# Diseases of Circulatory System as the Cause of Deaths in North East India

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***Abstract*-** One of the reasons of low life expectancy in North East India is the large number of premature deaths of the infants, child and adults. Along with the decline in infant and child mortality rates, the focus now has to be on reducing the premature adult deaths. For that, analysis of the adult deaths and its causes that account for these deaths is very important. One of the important causes of such deaths is the diseases related to the circulatory system. This paper, therefore, attempts to focus on the diseases of circulatory system as one of the important causes of deaths, as provided by the data in the MCCD 2015, in the eight states of North Eastern Region of India. The paper also examines the age and sex variation in this cause-group of the deaths in the selected stat**es.**

***Index Terms*-** Diseases of Circulatory System, Medically Certified Deaths, MCCD 2015

## I. Introduction

Premature adult mortality is pointed out as a major contributor to global mortality now as the child mortality is declining worldwide. Around two-thirds of India's 10 million deaths per year occurred before age 70 years in 2014. Around 1.4 million of these deaths were in children younger than 5 years of age, 0.6 million deaths were in young people aged 15-29 years and 4.4 million were in adults aged 30-69 years (United Nations, 2015 as cited in Ram et al., 2015). If the fast reduction in mortality rate has to take place and the United Nations 2030 Sustainable Development Goals need to be achieved, they invariably will require improved information on mortality and causes of death along with appropriate measures to reduce them. Government of India, recognising this, committed to introducing universal health coverage and has endorsed WHO's call for 25 percent reduction in the death rates of adults aged 30 – 69 years from selected non-communicable diseases between 2008 and 2025 (WHO, 2013 as cited in Ram et al., 2015).

Planners, researchers and other professionals regularly reliable cause specific mortality statistics for evidence-based decision-making with regard to resource allocation, monitoring of indicators, identifying the priorities for programs and other related activities in the area of Public Health (MCCD, 2015). However, causes of many of the fifty million annual deaths in low and middle income countries including India remain unknown, as most of the deaths occur at home without medical attention (Gomes et al., 2017). The scheme of Medical Certification of Cause of Death (MCCD), introduced in India under the provisions of Registration of Births and Deaths (RBD) Act 1969, has helped to accumulate and disseminate data for various states and union territories of India. The MCCD data is collected in the prescribed forms (Form 4 for Hospital deaths and Form 4A for Non-institutional deaths). Both these forms have been designed by World Health Organization (WHO). The forms are filled-up by the medical professionals attending to the deceased at the time of terminal illness. Thereafter, these forms are to be sent to the concerned Registrars of Births and Deaths for onward transmission to the Chief Registrar Office for tabulation as per the National List of Causes of Death based on Tenth Revision of International Classification of Disease (ICD-10). The states and union territories then subsequently send it to the Office of RGI for consolidation at the national level.

## II. Description of the Study Area

The North East India is comprised of 8 states, namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland and Tripura which cover nearly 8.0 percent of the geographical area of the country with the population share of 3.8 percent.

The largest and the smallest states in terms of geographical area are Arunachal Pradesh and Sikkim respectively. The most and the least populated states in this region are Assam and Sikkim respectively. The sex ratio is the highest in Meghalaya and the lowest in Sikkim. The population density is the highest in Assam and the lowest in Arunachal Pradesh. Meghalaya experienced the highest decadal growth rate (2001-2011) at 27.9 percent, whereas Nagaland experienced a negative growth rate of 0.6 percent during the same period **(Table 1)**.

**Table 1: Demographic characteristics of NER of India, 2011**

| States | Geographical Area (Sq. Km.) | Population | | | Sex ratio | Population density | Decadal growth rate |
|---|---|---|---|---|---|---|---|
| | | Total | Male | Female | | | |
| Arunachal Pradesh | 83,743 | 1383727 | 713912 | 669815 | 938 | 17 | 26.0 |
| Assam | 78,438 | 31205576 | 15939443 | 1526633 | 958 | 398 | 17.1 |
| Manipur | 22,327 | 2855794 | 1438586 | 1410278 | 985 | 128 | 24.5 |
| Meghalaya | 22,429 | 2966889 | 1491832 | 1475057 | 989 | 132 | 27.9 |
| Mizoram | 21,081 | 1097206 | 555339 | 541867 | 976 | 52 | 23.5 |
| Nagaland | 16,579 | 1978502 | 1024649 | 953853 | 931 | 119 | -0.6 |
| Sikkim | 7,096 | 610577 | 323070 | 287507 | 890 | 86 | 12.9 |
| Tripura | 10,486 | 3673917 | 1874376 | 1799541 | 960 | 350 | 14.8 |

Source: National Health Profile, 2015

The health sector specific information of the north eastern states **(Table 2)** says that, being the largest economy in the North East with an estimated Gross State Domestic Product (GSDP) at current prices at ₹ 1,98,098 crores, Assam spends the highest in the field of health sector. Assam yet does not hold the record of being the state with the highest per capita health expenditure or when health expenditure is calculated as a percentage of GSDP. In fact, on the above mentioned yardsticks, Assam ranks the lowest among all the North Eastern states as its per capita health expenditure stands at ₹ 1137 and it spends only 1.83 percent of its GSDP. Sikkim has the highest per capita health expenditure in the North East at ₹ 5666 and Mizoram spends the highest in the health sector as a percentage of the GSDP (4.64 percent).

**Table 2: Health expenditure figures in NER of India, 2014-15**

| States | Population (₹ Crores) 2014-15 | Total health expenditure on health (₹ Crores) | Total state expenditure (₹ Crores) | Health Expenditure as a % of total health expenditure | GSDP 2014-15 Current Prices (₹ Crores) | Health Expenditure as a % of GSDP | Per capita health expenditure (₹ ) |
|---|---|---|---|---|---|---|---|
| Arunachal Pradesh | 0.13 | 671 | 10899 | 6.16 | 16761 | 4.00 | 5196 |
| Assam | 3.19 | 3626 | 63609 | 5.70 | 198098 | 1.83 | 1137 |
| Manipur | 0.25 | 625 | 10901 | 5.73 | 18043 | 3.46 | 2450 |
| Meghalaya | 0.27 | 645 | 11683 | 5.52 | 24408 | 2.64 | 2366 |
| Mizoram | 0.10 | 536 | 7359 | 7.29 | 11559 | 4.64 | 5130 |
| Nagaland | 0.23 | 498 | 8941 | 5.57 | 18414 | 2.7 | 2127 |
| Sikkim | 0.06 | 361 | 6627 | 5.44 | 15209 | 2.37 | 5666 |
| Tripura | 0.38 | 853 | 11986 | 7.12 | 29667 | 2.87 | 2266 |

Source: National Health Profile, 2015

## III. Objectives of the Study

The specific objectives of the paper are:

- to study the variation in the diseases of circulatory system as the medically certified causes of death in the North Eastern Region of India.
- to study the age-sex variations in the diseases of circulatory system as the causes of death in the North Eastern Region of India.

**Methodology Used in the Present Study**

The report on MCCD-2015 for the whole country is based upon 11,83,052 total medically certified deaths (Male: 7,36,882 and Female: 4,46,170) accounting for 22.0 per cent of total registered deaths in respect of 33 States/UTs which supplied data for the report. The percentage of the medically certified deaths in the registered deaths is more than 50 percent for only Tripura and, Manipur, whereas for states like Nagaland and Arunachal Pradesh, the respective figures stand at 8.2 percent and 13.8 percent.

The number of medically certified of deaths in the North Eastern States of India, as per the MCCD 2015, is as under:

**Table 3: Medical certification of deaths in NER of India in 2015**

| States | Number of medically certified deaths |
|---|---|
| Arunachal Pradesh | 504 |
| Assam | 30017 |
| Manipur | 2077 |
| Meghalaya | 5708 |
| Mizoram | 2762 |
| Nagaland | 169 |
| Sikkim | 1321 |
| Tripura | 6496 |
| **NER States** | **49054** |
| Total MCCD Reporting States/UTs | 1183052 |

Source: MCCD, 2015

The paper mainly uses descriptive statistics to analyse the data as per the objectives mentioned above. The data which provide the base for the present analysis are presented in various tables as shown in the appendix.

## IV. Analyses and Discussion

The MCCD provides data on medically certified causes of death in eight broad categories. These eight leading causes (groups) of deaths constitute around 88.0 per cent of total medically certified cause of deaths in the country.

- Diseases of Circulatory System - 33.2 per cent
- Certain Infectious and Parasitic Diseases - 11.0 per cent
- Diseases of Respiratory System - 9.0 per cent
- Certain Conditions Originating in the Perinatal Period - 6.6 per cent
- Injury, Poisoning and Certain other Consequences of External Causes - 6.2 per cent
- Neoplasm - 5.3 per cent
- Diseases of Digestive System - 4.4 per cent
- Symptoms Signs & Abnormal Clinical Findings (Not Elsewhere Classified) - 12.2 per cent

When we go deeper into the data and try to find out the magnitude to which diseases of circulatory system like atherosclerosis (hardening of arteries), heart attack, mitral valve prolapse, etc. account for the total number of medically certified deaths in North East India, then we observe the followings:

**Arunachal Pradesh:** 19.6 Percent
**Assam:** 6.9 Percent
**Manipur:** 24.1 Percent
**Meghalaya:** 15.6 Percent
**Mizoram:** 13.9 Percent
**Nagaland:** 18.9 Percent
**Sikkim:** 27.7 Percent
**Tripura:** 37.9 Percent

The above data show that Tripura accounts for the highest deaths as a percentage to the total number of medically certified deaths related to diseases of circulatory system, followed by Sikkim and Manipur. As far as age – sex variation in these deaths is concerned; it is presented in Table 4.

**Table 4: Medically certified deaths for diseases of circulatory system by age group and sex for the NER of India, 2015**

| **States** | **Sex** | **Age Groups** | | | | **N. S.** | **Total** |
|---|---|---|---|---|---|---|---|
| | | **0-14** | **15-44** | **45-64** | **65+** | | |
| Arunachal Pradesh | Male | 0 | 27(32.9) | 34 (41.5) | 21 (25.6) | 0 | 82 (100.0) |
| | Female | 0 | 5 (29.4) | 4 (23.5) | 3 (17.6) | 0 | 17 (100.0) |
| | Total | 0 | 32 (32.3) | 38 (38.4) | 24 (24.2) | 0 | 99 (100.0) |
| Assam | Male | 0 | 56 (4.8) | 446 (38.6) | 414 (35.8) | 240 (20.8) | 1156 (100.0) |
| | Female | 0 | 49 (5.4) | 288 (31.6) | 356 (39.1) | 217 (23.8) | 910 (100.0) |
| | Total | 0 | 105 (5.1) | 734 (35.5) | 770 (37.3) | 457 (22.1) | 2066 (100.0) |
| Manipur | Male | 13 (3.7) | 49 (14.1) | 131 (37.7) | 153 (44.1) | 1 (0.3) | 347 (100.0) |
| | Female | 3 (1.9) | 15 (9.9) | 62 (40.5) | 73 (47.7) | 0 | 153 (100.0) |
| | Total | 16 (3.2) | 64 (12.8) | 193 (38.6) | 226 (45.2) | 1 (0.2) | 500 (100.0) |
| Meghalaya | Male | 16 (2.9) | 107 (19.5) | 208 (37.9) | 197 (35.9) | 20 (3.6) | 548 (100.0) |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | Female | 11 (3.2) | 48 (13.9) | 93 (26.9) | 191 (55.4) | 7(2.0) | 345 (100.0) |
| | Total | 21 (2.3) | 155 (17.3) | 301 (33.7) | 383 (42.9) | 27 (3.0) | 893 (100.0) |
| Mizoram | Male | 22 (8.8) | 59 (23.6) | 82 (32.8) | 87(34.8) | 0 | 250 (100.0) |
| | Female | 15 (11.2) | 22 (16.4) | 36 (26.9) | 61(45.5) | 0 | 134 (100.0) |
| | Total | 37 (9.6) | 81 (21.0) | 118 (30.7) | 148(38.5) | 0 | 384 (100.0) |
| Nagaland | Male | 0 | 4 (18.2) | 8 (36.4) | 8(36.4) | 2 (9.0) | 22 (100.0) |
| | Female | 0 | 2 (20.0) | 3 (30.0) | 4(40.0) | 1 (10.0) | 10 (100.0) |
| | Total | 0 | 6 (18.7) | 11 (34.4) | 12(25.5) | 3 (6.4) | 32 (100.0) |
| Sikkim | Male | 1 (0.5) | 33 (15.4) | 69 (32.2) | 110(51.4) | 1 (0.5) | 214 (100.0) |
| | Female | 2 (1.3) | 30 (19.7) | 50 (32.9) | 70(46.0) | 0 | 152 (100.0) |
| | Total | 3 (0.8) | 63 (17.2) | 119 (32.5) | 180(49.2) | 1 (0.3) | 366 (100.0) |
| Tripura | Male | 184 (10.8) | 232 (13.6) | 580 (34.0) | 697(40.9) | 13 (0.8) | 1705 (100.0) |
| | Female | 120 (15.9) | 114 (15.1) | 225 (29.8) | 293(38.8) | 2 (0.3) | 754 (100.0) |
| | Total | 304 (12.4) | 345 (14.0) | 805 (32.7) | 990(40.3) | 15 (0.6) | 2459 (100.0) |
| NER States | Male | 236 (5.4) | 567 (13.1) | 1558 (36.0) | 1687(39.0) | 276 (6.4) | 4324 (100.0) |
| | Female | 151 (6.1) | 285 (11.5) | 761 (30.7) | 1051(42.5) | 127 (5.1) | 2475 (100.0) |
| | Total | 387 (5.7) | 851 (12.5) | 2319 (34.1) | 2733(40.1) | 403 (5.9) | 6799 (100.0) |

- Calculation based on MCCD, 2015. Figures in the parentheses represent percentages.

Compared to other states of the NER, Tripura and Arunachal Pradesh have the highest incidence of diseases of circulatory system for both males and females in the age groups of 0-14 years and 15-44 years respectively. For example, males (10.8 percent) and females (15.9 percent) in the age group 0-14 years in Tripura suffer from these diseases (5.4 percent for males and 6.1 females in the NER), whereas the corresponding figures in the age group 15-44 years in Arunachal Pradesh are 32.9 percent and 29.4 percent respectively against the NER figures of 11.5 percent and 12.5 percent.

## V. Conclusion

The number of premature adult deaths in the North East India is very high if we go by the Report on Medical Certification of the Causes of Death, 2015. For example, out of all the medically certified deaths, the age group 65+ accounts for around 16 percent in Arunachal Pradesh, 20 percent in Assam, 17 percent in Manipur, 11 percent in Meghalaya, 7 percent in Mizoram, 7 percent in Nagaland, 15 percent in Sikkim and 21 percent in Tripura. The aggregate percentage for the NER is 18 percent. Therefore, the given the national life expectancy at approximately 68 years in 2015, the remaining deaths (excluding the number in the not specified list) in the NER can safely be termed as the premature deaths.

The percentage of medically certified deaths to total registered deaths and the percentage of registered deaths to all deaths are found to be lower. Majority of the medically certified causes of the death are found to be in the productive age group of 15 – 64 years. Until and unless most of the deaths are registered and also the causes of the death are ascertained, the public health planners will have tough task to formulate a comprehensive health policy to meet the demand of the ever growing millions in India.

The diseases of circulatory system also account for the significant number of medically certified deaths across North East Indian states and a widespread variation is also observed among the North Eastern states in terms of diseases of circulatory system accounting for the significant number of medically certified deaths.

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