**Comparative Analysis of total mortality premature deaths due to noncommunicable diseases (NCD) as a proportion of all NCD deaths, among selected countries**

**Abstract: -**

This study investigates the health status and demographic characteristics of five countries, Afghanistan, Armenia, Azerbaijan, Bhutan, and Kazakhstan with a focus on age distribution, mortality rates, and premature deaths due to non-communicable diseases (NCDs). Using data from the UN Population Division and WHO indicators for 2020, population sizes and mortality rates across different age groups were analyzed. The results reveal notable demographic differences for Afghanistan, with a predominantly younger population and the highest number of deaths (198,692), while Bhutan exhibited the lowest mortality rates. A gender differences in premature NCD-related mortality was observed across all countries, with males consistently experiencing higher rates than females. Afghanistan showed a rate ratio of 1.13, while Armenia displayed a significant disparity (rate ratio: 1.95). Kazakhstan presented the highest odds ratio (2.56), indicating differences in the indicator. The study concludes that countries with larger populations and lower life expectancy, such as Afghanistan, face higher premature mortality rates, highlighting critical public health challenges, particularly concerning gender differences in NCD-related premature deaths.

**Aim: -**

The aim of this study is to explore and compare the health status and the demographic characteristics of 5 countries (Afghanistan, Armenia, Azerbaijan, Bhutan, Kazakhstan) using age and gender distribution, mortality rates and rates for premature deaths due to non-communicable disease.

**Methods: -**

Data on countries’ population size of 2020 were collected from Un population division (The Population Division of the Department of Economic and Social Affairs UN) and health indicator of premature deaths due to non-communicable disease were collected from World Health Organization indicators. The data were distributed by age categories, population size and death. Age and Country specific crude mortality rates calculated by this following

* Age specific Mortality rate = No of Deaths in specific age category / total population of that category.

The standard mortality rate is calculated by using distrate command in Stata. To compare and to measure association in different counties of premature death due to NCD, odd ratio, incidence rate also calculated and similar analysis performed in Stata.

* + - ODD Ratio= Odds of events in exposed/ Odds of events in Unexposed
    - Incidence Rate = Number of new cases/ Number of persons at risk

All the analysis was performed using Microsoft excel and Stata.

**Results: -**

Figure No.1 shows the age distribution by country. Afghanistan's population is relatively young, with a larger component below the age group 15. For Kazakhstan, the population structure shows a better proportion in the higher age groups or an aging population. Bhutan and Armenia have smaller populations overall, with Bhutan having the fewest people in every age group. These differences give a clear sense of how each country’s population is structured and the stages of demographic transition they are in.

Fig 1. Age Distribution Across Five Countries

The Stata output using the age categories data and distrate command (Table 1). The table 1, represents mortality estimates, including crude and age-adjusted death rates, along with statistical parameters. Afghanistan reports the highest number of deaths (198,692.33) due to its large population and lower life expectancy. Bhutan records the lowest mortality figures, consistent with its smaller population size. Crude death rates range between 0.005 and 0.008, while adjusted rates vary from 0.009 to 0. 014. Standardized Rate Ratios (SRR) compare mortality rates between countries, Bhutan has the lowest SRR (0.739), suggesting significantly lower mortality relative to Afghanistan. Kazakhstan shows the highest SRR (1.084), indicating increased mortality rates compared to the other countries.

Table 1. Mortality estimates and age-adjusted mortality rates across Five Countries

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Country | Death | N | crude | rateadj | lb\_gam | ub\_gam | se\_gam | srr | lb\_srr | ub\_srr |
| Afghanistan | 198692 | 3.89e+07 | 0.005 | 0.013 | 0.012 | 0.013 | 0.000 | 1.000 |  |  |
| Armenia | 23450 | 2963234 | 0.008 | 0.012 | 0.012 | 0.013 | 0.000 | 0.996 | 0.981 | 1.011 |
| Azerbaijan | 51767 | l.0le+07 | 0.005 | 0.012 | 0.012 | 0.012 | 0.000 | 0.954 | 0.943 | 0.966 |
| Bhutan | 3726 | 771612 | 0.005 | 0.009 | 0.009 | 0.010 | 0.000 | 0.739 | 0.711 | 0.767 |
| Kazakhstan | 125477 | l.88e+07 | 0.007 | 0.014 | 0.013 | 0.014 | 0.000 | 1.084 | 1.074 | 1.094 |

Figure No. 2. Shows Afghanistan has the highest standardized mortality rate (150 per 10,000), followed by Kazakhstan, with lower rates in other countries. The crude mortality rates show a similar pattern but are lower across, likely reflecting adjustments for population size. Bhutan, despite its small population (~771,612), has both crude and standardized rates close to zero, indicating good mortality outcomes relative to its size.

Fig2. Crude and standardized mortality rates among five countries

Premature deaths due to non-communicable disease shown in Table 2, Incidence rates reflect males consistently show higher proportions of premature NCD deaths than females across all countries, indicating a gender disparity in early mortality due to NCDs. In Afghanistan, 71% of premature NCD deaths occur among males compared to 63% among females. In Kazakhstan, 57% of premature NCD deaths occur among males, while only 34% occur among females. Regarding as rate ratio above 1 indicates that males experience higher proportions of premature NCD deaths than females. In Afghanistan, the rate ratio is 1.13, meaning males are 13% more likely to experience premature NCD deaths than females. In Armenia, the rate ratio is 1.95, highlighting a greater gender difference, with males being nearly twice(2X) as likely to die prematurely from NCDs compared to females.

Kazakhstan has the highest rate difference (0.23), indicating a large disparity, with males experiencing a 23% higher proportion of premature NCD deaths compared to females. Azerbaijan has the smallest rate difference (0.02), reflecting a smaller gender disparity. Kazakhstan shows the highest odds ratio 2.56 (cl 1.45-1.46), indicating that males are over 2.5 times as likely as females to die prematurely from NCDs. Bhutan has the lowest odds ratio 1.32 (cl 1.30-1.33), suggesting relatively smaller gender differences.

Table 2 Key Epidemiological Measures across Five Countries

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Countries | Incidence among Males | Incidence among Females | Rate Ratio | Rate Difference | ODD Ratio | inf | sup |
| Afghanistan | 0.71 | 0.63 | 1.13 | 0.08 | 1.45 | 1.45 | 1.46 |
| Armenia | 0.41 | 0.21 | 1.95 | 0.20 | 1.88 | 1.86 | 1.89 |
| Azerbaijan | 0.55 | 0.53 | 1.04 | 0.02 | 2.26 | 2.25 | 2.27 |
| Bhutan | 0.43 | 0.36 | 1.19 | 0.07 | 1.32 | 1.30 | 1.33 |
| Kazakhstan | 0.57 | 0.34 | 1.68 | 0.23 | 2.56 | 2.55 | 2.56 |

**Conclusions: -**

This study highlights those countries with larger populations and lower life expectancy, such as Afghanistan, experience higher numbers of deaths compared to smaller countries like Bhutan. Premature deaths due to non-communicable diseases (NCDs) highlight a clear gender difference, with males consistently showing higher proportions of premature NCD deaths than females across all the countries included in the study.