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Analysis of occupation skills on all cause mortality in Pakistan

Muhammad Ghafoor Ali¹*, Saima Narjees Husain²

¹State Life Insurance Corporation, Islamabad, Pakistan

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*Correspondence:

Dr. Muhammad Ghafoor Ali, E-mail: ghafoor_dr@hotmail.com

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ABSTRACT

Background: Occupational injuries/diseases are considered as leading problems for workers, especially in less developed countries. Based on International Standard Classification of Occupation (ISCO-08) four broad skill levels are defined. Employment has been established as a fundamental determinant of health and review of occupation/all cause mortality has been carried to observe the impact of occupation skill on cause of death.

Methods: A retrograde study conducted on mortality data of State Life Insurance Corporation of Pakistan. Randomly 500 death cases were collected during study period between 2006 to 2018. The death claim instrument were proposal forms and death claim register. The data about occupation and cause of death was inserted on spread sheet of excel and finally analyzed through SPSS for occupation skill and cause of death.

Results: Almost equal proportion of data found in skill-1 (14%) and skill-4 (12.6%) while maximum contribution found in skill level-2 (49.40%) followed by skill-3 (24%). The maximum percentages of mortality seen cause wise as CVS (49.39% skill-2), cancer (17.46% skill-4), road side accident (14.28% skill-1), multiple causes (6.67% skill-3), liver disorder (5.71% skill-1), CNS (3.17% skill-4), kidney disorder (5.71% skill-1), GIT (6.35% skill-4), respiration (3.17% skill-4), un-natural (2.02% skill-2), idiopathic (2.85% skill-1), endocrine (1.58% skill-4), body temperature (1.42% skill-1), poisoning (0.83% skill 3), electric shock (2.85% skill-1), sepsis (1.58% skill-4), obstetric (0.83% skill-3) and burn (1.42% skill-1) while lowest found as CVS(46.67% skill-3), cancer (7.14% skill-1), road accident (7.93% skill-4), multiple causes (2.85% skill-1), liver (1.58% skill-4), GIT (2.02% skill-2), respiration (1.61% skill-2) and idiopathic (0.40% skill-2). Many causes in skill-1 and skill-4 found no mortality.

Conclusions: Mortality due to cardiovascular diseases found highest in all skills while lower frequency of death seen in other systematic disorders. Mostly highest and lowest mortality percentages found either in skill-1 or skill-4 whereas comparatively higher percentages have steadily been maintained in skill-2 and skill-3.

Keywords: Occupation skill, Insurance, Mortality

INTRODUCTION

In less developed countries occupational injuries/diseases are usually considered leading problems for workers. According to International Labour Organization (ILO) about 160 million suffered from occupational illnesses 2.3 million people died of occupational accidents/diseases and 317 million suffered serious nonfatal occupational

injuries where most of them were belonging to rural areas in the developing countries. In the most economically productive age span it has been seen that adult mortality is an important indicator for Burden of Disease (BOD). The life tables describe death rate, survivor's numbers for each age group and death probability. In this regard census, vital registration, surveys and age-specific mortality rates are being needed to compute the

²Palmers Medical Centre, Melbourne, Australia

expectancy of life at the time of birth.² The four level structure by International hierarchy Standard Classification of Occupation 2008 (ISCO-08) has classified all jobs in the world to 436 unit groups having aggregation in to 130 minor groups 43 sub-major groups and 10 major groups. Skill has been described as ability to carry out tasks and duties about an assigned job whereas skill level pertains to range of tasks, complexity and duties that can be done in occupation. Skill level-1 pertain to performance of simple and routine manual/physical task which are requiring by use of hand held tools e.g., vacuum and shovels cleaners, lifting, assembling goods by hand, digging, cleaning, picking fruits/vegetables, carrying material by hand and operating non-motorized vehicles. Skill level-2 pertain to tasks e.g., repair of electrical/mechanical maintenance and equipments, driving vehicles, operating machinery/electrical equipments, ordering/storage of information and manipulation. Skill Level-3 include to perform complex practical and technical tasks which are requiring extensive level of technical, procedural and factual knowledge about specialized field e.g., to perform technical functions required to support the professionals; implementation about safety, health, and related regulations; supervising, controlling, coordinating, and scheduling activities of workers. Skill Level-4 pertains to tasks requiring decision making, solving complex problems and creativity which is based thorough factual and theoretical knowledge in a specialized field e.g., teachers, medical practitioners, engineer, nurses, computer system analysts, marketing managers and musicians.³ All cause mortality has been described by the disease tracking scientists or epidemiologists for referring death due to any cause. The term all cause mortality refers to a disease/harmful exposure e.g. dangerous chemical, radiation or anything responsible to cause death is considered to be a 'cause of death'. Therefore all cause mortality has been described as any cause of death. 4 Since long employment has been established as a fundamental determinant of health. The mortality rates on the basis of occupation have been first calculated in UK in 1851.⁵ In comparison to non-manual the manual workers have been seen with higher morbidity, mortality and injury at the work place. An inverse relationship has been seen between education and income with mortality and morbidity resulting from work place injury.6

The study has been carried out to observe the impact of occupation skill on the cause of death.

METHODS

The study has been carried on mortality data of State Life Insurance Corporation of Pakistan. The study has been a retrograde study where a total 500 cases were collected during the study period. The study has been conducted only in the adult age group and minor life insured were excluded during collection of data. The life insured who were having age 18 years and above were considered whereas below 18 years of age were not taken in

consideration. The data was collected for all occupations therefore no exclusion of mortality case on the basis of occupation was made in the study. The data was also collected for all causes of death and no mortality case on the basis of cause of death was excluded. The study period for collection of mortality data was between 2006 to 2018. The cases have been collected by simple random sampling technique. The death claim instruments were proposal forms and death claim register. The proposal form is submitted at the inception of insurance and gave information about occupation of individual whereas the death claim papers are completed after the death of policyholder and gave information about cause of death. The data has been collected from original death claim files and files with incomplete data were replaced with other randomly collected cases. The data about occupation and cause of death was inserted on spread sheet of excel and again checked for any error/discrepancy. On the basis of International Standard Classification of Occupation 2008 (ISCO-08) four ISCO skill levels has been bifurcated. Further bifurcation of skill levels has been made on the basis of cause of death. The same available data which is based on skill level and cause of death has been evaluated on SPSS to conclude the results of study.

RESULTS

The results of our study were bifurcated according to cause of death and against their occupation skill detailed as in Table 1.

The result indicate that almost equal proportion of the data has been found in skill-1 (14%) and skill-4 (12.6%) while maximum contribution of the data has been found in occupation skill level-2 (49.40%) followed by occupation skill-3 (24%).

The cardiovascular death causes occurred at almost similar percentage in all occupation skills whereas cancer has shown contribution found to be increasing as occupation skill increase from skill-1 to skill-4. The data due of road accident found as higher in deceased with occupation skill-1 (14.28%) while lowest found in the skill-4 (7.93%). Multiple cause have shown lower mortality due to lower socioeconomic condition in skill-1 (2.85%) while comparatively higher mortality in skill-4 (6.35%). The liver disorder has shown lowest percentage in occupation skill-4 (1.58%) whereas in rest of three occupation skill the contribution is higher and also almost at similar proportion. Mortality due to CNS related disorder found highest in occupation skill-4 (3.17%) while no case found in the deceased bearing occupation skill-1 while opposite result has been found in the mortality cases due to kidney related disorder where highest percentage found in the deceased with occupation skill-1 (5.71%) while no case found in the deceased with occupation skill-4. The data of GIT and Respiration related disorder found higher in the deceased with occupation skill-1 and 4 while lower proportion found

with skill level-2 and 3. No mortality seen due to endocrine disorder in occupation skill-1 while maximum found in deceased with skill level-4 (1.58%). We have not found any mortality case due to un-natural cause in occupation skill-1 however maximum contribution of death due to idiopathic reason found in the occupation skill-1. Mortality due to poisoning has been found only in middle class occupation skill community i.e., occupation skill-2 (0.4%) and skill-3 (0.83%). Maximum cases due to electric shock seen in deceased with occupation skill-1

(2.85%). No mortality found due to sepsis in occupation skill-3 and similarly no mortality due obstetric cause found in deceased with occupation skill 1 and 4. The mortality due to burn found in deceased with occupation skill-1 (1.42%) and skill-2 (0.4%).

The p value >0.05 have been found in all skill indicating weak evidences against the null hypothesis. Therefore we have been failed to reject our null hypothesis that mortality is affected by the occupation.

Table 1: Bifurcation of data (n=500) based on occupation skill/cause of death.

Occupation skill or cause of death	Skill-1 (n=70: 14%)	Skill-2 (n=247: 49.40%)	Skill-3 (n=120: 24.00%)	Skill-4 (n=63: 12.6%)
	N (%)	N (%)	N (%)	N (%)
CVS related mortality	33 (47.14)	122 (49.39)	56 (46.67)	30 (47.62)
Cancer mortality	5 (7.14)	31 (12.55)	18 (15.00)	11 (17.46)
Road accident mortality	10 (14.28)	25 (10.12)	12 (10.00)	5 (7.93)
Multiple cause mortality	2 (2.85)	16 (6.47)	8 (6.67)	4 (6.35)
Liver related mortality	4 (5.71)	14 (5.66)	6 (5.00)	1 (1.58)
CNS related mortality	0	7 (2.83)	1 (0.83)	2 (3.17)
Kidney related mortality	4 (5.71)	7 (2.83)	6 (5.00)	0
GIT related mortality	3 (4.28)	5 (2.02)	3 (2.50)	4 (6.35)
Respiration mortality	2 (2.85)	4 (1.61)	2 (1.67)	2 (3.17)
Un-natural mortality	0	5 (2.02)	2 (1.67)	1 (1.58)
Idiopathic mortality	2 (2.85)	1 (0.40)	1 (0.83)	1 (1.58)
Endocrine mortality	0	2 (0.81)	1 (0.83)	1 (1.58)
Body temperature	1 (1.42)	2 (0.81)	1 (0.83)	0
Poisoning mortality	0	1 (0.40)	1 (0.83)	0
Electric shock mortality	2 (2.85)	1 (0.40)	0	0
Sepsis mortality	1 (1.42)	1 (0.40)	0	1 (1.58)
Obstetrics mortality	0	1 (0.40)	1 (0.83)	0
Burn mortality	1 (1.42)	1 (0.40)	0	0
Autoimmune mortality	0	0	1 (0.83)	0
Natural disaster mortality	0	1 (0.40)	0	0

DISCUSSION

The result indicate that almost equal proportion of the data has been found in skill-1 and skill-4 while maximum contribution of the data has been found in occupation skill level-2 followed by occupation skill-3. This indicate maximum contribution of community have been occupied by the occupation with middle class population of the community whereas lower and higher income are found at lower and also with almost same proportion. Our results are therefore found to be similar from Katikireddi et al who found in health professionals, managers, and teachers had particularly low mortality rates whereas those working in elementary agricultural, construction, and housekeeping jobs had high rates.⁷

It has been seen in our study the mortality percentage due to cardiovascular causes has occurred at almost similar percentage in all occupation skills. This indicates mortality due to cardiovascular disorders are independent from change of occupation skill. Our results therefore found to be different from Zaitsu et al who concluded that managerial/professional class appeared to potentially experience higher CHD (coronary heart disease) risk compared with other groups. 8

We have found 59/500 (11.8%) male mortality cases where 6/500 (1.2%) female who died due to cancer. Our results therefore found to be similar with Purdue et.al who observed 3-14% men and 1-2% women who has been died of cancer.⁹

Mortality due to multiple causes is expected to exist at higher ratio in occupation skill-1 due to lower socioeconomic conditions which resultantly found difficulties/obstacles in attaining quality standard treatment however our study have shown lowest percentage contribution of mortality data in deceased with occupation skill-1.

European association for the study of liver have suggested that prevention is achieved with industrial hygiene techniques mainly with adherence to exposure limits and programmes of medical surveillance of exposed workers, aimed at avoiding further damage by removing workers from additional exposure. We agree with recommendation of European Association for mortality as mortality data of our study have shown that death cases due to liver disorder has been found as lowest in occupation skill-4 whereas in rest of three occupation skills the contribution is higher and also almost at similar proportion. ¹⁰

Ligun et al concluded that risk of intracerebral hemorrhage (ICH) found to be increased as the work intensity level increased and our results therefore look to be similar Ligun et al whereas we have seen that mortality due to CNS related disorder has been found highest in occupation skill-4 while no case found in the deceased bearing occupation skill-1.

Mortality due to kidney related disorder found in our data as highest in the deceased with occupation skill-1 while no case found in the deceased with occupation skill-4. Our results therefore look to be similar with the findings of Adjei et al who found that low level occupation was consistently associated with worse kidney outcomes among all ethnic groups.¹²

Our mortality data showed highest of death cases due to respiratory cause in occupation skill-4 who are qualified from higher educational institution and involved in supervisory status in their occupation and are assumed to be more away from hazardous inhalation agents causing respiratory disorder. We therefore agree with Blanc et.al who after comprehensive review of literature and analysis found that non-malignant respiratory diseases demonstrate a substantial occupational burden for multiple respiratory conditions not typically considered potentially work related. However significance of occupation hazardous inhalation agents causing cannot be ignored as we observed significant mortalities due to respiratory disorder with occupation skill-1.¹³

Huerta-Franco et al in their study pointed toward association between stress and peptic ulcer disease in men with supervisory job as being having higher prevalence. Our results are also looking similar to Huerta-Franco as we has observed highest percentage of mortality due to gastrointestinal disorders in deceased bearing skill-4 who are maximally involved in stressful working in their profession. ¹⁴

We have found un-natural cause consisting of suicide, homicide, fall from mountain and blast of cylinder. In our data no mortality found due to un-natural cause in the deceased with occupation skill-1 indicating that by improvement of occupation skill risk there is no assurance for reduction of mortality due to un-natural death. However maximum percentage contribution of death cases due to idiopathic/unknown reason found in the deceased with occupation skill-1 support that the poor socioeconomic condition in community with occupation

skill-1 have not sufficient funds for their medical management resulting in higher proportion of death due to unknown reason.

We have found mortality from diabetes mellitus only as endocrine related disorder deaths in our data. It is seen that no mortality due to endocrines disorder found in occupation skill-1 while maximum found in the deceased with skill level-4. Stahl et al concluded that low occupational class is an independent predictor of type 2 diabetes. Our result therefore differ from Stahl et al regarding poverty as independent risk factor for diabetes mellitus as we found no case in occupation skill-1 which was one of the representing community with lower financial status.¹⁵

Mortality cases due to poisoning have been found in deceased bearing the occupation of tailoring and business. Although our result did not show association of poisoning with the occupation however existence in skill 2 and 3 indicate more inclination in middle class toward mortality due to poisoning. Mortality due to electric shock were bearing the occupation as line man and milk selling indicating positive impact of occupation mortality due to electric shock.

Study conducted by Knoop et al found that hospital mortality for sepsis admissions was 19.4% and overall 26.4% of the included patients died while hospitalized for sepsis. Our data have shown only 0.6% of mortality which occurred due to sepsis. Based on our result we are of opinion that we can't justify our result for disagreeing with Knoop et al as our data has been based on death claim and many cases might has been labeled under systemic cause and also bearing any infection which the claimant/medical examiner did not felt to mention as appropriate for the processing of claim file.¹⁶

Getachew et al concluded in their study that improve maternal knowledge and thereby reduce maternal death, the identified significant factors should be addressed through maternal and child health services. Although no mortality due to obstetric cause found in deceased with occupation skill-1 even then due to existence in middle class community of our data (occupation skill 2 and 3) we agree with Getachew et al about improvement in maternal knowledge for reduction of mortality due to obstetrical causes.¹⁷

According to WHO facts sheet an estimated 180000 death occur due to burn in lower and middle income countries. Burn mainly occurs in home and work place. According to WHO females have slightly higher rates of death from burns compared to males according to the most recent data. Our results due to burn also support the fact findings of World Health Organization where we have seen that out two victims from burn one was the farmer and other was a house wife in our study.¹⁸

We have found only one deceased who has been died of autoimmune cause (SLE) and was having occupation falling in skill level-3. The age of deceased died of SLE has been found to be lesser then 45 years therefore we agree with Rees et al who concluded that people with SLE have higher death rates than people without SLE and young people with SLE are at the greatest relative risk of death compared with people of the same age.¹⁹

It has been seen in our mortality data that one deceased dies of natural disaster (drowning) who was more than 60 years old and falling in occupation skill level-2. Mortality due to natural disaster found and was bearing the occupation as a farmer. Although data was not sufficient for a conclusion about mortality from natural disaster however on the basis of available result we can comment different from Phad et al who pointed that comparatively younger age group found victim due to drowning while we observe mortality case in higher age group however simultaneously our result looks to be similar about higher percentage of death in farmer due to drowning (a natural disaster).²⁰

CONCLUSION

Mortality due to cardiovascular disorder found highest and occurs in all skills at almost same proportions. The death cases due to other systematic causes occur at variable proportion in all skills and at a lower frequency. Road side accidental mortality seen more in unskilled and decreased as level of skill increased. No reduction in mortality due to un-natural/idiopathic causes seen by increasing level of occupation skill. Mortality due to burn observed only in un-skilled population bearing lower socioeconomic conditions. Most of the highest and lowest mortality percentages are found either in skill-1 or skill-4 whereas comparatively higher percentages of mortality have steadily been maintained in the skill-2 and skill-3. All these conclusions indicate that irrespective of skill level compulsory provision of health education is essential for all occupations.

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