Cardiovascular causes followed by Cancer. However significant death cases have been seen due to Accident, Liver, CNS, Multisystem involvement, Natural disaster and Un-natural. The minimum causes of deaths found in GIT, Kidney, Unknown, Body Temperature, Respiration and Endocrine related mortality.

The data of BMI (WHO) showed that maximum mortality i.e., 71.67 percent occurred with normal BMI followed by Pre-obese (19.00%) whereas contribution of mortality due to underweight and obese is on lower side.

The BMI(Asia) has shown that there is highest mortality(42.67%) in the BMI which is At-Risk for overweight followed by Normal(29.00%), Obese-I(19.00%),Obese- II(8.33%) and Underweight(1.00%) .

The second highest mortality (Pre-obese) on WHO criteria and first high (At-Risk) indicate that individuals with borderline higher values are at higher risk of mortality.

Tables 2 and 3 indicate analysis on the basis of individual cause of death and correlation co-efficient(r) for statistical evaluation.

The Table 2 and 3 indicate comparatively lesser percentage of deceased who were female or unmarried. The lesser proportion could have been probably due to lesser number of female and unmarried which have been insured at the time of registration of individuals. The accident, cancer, GIT, natural disaster and unnatural have shown lesser association with history however CVS, liver, CNS, kidney, respiration, endocrine and multiple cause have shown significant association with the cause of death.

Tables 2 & 3 has also been showing correlation co-efficient(r) indicating relationship between the variable BMI(x) and Life Expectancy(y).The 'r' value lesser then '0.5' means poor association between the variables whereas greater than '0.8' indicate strong association with mortality. The correlation co-efficient found as '0.07' on the basis of all-cause mortality indicating positive relationship between BMI and Life Expectancy. The mortality which occurred due to CVS, Road side Accident, Cancer, Kidney Respiration, Multiple causes and Unknown causes have shown positive association between BMI(x) and Life Expectancy(y) whereas death due to GIT, Liver, CNS, Body Temperature, Natural Disaster and Un-natural causes indicated negative association between the variables.

4. DISCUSSION

Vaughn studied fitness vs. fatness on all-cause mortality and found that compared to normal weight fit individuals unfit individuals had twice the risk of mortality regardless of BMI.They further said that overweight and obese fit individuals had similar mortality risks as normal weight fit individuals. Our result is therefore different from Vaughn on WHO criteria where we have observed higher morality at normal body mass index in otherwise fit individuals. It has also been found as different on Asian BMI which revealed that obese weight (at-risk/overweight) deceased has shown higher mortality. To conclude we are of opinion that not only unfit individuals but as well as obese are more at risk of mortality [6].

Our available data on lower BMI have shown death due to CCF, Firing and Cholera having no association with cause of death. In this regard we may conclude that our results are different from Raj who found that low BMI and high body fat percentage are independently associated with increased mortality. Although our data on lower BMI was not sufficient for conclusion but higher age in all of the deceased with lower weight value have been seen therefore we would add that lower BMI in elderly is prone to be associated with higher risk of mortality [7].

Our study conducted on insurance applicants and results showed that none of the applicant investigated for NT-pro BNP (N-terminal prohormone of brain natriuretic peptide). The study conducted on NT-proBNP as a predictor of all-cause mortality in a population of insurance applicants have shown that NT-proBNP is a

strong independent predictor of all-cause mortality.Since we have not detected NT-proBNP in death claim file therefore we recommend that said test be conducted at the time of acceptance of a proposal for life insurance scheme [8].

Ziad analyzed among early death after discharge from emergency departments: analysis of national US insurance claims data and found that among discharged patients 0.12% died within seven days after discharge from hospital. The leading causes of death were atherosclerotic heart disease (13.6%) and concluded that every year a substantial number of Medicare beneficiaries die soon after discharge from emergency departments despite no diagnosis of a life limiting illnesses recorded in their claims. Our study was also retrospective study and shown similar results of early death after acceptance of life for insurance while no significant positive finding having impact on mortality detected earlier [9].

Table 1. Data of all-cause mortality

Total	**Mortality Cases**	**n-300**	
Factors	**Valid**	**Frequency**	**Percent**
Age	40 – 50	160	53.34
	51 – 60	118	39.33
	61 - 70	22	07.33
Gender	Male	277	92.33
	Female	23	07.67
Marital Status	Married	296	98.67
	Unmarried	4	01.33
Income	Up to 250000	188	62.67
	250001 – 50000	65	21.66
	Above 50000	47	15.67
Medical History	History related to Mortality	115	38.33
	History not related to Mortality	185	61.67
All-Cause Mortality	CVS	130	43.34
	Accident	23	07.67
	Cancer	27	09.00
	GIT	06	02.00
	Liver	12	04.00
	CNS	15	05.00
	Kidney	10	03.33
	Body Temperature	03	01.00
	Respiration	02	00.67
	Endocrine	01	00.33
	Multisystem	23	07.67
	Natural Disaster	19	06.33
	Un-Natural	25	08.33
	Unknown	04	01.33
BMI (WHO)	Severe Thinness	00	00
	Moderate Thinness	01	00.33
	Mild Thinness	02	00.67
	Normal	215	71.67
	Pre-Obese Obese	57	19.00
	Class I Obese	22	07.33
	Class II Obese	02	00.67
	Class III	01	00.33
BMI (Asia)	Underweight	03	01.00
	Normal	87	29.00
	At-Risk	128	42.67
	Obese I	57	19.00
	Obese II	25	08.33

Table 2. Division of data and statistic based on cause of death

Total Death Cause	Mortality Valid	Cases CVS n=130: (43.34%)	n-300 Accident n=23 (7.67%)	Cancer n=27 (9.00%)	GIT n=6 (2.00%)	Liver n=12 (4.00%)	CNS n= 15 (5.00%)	Kidney n=10 (3.33%)
Factors	**& Statistic**	**N(%)**	**N(%)**	**N(%)**	**N(%)**	**N(%)**	**N(%)**	**N(%)**
Age	40 – 50	65(65.00)	18(78.26)	13 (48.15)	03 (50.00)	08(66.67)	7 (46.67)	5 (50.00)
	51 – 60	58(44.62)	05(21.74)	12 (44.44)	03 (50.00)	04(33.33)	6 (40.00)	4 (40.00)
	61 - 70	7(05.38)	00 00	02 (07.41)	00 00	00 00	2 (13.33)	1 (10.00)
Gender	Male	115(88.46)	23(100.00)	26 (96.30)	06(100.00)	12(100.00)	15(100.00)	10(100.00)
	Female	15(11.54)	00 00	1 (03.70)	00 00	00 00	0 00	0 00
Marital Status	Married	127(97.70)	23(100.00)	27(100.00)	05 (83.33)	12(100.00)	15(100.00)	10(100.00)
	Unmarried	3(02.30)	00 00	00 00	01 (16.67)	00 00	0 00	0 00
Income	Up to 250000	77(59.23)	15 (65.22)	13 (48.15)	06(100.00)	09(75.00)	6 (40.00)	9 (90.00)
	250001 – 50000	30(23.08)	08 (34.78)	8 (29.63)	00 00	03(25.00)	7 (46.67)	1 (10.00)
	Above 50000	23(17.69)	00 00	6 (22.22)	00 00	00 00	2 (13.33)	0 00
Medical History	History related to Mortality	78(60.00)	01(04.35)	7 (25.93)	02 (33.33)	09(75.00)	10 (66.67)	6 (60.00)
	History not related to Mortality	52(40.00)	22(95.65)	20 (74.07)	04 (66.67)	03(25.00)	5 (33.33)	4 (40.00)
BMI(WHO)	Underweight	1(00.77)	0 00	0 00	01 (16.67)	00 00	0 00	0 00
	Normal	94(72.31)	15(65.22)	18(66.67)	04 (66.66)	10(83.34)	8 (53.33)	6 (60.00)
	Pre-Obese	23(17.69)	6(26.08)	5(18.52)	01 (16.67)	01(08.33)	5 (33.33)	4 (40.00)
	Obese Class I	11(08.46)	1(04.35)	4(14.81)	00 00	01(08.33)	1 (6.67)	0 00
	Obese Class II	1(00.77)	0 00	0 00	00 00	00 00	1 (6.67)	0 00
	Obese Class III	0 00	1(04.35)	0 00	00 00	00 00	0 00	0 00
BMI(Asia)	Underweight	1(00.77)	0 00	0 00	01 (16.66)	00 00	0 00	0 00
	Normal	39(30.00)	08(34.78)	5(18.52)	03 (50.00)	03(25.00)	3 (20.00)	3 (30.00)
	At Risk	55(42.31)	07(30.43)	13(48.15)	01 (16.67)	07(58.34)	5 (33.33)	3 (30.00)
	Obese I	23(17.67)	06(26.09)	5(18.52)	01 (16.67)	01(08.33)	5 (33.33)	4 (40.00)
	Obese II	12(09.23)	2(08.70)	4(14.81)	00 00	01(08.33)	2 (13.34)	0 00
Statistic	Correlation Co-efficient®	0.12	0.20	0.04	-0.21	-0.06	-0.04	0.15

Table 3. Division of data and statistic based on cause of death

Total	**Mortality**	**Cases**	**n-300**					
Death Cause	**Valid**	**Temperature n=3 (1.00%)**	**Respiration n=2 (0.67%)**	**Endocrine n=1 (0.33%)**	**Multiple n=23 (7.67%)**	**Disaster n=19 (6.33%)**	**Un-Natural n=25 (8.33%)**	**Unknown n=4 (1.33%)**
Factors	**& Statistic**	**N(%)**	**N(%)**	**N(%)**	**N(%)**	**N(%)**	**N(%)**	**N(%)**
Age	40 – 50	1 (33.33)	1 (50.00)	0 00	9 (39.13)	13 (68.42)	16(64.00)	0 00
	51 – 60	2 (66.67)	1 (50.00)	1(100.00)	9 (39.13)	06 (31.58)	07(28.00)	2 (50.00)
	61 - 70	0 00	0 00	0 00	5 (21.74)	0 00	02(08.00)	2 (50.00)
Gender	Male	3(100.00)	2(100.00)	1(100.00)	20 (86.96)	17 (89.47)	24(96.00)	4(100.00)
	Female	0 00	0 00	0 00	3 (13.04)	02 (10.53)	01(04.00)	0 00
Marital Status	Married	3(100.00)	2(100.00)	1(100.00)	23(100.00)	19(100.00)	25(100.00)	4(100.00)
	Unmarried	0 00	0 00	0 00	0 00	0 00	0 00	0 00
Income	Up to 250000	3(100.00)	0 00	1(100.00)	16 (69.57)	17 (89.47)	14(56.00)	3 (75.00)
	250001 – 50000	0 00	0 00	0 00	3 (13.04)	02 (10.53)	05(20.00)	1 (25.00)
	Above 50000	0 00	2(100.00)	0 00	4 (17.39)	0 00	06(24.00)	0 00
Medical History	History related to Mortality	1 (33.33)	2(100.00)	1(100.00)	15 (65.22)	0 00	01(04.00)	2 (50.00)
	History not related to Mortality	2(66.67)	0 00	0 00	8 (34.78)	19(100.00)	24(96.00)	2 (50.00)
BMI(WHO)	Underweight	0 00	0 00	0 00	0 00	0 00	01(04.00)	0 00
	Normal	3(100.00)	1 (50.00)	0 00	16 (69.57)	17 (89.48)	19(76.00)	4(100.00)
	Pre-Obese	0 00	0 00	1(100.00)	6 (26.08)	01 (05.26)	04(16.00)	0 00
	Obese Class I	0 00	1 (50.00)	0 00	1 (04.35)	01 (05.26)	01(04.00)	0 00
	Obese Class II	0 00	0 00	0 00	0 00	0 00	0 00	0 00
	Obese Class III	0 00	0 00	0 00	0 00	0 00	0 00	0 00
BMI (Asia)	Underweight	0 00	0 00	0 00	0 00	0 00	01(04.00)	0 00
	Normal	3(100.00)	0 00	0 00	7 (30.44)	03 (15.79)	09(36.00)	1 (25.00)
	At-Risk	0 00	1 (50.00)	0 00	9 (39.13)	14 (73.69)	10(40.00)	3 (75.00)
	Obese I	0 00	0 00	1(100.00)	6 (26.08)	01 (05.26)	04(16.00)	0 00
	Obese II	0 00	1 (50.00)	0 00	1 (04.35)	01 (05.26)	01(04.00)	0 00
Statistic	Correlation Co-efficient®	-0.57	1	0	0.35	-0.41	-0.22	0.73

Our study showed higher mortality at normal BMI(WHO) which is opposite to Shoaib where they indicated that BMI associated with lowest all-cause mortality has increased by 3.3 over 3 decades from 1976-1978 to 2003-2013. However simultaneously due to significant mortality toward higher weight cases in Asian standard, our results don't exclude the negative impact of the higher BMI on mortality.We in the light of our study are of opinion that BMI values should be revised by WHO as different for different ethnic areas in the world [10].

We observed in our data with 57/215 (26.51%) cases with normal BMI (WHO) who were 51 years and above old while rest 158/215(73.49%) death cases were up to 50 years at commencement of policies. Therefore our results looks similar with Chan who concluded that older adults with BMI 24–28 had lower all-cause mortality, infection-related mortality, cardiovascular-related mortality and all-cause hospitalization [11].

Ghulam et.al found that of the 2,366 patients 830(35.1%) had normal body mass index, 1,024(43.3%) were overweight, 402(16.9%) were obese and 110(4.6%) were morbidly obese. Our data of CVS mortality have shown occurrence of maximum mortality with normal BMI followed by pre-obese/obese on WHO standard while Asian criteria show higher percentage of death cases that were having higher weight values. On review of our results on both standard (i.e., WHO and Asia) we are of view that only control of weight is not sufficient to compete higher incidence of mortality due to cardiac diseases and more factors are needed to be searched to attain a better prognosis [12].

Shehab concluded that in- and peri-hospital mortality in Acute Coronary Syndrome(ACS) is significantly associated with age, gender, STEMI, HF(heart failure),and dyslipidemia but not obesity measures. Our results on the basis of relevant medical history in CVS related mortality indicate that maximum mortality due to cardiac disease history was associated with cause of death showing similarity to Shehab who pointed toward association of risk factors with cardiac mortality [13].

Shehab also pointed about lack of association of obesity with ACS mortality.We agree with Shehab where we observed that maximum CVS mortality (72.31%) were having normal body mass index on WHO standard however since Asian criteria show higher mortality with higher BMI then normal therefore we would again suggest as earlier about revision BMI values by WHO on the basis of different ethnicities [13].

We have seen that maximum accidental deaths occurred with normal BMI(WHO).Bener et.al concluded at their end that young drivers are more likely to be involved in collisions during lane changing than non-lane changing drivers.Our results also pointed for higher morality due to road accident in earlier age group and found to be decreased on increasing age. We therefore agree with conclusion Bener about higher incidence of accidents in younger age group.Our data on Asian weight standard has shown about higher incidence of accident toward borderline/higher weight value.We therefore are also of opinion that in addition to the factors indicated by Bener(chronic fatigue, acute sleepiness, and careless driver behavior) higher BMI can also be associated with higher incidence of mortality in accident [14].(Bener et.al.2017)

Our data in accidental death does not show any history of taking alcohol which is probably due to religious factors however impact of alcohol on road accident can't be ignored. We therefore due to non-availability of data can't deny the results of Miyatake et.al who concluded that drinking habits & road traffic accidents due to drunken driving were closely linked to injured subjects in Japan [15].

Jin-hu Fan conducted the study on BMI and risk of gastric cancer and found higher BMI was associated with decreased risk of GNCA(gastric non-cardia adenocarcinoma).We evaluated our results of gastro intestinal tract cancers and found 77.78% (7/9)of our gastro intestinal mortality cases were having normal BMI(WHO) while only 22.22%(2/9) were overweight.Our findings are therefore similar to Fan about reduced risk of gastric carcinoma at higher weight value [16].

Our cancer related mortality data found that normal BMI of Asia and WHO has distribution of 14.81 %(4 of 27) and 66.67 %(18 of 27) respectively. Similarly at higher BMI of Asia and WHO the distribution of mortality was 85.19 %(23 of 27) and 33.33 %(9 of 27)respectively. Although it looks on the basis of WHO values similar to Fan about higher body mass index is associated with reduced all-cause mortality due to cancer but simultaneously question of lower mortality at higher BMI is arisen when we

observe higher incidence (i.e., 85.19%) of cancer mortality when data is evaluated on the basis of Asian weight values for which further studies are required to conclude the matter [16].

We observed maximum mortality of cancer associated with normal BMI (WHO) therefore we are of opinion that reduction of weight would not have significant effect on the morbidity and mortality except improvement in quality of life. This is somewhat similar the findings by Jackson who found lack of observational evidence that weight loss improve survival for overweight and obese cancer survivors [17].

Our study showed higher mortality due to systematic disorders (CVS, GIT, CNS, Kidney, Respiration, Endocrine and Multiple Causes) in the community who were having previous history of any ailment. Therefore we agree with Chatterjee who studied the nutritional implications of GI-Related Scleroderma and stated that a multidisciplinary approach including rheumatologists, gastroenterologists with expertise in gastrointestinal dysmotility and early involvement of a dietitian familiar with the disease is paramount in producing better outcomes and improving survival in these patients [18].

Yen et.al stated that elevated BMI was an independent risk factor associated with chronic liver disease. On BMI-WHO we saw maximum mortality at normal weight while in Asian standard it was found with at-risk value.We are therefore of opinion that higher BMI is not an independent risk factor associated with chronic liver disease [19].

Mortality data (CNS) on WHO standard have shown significant death cases observed in deceased who were pre-obese/obese and Asian criteria also indicated higher CNS mortality in at-risk/obese individuals. Our results are therefore different from Aparicio who worked on overweight, obesity and survival after stroke where they concluded that overweight and mildly obese participants had better 10-year survival after ischemic stroke compared with normal weight participants. (Aparicio et.al.2017).However we agree with Sun who worked on association of body mass index with mortality and functional outcome after acute ischemic stroke and found that there is no survival advantage of overweight or obesity after ischemic stroke and that risk of death and functional disability is not significantly different in overweight and obese patients as compared with normal weight patients [20].

We observed mortality due to brain hemorrhage having normal BMI as 20%(2/10-Asia) and 40 %(4/10-WHO) while in overweight 81.82 %(8/10-Asia) and 60%(6/10-WHO) showing significant mortality in overweight at both body mass index standard. Our results are therefore support facts findings by oac(obesity action coalition) that one out of every five individuals who are affected by excess weight or obesity is affected by a metabolic condition known as “Syndrome X”. The factors that characterize the condition such as high blood pressure or insulin resistance can increase the individual’s risk for developing more serious health problems including heart disease, diabetes, and stroke [21].

The data on kidney related mortality have also shown higher mortality with normal BMI(WHO) which is reversed in Asian criteria. On the basis of WHO our results are found somewhat similar with Rahimlu et.al who found that higher BMI has protective effects with respect to all-cause mortality however different on the basis of Asian values with higher death on higher body mass index [22].

Heidari found that farmers worked in conditions in which serious health risk related to heat exposure especially in the summer can exist and workers who work under heat condition at outside environment have often heavy jobs and without any awareness and knowledge on heat stress. Our results are similar to Heidari that irrespective of BMI people doing heavy work (e.g., farmer as we observed in our study data of deceased died of heat stroke) in open environment are at higher risk of heat stroke in summer season [23].

Lai stated that tuberculosis infection underweight with body mass index less than 18.5 kg/m^2 is an independent predictor for early mortality within the first 8 weeks of treatment. We have seen small percentage of data from death due to respiratory disorder and in smaller percentage of available data death case due to tuberculosis is observed. We are therefore of opinion that tuberculosis is one of major cause of death in mortality due to respiratory system. Although we have not found any death from respiratory cause with lower body mass but even then we don’t disagree about result of Lai for role of lower BMI in prognosis of tuberculosis on account of having lack of sufficient supporting evidences [24].

The body mass index for death due to Aspiration Pneumonia is on higher side for both of the WHO and Asia criteria. We therefore agree with Mandal who stated that in obesity due to the short and narrowed airways there is a possibility of the stomach contents moving into the lungs. This causes severe pneumonia caused by the harmful stomach acids [25].

Our data regarding mortality due to diabetes mellitus was not sufficient to make a conclusive opinion however on the basis of available data we have observed life expectancy on higher side in deceased with diabetes having higher body mass index on both Asia and WHO standard. This is similar to the findings of Gao who observed significantly lower risk of all-cause mortality in overweight patients with diabetes compared with normal weight patients [26].

Our all mortality data due to body temperature were male and also not sufficient therefore we can't disagree with Gerald stated as Being cool: body temperature influences ageing and longevity. An example is observed in humans: women appear to have a slightly higher body temperature and yet live longer than men. The lack of mortality data about female due to body temperature support the result of longevity of life in females [27].

The data has been examined on the basis of failure of multiple organs and it was found most of the mortality cases have shown association of earlier medical history with the disease. It has also been seen that majority of the deceased with multisystem failure involve the community with lower socioeconomic status. As far as Body mass index is concerned we observed the same findings as mentioned earlier that in WHO-criteria more mortality cases were seen in deceased with normal weight and vice versa for Asian values.

We observed mortality cases due to natural disaster as being consisting of earth quake and flood bearing lower socioeconomic conditions. We however agreed with Gray who carried out study on Social Determinants of Health, Disaster Vulnerability and pointed toward implementation of "The Sendai Framework for Disaster Risk Reduction 2015–2030"which requires 'all-of-society engagement and partnership' in an inclusive, accessible and non-discriminatory manner [28].

We have observed mortality cases due to un-natural causes consisting of murder, burn, electric shock, bomb blast, fall from mountain, drowning and hit of cow in abdomen(deceased was having disabled left arm and hand). It has been seen with younger age group and comparatively lowers socioeconomic conditions. In WHO criteria it is seen with normal BMI while on Asia values show inclination toward higher weight values. Kimberley was of view that reasons for the lower numbers of obese/morbidly obese individuals among homicide victims are unclear but may include physical protection afforded by fat padding from sharp force injuries and relative sociodemographic isolation. Like Byard we have observed the lower proportion of obese in mortality population with un-natural cause of death [29].

Wills in their article "what does it mean when the cause of death is undetermined?" stated that a medical examiner may classify the cause of death as undetermined if he doesn't understand intent at the conclusion of an autopsy; if he cannot say for sure what caused the death. For example if a person with severe heart problems dies of a heart attack and is found to have a large dose of cocaine in his system it may not be clear if the heart attack was natural or caused by the cocaine. If the medical examiner cannot conclude he might list the death as undetermined. We have observed the findings with unknown death cause which are found to be invariably similar with known cause of death yet the death cause has been declared as unknown. Therefore in agreeing with Wills we are of opinion if the medical examiner cannot conclude he might list the death as undetermined [30].

5. CONCLUSIONS

Medical history plays an important role in mortality but it is not compulsory that history is always associated with cause of death. BMI (WHO) showed higher mortality with normal BMI whereas BMI (Asia) showed higher mortality with BMI at-risk however still there is significant mortality with normal BMI (Asia).When we analyzed the data on the basis of WHO (BMI) then our hypothesis is not proved but when data is analyzed on the basis of BMI (Asia) then result showed that mortality is effected by the body mass effect. Therefore WHO should make separate criteria of standard of BMI as being different for community of different ethnicity. NT-proBNP be conducted in insurance applicants to get prediction for mortality. Necessary measures should be opted for implementation of "The Sendai Framework for Disaster Risk Reduction

2015- 2030".Irrespective of state of health healthy life style, balanced nutrition and regular medical examination be ensured after 40 years of age. Preventive measures should be opted in individuals having positive findings in the medical history. The insurance organization should asses the applicants on BMI standard from ethnic area of applicant.

CONSENT

As per international standard or university standard, written approval has been collected and preserved by the author from the Organization Regional Chief (North).

ETHICAL APPROVAL

The study has been accepted by the Committee in Faculty of Sciences, Department of Environmental Design, Health and Nutrition Sciences, Allama Iqbal Open University, Islamabad, Pakistan.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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