Original Article

Leading causes of mortality from diseases and injury in Nepal: a report from national census sample survey

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Background: The burden of injuries in relation to other diseases has been inadequately addressed in most of the official publications and scientific literature relating to Nepal.
Objectives: In the current constraint of poor availability of such information, National Census Sample Survey information was utilized to understand the mortality pattern of major forms of injuries in relation to all diseases.
Methods: A nationally representative sample was drawn from six districts and 52 municipalities as a part of national census sample survey. The instrument included respondent-reported deaths in the family, the cause of death, the age and sex.
Results: The national representative information on the pattern of diseases shows that there were 7,010 deaths as a result of the external causes of injuries (4,803 males and 2,207 females) in a period of one year prior to the survey in 2001. Suicides, transport related accidents and other accidents accounted for the largest proportion of injuries. Other accidents ranked sixth, suicide 9th and transport accidents 10th leading cause of death for both sexes and all diseases.
Conclusion: Injuries accounted for as many number of death as tuberculosis and many times more than malaria or HIV/AIDS in Nepal. External causes of injuries are therefore a major burden of mortality and morbidity in an impoverished country like Nepal and needs an urgent public health attention.

Introduction

Health indicators of the population in Nepal are recorded as poor with a low life expectancy and high rates of mortality and morbidity [1, 2]. Yet the available health information system has been grossly inadequate to represent the health of the population. Because the vital statistics registration is poor and other means of compilation are not representative to the general population, the picture of diseases and injuries remain largely unknown. The available information is poorly analysed and reported in the public domain leading to under-recognition of some of the major health problems in Nepal. Based on the national census 2001, the majority of the population (Total- 23,151,423, males - 11,563,921 and females - 11,587,592) in Nepal is rural (86% rural versus 14% urban). The average national life expectance is 59 years with a wide variation in the expectancy between rural and urban population.

Injuries, among all other diseases remain one of the most neglected areas of public health, despite its large burden to health of the population and the huge potential the health system can play [3,4]. While there is a need of understanding the health problem in a wholistic approach, the information available is not representative to give the whole picture. In an attempt to understand the mortality pattern in a nationwide sample survey conducted under rigorous Census Sample Survey of Central Bureau of Statistics of His Majesty's Government of Nepal, the information received from verbal autopsy was utilized to depict the picture. This paper therefore examines the pattern of causes of death of Nepalese population to assist evidence based policy development and advocacy. Because the author has a main interest in understanding the external causes of injuries in relation to the other diseases, injuries and violence are specifically highlighted.

National Institute for Injury Prevention is a non-profit organization in Nepal advocating for incorporating injury prevention in national health and development agenda. The organization is assisting the government of Nepal to develop appropriate policy, surveillance and action.

Methodology

The Census Bureau of Statistics has used sampling procedure in the census enumeration in the Population Census 2001 [5]. This sample enumeration uses the comprehensive range of information in a framework of sample design. Institutional households were not covered in the sample enumeration. A total of six districts and 52 municipalities were included in the sampling. Using microcomputers, data entry was re-verified by the supervisors.

The instrument was developed by a team of experts for the National Census 2001 to compile a wide variety of population and demographic information [6]. The instrument included respondent-reported deaths in the family, the cause of death, the age and sex. The cause of death list was developed in consultation with experts from health sector and the available information in the health sector. The individual causes of death were thoroughly explained to the interviewers during the training, as well as development of guidelines for instruments so as the interviewers were able to explain the causes of death and code them appropriately. The data were entered in microcomputers and analysed after appropriate data cleaning with a close supervision of supervisors and experts from the Central Bureau of Statistics.

Extrapolations were made from the sample survey for the national level adjusting age and sex distribution of the population using STATA and SPSS software packages. The extrapolated mortality by cause of death were tabulated and the diseases were ranked using spreadsheet. Based on the population distribution obtained from the National Census 2001, mortality rate was calculated per 100,000 population per year.

The external causes of injuries included transport-related accidents, suicides, homicides, conflict-related injuries, natural calamities and other accidents. Other accidents mostly included death as a result of fall from heights, burns, poisoning etc.

Results

The national census sample survey estimated that there were 7,010 deaths (4,803 males and 2,207 females) as a result of external causes of injuries. Males accounted for 64.4 percent of deaths and female accounted for 35.6% of deaths. Of these deaths, 21 percent were reported among under 15 years age population, 67% among the 15-64 years of age and remaining 12 percent among the 65 or more years of age population. The incidence rate of the injury related mortality was however the highest among the population aged 65 years or older *(Fig. 1).*

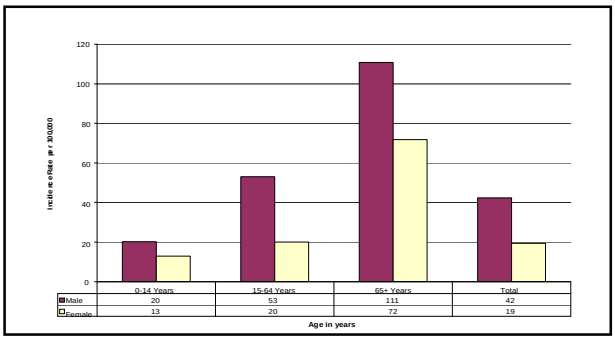

Fig. 1. Distribution of incidence of injury by age and sex, National Census 2001, Nepal

External causes of injuries were reported to rank high in all ages and both sexes. Other accidents were reported as 6th leading cause of mortality, next to the Tuberculosis. Suicides and transport related accidents were reported as 9th and 10th leading cause of death respectively *(Table 1)* whereas Malaria was the 13th leading cause of death and HIV/AIDS was the 20th leading cause of death. Children continue to die as a result of external causes of injuries which are ranked high in comparison to other diseases. Males had a higher rank of transport related accident and violence than females, where as suicide had a similar rank for both male and female *(Table 2 and Table 3).*

Discussion

External causes of injuries are important cause of mortality in Nepal where it is assumed that infectious diseases are the only important public health problem. In particular, suicides, transport related accidents and homicides remain the major causes. With current and ongoing conflict, more and more deaths are reported in among the warring parties (security forces and rebel groups) as well as civilians in the cross fire [7]. Because of the conflict, the health care personnel are also at risk of providing appropriate care [8,9]. Similarly, road traffic injuries were reported in an increasing trend during the last decades [10].

The ranking of external causes of injuries in Nepal correspond to the global mortality and disability ranking where road traffic injuries, suicides and violence are the leading causes of death [3,4]. A similar picture was reported for South-East Asia Region where injuries are increasingly taking up the leading position as a cause of morbidity, mortality and disability [11]. The vulnerable population accounts for a large number of such people, making this a major issue of public health.

Although this mortality information obtained from such surveys is the best available information representing at national level, they cannot be claimed as the most reliable

Table 1. Ranking of leading causes of death by age, both sexes, 2001 Census Sample Survey, Nepal

Rank	All		0-14		15-65		65+	
	Cause	Death (Rate[1])	Cause	Death (Rate*)	Cause	Death (Rate*)	Cause	Death (Rate*)
1	Asthma/Bronchitis	7170 (32)	Pneumonia	3665 (41)	Asthma/Bronchitis	2747 (21)	Asthma/Bronchitis	4059 (424)
2	Cholera/Diarrhoea	5119 (23)	Cholera/Diarrhoea	3417 (38)	Cancer	2401 (19)	Cancer	1176 (123)
3	Pneumonia	4428 (19)	Miscarriage/Delivery Case	1108 (12)	Tuberculosis	2226 (17)	Heart Diseases	997 (104)
4	Cancer	3879 (17)	Measles	1011 (11)	Other Accident	1760 (14)	Tuberculosis	836 (57)
5	Tuberculosis	3398 (15)	Other Accident	724 (8)	Heart Diseases	1575 (12)	Cholera/Diarrhoea	647 (68)
6	Other Accident	2907 (13)	Malaria	506 (6)	Suicide	1128 (9)	Blood Pressure	462 (48)
7	Heart Diseases	2853 (13)	Typhoid	486 (5)	Cholera/Diarrhoea	1055 (8)	Other Accident	423 (44)
8	Miscarriage/Delivery Case	2377 (10)	Asthma/Bronchitis	365 (4)	Accident/Transport	1040 (8)	Pneumonia	384 (40)
9	Suicide	1492 (7)	Jaundice	350 (4)	Miscarriage/Delivery Case	1031 (8)	Typhoid	287 (30)
10	Accident/Transport	1468 (6)	Tuberculosis	335 (4)	Jaundice	661 (5)	Diabetics	267 (28)
11	Jaundice	1152 (5)	Cancer	301 (3)	Blood Pressure	540 (4)	Malaria	243 (25)
12	Typhoid	1142 (5)	Heart Diseases	282 (3)	Malaria	379 (3)	Miscarriage/Delivery Case	238 (25)
13	Malaria	1128 (5)	Suicide	258 (3)	Pneumonia	379 (3)	Accident/Transport	194 (20)
14	Measles	1118 (5)	Accident/Transport	233 (3)	Typhoid	369 (3)	Jaundice	141 (15)
15	Blood Pressure	1055 (5)	Natural Calamities	194 (2)	Violence, Murder cases	297 (2)	Natural Calamities	112 (12)
16	Diabetics	588 (3)	Appendicitis	112 (1)	Diabetics	272 (2)	Suicide	107 (11)
17	Natural Calamities	554 (2)	Encephalitis/Meningitis	107 (1)	Natural Calamities	248 (2)	Appendicitis	107 (11)
18	Appendicitis	423 (2)	AIDS/STDs	107 (1)	Appendicitis	204 (2)	AIDS/STDs	68 (7)
19	Violence, Murder cases	399 (2)	Violence, Murder cases	63 (1)	Rebel	175 (1)	Viral Influenza	49 (5)
20	AIDS/STDs	345 (2)	Hepatitis	63 (1)	AIDS/STDs	170 (1)	Violence, Murder cases	39 (4)
21	Encephalitis/Meningitis	262 (1)	Viral Influenza	58 (1)	Encephalitis/Meningitis	117 (1)	Encephalitis/Meningitis	39 (4)
22	Rebel	190 (1)	Blood Pressure	53 (1)	Hepatitis	97 (1)	Measles	34 (4)
23	Viral Influenza	185 (1)	Diabetics	49 (1)	Viral Influenza	78 (1)	Hepatitis	24 (3)
24	Hepatitis	185 (1)	Rebel	15 (0)	Measles	73 (1)	Rebel	0 (0)

Table 2. Ranking of leading causes of death by age, male, 2001 Census Sample Survey, Nepal

Ranks	All		0-14		15-65		65+	
	Cause	Death (Rate[1])	Cause	Death (Rate*)	Cause	Death (Rate*)	Cause	Death (Rate*)
1	Asthma/Bronchitis	4127 (36)	Pneumonia	2095 (46)	Asthma/Bronchitis	1449 (23)	Asthma/Bronchitis	2416 (501)
2	Cholera/Diarrhoea	2698 (24)	Cholera/Diarrhoea	1852 (41)	Tuberculosis	1424 (23)	Cancer	681 (141)
3	Pneumonia	2494 (22)	Measles	530 (12)	Cancer	1293 (20)	Tuberculosis	627 (130)
4	Tuberculosis	2294 (20)	Other Accident	437 (10)	Other Accident	1293 (20)	Heart Diseases	622 (129)
5	Cancer	2139 (19)	Asthma/Bronchitis	262 (6)	Heart Diseases	958 (15)	Cholera/Diarrhoea	335 (70)
6	Other Accident	1978 (17)	Tuberculosis	243 (5)	Accident/Transport	894 (14)	Blood Pressure	321 (66)
7	Heart Diseases	1726 (15)	Typhoid	238 (5)	Suicide	637 (10)	Other Accident	248 (51)
8	Accident/Transport	1162 (10)	Malaria	224 (5)	Cholera/Diarrhoea	510 (8)	Diabetics	199 (41)
9	Suicide	894 (8)	Jaundice	194 (4)	Jaundice	399 (6)	Pneumonia	194 (40)
10	Blood Pressure	724 (6)	Suicide	190 (4)	Blood Pressure	350 (6)	Typhoid	131 (27)
11	Jaundice	690 (6)	Cancer	165 (4)	Violence, Murder cases	228 (4)	Malaria	126 (26)
12	Typhoid	574 (5)	Accident/Transport	151 (3)	Pneumonia	204 (3)	Accident/Transport	117 (24)
13	Measles	569 (5)	Heart Diseases	146 (3)	Typhoid	204 (3)	Jaundice	97 (20)
14	Malaria	530 (5)	Natural Calamities	112 (2)	Malaria	180 (3)	Suicide	68 (14)
15	Diabetics	413 (4)	Appendicitis	78 (2)	Diabetics	170 (3)	Natural Calamities	68 (14)
16	Natural Calamities	311 (3)	AIDS/STDs	78 (2)	Rebel	160 (3)	Appendicitis	49 (10)
17	Violence, Murder cases	287 (3)	Encephalitis/Meningitis	68 (1)	Natural Calamities	131 (2)	Violence, Murder cases	34 (7)
18	Appendicitis	248 (2)	Blood Pressure	53 (1)	Appendicitis	122 (2)	AIDS/STDs	34 (7)
19	AIDS/STDs	209 (2)	Diabetics	44 (1)	AIDS/STDs	97 (2)	Viral Influenza	29 (6)
20	Rebel	170 (1)	Viral Influenza	39 (1)	Encephalitis/Meningitis	63 (1)	Measles	15 (3)
21	Encephalitis/Meningitis	146 (1)	Hepatitis	34 (1)	Hepatitis	58 (1)	Encephalitis/Meningitis	15 (3)
22	Viral Influenza	112 (1)	Violence, Murder cases	24 (1)	Viral Influenza	44 (1)	Hepatitis	10 (2)
23	Hepatitis	102 (1)	Rebel	10 (0)	Measles	24 (0)		

Table 3. Ranking of leading causes of death by age, female, 2001 Census Sample Survey, Nepal

Rank	All		0-14		15-65		65+	
	Cause	Death (Rate[1])	Cause	Death (Rate*)	Cause	Death (Rate*)	Cause	Death (Rate*)
1	Asthma/Bronchitis	3043 (27)	Pneumonia	1570 (36)	Asthma/Bronchitis	1298 (20)	Asthma/Bronchitis	1643 (347)
2	Cholera/Diarrhoea	2421 (21)	Cholera/Diarrhoea	1565 (36)	Cancer	1108 (17)	Cancer	496 (105)
3	Miscarriage/Delivery Case	2377 (21)	Miscarriage/Delivery Case	1108 (25)	Miscarriage/Delivery Case	1031 (16)	Heart Diseases	374 (79)
4	Pneumonia	1935 (17)	Measles	481 (11)	Tuberculosis	802 (12)	Cholera/Diarrhoea	311 (66)
5	Cancer	1740 (15)	Other Accident	287 (7)	Heart Diseases	617 (9)	Miscarriage/Delivery Case	238 (50)
6	Heart Diseases	1128 (10)	Malaria	282 (6)	Cholera/Diarrhea	544 (8)	Tuberculosis	209 (44)
7	Tuberculosis	1103 (10)	Typhoid	248 (6)	Suicide	491 (8)	Pneumonia	190 (40)
8	Other Accident	928 (8)	Jaundice	156 (4)	Other Accident	467 (7)	Other Accident	175 (37)
9	Suicide	598 (5)	Cancer	136 (3)	Jaundice	262 (4)	Typhoid	156 (33)
10	Malaria	598 (5)	Heart Diseases	136 (3)	Malaria	199 (3)	Blood Pressure	141 (30)
11	Typhoid	569 (5)	Asthma/Bronchitis	102 (2)	Blood Pressure	190 (3)	Malaria	117 (25)
12	Measles	549 (5)	Tuberculosis	92 (2)	Pneumonia	175 (3)	Accident/Transport	78 (16)
13	Jaundice	462 (4)	Accident/Transport	83 (2)	Typhoid	165 (3)	Diabetics	68 (14)
14	Blood Pressure	331 (3)	Natural Calamities	83 (2)	Accident/Transport	146 (2)	Appendicitis	58 (12)
15	Accident/Transport	306 (3)	Suicide	68 (2)	Natural Calamities	117 (2)	Jaundice	44 (9)
16	Natural Calamities	243 (2)	Encephalitis/Meningitis	39 (1)	Diabetics	102 (2)	Natural Calamities	44 (9)
17	Diabetics	175 (2)	Violence, Murder cases	39 (1)	Appendicitis	83 (1)	Suicide	39 (8)
18	Appendicitis	175 (2)	Appendicitis	34 (1)	AIDS/STDs	73 (1)	AIDS/STDs	34 (7)
19	AIDS/STDs	136 (1)	AIDS/STDs	29 (1)	Violence, Murder cases	68 (1)	Encephalitis/Meningitis	24 (5)
20	Encephalitis/Meningitis	117 (1)	Hepatitis	29 (1)	Encephalitis/Meningitis	53 (1)	Measles	19 (4)
21	Violence, Murder cases	112 (1)	Viral Influenza	19 (0)	Measles	49 (1)	Viral Influenza	19 (4)
22	Hepatitis	83 (1)	Diabetics	5 (0)	Hepatitis	39 (1)	Hepatitis	15 (3)
23	Viral Influenza	73 (1)	Rebel	5 (0)	Viral Influenza	34 (1)	Violence, Murder cases	5 (1)
24	Rebel	19 (0)	Blood Pressure	0 (0)	Rebel	15 (0)	Rebel	0 (0)

information for the following reasons. First, this information is compiled based on verbal response of a family member in the household, who may not be able recall the exact circumstance of death. Therefore, the causes of death should not be equated with International Classification of Diseases or its equivalences. Second, it is likely that deaths which are happening among young children or a family member who have been away for work related or other reasons may have been ignored. Third, the socio-cultural factors and factors related to conflict deaths may prevent the person to appropriately report the deaths. Despite these limitations, external causes of death are easier to identify by the respondent by their nature. This may have been useful for reliability of the cause of death in reporting them.

While it is important to control communicable diseases and maternal/perinatal conditions, the current burden of injuries and other non-communicable diseases are too important to avoid as public health problem [(12)]. However, there is no formal structure in the Ministry of Health dedicated to these conditions. The burden of these injuries is expected to rise further as the country is facing acute crisis of insurgency thereby increasing urbanization and displaced population. The motorization is also in a fast pace resulting in likelihood of increase in transport-crash related deaths.

This study is only an example of how the available information can serve as a tool to understand the health situation. There are other mines of information not being used as there is inadequate interest or obligation of professionals to utilize available data base for information. It is also necessary for development of capacity of professionals to conduct research and to make appropriate reporting in the public domain.

The current health information system is very slow in catching information from within the health sector. It is important that the information available in the health institutions are regularly compiled and utilized for planning, programming, and monitoring the actions. In particular, injury information system based in the emergency departments can serve as a very useful tool for monitoring injury related morbidity and mortality. This information, supported by periodic supplementary surveys will help in strengthening the evidence base for action. While it is important that overall health system needs to address effectively to major health issues, it would be necessary to re-prioritize health issue in the light of new evidences. This study is expected to enlighten the policy makers for addressing the new challenges posed by injuries and violence in addition to the other public health challenges.

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