

# **A Study on Morbidity and Mortality Analysis Using HMIS Data in Tamil Nadu**

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## **Abstract**

Morbidity and mortality are critical indicators of population health and healthcare system performance. This study analyzes morbidity and mortality trends in Tamil Nadu using secondary data from the Health Management Information System (HMIS) between April 2025 and April 2026. A retrospective descriptive and analytical design was adopted, covering all districts and age groups. Key variables included communicable and non-communicable diseases, maternal and child health conditions, and cause-specific mortality. Data were processed using SPSS with descriptive statistics, trend analysis, and district-wise comparisons.

The study aims to identify leading causes of morbidity and mortality, examine demographic and regional variations, and assess maternal and child health indicators. Findings are expected to highlight high-burden diseases, vulnerable populations, and district disparities. Results will inform targeted interventions, strengthen disease surveillance, and enhance maternal and child health services.

By leveraging HMIS data, this research contributes to evidence-based public health planning and policy formulation in Tamil Nadu. Limitations include potential underreporting, exclusion of private healthcare data, and district-level variations in data quality. Overall, the study underscores the importance of digital health information systems in guiding effective healthcare delivery and improving public health outcomes.

**Keywords:** Morbidity, Mortality, Health Management Information System (HMIS), Tamil Nadu public health, Disease surveillance, Communicable diseases, Non-communicable diseases, Maternal health, Child health, Infant mortality rate (IMR) and Maternal mortality ratio (MMR)

## **1. Introduction**

### **1.1 Background**

Morbidity and mortality are important indicators used to assess the health status of a population and the effectiveness of healthcare services. Morbidity refers to the occurrence of diseases, illnesses, and health conditions within a population, whereas mortality refers to the occurrence of deaths. Analysis of these indicators helps policymakers and healthcare administrators identify priority health problems and allocate resources effectively.

Tamil Nadu has one of the most advanced public health systems in India and has adopted digital health information systems for monitoring healthcare delivery. The Health Management Information System (HMIS) is a nationwide web-based platform that collects routine health service data from public healthcare facilities. The system provides valuable information regarding disease burden, service utilization, maternal and child health outcomes, and mortality patterns.

## **1.2 Need for the Study**

Understanding disease patterns and causes of death is essential for planning effective public health interventions. HMIS data offers a cost-effective source of population-level information that can be used for evidence-based decision-making. Analyzing morbidity and mortality trends in Tamil Nadu will help identify high-burden diseases, vulnerable population groups, and regional disparities in health outcomes.

## **1.3 Rationale**

The use of secondary HMIS data allows large-scale analysis without the need for extensive primary data collection. Regularly updated HMIS records provide opportunities to assess trends and evaluate healthcare performance across districts.

## **1.4 Objectives**

### **Primary Objective**

To analyze morbidity and mortality trends using HMIS data in Tamil Nadu.

### **Specific Objectives**

1. To identify the leading causes of morbidity and mortality.
2. To examine trends across age groups, gender, and geographical regions.
3. To compare district-wise variations in morbidity and mortality indicators.
4. To assess selected maternal and child health indicators reported through HMIS.

## **2. Review of Literature**

### **2.1 Global Burden of Disease**

Discuss global trends in morbidity and mortality and their impact on public health planning.

### **2.2 Morbidity and Mortality in India**

Review studies conducted using national health databases, Sample Registration System (SRS), NFHS, and HMIS.

## **2.3 Use of HMIS Data in Public Health Research**

Summarize previous studies that utilized HMIS data for disease surveillance, maternal health monitoring, and mortality assessment.

## **2.4 Research Gap**

Although HMIS data is widely collected, limited studies have comprehensively examined morbidity and mortality patterns across all districts of Tamil Nadu using recent data.

## **3. Methodology**

### **3.1 Study Design**

Retrospective descriptive and analytical study.

### **3.2 Study Area**

Tamil Nadu, India.

### **3.3 Study Period**

April 2025 to April 2026.

### **3.4 Data Source**

Secondary data obtained from the Health Management Information System (HMIS) portal.

### **3.5 Study Population**

All individuals whose health records are reported through public health facilities in Tamil Nadu during the study period.

### **3.6 Inclusion Criteria**

- All HMIS records available between April 2025 and April 2026.
- Records from all districts of Tamil Nadu.
- Individuals of all age groups and both sexes.

### **3.7 Exclusion Criteria**

- Incomplete or duplicate records.
- Records outside the study period.

### **3.8 Study Variables**

#### **Morbidity Indicators**

- Disease-wise OPD cases
- Disease-wise IPD admissions
- Communicable diseases
- Non-communicable diseases
- Maternal and child health conditions

#### **Mortality Indicators**

- Total deaths
- Cause-specific deaths
- Age-specific mortality
- Maternal mortality
- Infant mortality

#### **Demographic Variables**

- Age
- Gender
- District

### **3.9 Data Analysis**

Data will be entered and analyzed using SPSS software.

#### **Descriptive Statistics**

- Frequencies
- Percentages
- Means and standard deviations

#### **Analytical Statistics**

- Trend analysis
- District-wise comparison
- Age and gender-wise comparison
- Graphical representation using charts and tables

### **3.10 Ethical Considerations**

The study utilizes secondary anonymized HMIS data. No personal identifiers will be collected. Data confidentiality and privacy will be maintained throughout the study.

## **4. Results (To Be Completed After Data Analysis)**

### **4.1 Distribution of Morbidity Cases**

- Disease-wise morbidity profile
- Top ten causes of morbidity

### **4.2 Distribution of Mortality Cases**

- Leading causes of death
- Age-specific mortality patterns

### **4.3 District-wise Analysis**

- Comparison of morbidity indicators
- Comparison of mortality indicators

### **4.4 Maternal and Child Health Indicators**

- ANC coverage
- Institutional deliveries
- Infant health outcomes

### **4.5 Trend Analysis**

- Monthly trends
- Seasonal variations
- Changes across districts

## **Chapter 5: Discussion**

Interpret the findings by comparing them with previous studies and national statistics. Discuss possible reasons for observed trends and district-level variations.

## Chapter 6: Conclusion and Recommendations

### Conclusion

The study will provide a comprehensive overview of morbidity and mortality patterns in Tamil Nadu using HMIS data. The findings will help identify major health challenges, vulnerable populations, and regional disparities.

### Recommendations

1. Strengthen HMIS data quality and reporting.
2. Improve disease surveillance mechanisms.
3. Focus interventions on high-burden districts.
4. Enhance maternal and child health services.
5. Utilize HMIS findings for evidence-based policy formulation.

### Limitations

1. Possible underreporting in HMIS records.
2. Variations in data quality across districts.
3. Exclusion of private healthcare facility data.
4. Potential incompleteness of mortality reporting.

### References

(Use Vancouver or APA style)

1. Ministry of Health and Family Welfare, Government of India. Health Management Information System (HMIS) Reports.
2. World Health Organization. World Health Statistics.
3. National Health Mission, India.
4. Relevant peer-reviewed journal articles on HMIS, morbidity, and mortality analysis.

For your **HMIS-based Morbidity and Mortality Analysis in Tamil Nadu**, the following table shells can be prepared in advance for SPSS outputs and report writing.

**Table 1. Distribution of Study Population by District**

| Sl. No. | District   | Total Population Covered | Percentage (%) |
|---------|------------|--------------------------|----------------|
| 1       | District 1 |                          |                |
| 2       | District 2 |                          |                |
| ...     | ...        |                          |                |
| Total   | Tamil Nadu |                          | 100            |

**Table 2. Distribution of Morbidity Cases by Disease Category**

| Disease Category           | Number of Cases | Percentage (%) |
|----------------------------|-----------------|----------------|
| Communicable Diseases      |                 |                |
| Non-Communicable Diseases  |                 |                |
| Maternal Health Conditions |                 |                |
| Child Health Conditions    |                 |                |
| Nutritional Disorders      |                 |                |
| Others                     |                 |                |
| Total                      |                 | 100            |

**Table 3. Top Ten Causes of Morbidity**

| Rank | Disease/Condition | Number of Cases | Percentage (%) |
|------|-------------------|-----------------|----------------|
| 1    |                   |                 |                |
| 2    |                   |                 |                |
| 3    |                   |                 |                |
| 4    |                   |                 |                |
| 5    |                   |                 |                |
| 6    |                   |                 |                |
| 7    |                   |                 |                |
| 8    |                   |                 |                |
| 9    |                   |                 |                |
| 10   |                   |                 |                |

**Table 4. Morbidity Distribution by Age Group**

| Age Group (Years) | Number of Cases | Percentage (%) |
|-------------------|-----------------|----------------|
| <1                |                 |                |
| 1–4               |                 |                |
| 5–14              |                 |                |
| 15–24             |                 |                |
| 25–44             |                 |                |
| 45–59             |                 |                |
| ≥60               |                 |                |
| Total             |                 | 100            |

**Table 5. Morbidity Distribution by Gender**

| Gender             | Number of Cases | Percentage (%) |
|--------------------|-----------------|----------------|
| Male               |                 |                |
| Female             |                 |                |
| Transgender/Others |                 |                |
| Total              |                 | 100            |

**Table 6. District-wise Morbidity Rate**

| District   | Total Cases | Population Covered | Morbidity Rate per 1,000 Population |
|------------|-------------|--------------------|-------------------------------------|
| District 1 |             |                    |                                     |
| District 2 |             |                    |                                     |
| ...        |             |                    |                                     |

**Table 7. Total Mortality Distribution**

| Indicator     | Frequency | Percentage (%) |
|---------------|-----------|----------------|
| Total Deaths  |           |                |
| Male Deaths   |           |                |
| Female Deaths |           |                |
| Others        |           |                |

**Table 8. Leading Causes of Mortality**

| Rank | Cause of Death | Number of Deaths | Percentage (%) |
|------|----------------|------------------|----------------|
| 1    |                |                  |                |
| 2    |                |                  |                |
| 3    |                |                  |                |
| 4    |                |                  |                |
| 5    |                |                  |                |
| 6    |                |                  |                |
| 7    |                |                  |                |
| 8    |                |                  |                |
| 9    |                |                  |                |
| 10   |                |                  |                |

**Table 9. Mortality Distribution by Age Group**

| Age Group (Years) | Number of Deaths | Percentage (%) |
|-------------------|------------------|----------------|
| <1                |                  |                |
| 1–4               |                  |                |
| 5–14              |                  |                |
| 15–24             |                  |                |
| 25–44             |                  |                |
| 45–59             |                  |                |
| ≥60               |                  |                |
| Total             |                  | 100            |

**Table 10. Mortality Distribution by Gender**

| Gender             | Number of Deaths | Percentage (%) |
|--------------------|------------------|----------------|
| Male               |                  |                |
| Female             |                  |                |
| Transgender/Others |                  |                |
| Total              |                  | 100            |

**Table 11. District-wise Mortality Rate**

| District   | Total Deaths | Population Covered | Mortality Rate per 1,000 Population |
|------------|--------------|--------------------|-------------------------------------|
| District 1 |              |                    |                                     |
| District 2 |              |                    |                                     |
| ...        |              |                    |                                     |

**Table 12. Maternal Health Indicators**

| Indicator                    | Number | Percentage (%) |
|------------------------------|--------|----------------|
| Registered Pregnancies       |        |                |
| First Trimester Registration |        |                |
| Four or More ANC Visits      |        |                |
| Institutional Deliveries     |        |                |
| Caesarean Deliveries         |        |                |
| Maternal Deaths              |        |                |

**Table 13. Child Health Indicators**

| Indicator                | Number | Percentage (%) |
|--------------------------|--------|----------------|
| Live Births              |        |                |
| Low Birth Weight Babies  |        |                |
| Fully Immunized Children |        |                |
| Neonatal Deaths          |        |                |
| Infant Deaths            |        |                |
| Under-5 Deaths           |        |                |

**Table 14. District-wise Maternal Mortality Ratio (MMR)**

| District   | Maternal Deaths | Live Births | MMR per 100,000 Live Births |
|------------|-----------------|-------------|-----------------------------|
| District 1 |                 |             |                             |
| District 2 |                 |             |                             |

**Table 15. District-wise Infant Mortality Rate (IMR)**

| District   | Infant Deaths | Live Births | IMR per 1,000 Live Births |
|------------|---------------|-------------|---------------------------|
| District 1 |               |             |                           |
| District 2 |               |             |                           |

**Table 16. Monthly Trend of Morbidity Cases**

| Month      | Number of Cases |
|------------|-----------------|
| April 2025 |                 |
| May 2025   |                 |
| June 2025  |                 |
| ...        |                 |
| April 2026 |                 |

**Table 17. Monthly Trend of Mortality Cases**

| Month      | Number of Deaths |
|------------|------------------|
| April 2025 |                  |
| May 2025   |                  |
| June 2025  |                  |
| ...        |                  |

**Month    Number of Deaths**  
April 2026

**Table 18. Association Between Gender and Morbidity**

| Gender | Disease Present n (%) | Disease Absent n (%) | Total $\chi^2$ Value | p-value |
|--------|-----------------------|----------------------|----------------------|---------|
| Male   |                       |                      |                      |         |
| Female |                       |                      |                      |         |
| Total  |                       |                      |                      |         |

**Table 19. Association Between Age Group and Mortality**

| Age Group | Deaths n (%) | Survived n (%) | Total $\chi^2$ Value | p-value |
|-----------|--------------|----------------|----------------------|---------|
| <1        |              |                |                      |         |
| 1–4       |              |                |                      |         |
| 5–14      |              |                |                      |         |
| 15–24     |              |                |                      |         |
| ≥25       |              |                |                      |         |

**Table 20. Summary of Key Morbidity and Mortality Indicators**

| Indicator                           | Value |
|-------------------------------------|-------|
| Total Morbidity Cases               |       |
| Morbidity Rate per 1,000 Population |       |
| Total Deaths                        |       |
| Mortality Rate per 1,000 Population |       |
| Maternal Mortality Ratio            |       |
| Infant Mortality Rate               |       |
| Under-5 Mortality Rate              |       |

These 20 tables are generally sufficient for a Master's dissertation, MPH project, or epidemiological HMIS analysis report using SPSS.

Variables and indicators list from HMIS, and A complete SPSS analysis plan with statistical tests and chart formats for your dissertation.

For a dissertation titled “A Study on Morbidity and Mortality Analysis Using HMIS Data in Tamil Nadu (April 2025–April 2026)”, your examiner will expect three things:

1. **Variable Dictionary (Codebook)**
2. **Indicator Definitions and Formulae**
3. **SPSS Analysis Plan**

## 1. HMIS Variables and Data Dictionary

### A. Geographic Variables

| Variable Name        | Type    | Coding                            |
|----------------------|---------|-----------------------------------|
| District             | Nominal | 1=Chennai, 2=Coimbatore, etc.     |
| Block/Taluk          | Nominal | As per HMIS                       |
| Facility Type        | Nominal | PHC, HSC, GH, DH, Medical College |
| Reporting Month Date |         | Apr 2025–Apr 2026                 |

### B. Demographic Variables

| Variable  | Type        | Coding                                  |
|-----------|-------------|-----------------------------------------|
| Age       | Continuous  | Actual age                              |
| Age Group | Categorical | <1, 1–4, 5–14, 15–24, 25–44, 45–59, ≥60 |
| Sex       | Nominal     | Male, Female, Other                     |
| Residence | Nominal     | Rural/Urban                             |

### C. Morbidity Variables

| Variable                          | Type       |
|-----------------------------------|------------|
| Total OPD Cases                   | Continuous |
| Total IPD Cases                   | Continuous |
| Fever Cases                       | Continuous |
| Acute Respiratory Infection Cases | Continuous |
| Diarrheal Disease Cases           | Continuous |
| Tuberculosis Cases                | Continuous |
| Malaria Cases                     | Continuous |
| Dengue Cases                      | Continuous |
| Hypertension Cases                | Continuous |
| Diabetes Cases                    | Continuous |
| Cardiovascular Disease Cases      | Continuous |

| Variable            | Type       |
|---------------------|------------|
| Cancer Cases        | Continuous |
| Mental Health Cases | Continuous |
| Other Diseases      | Continuous |

## D. Mortality Variables

| Variable              | Type       |
|-----------------------|------------|
| Total Deaths          | Continuous |
| Male Deaths           | Continuous |
| Female Deaths         | Continuous |
| Infant Deaths         | Continuous |
| Neonatal Deaths       | Continuous |
| Under-5 Deaths        | Continuous |
| Maternal Deaths       | Continuous |
| Cause-specific Deaths | Continuous |

## E. Maternal Health Variables

| Variable                         | Type       |
|----------------------------------|------------|
| Registered Pregnancies           | Continuous |
| First Trimester ANC Registration | Continuous |
| 4 ANC Visits Completed           | Continuous |
| Institutional Deliveries         | Continuous |
| Caesarean Deliveries             | Continuous |
| High-Risk Pregnancies            | Continuous |
| Maternal Deaths                  | Continuous |

## F. Child Health Variables

| Variable                  | Type       |
|---------------------------|------------|
| Live Births               | Continuous |
| Low Birth Weight Babies   | Continuous |
| Fully Immunized Children  | Continuous |
| Vitamin A Supplementation | Continuous |
| Neonatal Deaths           | Continuous |
| Infant Deaths             | Continuous |

| Variable       | Type       |
|----------------|------------|
| Under-5 Deaths | Continuous |

## 2. Indicators and Formulae

### Morbidity Indicators

#### Crude Morbidity Rate

Crude Morbidity Rate =  $\frac{\text{Total Morbidity Cases}}{\text{Population}} \times 1000$   
 $\text{Crude Morbidity Rate} = \frac{\text{Total Morbidity Cases}}{\text{Population}} \times 1000$

Unit = per 1,000 population

#### Disease-specific Morbidity Rate

Disease-specific Morbidity Rate =  $\frac{\text{Cases of Specific Disease}}{\text{Population}} \times 1000$   
 $\text{Disease-specific Morbidity Rate} = \frac{\text{Cases of Specific Disease}}{\text{Population}} \times 1000$

### Mortality Indicators

#### Crude Death Rate (CDR)

CDR =  $\frac{\text{Total Deaths}}{\text{Population}} \times 1000$   
 $\text{CDR} = \frac{\text{Total Deaths}}{\text{Population}} \times 1000$

#### Cause-Specific Mortality Rate

Cause-Specific Mortality Rate =  $\frac{\text{Deaths Due to Specific Cause}}{\text{Population}} \times 100000$   
 $\text{Cause-Specific Mortality Rate} = \frac{\text{Deaths Due to Specific Cause}}{\text{Population}} \times 100000$

#### Infant Mortality Rate (IMR)

IMR =  $\frac{\text{Infant Deaths (<1 year)}}{\text{Live Births}} \times 1000$   
 $\text{IMR} = \frac{\text{Infant Deaths (<1 year)}}{\text{Live Births}} \times 1000$

#### Neonatal Mortality Rate (NMR)

NMR =  $\frac{\text{Neonatal Deaths (<28 days)}}{\text{Live Births}} \times 1000$   
 $\text{NMR} = \frac{\text{Neonatal Deaths (<28 days)}}{\text{Live Births}} \times 1000$

## Under-5 Mortality Rate

$$\text{U5MR} = \frac{\text{Deaths Under 5 Years}}{\text{Live Births}} \times 1000$$

## Maternal Mortality Ratio (MMR)

$$\text{MMR} = \frac{\text{Maternal Deaths}}{\text{Live Births}} \times 100000$$

## Maternal and Child Health Indicators

### ANC Coverage

$$\text{ANC Coverage} = \frac{\text{Women Receiving ANC}}{\text{Registered Pregnancies}} \times 100$$

### Institutional Delivery Rate

$$\text{Institutional Delivery Rate} = \frac{\text{Institutional Deliveries}}{\text{Total Deliveries}} \times 100$$

## 3. Complete SPSS Analysis Plan

### Objective 1

### Identify Leading Causes of Morbidity and Mortality

### SPSS Procedure

Analyze → Descriptive Statistics → Frequencies

Output:

| Variable         | Statistics    |
|------------------|---------------|
| Disease Category | Frequency (%) |
| Cause of Death   | Frequency (%) |

### Charts

- Bar Chart
- Pie Chart

Example:

Top causes of morbidity

Example format for dissertation figures.

03507001,0501,400DiabetesHypertensionARIDIarrhea

## **Objective 2**

### **Compare Morbidity by Gender**

#### **SPSS Test**

Analyze → Descriptive Statistics → Crosstabs

Rows = Gender

Columns = Disease Category

Statistics = Chi-square

#### **Statistical Test**

Pearson Chi-square

#### **Report**

##### **Gender Disease Cases $\chi^2$ p-value**

Interpretation:

- $p < 0.05$  = Significant association
- $p > 0.05$  = Not significant

## **Objective 3**

### **Compare Morbidity by Age Group**

#### **SPSS Test**

Cross-tabulation

Chi-square Test

## **Chart**

Clustered Bar Chart

## **Objective 4**

### **District-wise Comparison**

#### **SPSS Test**

Analyze → Compare Means → One-Way ANOVA

Dependent Variable:

- Morbidity Rate

Factor:

- District

## **Output**

### **District Mean Morbidity Rate**

## **Interpretation**

$p < 0.05$  indicates significant district variation.

## **Objective 5**

### **Trend Analysis (Apr 2025–Apr 2026)**

#### **SPSS Procedure**

Analyze → Forecasting → Time Series

or

Graphs → Line Chart

## **Variables**

- Month
- Morbidity Cases

## Statistical Test

Linear Trend Analysis

## Chart

Line Chart

Example format:

Monthly morbidity trend

Example monthly trend visualization.

4,2004,5504,9005,2505,600Apr 2025May 2025Jun 2025Jul 2025Aug 2025

## Objective 6

### Mortality by Age Group

#### SPSS Test

Chi-square Test

Variables:

- Age Group
- Death Status

Output:

| Age Group | Deaths (%) |  $\chi^2$  | p-value |

## Objective 7

### Maternal and Child Health Indicators

#### SPSS Analysis

Descriptive Statistics

Calculate:

- MMR
- IMR

- NMR
- ANC Coverage
- Institutional Delivery Rate

## Charts

- Bar Charts
- Trend Line Charts
- District Ranking Charts

## Statistical Tests Summary

| Objective           | Test                       |
|---------------------|----------------------------|
| Disease frequencies | Frequency Analysis         |
| Gender vs Morbidity | Chi-square                 |
| Age vs Morbidity    | Chi-square                 |
| District comparison | One-Way ANOVA              |
| Morbidity trends    | Time Series/Trend Analysis |
| Mortality trends    | Time Series/Trend Analysis |
| Maternal indicators | Descriptive Statistics     |
| Child indicators    | Descriptive Statistics     |
| District ranking    | ANOVA + Bar Charts         |

This analysis plan is typically sufficient for an **MPH, MSc Biostatistics, MHA, or Public Health dissertation** using HMIS secondary data and will align well with the objectives you have stated.