

# **Documenting cause of death among tribal population through automated verbal autopsy using information and communication technology**

**Project Number-6118**

**Grant in aid "ST-General component Plan", Department of Science and Technology.**



**Project Report  
(a preliminary overview)**

**August 2025**

**Achutha Menon Centre for Health Science Studies (AMCHSS)  
Sree Chitra Tirunal Institute for Medical Sciences and Technology  
(SCTIMST)  
Trivandrum, 695011, Kerala, India**

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Duration of the study: 1.6.2020 to 31.5.2024

**Name, designation, affiliations of the Investigators**

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## Abbreviations used

CSMF	Cause Specific Mortality Fraction
LSGI	Local Self Government Organisation
ODK	Open Data Kit
PHMRC	Population Health Metrics Research Consortium
PCVA	Physician Coded Verbal Autopsy
VA	Verbal Autopsy
WHO	World Health Organisation

## പഠന സംഗ്രഹം

### പശ്ചാത്തലം

കേരളത്തിലെ ആദിവാസി ജനവിഭാഗം ആരോഗ്യ-വികസന സൂചകങ്ങളിൽ പൊതുജനവിഭാഗവുമായി താരതമ്യപ്പെടുത്തുമ്പോൾ വളരെ പിന്നിലാണ്. അവർക്കിടയിലെ മരണങ്ങളേയും മരണകാരണങ്ങൾ ആയേക്കാവുന്ന രോഗാവസ്ഥകളേയും കുറിച്ച് ശാസ്ത്രീയമായി അവലോകനം ചെയ്യുന്നതിനുള്ള ഒരു വിവരശേഖരണം ആണ് ഈ പദ്ധതിയിലൂടെ ലക്ഷ്യമിട്ടിരുന്നത്.

നമ്മുടെ നാട്ടിൽ മിക്കവാറും മരണങ്ങൾ നടക്കാറുള്ളത് വീട്ടിൽ തന്നെയാണെന്നതിനാൽ മരണകാരണങ്ങളേയും രോഗാവസ്ഥകളേയും കുറിച്ച് പ്രധാന രജിസ്ട്രികളിൽ നിന്നും ആശുപത്രികളിൽ നിന്നുമുള്ള വിവരങ്ങളുടെ അഭാവത്തിൽ ശാസ്ത്രീയമായ ഒരു അവലോകനത്തിന് സാധ്യത കുറയുന്നു. ഇത്തരം സാഹചര്യങ്ങളിൽ മരണകാരണം വിലയിരുത്തുന്നതിനുള്ള പരോക്ഷ മാർഗ്ഗമാണ് Verbal Autopsy (മരണകാരണ വിശകലന സർവ്വേ), മരണകാരണം നിർണ്ണയിക്കാൻ മരിച്ചു പോയ വ്യക്തിക്കുണ്ടായിരുന്ന രോഗലക്ഷണങ്ങളേയും സാഹചര്യങ്ങളേയും കുറിച്ചുള്ള വിവരങ്ങൾ അവരുടെ അടുത്ത ബന്ധുക്കളിൽ നിന്നോ വേണ്ടപ്പെട്ടവരിൽ നിന്നോ നിർദ്ദിഷ്ട ചോദ്യാവലികൾ ഉപയോഗിച്ച് ശേഖരിച്ച് വിശകലനം ചെയ്യുന്ന രീതിയാണിത്.

പ്രസ്തുത ചോദ്യാവലി ഉപയോഗിച്ച് ആദിവാസി ജനസമൂഹത്തിലെ മരണകാരണം രേഖപ്പെടുത്തുകയും അവ കേരളത്തിലെ സാധാരണ ജനങ്ങളുടെ മരണ കാരണങ്ങളുമായി താരതമ്യപ്പെടുത്തുകയും ചെയ്യുകയായിരുന്നു ഈ പഠനത്തിന്റെ ഉദ്ദേശ്യം. ഇത്തരത്തിലുള്ള വിശകലനം ആദിവാസി സമൂഹങ്ങളിലെ മരണങ്ങൾക്ക് കാരണമായേക്കാവുന്ന അപകടസാധ്യതകൾ കണ്ടെത്തുന്നതിനും, തുടർന്നുള്ള പൊതുജനാരോഗ്യ ഇടപെടലുകൾ വിഭാവനം ചെയ്ത് നടപ്പിൽ വരുത്തുന്നതിന് ഉപകരിക്കപ്പെടുന്നതുമാണ്.

### പദ്ധതിയുടെ പ്രധാന ലക്ഷ്യങ്ങൾ

വയനാട്ടിലെ ആദിവാസി ജനങ്ങൾക്കിടയിലെ മരണകാരണങ്ങളെക്കുറിച്ചുള്ള വിവരങ്ങൾ ശേഖരിക്കുക. ആദിവാസി സമൂഹങ്ങളിലെ മരണകാരണങ്ങളെ വയനാട്ടിലെ അതേ പ്രദേശത്ത് താമസിക്കുന്ന മറ്റുവിഭാഗത്തിൽ പെട്ട ജനങ്ങളുടെ മരണകാരണങ്ങളുമായി താരതമ്യം ചെയ്യുക. വയനാട്ടിലെ ആദിവാസി സമൂഹങ്ങളിലെയും മറ്റുവിഭാഗങ്ങളിലേയും മരണകാരണങ്ങൾ കേരളത്തിന്റെ പൊതു ജനസംഖ്യയെ പ്രതിനിധീകരിക്കുന്ന ഒരു പ്രദേശമെന്ന നിലയിൽ തിരുവനന്തപുരത്തെ ജനങ്ങൾക്കിടയിലെ മരണകാരണങ്ങളുമായി താരതമ്യം ചെയ്യുക. രണ്ട് വർഷ കാലയളവിൽ പഠനവിധേയമാക്കപ്പെടുന്ന ജനസമൂഹത്തിലെ മരണകാരണങ്ങളുടെ കാലാനുസൃതമായ വ്യതിയാനം പഠിക്കുക.

**വിവരശേഖരണം നടപ്പിലാക്കിയ പ്രദേശങ്ങൾ**

വയനാട് ജില്ലയിലെ ഒരു മുനിസിപ്പാലിറ്റി- സുൽത്താൻ ബത്തേരി, നാല് പഞ്ചായത്തുകൾ -പുൽപ്പള്ളി, മുളളൻകൊല്ലി , പൂതാടി, നൂൽപ്പുഴ, ഉൾപ്പെടുന്ന അഞ്ചു പ്രദേശങ്ങളും തിരുവനന്തപുരത്തെ വെങ്ങാനൂർ , കാഞ്ഞിരംകുളം , കരുംകുളം , കോട്ടുകാൽ , അതിയന്നൂർ എന്നീ അഞ്ചു പഞ്ചായത്തുകളും ആണ് സർവ്വേക്കായി തിരഞ്ഞെടുത്തിരുന്നത്.

**വിവരശേഖരണം**

രണ്ടു ജില്ലകൾക്കുമായി ഓരോ റിസർച്ച് അസോസിയേറ്റിനെയും പൊതുവായി കാര്യങ്ങളുടെ മേൽനോട്ടം വഹിക്കുന്നതിനു ഒരു സീനിയർ പ്രോജക്ട് അസോസിയേറ്റിനെയും പ്രധാന ഗവേഷകയുടെ കീഴിൽ നിയമിക്കപ്പെട്ടു.

പദ്ധതിയുടെ ആദ്യഘട്ടമായി പഠനത്തിൽ ഉൾപ്പെടുത്തിയിട്ടുള്ള എല്ലാ മേഖലകളിലെയും പഞ്ചായത്ത് / മുനിസിപ്പാലിറ്റി അംഗങ്ങളെ സമീപിച്ചു മരണം റിപ്പോർട്ട് ചെയ്യാൻ സഹായം തേടുകയും, അതതു പ്രദേശത്തെ വ്യക്തികളെ ഉൾപ്പെടുത്തിക്കൊണ്ട് ഓരോ വാർഡിലും ഒരു റിപ്പോർട്ടിംഗ് സംവിധാനം ഉണ്ടാക്കുകയും ചെയ്തു. ഒരു വാർഡിൽ ഒരു മരണം നടന്നാൽ മരണപ്പെട്ടയാളിന്റെ പേര്, സ്ഥലം, വേണ്ടപ്പെട്ടവരെ ബന്ധപ്പെടുന്നതിനുള്ള നമ്പർ, തുടങ്ങിയ വിവരങ്ങൾ മൊബൈൽ അപ്ലിക്കേഷൻ വഴിയോ, വാട്ട്സ്ആപ്പ്, ടെക്സ്റ്റ് സന്ദേശമയക്കൽ അല്ലെങ്കിൽ ഒരു ഫോൺ കോൾ വഴിയോ കേന്ദ്ര സെർവറിലേക്ക് അറിയിക്കാൻ സൗകര്യമുണ്ടായിരുന്നു. വാർഡ് മെമ്പർ, അങ്കണവാടി, കുടുംബശ്രീ പ്രവർത്തകർ, ആദിവാസി പ്രമോട്ടർമാർ, പഠന മേഖലയിലെ മറ്റ് തിരഞ്ഞെടുത്ത കമ്മ്യൂണിറ്റി നേതാക്കൾ, പൊതു പ്രവർത്തകർ എന്നിവർ ഇതിനോട് സഹകരിച്ചു.

അതോടൊപ്പം തന്നെ ഓരോ പഞ്ചായത്തിൽ നിന്നും നഴ്സിംഗ് യോഗ്യതയുള്ള 2/3 വ്യക്തികളെ പാർട്ട്-ടൈം ഡാറ്റാ കളക്ടേഴ്സ് ആയി പരിശീലനം കൊടുത്തു നിയോഗിച്ചു. മരണ വിവരങ്ങൾ റിപ്പോർട്ട് ചെയ്യപ്പെട്ടതനുസരിച്ച് ഓരോ പഞ്ചായത്തിൽ നിന്നും/മുനിസിപ്പാലിറ്റിയിൽ നിന്നും തിരഞ്ഞെടുത്ത നഴ്സ്മാർ അഭിമുഖം നടത്തി മരണകാരണവിവരങ്ങൾ ശേഖരിച്ചു SCTIMST യുടെ സെർവറിലേക്കു അപ്ലോഡ് ചെയ്തു. ശ്രീ ചിത്രയിലെ നൈതികനീതിസമിതിയുടെ മേൽനോട്ടത്തിൽ നൈതികസമിതിയുടെ മാർഗനിർദ്ദേശങ്ങൾക്കനുസൃതമായിട്ടായിരുന്നു ഈ വിവരശേഖരണം നടപ്പാക്കിയത്.

ഈ സർവ്വേ കേന്ദ്ര ശാസ്ത്ര സാങ്കേതിക വകുപ്പിന്റെ ട്രൈബൽ കോംപോണിംഗ് പ്ലാൻ എന്ന പദ്ധതിയുടെ സഹായത്തോടെ ശ്രീ ചിത്രയിലെ ഡോ.ജിസ്റ്റ വി ടി (സയൻസിസ് , അച്യുത മേനോൻ സെന്റർ, SCTIMST), ഡോ. ബിജു സോമൻ (പ്രൊഫസർ, അച്യുതമേനോൻ സെന്റർ, SCTIMST ), ശ്രീ. സുരേഷ് കുമാർ ബി , എഞ്ചിനീയർ ജി, കമ്പ്യൂട്ടർ ഡിവിഷൻ , SCTIMST എന്നിവരുടെ നേതൃത്വത്തിലാണ് നടപ്പിലാക്കിയത്.

**ശേഖരിക്കപ്പെട്ട വിവരങ്ങളുടെ വിശകലനവും വ്യാഖ്യാനവും**

2022 ജനുവരി 1 മുതൽ 2023 ഡിസംബർ 31 വരെയുള്ള രണ്ടു വർഷ കാലയളവിൽ പഠന വിധേയമായ സ്ഥലങ്ങളിൽ നടന്ന മരണങ്ങൾ ആണ് ഈ പഠനത്തിൽ ഉൾപ്പെടുത്തിയിട്ടുള്ളത്. രണ്ട് പഠന സ്ഥലങ്ങളിൽ നിന്നുമായി 4214 മരണങ്ങൾ ഈ പഠനത്തിൽ വിശകലനം ചെയ്യപ്പെട്ടു. തിരുവനന്തപുരത്ത് നിന്ന് 1813, വയനാട് ജില്ലയിൽ നിന്ന് 2401 (ട്രൈബൽ വിഭാഗം: 661 ; ഇതര വിഭാഗം:1740). ആകെ 27 നവജാത ശിശുമരണങ്ങളും (28 ദിവസമോ അതിൽ താഴെയോ പ്രായം) 15 ശിശുമരണങ്ങളും (29 ദിവസം മുതൽ 11 വയസ്സ് വരെ), 12 വയസ്സിനു മുകളിൽ പ്രായമുള്ളവരുടെ 4172 മരണങ്ങളും പഠനത്തിൽ രേഖപ്പെടുത്തിയിട്ടുണ്ട്. വിശകലനം നടത്തിയവയിൽ അറുപത് ശതമാനത്തിൽ അധികം മരണങ്ങളും വീടുകളിൽ വെച്ച് നടന്നതായി രേഖപ്പെടുത്തി. Smart-VA ഉപയോഗിച്ചുള്ള മരണ കാരണ വിശകലനം നടത്തിയതിൽ, ഒന്നും രണ്ടും സ്ഥാനങ്ങളിൽ സ്ത്രീകളും ഹൃദ്രോഗവും ആണ് മരണകാരണങ്ങളായി കാണപ്പെട്ടത്.

പഠന മേഖലകളിൽ പ്രസ്തുത പഠനം നടപ്പിലാക്കിയ രീതികളെ കുറിച്ചും, പഠനത്തിൽ രേഖപ്പെടുത്തപ്പെട്ട മരണങ്ങളുടെ പ്രാഥമികമായ വിതരണങ്ങളും, SmartVA ടൂൾ നിർണ്ണയിക്കുന്ന കാരണങ്ങളുമാണ് ഈ വിവരണത്തിൽ ഉൾപ്പെടുത്തിയിട്ടുള്ളത്. പഠന സ്ഥലങ്ങളുടെ ജനസംഖ്യയുടെ വലുപ്പവും പ്രായത്തിന്റെ ഘടനയും സ്ത്രീ പുരുഷ അനുപാതവും വ്യത്യസ്തമായിരിക്കും എന്നതിനാൽ, വിവിധ വിഭാഗങ്ങളിലെ മരണ കാരണങ്ങൾ താരതമ്യ പഠനം നടത്തുന്നതിന് ഈ പട്ടികകളിൽ നൽകിയിരിക്കുന്ന അക്കങ്ങളും ശതമാനങ്ങളും അടിസ്ഥാനമാക്കിയുള്ള താരതമ്യങ്ങൾ മതിയാവുകയില്ല. പഠന വിഭാഗങ്ങളെ താരതമ്യപ്പെടുത്തുന്നതിന് ജനസംഖ്യയിലെ ഉചിതമായ പ്രായ-ലിംഗ വ്യത്യാസങ്ങൾ അനുസരിച്ച് സ്റ്റാൻഡേർഡൈസ് ചെയ്ത നിരക്കുകൾ ആവശ്യമാണ്. സാധ്യതയുള്ളതും വിശ്വസനീയവുമായ താരതമ്യങ്ങൾ നടത്താൻ ഞങ്ങൾ അത്തരത്തിലുള്ള കൂടുതൽ വിശകലനം നടത്തുകയും സർവ്വേ ഫലങ്ങൾ അവതരിപ്പിക്കുകയും പ്രസിദ്ധീകരിക്കുകയും ചെയ്യും.

## **Summary**

### **Background and objective:**

The tribal populations in Kerala markedly lagged in terms of health and development indicators compared to the general population. Since most deaths occur at home and access to formal health care services is limited, the possibility of a formal assessment of causes of death in tribal populations is limited. In many such populations with a lack of systematically collected data from vital registration and hospitals regarding the causes of morbidity and mortality, an indirect means of assessing causes of death, such as verbal autopsy, offers an affordable and effective means to bridge the health information gaps. With this background, we planned the present study with the major objective of generating data on causes of death among tribal populations in Wayanad and to compare the causes of death pattern in the tribal population with that of the general population in Wayanad and Trivandrum.

### **Data collection procedures:**

The study was conducted in the five administrative areas (one municipality—Sulthan Batheri and four panchayaths—Pulpally, Mullankolly, Poothadi, and Noolpuzha) in Wayanad district and five (panchayaths—Vengannur, Kanjiramkulam, Karumkulam, Kottukal, and Athiyannur) in Athiyannoor block in Thiruvananthapuram District.

The first phase of the sample selection procedure focused on building a community-driven death reporting system by involving the ward members, Anganwadi teachers, tribal promoters, community leaders, etc, in the study area. Two or three field data collectors from each panchayat or municipality with nursing qualifications were trained to conduct the verbal autopsy surveys using the Open Data Kit (ODK) app on android phones. Data were collected in a database created in-house at ODK Central and stored on the SCTIMST server. This data collection was executed according to the guidelines of the institutional ethics committee.

### **Analysis of Data**

The deaths over 24 months, from 2022 January 1st to 2023 December 31st, were included in the survey. The data collected in the server was analyzed using the SmartVA analyze

2.2 application to generate probable causes of death of the deceased individuals. A total of 4214 deaths from two study sites were surveyed in this study, 1813 from Thiruvananthapuram and 2401 from Wayanad district (Tribal:661; nontribal: 1740). A total of 27 neonatal deaths (age 28 days or less), 15 infant deaths (29 days to 11 years), and 4172 deaths above 12 years of age were recorded in the study. Of those analyzed, more than 60 percent of deaths occurred in homes. The SmartVA analysis generates the probable causes for each death, and the results showed that stroke and ischemic heart disease are the first two positions among different causes of deaths.

This is a preliminary report of the study project. This report includes the methods for implementing this project, data on the distribution of deaths surveyed in the study, and the distribution of causes of deaths determined by the SmartVA tool. As the population size, age composition, and gender distribution of the study sites and populations may vary, comparisons based on numbers and percentages given in the study report may not be sufficient for making a valid comparison of deaths and their causes in different populations. We will conduct further analysis to estimate the standardized rates using appropriate age-sex distributions in the populations to generate reliable and valid conclusions on the comparisons of different populations regarding the distribution of deaths and probable causes.

## 1. Background

Understanding the causes of death is crucial for making policy decisions and planning healthcare in all countries. While high-income nations tend to collect and maintain death and birth data systematically through well-established civil registration and vital statistics systems, the same cannot be applied to all low- and middle-income countries due to lack of resources. The causes of death can vary depending on various factors such as time, region, age, sex, and socioeconomic profile, and in underdeveloped areas, lack of facilities or access to medical certification often leads to underreporting of causes of death, presenting a challenge for policymakers. [1]

The World Health Organization (WHO) defines verbal autopsy as "a method used to ascertain the cause of death based on interviews with the next of kin or other caregivers". [2] Verbal autopsy serves as a primary source of information in uncovering causes of death in regions where many individuals die at home without access to medical facilities or certification. A standard verbal autopsy tool includes a structured questionnaire, a cause-of-death classification system, and either expert or algorithmic methods for determining the cause of death. [3]

Structured verbal autopsy questionnaires collect information from family members or caregivers regarding symptoms, medical history, and circumstances surrounding the death. This information is then interpreted by physicians or automated methods using the International Classification of Diseases (ICD) system, developed and revised by the WHO annually. Reliable mortality data provide insights into disease burdens and health inequalities within populations, aiding in better policy decisions, health planning, and program evaluation. Research has shown that the verbal autopsy approach in rural India is cost-effective, with the potential for further cost reduction through electronic devices.[4]

Verbal autopsy provides valuable insights into causes of death, particularly in areas lacking medical infrastructure or certification. VA finds out the probable cause of death in the absence of medical attention or medical records.[5] The standardized questionnaire for verbal autopsy was first used on a small scale in the 1980s and gradually became popular in the 1990s. [6] It was considered a costly endeavour until recently, as only Physician Coded Verbal Autopsy (PCVA) was accepted for research purposes.

However, due to advances in health informatics, we now have many mobile technologies based on verbal autopsy tools in the free and open-source software arena. SmartVA is one of them, which was developed and validated by the Population Health Metrics Research Consortium (PHMRC). It offers a promising solution for assessing causes of death in populations.

SmartVA utilizes the Tariff method for computer certification of verbal autopsies, aligning with WHO standards and reducing costs by eliminating the need for physician involvement. The tariff method produces estimates of causes of death at individual and population levels by analyzing the input of verbal autopsy interview data. The tariff is a data-driven algorithm method that does not require physician involvement, reducing costs and increasing sustainability. The local nonmedical health workers can be trained to collect information in the local language, which will help quantify the cause of death and aid in a health priority setting. The updated SmartVA tool (version 2) is compatible with mobile devices and utilizes open-source data collection applications for data storage, even in areas with limited connectivity. Studies have shown that SmartVA results are comparable to those obtained through physician coding. [7,8] James et al. showed that the Tariff method is reliable for providing individual cause assessment and cause-specific mortality fractions. [9]

A large-scale study on the comparison of physician assignment and automated computer diagnosis was published by Jha et al. in 2019. The study showed an average concordance of automated algorithms with that of the physician assignment, which was 62%, 56%, and 59% for adult, child, and neonatal deaths. The study suggests the importance of carefully evaluating automated algorithms to assess the cause of death. Despite these challenges, conducting verbal autopsies on a nationwide scale can be a useful method for obtaining cause-of-death data, especially in low and middle-income countries. Though VA relies on the structured interviews conducted by nonmedical field staff, well-conducted studies showed robust and reasonable information on the patterns of death for vital causes of death.[10]

According to the 2011 census, 8.6% of the total population in India belongs to the ST category (104 million), and almost 90% of the tribal population in India lives in rural areas. The total population in Kerala, according to the 2011 census, was 33406061, and the ST population is 484839 (1.4%).[11] The factors that lead to poor health conditions

among the tribal population in Kerala include food insecurity due to the change in the pattern of land use, land alienation, poverty, and infrastructure inadequacy. Chronic malnutrition and anaemia among pregnant and lactating women contribute to high infant mortality rates in the Tribal population in Kerala.[12] A study among women in a tribal settlement in Kasaragod district reported that 62% of the women had moderate and 11% had severe anaemia.[13] The prevalence of hypertension among Kani tribes in the Trivandrum district was 48.3%, and it was reported as 40% in another study among the adult tribal population in Kerala. [14,15] Jose et al., reported that 85% of tribal antenatal women utilized maternal healthcare facilities as compared to 100% of the nontribal in their study.[16] Another study reported a high burden of underweight, anaemia and goitre among tribal as compared to nontribal populations and significant inequalities in health indicators within tribal populations.[17]

The tribal populations in Kerala markedly lagged in terms of health and development indicators compared to the general population. Factors such as food insecurity, poverty, inadequate infrastructure, and healthcare access contribute to poor health outcomes, including high rates of infant mortality and high prevalence of diseases like tuberculosis and hypertension. Cause of death and morbidity among the tribal population remains largely speculative since most deaths occur at home and access to formal health care services is limited. Bridging these health information gaps through a systematic evaluation of deaths in the population utilizing the automated verbal autopsy tool can facilitate targeted interventions and improve health outcomes in such vulnerable populations. It offers an affordable and effective means to bridge the health information gaps and lead to better public health interventions.

Thus the present study aimed at document the cause of death among tribal population using the automated verbal autopsy tool and compare it with the cause of death profile of the general population in Kerala.

## **Objectives**

The major objective of the study was to generate data on causes of deaths among tribal population in Wayanad and compare the death profile with general population in Wayanad and Trivandrum.

## **Specific Objectives**

1. To generate data on causes of death among tribal populations in Wayanad through automated verbal autopsy surveys.
2. To compare the causes of death among tribal populations with that of the general population living in the same area of Wayanad.
3. To compare the causes of death among tribal and general population in Wayanad with that of the general population in Thiruvananthapuram.
4. To study the seasonal variation of causes of death in the study populations over a period of two years.

## 2. Study Methods

### Study setting & target population

The study locations included four panchayaths (Pulpally, Mullankolly and Poothadi from Panamaram block, Noolpuzha from Sulthan Batheri block) and one municipal area (Sulthan Batheri) in Wayanad district, under the Pulpally health block. Vengannur, Kanjiramkulam, Karumkulam, Kottukal, and Athiyannur grama panchayats in the Athiyannoor block comprise the study location in Thiruvananthapuram District. The present study targeted to cover all deaths in the study locations in both districts over two years from 1st Jan 2022 to 31st Dec 2023.

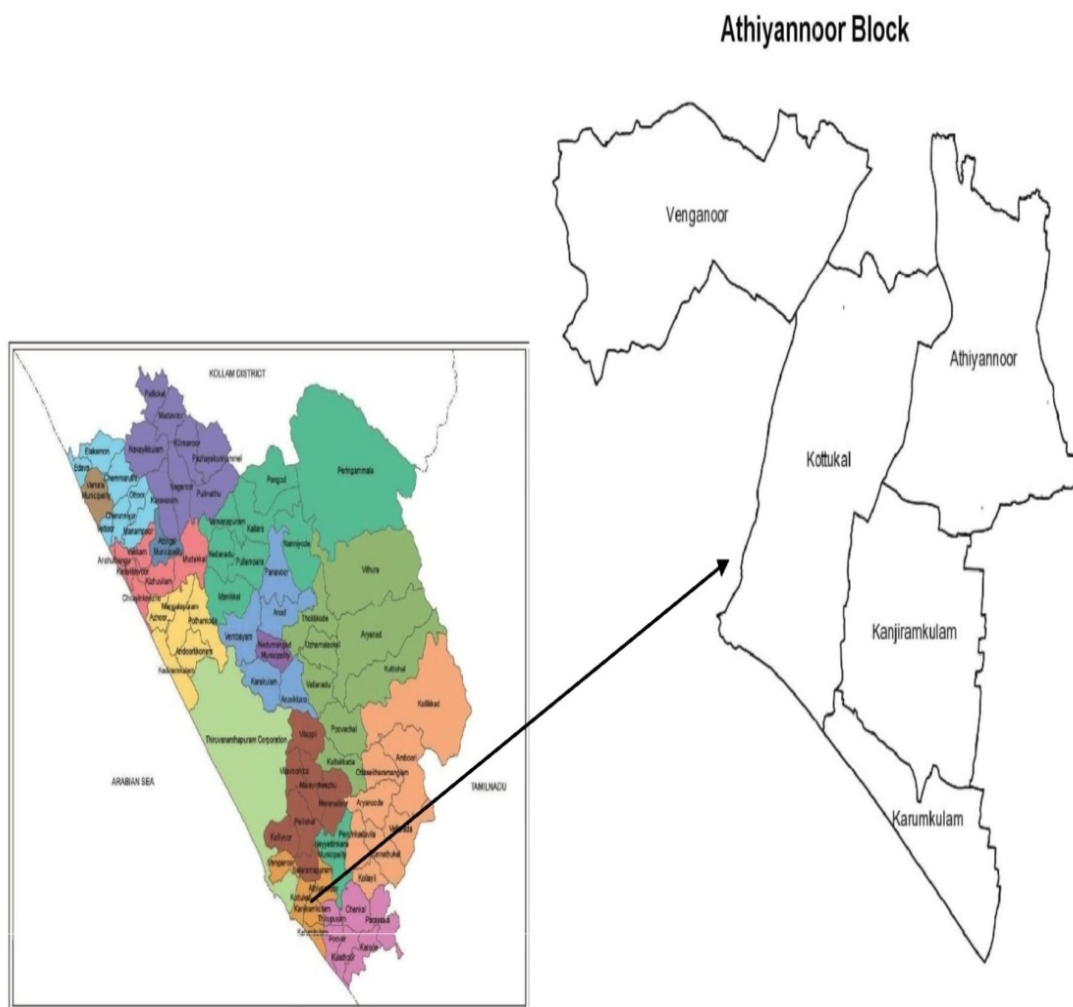
**Table.2.1 The list of panchayats and the population as per the 2011 census**

District	Panchayats/ Municipality	Area in Sq.Km	Population as per 2011 Census Report	Population Density as per 2011 Census Report	Number of Households as per 2011 Census Report
Trivandrum	Athiyannoor	14.71	26973	1833.65	7166
	Kanjiramkulam	10.29	18821	1829.06	4919
	Karumkulam	12.43	28290	2275.95	6451
	Kottukal	12.19	33336	2734.7	8356
	Vengannoor	13.8	35963	2606.01	9277
Wayanad	Sulthan Batheri Municipality *	103	45417	416	10230
	Noolpuzha	242.97	27833	114.55	6510
	Poothadi	82.88	39649	478.39	9800
	Mullankolly	71.58	28400	396.76	6929
	Pulppally	77.78	33951	436.5	8414

\* For Sulthan Batheri, the population details were taken from Kudumbashree PMAY - SULTHAN BATHERY | CITY PROFILE <https://www.kudumbashree.org/sub-district/881087/20>

Considering a death rate of 6 per 1000 population and assuming that the tribal population is one-fourth in Wayanad, we anticipated 300 deaths among the tribal and 900 deaths among the nontribal population in the study area of Wayanad in a year. Similarly, we expected to cover around 770 deaths per year from Athiyannoor block, considering the death rate of 5.72 in rural Thiruvananthapuram. [11] Hence, the anticipated number of verbal autopsies to be conducted for two years period was estimated at 2400 verbal autopsies from the study area of Wayanad (600+1800) and 1500 verbal autopsies from Athiyannoor block in Thiruvananthapuram.

**The study location in Thiruvananthapuram District**



**Figure 2.1 Map showing study location in Trivandrum district**



**Figure2.2 Map showing study location in Wayanad district**

## **Project Implementation**

### **Recruitment of research associates**

The study got IEC approval in March 2020; however, due to the restrictions related to the COVID-19 pandemic, the approvals from other departments and staff appointments were delayed. We appointed one research associate at the initial stage of the project in February 2021, and later, another research associate for the Wayanad district and a senior project associate for the overall monitoring of the project was appointed in November 2021. The

professionals with qualifications in Master of Social Work and experience in the field of research undertakings were appointed with due selection process through the institute.

### **Obtaining permissions and intimations to various offices**

The permissions from different institutions were gathered prior to the implementation of the project. As this study is about the death assessment of the tribal population in Kerala, prior permission was obtained from the tribal Development Department to conduct the research and collect information from tribal settlements. We made an agreement with tribal development officer Sulthan Bathery, Wayanad, as per the order from the director of the tribal development Department, Govt. of Kerala, before proceeding to the field. Integrated tribal development officer Nedumamnagdu has granted a wave in signing the agreement, as the area selected in Thiruvananthapuram district is not a tribal populated area.

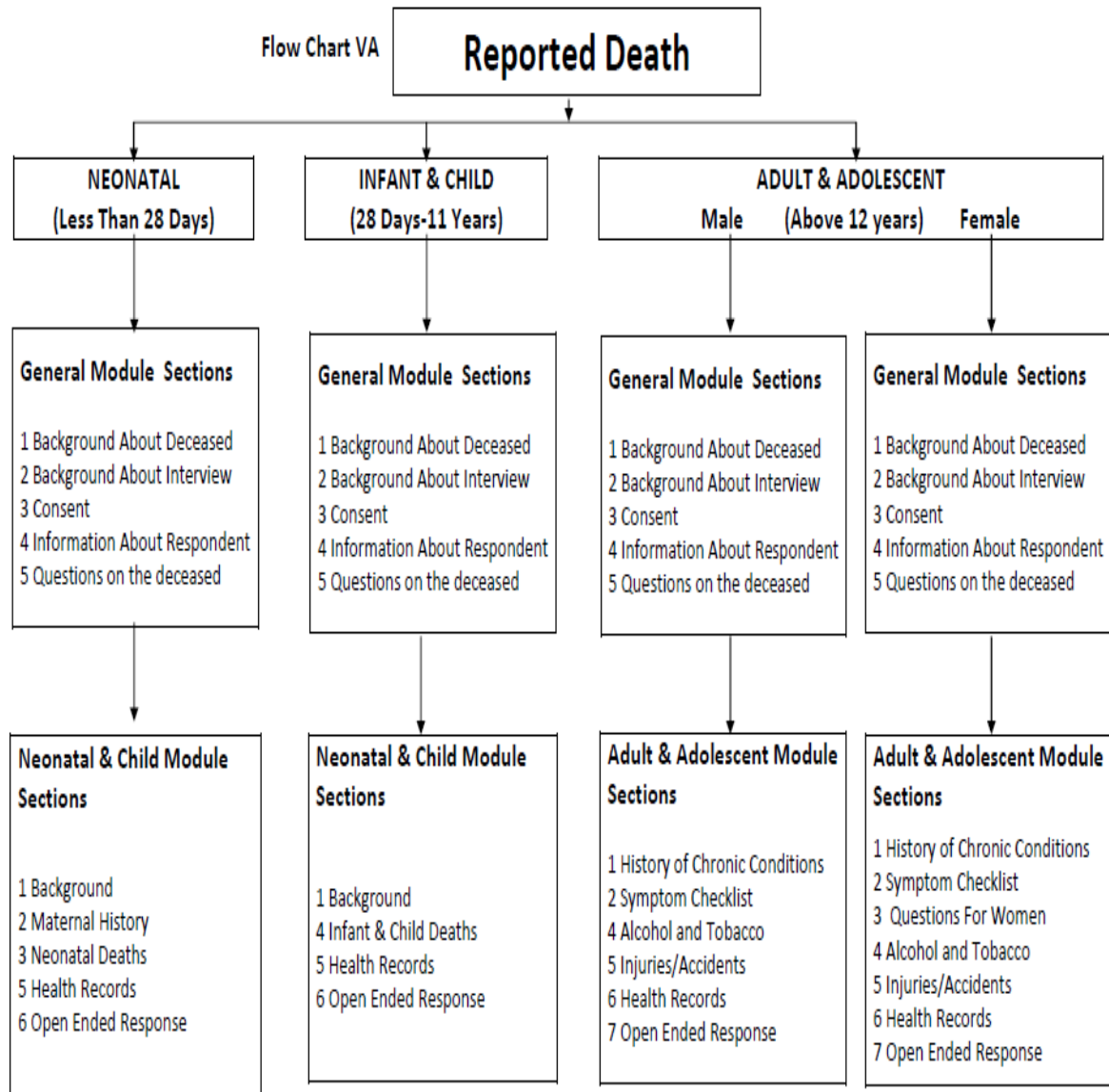
Permissions from various departments, including the District medical office, tribal development office, integrated child development office, forest range office, Gramapanchayaths and block panchayaths, Kudumbashree, Police stations, etc., also availed for fast and smooth implementation of the project. A short write-up about the project with its objectives and implementation strategy with a cover letter was forwarded to the block panchayats, GramaPanchayaths/Municipalities, and different departments in the study locations who are stakeholders of this project. As part of this project, research associates in charge of each district attended Panchayat committee meetings or personally met elected representatives to make them aware of the project. All the selected ten local bodies in two districts were willing to implement this project in the concerned area.

### **The study tool, translation and its implementation in Open Data Kit (ODK) platform**

This study adopted the verbal autopsy complete questionnaire from the Population Health Matric Research Consortium (PHMRC). The different sections in the SmartVA tool include information about respondents, socioeconomic and demographic information about the deceased, treatments, and other health-related events preceding the deaths. The

age cutoffs for selecting the modules of adult, child and neonate verbal autopsies are 12 years and older, 29 days to 11 years old, and  $\leq 28$  years old, respectively.

The different modules of the PHMRC SmartVA tool are presented in Figure 2.3.



**Figure.2.3 The different modules of the SMARTVA tool**

Translation of the PHMRC SmartVA tool into the local language, Malayalam, and its installation in the Open Data Kit (ODK) platform were among the major tasks in this project. This study adopted electronic devices (Smart Phones) to collect information from the field. Pretesting of the tool and data entry using ODK was also performed to check its suitability.

Apart from the verbal autopsy tool to collect death information from the selected gram panchayats, a simple questionnaire with some basic information related to the deaths was also prepared to report the death on a timely basis. We used a survey form made in the Redcap web application to collect death details with the help of informers from the study area. Both ODK and REDCap applications were administered using Android devices. The data collected through ODK and Redcap is stored in the SCTIMST server.

### **The selection of Field nurses and their training in using the SmartVA tool**

Permanent residents from the research settings were selected as field data collectors in this research. We aimed to select nurses with BSc nursing backgrounds to administer the SmartVA tool. In the absence of such persons, especially in tribal locations, individuals with a diploma in nursing or midwifery training were also considered for the purpose. Three nurses from each local body were chosen for the Wayanad district, considering its geographical and demographical specialities and two nurses from each local body were selected for the Trivandrum district to conduct verbal autopsy interviews.

As per the qualifications proposed in the research proposal, initially, we selected ten field data collectors for Thiruvananthapuram and 15 Data collectors for Wayanad District on a part-time (casual engagement) basis. A notice regarding the selection of nursing-qualified personnel from research settings was shared with the Panchayath authority to get applicants from the respective panchayats. A list of interested candidates was prepared, and based on the online interview, qualified candidates were selected. Priorities were given to nurses who use Android phones and know two-wheeler driving, as they have to travel the nook and corners of Panchayat's administrative area when deaths happen.

Due to the COVID-19 restrictions, the training for field data collectors was conducted online. The ODK was installed in the mobile phones and handed over the hard copies of the questionnaire and instructions during individual visits of the selected nurses to the research offices. Then five days of online training (two hours per day) to introduce the tool and the verbal autopsy interview using an android mobile phone with ODK platform was conducted, followed by another five days of field training for conducting verbal autopsy interviews to familiarize with the consenting process, verbal autopsy

interview questionnaires and processes. Trial/mock verbal autopsy data were sent to the ODK server and verified by the research team, and necessary feedback was given to field data collectors to improve the quality of the interviews.

After one year of the data collection process, a one-day refresher training for field data collectors was also conducted at Thiruvananthapuram and Wayanad with the intention of improving/maintaining the quality of verbal autopsy interviews. Some nurses appointed in the initial phase were relieved from the project upon their requests due to receiving another job, etc, and we appointed additional nurses from the same area through their contacts.

The research team also made efforts to keep in touch with the informers and motivate them to promote death reporting from their localities. The involvement of Anganwadi workers in death reporting from the research settings in Wayanad was also promoted as they are one of the close service providers for the tribal population.

### **Development of a community-driven death reporting system**

A community-driven death reporting system was the core of this study to report death information from the community on a real-time basis. Awareness regarding the importance of reporting death from the field, the strategies for reporting death and the significance of the projects were made among the Panchayath functionaries and elected representatives. A detailed write-up regarding the study was shared with all stakeholders associated with the study to make them aware of the purpose of the research and the importance of death reporting. Ward members from the study area of Wayanad and Thiruvananthapuram were familiarized with the process of death reporting through REDCap, the importance of death reporting, and the purpose of the study by attending their meetings in respective local bodies. With their permission, WhatsApp groups were formed for each Panchayat to facilitate and follow-up on the death reporting.

The study coordinators scrutinized the database on a daily basis to avoid duplicate entries and identify the locality, the relevant Panchayat, and the name of the nurse from the enrolled list who could be entrusted with verbal autopsy. In Wayanad district, Anganwadi workers were also familiar with reporting deaths happening in their administrative area using the REDCap application. The research associates visited the local bodies and cross-

checked the death information to identify the missing entries, and the missed death information was collected from death registration-related documents from the Panchayat/ Municipality with their permission once every three months.

### **Conduct of the Verbal autopsy survey**

After verifying the reported deaths in each area to avoid double entry, the research associates allotted the verbal autopsy interviews to the nurses. The interviews were conducted after getting prior written permission from the respondents, usually the close relatives of the deceased. Before visiting the house, the nurses often contacted the family to inform them of their visit and asked for a convenient time to meet. During their visit, the data collectors shared information about the survey, explained the purpose, and shared the information sheet with them. If the participants were not able to read the information sheet, data collectors read the information, and doubts were cleared before the interview. The verbal autopsy interviews were conducted only after completing the informed consent process.

Usually, the verbal autopsy interviews were conducted after three weeks of the mourning period. After the interview, the nurses were instructed to recheck the data in ODK and send it to the server after making the necessary verification and editing. The data received on the server was verified by research associates before approval to ensure the quality of the collected data.

In specific cases, consent was not given by respondents or relatives of the deceased to conduct the verbal autopsy or family members were not available to share information about the deceased. In such cases, the verbal autopsy was not conducted, and those records were marked as refusals or had issues with data collection.

### **Data storage and analysis of cause of death using the Tariff 2 method**

Data was collected in a database created in-house in ODK central and stored in the server of SCTIMST. The CSV file downloaded from the ODK platform was analyzed using the SMARTVA analyze 2.2 using the Tariff2 method. Tariff is an automated algorithm that generates the cause of death from the verbal autopsy data.

“Tariff method assigns a tariff score to each Verbal Autopsy in the input data for every possible cause of death, and each VA’s scores are then ranked against scores from the PHMRC Gold standard dataset.”

The tariff analysis will mainly produce four output files such as an individual cause of death file, a cause-specific mortality fraction file, a file with some readymade graphs and tables, and a file folder for monitoring and checking the quality. Further statistical analysis was carried out using the individual cause of death file for describing the distribution of deaths and causes using STATA SE-17, and R software packages.

### **Physician-coded verbal autopsy for assessing the agreement with SmartVA**

Physician-coded verbal autopsy (PCVA) was conducted in 100 recorded deaths using the verbal autopsy tool taken from the Centre for Global Health Research. An MBBS-qualified doctor trained in conducting PCVA was entrusted to do this to validate the process of verbal autopsy in the local context.

From May to Sep 2023, using the list of verbal autopsies conducted in the previous month, a random list of 15 deaths per study location (3 per panchayath) was generated by the research associates, and the list was sent to the physician. She contacted the family members and conducted telephonic interviews to collect information. In total, eight to twelve deaths from each grama panchayat, irrespective of age and gender, were selected for the PVCA.

### **Ethical considerations**

The Institutional Ethics Committee of Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum granted approval for the research proposal well before the conduct of the study.

Answering questions related to the death of a close relative will be painful to the respondent. The verbal autopsy interviews were carried out with due respect and understanding of the circumstances. The nurses conducted the interviews a couple of weeks after the deaths happened, and verbal autopsies were performed at a convenient time later in situations where the relatives were too emotionally weak to provide answers.

The nurses provided emotional support and advice and were compassionate to the caregiver/respondent in case of an emotional crisis during the verbal autopsy survey.

There was less scope for determining a medico-legal case during the verbal autopsy since we only asked general questions, and no specific cause of death identification was done as the cause of death was defined at a later stage by the computer-automated Tariff method. The data collectors kept all the collected information confidential, and the researchers instructed them not to disclose it to any third party other than the research team if clarifications were needed.

Data confidentiality would be ensured by proper encryption of the databases. Only the investigators can link the identification details with other information.

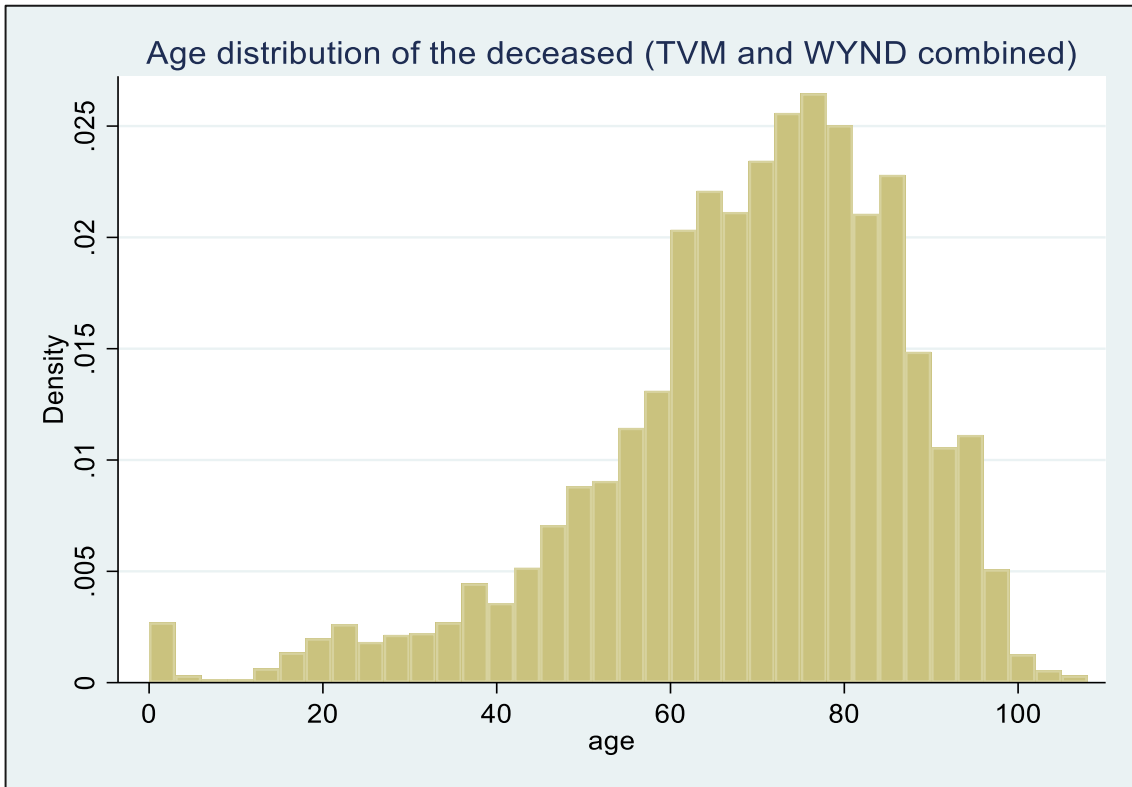
### 3. Results

#### Section1: Distribution of deaths covered by the study

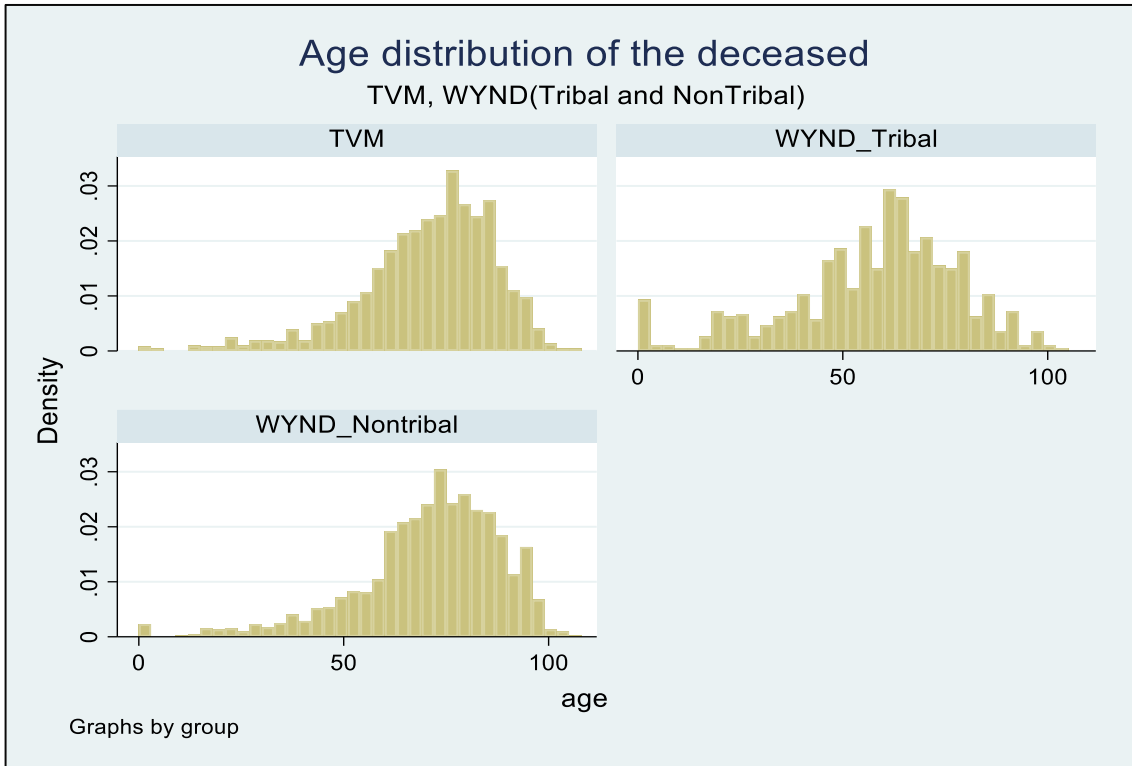
We conducted 4,214 verbal autopsies from the two study locations, 1,813 from Trivandrum and 2,401 from Wayanad district. The number of deaths we covered from Trivandrum was more than the expected number of 1,500. In Wayanad, we conducted a slightly higher number of verbal autopsies (661) than we anticipated (600) from tribal populations. However, the deaths from the non-tribal population (1,740) covered by our study were slightly lower than the expected 1800 from the non-tribal populations in Wayanad (Table 3.1).

**Table.3.1 Number of deaths evaluated using Automated Verbal Autopsy tool**

<b>Panchayats in two Districts</b>	<b>TVM</b>	<b>WYND</b>	<b>WYND Tribal</b>	<b>WYND Non-Tribal</b>	<b>Total deaths</b>
Athiyanloor	430				430
Kanjiramkulam	216				216
Karumkulam	440				440
Kottukal	354				354
Venganoor	373				373
Sulthan Batheri		505	109	396	505
Noolpuzha		414	227	187	414
Poothadi		560	127	433	560
Mullankolly		401	56	345	401
Pulpally		521	142	379	521
<b>Total</b>	<b>1,813</b>	<b>2,401</b>	<b>661</b>	<b>1,740</b>	<b>4,214</b>



**Figure. 3.1 Age distribution of the deceased (N=4214, combined data)**



**Figure. 3.2 Age distribution of the deceased in Trivandrum, Wayanad Tribal and Non tribal populations**

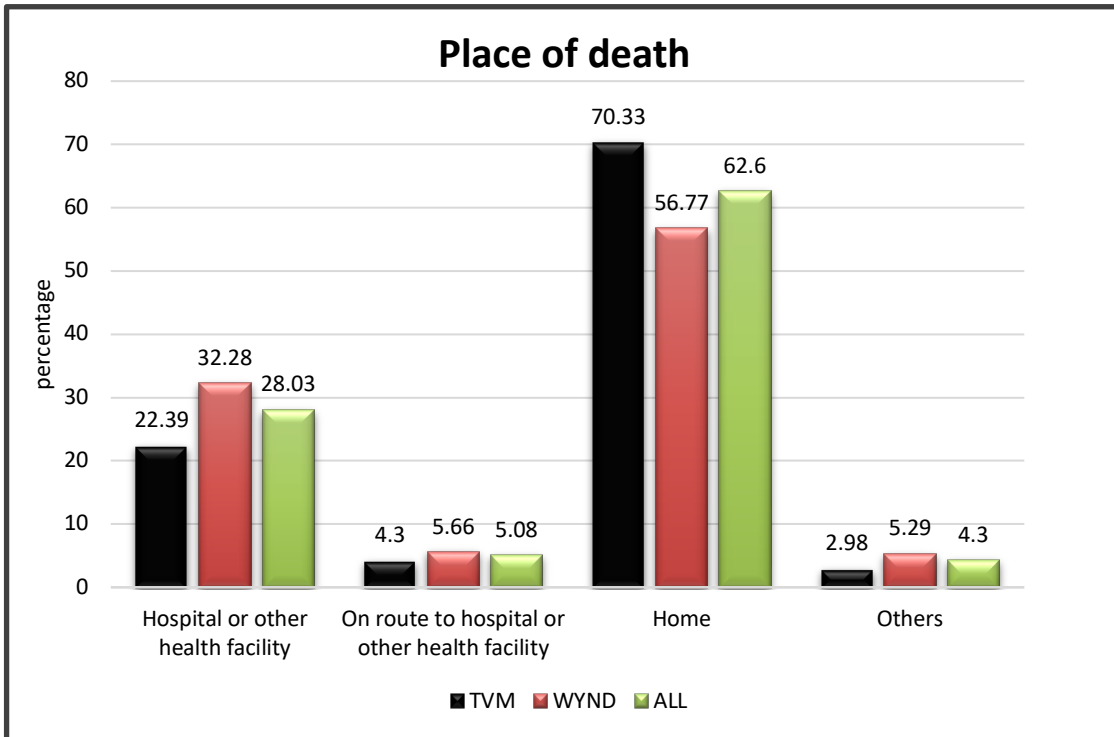
A total of 27 Neonatal deaths, 15 child deaths, and 4,172 adolescent and adult deaths were recorded in the study (Table 3.2). Nearly 75% of all deaths were among 60 years or older adults, and 50% were above 71 years. The age distribution of the deceased was more or less similar in both Trivandrum and Wayanad Non-tribal populations. However, the age distribution was more dispersed among the tribal population, especially towards the younger ages visible in the tribal population compared to other populations (Figure 3.2). The median age of death was 73 years, 60 years and 73 years for Trivandrum, Wayanad Tribal and Wayanad Non-tribal populations, respectively.

**Table.3.2 Distribution of deaths according to Age and Sex of the deceased**

Study Site	Age <28 days (Neonatal )			Age <12 years and >28 days (Child)			Age >=12 years (adolescents and adults)			All deaths
	M	F	All	M	F	All	M	F	All	
TVM	3	0	3	2	1	3	996	811	1,807	1,813
WYND	14	10	24	8	4	12	1,402	963	2,365	2,401
WYND Tribal	9	5	14	6	3	9	386	252	638	661
WYND Non-Tribal	5	5	10	2	1	3	1,016	711	1,727	1,740
<b>Total</b>	<b>17</b>	<b>10</b>	<b>27</b>	<b>10</b>	<b>5</b>	<b>15</b>	<b>2,398</b>	<b>1,774</b>	<b>4,172</b>	<b>4,214</b>

M-Males; F-Females

Among the analysed deaths, more than 60% happened at home, and there is a variation in the percentage between TVM and WYND (70.3% Vs 56.7%).



**Figure 3.3 Places of deaths reported in the verbal autopsy survey**

Among the 661 deaths from the Tribal population, more deaths were reported from the Paniya, Kurumar and Kattunayka tribal groups, as the population of these tribes was high in the study area (Table 3.3).

**Table.3.3 The distribution of deaths from different tribal populations**

Tribe	Freq.	Percent
Adiya	10	1.51
Eruvan	2	0.3
Kattunayka	125	18.91
Kurichyar	2	0.3
Kurumar	171	25.87
Oorali	24	3.63
Panar	1	0.15
Paniya	326	49.32
Total	661	100

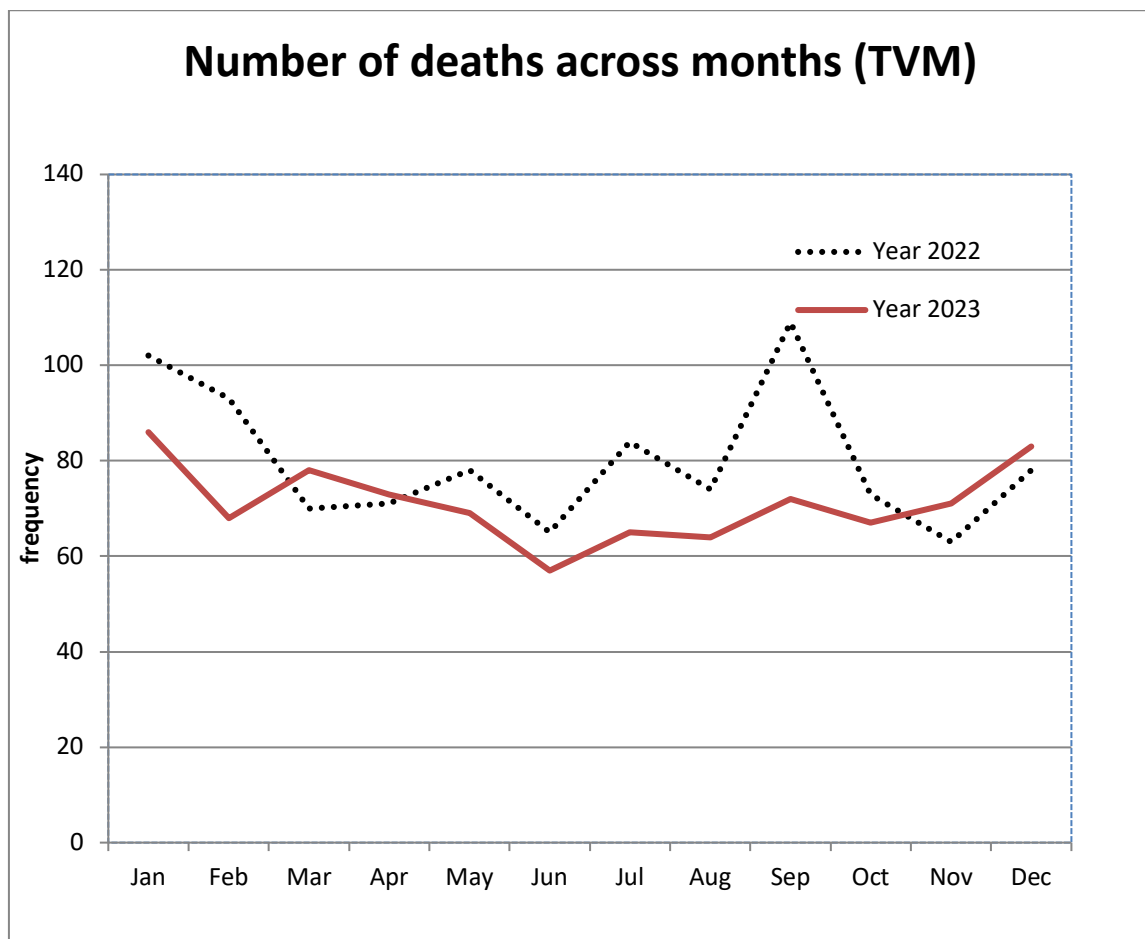
## Section 2: Distribution of deaths over 24 months

The month-wise distribution of deaths covered in the study is described in this section.

**Table.3.4 Seasonal Variation of deaths in Thiruvananthapuram Population**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	102	93	70	71	78	65	84	74	109	73	63	78
2023	86	68	78	73	69	57	65	64	72	67	71	83

The deaths in the two years showed a more or less similar pattern; however in September 2022, there was an increase in the reported deaths Trivandrum.

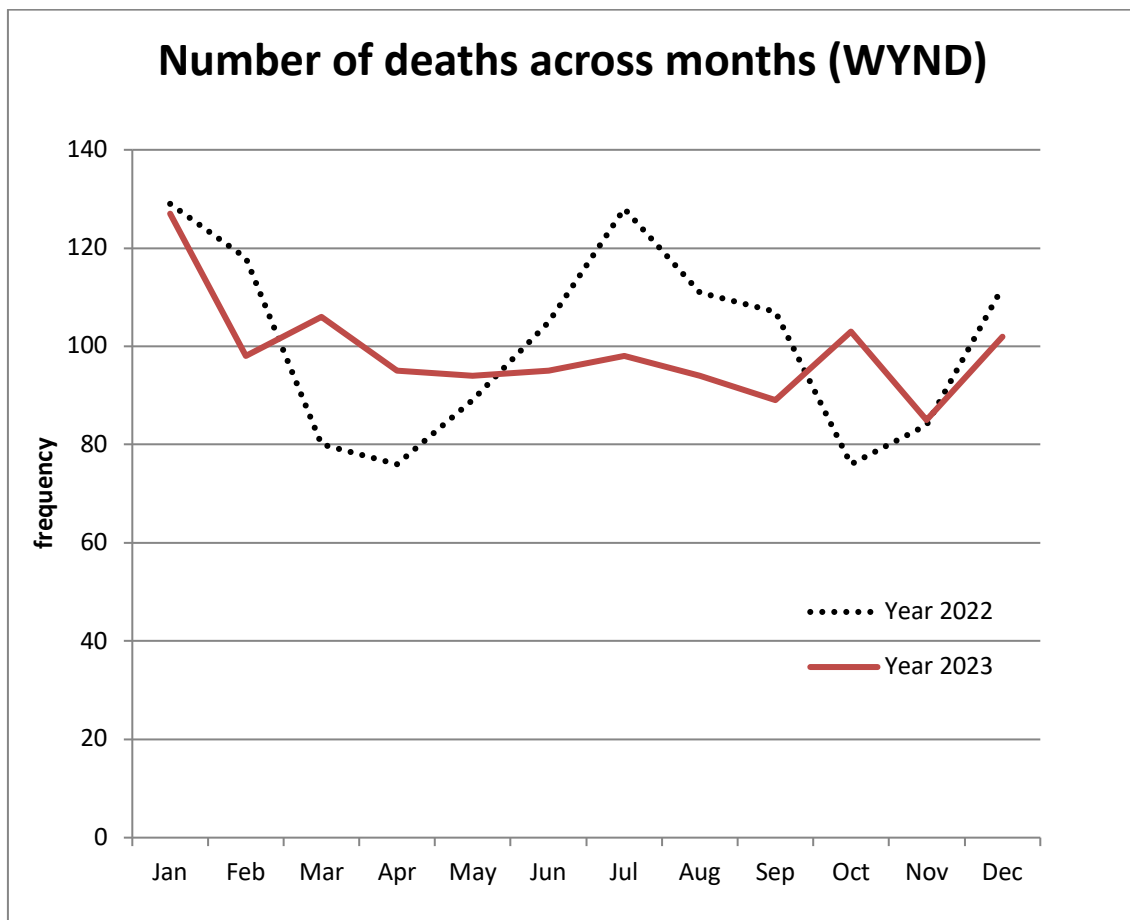


**Figure.3. 4 Distribution of deaths over months –Thiruvananthapuram**

**Table.3.5 Seasonal Variation of deaths in Wayanad Population**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2022</b>	129	118	80	76	89	105	128	111	107	76	84	112
<b>2023</b>	127	98	106	95	94	95	98	94	89	103	85	102

Overall, the deaths in Wayanad showed a reduction from February to May 2022, an increase from June to August, and then a substantial increase in December 2022 and January 2023, and then showed a more or less uniform pattern during the rest of the year 2023.

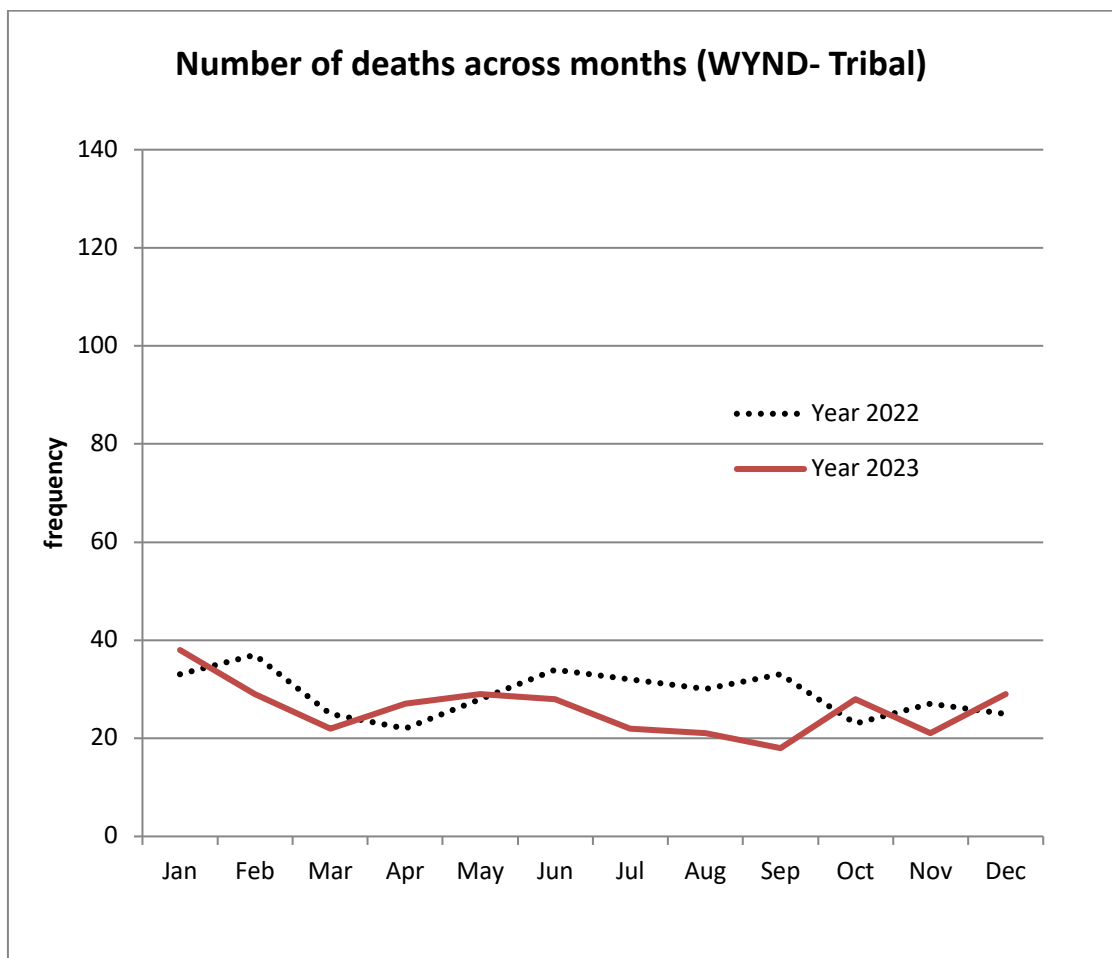


**Figure.3. 5 Distribution of deaths over months –Wayanad**

**Table.3.6 Seasonal Variation of deaths in Wayanad Tribal Population**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2022</b>	33	37	25	22	28	34	32	30	33	23	27	25
<b>2023</b>	38	29	22	27	29	28	22	21	18	28	21	29

When we separately assessed the deaths across months among the tribal population, the pattern was more or less similar across two years except for a slight decrease in deaths from July to September 2023 compared to the same period in 2022.

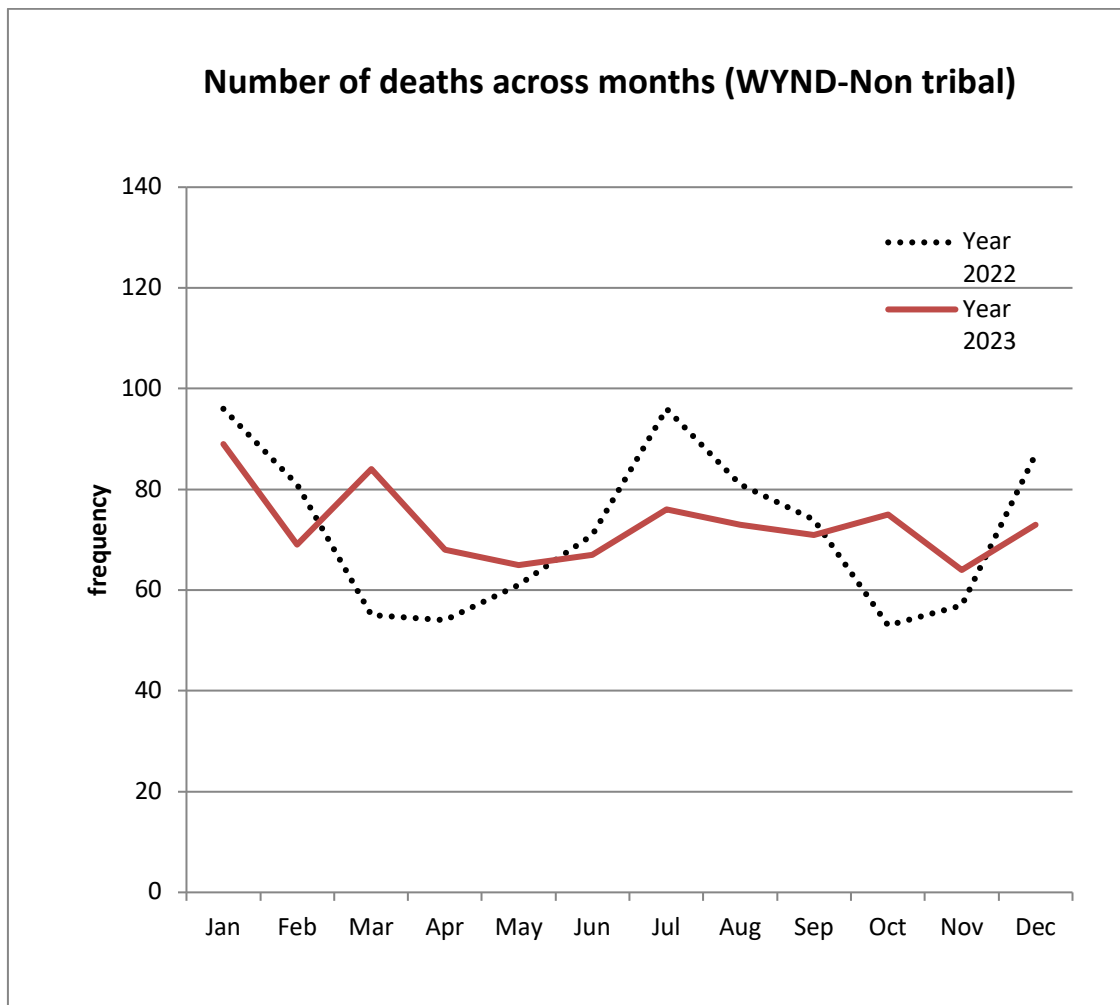


**Figure.3. 6 Distribution of deaths over months –Wayanad-Tribal Population**

**Table.3.7 Seasonal Variation of deaths in Wayanad Non- Tribal Population**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
<b>2022</b>	96	81	55	54	61	71	96	81	74	53	57	87
<b>2023</b>	89	69	84	68	65	67	76	73	71	75	64	73

Among the nontribal population in Wayanad, the deaths were more or less similar across months in 2023, but a decrease was observed in 2022 during March –April and October –November, and a slight upward trend was observed during July and December in 2022.



**Figure.3. 7 Distribution of deaths over months –Wayanad- Nontribal Population**

### Section 3: Smart-VA analysed Causes of deaths

In this section, the Smart-VA analyzed causes of death are described. The results are reported for all deaths (combining all ages, males and females), adolescent and adult (males and females), and child and neonatal deaths. The frequency of deaths due to different causes and percentages from total number of deaths reported in each population are given in these tables.

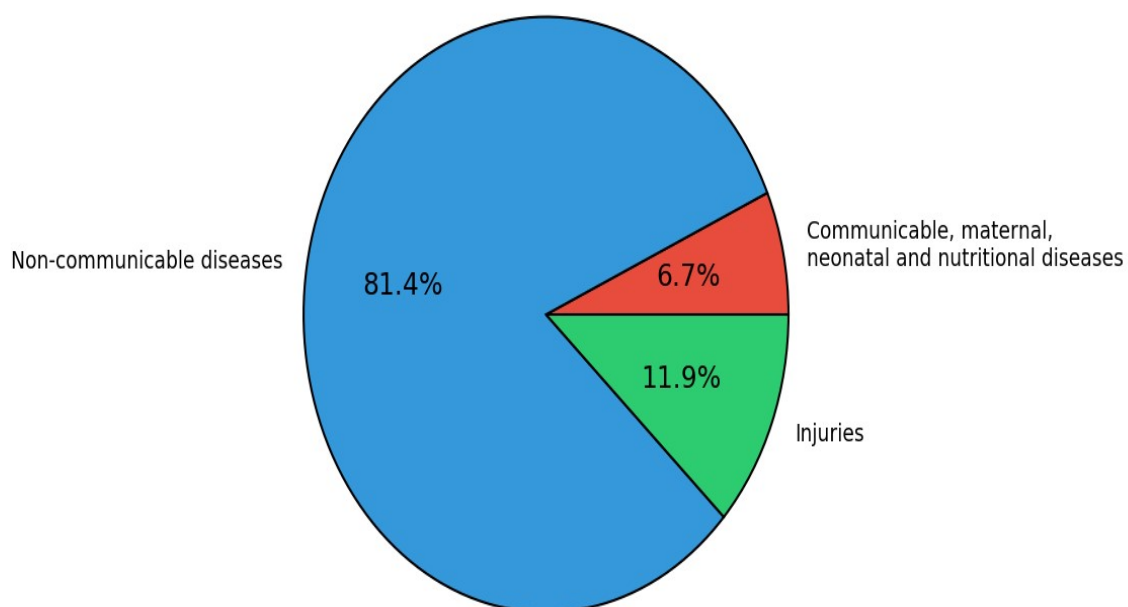
**Table.3.8 SmartVA analysed causes of deaths (for all ages, males and females combined)**

Cause of Deaths (All)	TVM		WYND		WYND Tribal		WYND Non-tribal		All	
	N	%	N	%	N	%	N	%	N	%
Stroke	482	26.6	442	18.4	127	19.2	315	18.1	924	21.9
Ischemic Heart Disease	244	13.5	343	14.3	59	8.9	284	16.3	587	13.9
Chronic Respiratory	151	8.3	254	10.6	37	5.6	217	12.5	405	9.6
Diabetes	124	6.8	138	5.8	39	5.9	99	5.7	262	6.2
Suicide	21	1.2	133	5.5	47	7.1	86	4.9	154	3.7
Chronic Kidney Disease	59	3.3	90	3.8	19	2.9	71	4.1	149	3.5
Other Non-communicable Diseases	45	2.5	73	3.0	36	5.5	37	2.1	118	2.8
Cirrhosis	29	1.6	61	2.5	19	2.9	42	2.4	90	2.1
Prostate Cancer	32	1.8	55	2.3	8	1.2	47	2.7	87	2.1
Falls	24	1.3	60	2.5	20	3.0	40	2.3	84	2.0
Esophageal Cancer	22	1.2	47	2.0	17	2.6	30	1.7	69	1.6
Other Injuries	50	2.8	8	0.3	3	0.5	5	0.3	58	1.4
Leukemia/Lymphomas	25	1.4	32	1.3	9	1.4	23	1.3	57	1.4
Breast Cancer	33	1.8	21	0.9	5	0.8	16	0.9	54	1.3
Stomach Cancer	19	1.1	35	1.5	6	0.9	29	1.7	54	1.3

Lung Cancer	10	0.6	38	1.6	3	0.5	35	2.0	48	1.1
Road Traffic	17	0.9	28	1.2	4	0.6	24	1.4	45	1.1
Cervical Cancer	17	0.9	26	1.1	8	1.2	18	1.0	43	1.0
TB	12	0.7	29	1.2	19	2.9	10	0.6	41	1.0
Other Cancers	8	0.4	30	1.3	13	2.0	17	1.0	38	0.9
Pneumonia	10	0.6	24	1.0	6	0.9	18	1.0	34	0.8
Poisonings	5	0.3	27	1.1	2	0.3	25	1.4	32	0.8
Drowning	14	0.8	9	0.4	1	0.2	8	0.5	23	0.6
Diarrhoea /Dysentery	2	0.1	13	0.5	6	0.9	7	0.4	15	0.4
Other Infectious Diseases	5	0.3	9	0.4	4	0.6	5	0.3	14	0.3
Homicide	4	0.2	9	0.4	4	0.6	5	0.3	13	0.3
Preterm Delivery	0	0.0	11	0.5	7	1.1	4	0.2	11	0.3
Fires	2	0.1	8	0.3	5	0.8	3	0.2	10	0.2
Other Cardiovascular Diseases	4	0.2	5	0.2	2	0.3	3	0.2	9	0.2
AIDS	1	0.1	4	0.2	3	0.5	1	0.1	5	0.1
Maternal	1	0.1	2	0.1	1	0.2	1	0.1	3	0.1
Neonatal Meningitis/Septic	0	0.0	3	0.1	3	0.5	0	0.0	3	0.1
Other Defined Causes of Child Deaths	1	0.1	2	0.1	0	0.0	2	0.1	3	0.1
Sepsis	0	0.0	3	0.1	1	0.2	2	0.1	3	0.1
Bite of Venomous Animal	1	0.1	1	0.0	1	0.2	0	0.0	2	0.1
Digestive Diseases	0	0.0	2	0.1	1	0.2	1	0.1	2	0.1
Meningitis	1	0.1	1	0.0	0	0.0	1	0.1	2	0.1
Birth asphyxia	0	0.0	1	0.0	0	0.0	1	0.1	1	0.0
Childhood Cancer	1	0.1	0	0.0	0	0.0	0	0.0	1	0.0

Colorectal Cancer	1	0.1	0	0.0	0	0.0	0	0.0	1	0.0
Measles	0	0.0	1	0.0	1	0.2	0	0.0	1	0.0
Stillbirth	0	0.0	1	0.0	1	0.2	0	0.0	1	0.0
Undetermined	336	18.5	322	13.4	114	17.3	208	12.0	658	15.6
<b>Total</b>	<b>1,813</b>	<b>100</b>	<b>2,401</b>	<b>100</b>	<b>661</b>	<b>100</b>	<b>1,740</b>	<b>100</b>	<b>4,214</b>	<b>100</b>

Among the determined causes, stroke and ischemic heart disease came into the first and second positions of probable causes of deaths in all population groups ( $\geq 12$  years).

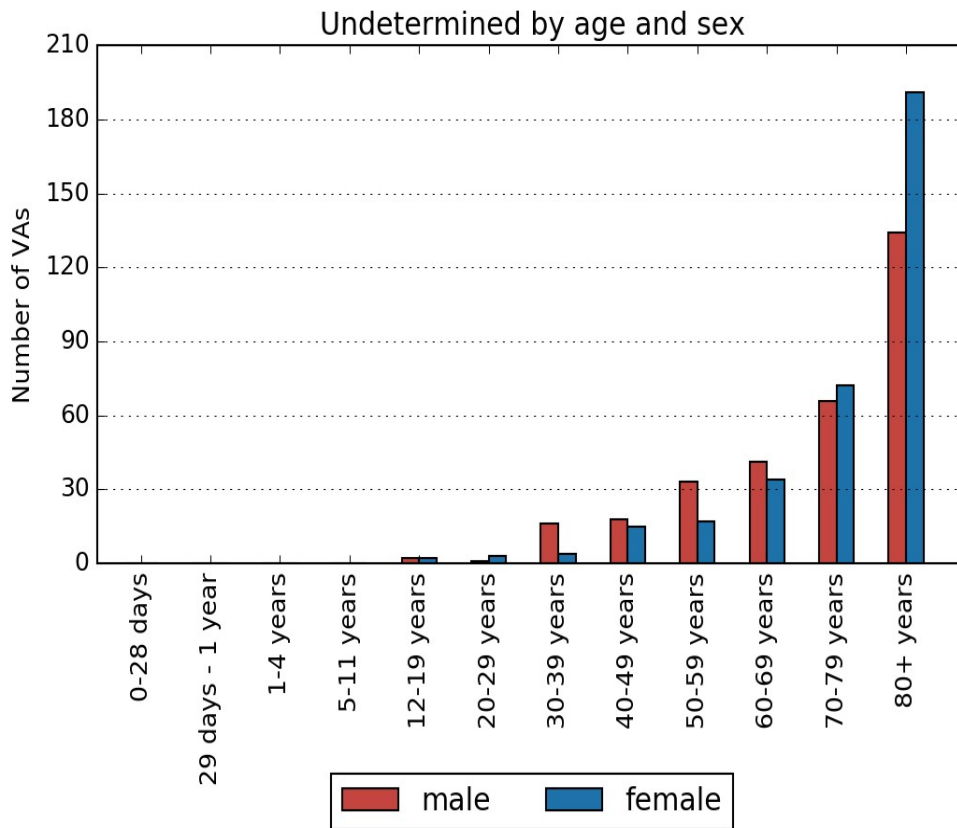


[Graph generated in SmartVA analyze]

**Figure 3.8 Deaths due to Non-communicable diseases (for all ages, males and females combined, N=4214)**

Overall, 81.4% of deaths are attributed to Non-communicable diseases (Figure 3.8)

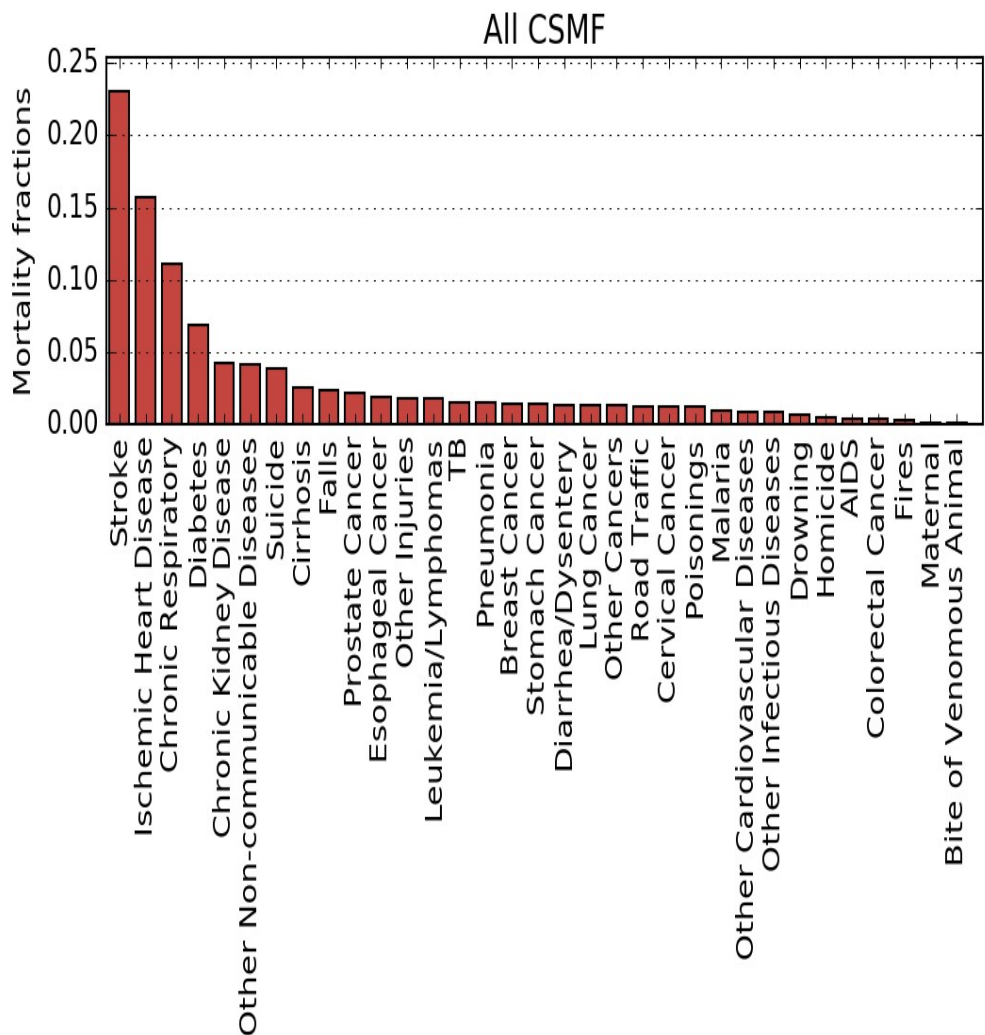
The percentage of undermined causes of death estimated by the Tariff method was 15.6%, and among males and females, causes of death were analysed as undetermined at 13% and 19%, respectively. Figure 3.9 shows that undetermined causes are more from the elderly population.



[Graph generated in SmartVA analyze]

**Figure 3.9 Distribution of undetermined causes of deaths among males and females**

Cause-Specific Mortality Fractions (CSMF) were estimated for each of the causes of death on the cause list for that age module. These graphs include the added weights that were applied from the undetermined VAs. The following graph shows the CSMF for all adolescent and adult deaths (combined for males and females).



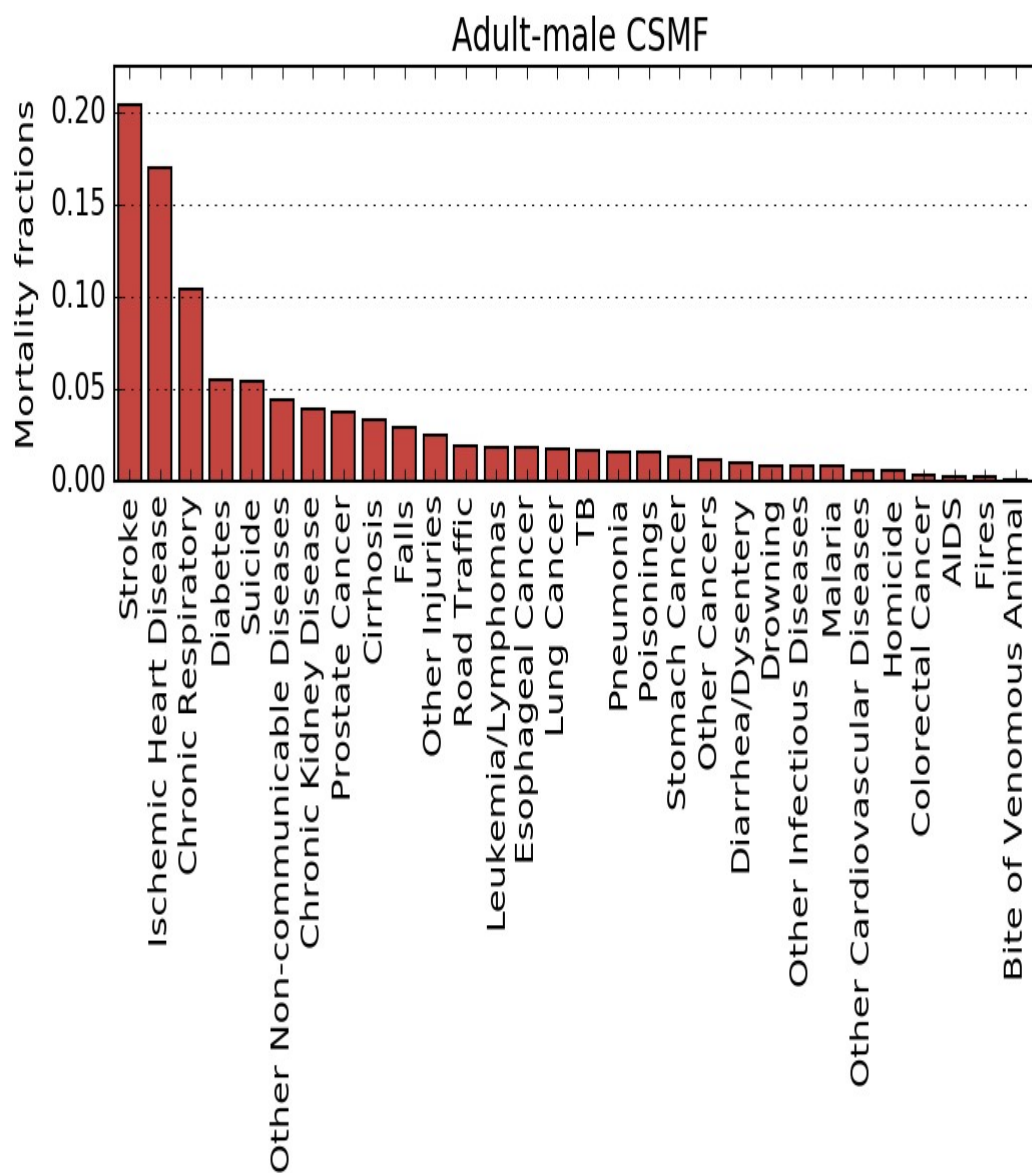
[Graph generated in SmartVA analyze]

**Figure 3.10 Cause Specific Mortality Fractions for all adolescents and adults (males and females combined, N=4172)**

Tables 3.9 and 3.10 show the causes of death among adolescents and adults ( $\geq 12$  years) separately for males and females in different populations under study.

**Table.3.9 SmartVA analysed causes of deaths (12 years and older- males)**

Cause of Deaths (Adolescents & adult males)	TVM		WYND		WYND Tribal		WYND Non-tribal		All	
	N	%	N	%	N	%	N	%	N	%
Stroke	247	24.8	226	16.1	77	20	149	14.7	473	19.7
Ischemic Heart Disease	147	14.8	226	16.1	40	10.4	186	18.3	373	15.6
Chronic Respiratory	62	6.2	159	11.3	23	6	136	13.4	221	9.2
Suicide	17	1.7	110	7.9	38	9.8	72	7.1	127	5.3
Diabetes	61	6.1	60	4.3	21	5.4	39	3.8	121	5.1
Prostate Cancer	32	3.2	55	3.9	8	2.1	47	4.6	87	3.6
Chronic Kidney Disease	35	3.5	47	3.4	11	2.9	36	3.5	82	3.4
Other Non- communicable Diseases	32	3.2	50	3.6	26	6.7	24	2.4	82	3.4
Cirrhosis	26	2.6	45	3.2	14	3.6	31	3.1	71	3
Falls	13	1.3	50	3.6	16	4.2	34	3.4	63	2.6
Other Injuries	45	4.5	7	0.5	2	0.5	5	0.5	52	2.2
Road Traffic	16	1.6	25	1.8	3	0.8	22	2.2	41	1.7
Esophageal Cancer	14	1.4	25	1.8	9	2.3	16	1.6	39	1.6
Lung Cancer	9	0.9	29	2.1	2	0.5	27	2.7	38	1.6
Leukemia/Lymphomas	18	1.8	18	1.3	1	0.3	17	1.7	36	1.5
Poisonings	4	0.4	25	1.8	1	0.3	24	2.4	29	1.2
Stomach Cancer	9	0.9	20	1.4	4	1	16	1.6	29	1.2
TB	10	1	18	1.3	12	3.1	6	0.6	28	1.2
Pneumonia	5	0.5	17	1.2	3	0.8	14	1.4	22	0.9
Other Cancers	6	0.6	14	1	4	1	10	1	20	0.8
Drowning	10	1	7	0.5	1	0.3	6	0.6	17	0.7
Homicide	4	0.4	6	0.4	2	0.5	4	0.4	10	0.4
Other Infectious Diseases	5	0.5	5	0.4	1	0.3	4	0.4	10	0.4
Diarrhoea/Dysentery	0	0	5	0.4	3	0.8	2	0.2	5	0.2
Fires	2	0.2	3	0.2	2	0.5	1	0.1	5	0.2
Other Cardiovascular Diseases	0	0	2	0.1	1	0.3	1	0.1	2	0.1
AIDS	0	0	1	0.1	1	0.3	0	0	1	0
Bite of Venomous Animal	0	0	1	0.1	1	0.3	0	0	1	0
Colorectal Cancer	1	0.1	0	0	0	0	0	0	1	0
Undetermined	166	16.7	146	10.4	59	15.3	87	8.6	312	13
<b>Total</b>	<b>996</b>	<b>100</b>	<b>1,402</b>	<b>100</b>	<b>386</b>	<b>100</b>	<b>1,016</b>	<b>100</b>	<b>2,398</b>	<b>100</b>

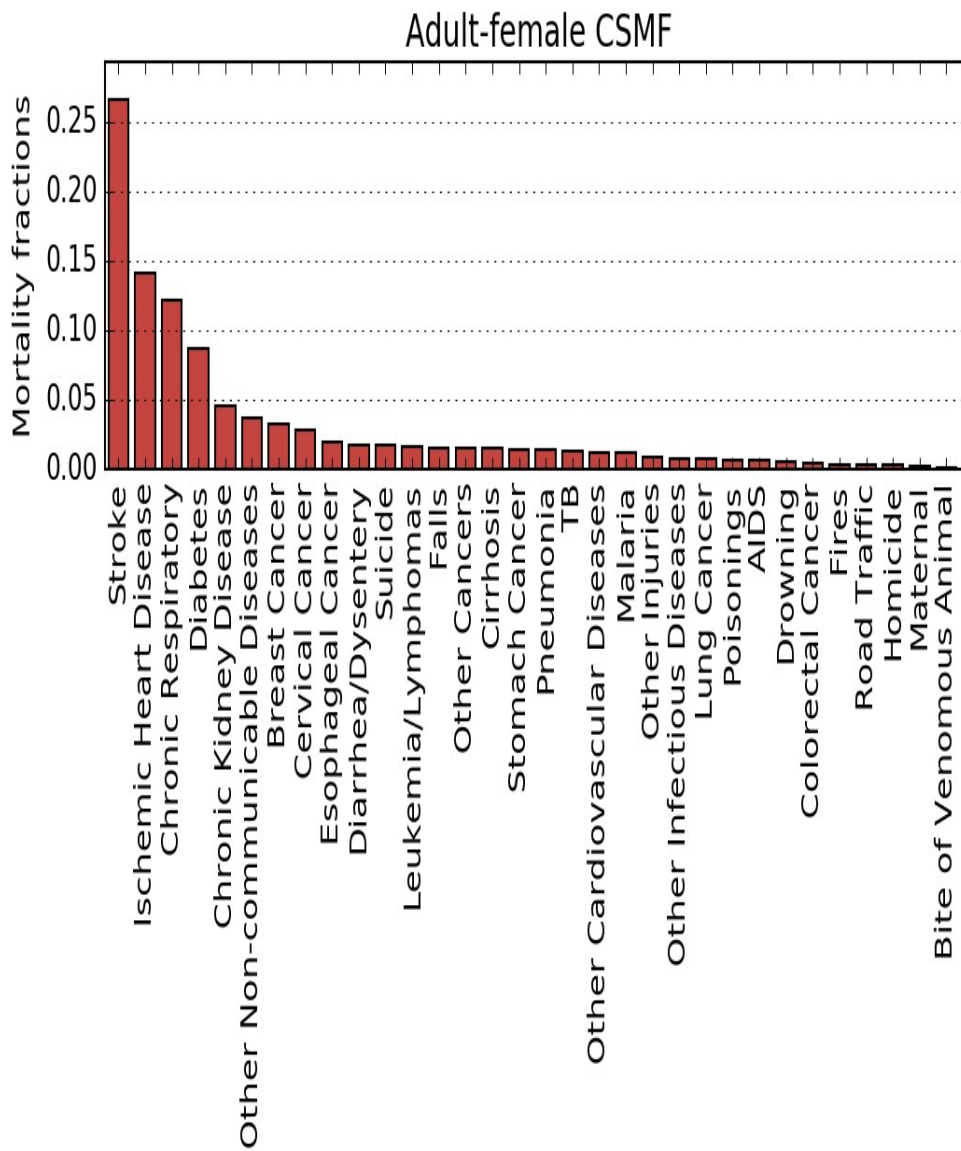


[Graph generated in SmartVA analyser]

**Figure 3.11 Cause Specific Mortality Fractions, adolescent and adult males (N=2398)**

**Table.3.10 SmartVA analysed causes of deaths (12 years and older- females)**

Cause of Deaths (Adolescents & adult females)	TVM		WYND		WYND Tribal		WYND Non-tribal		All	
	N	%	N	%	N	%	N	%	N	%
Stroke	235	29.0	216	22.4	50	19.8	166	23.4	451	25.4
Ischemic Heart Disease	97	12.0	117	12.2	19	7.5	98	13.8	214	12.1
Chronic Respiratory	89	11.0	95	9.9	14	5.6	81	11.4	184	10.4
Diabetes	63	7.8	78	8.1	18	7.1	60	8.4	141	8.0
Chronic Kidney Disease	24	3.0	43	4.5	8	3.2	35	4.9	67	3.8
Breast Cancer	33	4.1	21	2.2	5	2.0	16	2.3	54	3.0
Cervical Cancer	17	2.1	26	2.7	8	3.2	18	2.5	43	2.4
Other Non- communicable Diseases	13	1.6	23	2.4	10	4.0	13	1.8	36	2.0
Esophageal Cancer	8	1.0	22	2.3	8	3.2	14	2.0	30	1.7
Suicide	4	0.5	23	2.4	9	3.6	14	2.0	27	1.5
Stomach Cancer	10	1.2	15	1.6	2	0.8	13	1.8	25	1.4
Falls	11	1.4	10	1.0	4	1.6	6	0.8	21	1.2
Leukemia/Lymphomas	7	0.9	14	1.5	8	3.2	6	0.8	21	1.2
Cirrhosis	3	0.4	16	1.7	5	2.0	11	1.6	19	1.1
Other Cancers	2	0.3	16	1.7	9	3.6	7	1.0	18	1.0
TB	2	0.3	11	1.1	7	2.8	4	0.6	13	0.7
Lung Cancer	1	0.1	9	0.9	1	0.4	8	1.1	10	0.6
Diarrhoea/Dysentery	1	0.1	8	0.8	3	1.2	5	0.7	9	0.5
Other Cardiovascular Diseases	4	0.5	3	0.3	1	0.4	2	0.3	7	0.4
Pneumonia	4	0.5	3	0.3	0	0.0	3	0.4	7	0.4
Other Injuries	5	0.6	1	0.1	1	0.4	0	0.0	6	0.3
Drowning	3	0.4	2	0.2	0	0.0	2	0.3	5	0.3
Fires	0	0.0	5	0.5	3	1.2	2	0.3	5	0.3
AIDS	1	0.1	3	0.3	2	0.8	1	0.1	4	0.2
Maternal	1	0.1	2	0.2	1	0.4	1	0.1	3	0.2
Other Infectious Diseases	0	0.0	3	0.3	2	0.8	1	0.1	3	0.2
Poisonings	1	0.1	2	0.2	1	0.4	1	0.1	3	0.2
Road Traffic	1	0.1	2	0.2	1	0.4	1	0.1	3	0.2
Homicide	0	0.0	2	0.2	1	0.4	1	0.1	2	0.1
Bite of Venomous Animal	1	0.1	0	0.0	0	0.0	0	0.0	1	0.1
Undetermined	170	21.0	172	17.9	51	20.2	121	17.0	342	19.3
<b>Total</b>	<b>811</b>	<b>100</b>	<b>963</b>	<b>100</b>	<b>252</b>	<b>100</b>	<b>711</b>	<b>100</b>	<b>1774</b>	<b>100</b>



[Graph generated in SmartVA analyser]

**Figure 3.12 Cause Specific Mortality Fractions, females (N=1774)**

**Table .3.11 SmartVA analysed causes of deaths for Neonates (<=28 days old)**

<b>Cause of Deaths (Neonatal)</b>	<b>TVM</b>	<b>WYND</b>	<b>WYND Tribal</b>	<b>WYND Non-tribal</b>	<b>All</b>
Birth asphyxia	0	1	0	1	1
Digestive Diseases	0	1	0	1	1
Meningitis	1	0	0	0	1
Neonatal Meningitis/Sepsis	0	3	3	0	3
Other Defined Causes of Child Deaths	1	2	0	2	3
Pneumonia	1	1	1	0	2
Preterm Delivery	0	11	7	4	11
Sepsis	0	3	1	2	3
Stillbirth	0	1	1	0	1
Undetermined	0	1	1	0	1
<b>Total</b>	<b>3</b>	<b>24</b>	<b>14</b>	<b>10</b>	<b>27</b>

Three neonatal deaths were reported from Trivandrum and 24 from Wayanad. Preterm delivery was identified as the highest probable cause of death among neonates, determined by the Tariff method (11/27).

**Table .3.12 SmartVA analysed causes of deaths for Children (29 days-11 years old)**

<b>Cause of Deaths (Child)</b>	<b>TVM</b>	<b>WYND</b>	<b>WYND Tribal</b>	<b>WYND Non-tribal</b>	<b>All</b>
Childhood Cancer	1	0	0	0	1
Diarrhoea/Dysentery	1	0	0	0	1
Digestive Diseases	0	1	1	0	1
Drowning	1	0	0	0	1
Homicide	0	1	1	0	1
Measles	0	1	1	0	1
Meningitis	0	1	0	1	1
Other Infectious Diseases	0	1	1	0	1
Pneumonia	0	3	2	1	3
Road Traffic	0	1	0	1	1
Undetermined	0	3	3	0	3
<b>Total</b>	<b>3</b>	<b>12</b>	<b>9</b>	<b>3</b>	<b>15</b>

The deaths among children aged between more than 28 days and less than 12 years were lower than neonatal deaths, three from Trivandrum and 12 from Wayanad were recorded in the study through verbal autopsy survey. The cause of death was undetermined by smartVA for three deaths.

### **The agreement between Automated Verbal autopsy and Physician coded verbal autopsy**

The physician-coded verbal autopsy (PCVA) was conducted for 100 deaths, 50 each from the Thiruvananthapuram and Wayanad districts of Kerala. Among the 100 deceased individuals taken for the PCVA, more than half of the deaths took place at home (55%), 68% were above 60 years old, 46% were females, and about one-fourth of the deaths studied were from the tribal area, showing a similar distribution of characteristics for the sample as that in the overall data. However, a mismatch of respondents was found in 10% of the interviews.

Among the 100 deceased, 21 were determined as undetermined by the AVA, but only two were undetermined according to PVCA. PCVA identified causes of death for 20 cases that were undetermined from automated verbal autopsy (AVA).

The overall agreement between PCVA and AVA for the top single cause was 57%, while the agreement for the top three causes was found to be 61%. Agreement between PCVA and AVA for the top 3 causes, excluding the 21 undetermined cases by AVA, is 77.22% (N=79).

Hence, the assessments based on PVCA and AVA show good agreement in defining the causes of death for the majority of deaths. However, the probable reasons for the disagreement for the rest of the cases may be associated with the respondent mismatch, the interview mode, which is a telephonic interview for the PVCA (at the same time, the verbal autopsy survey was conducted in person by the field nurse), the difference in the tools used for cause of death assessment, and information bias due to the repeated interviews.

A detailed and clear examination of the data will be done to get a concise report based on this evaluation.

## **Strength and limitations**

The death-related assessments in Kerala are largely based on hospital deaths. The causes of death of the individuals who die at home will not be included in such reports, and a large majority of deaths at home will not have proper records on the causes of death; even in the death register, the adequate details regarding the causes are scarce. Here comes the importance of this study as this is a first of its kind in Kerala to cover the complete deaths in two geographical localities, including all deaths irrespective of whether the deaths happened at the hospital or home or on the way to the hospital or any other situations.

This study aimed to generate causes of death data for the tribal populations in Wayanad for a better understanding of the mortality and morbidity pattern in the population and to compare with general populations in the same area in Wayanad and Trivandrum. For evaluating the objectives, we achieved a good coverage of deaths from the study populations. In addition to the reported deaths from the field, we cross-checked the deaths registered in each LSGI every three months to cover any missing deaths in our repository. However, there were many deaths registered in the LSGIs that were unidentifiable by the health workers. It was partly due to the deaths that happened within the LSGIs, but the person may not be a permanent resident in the study location. However, the number of fatalities we covered from both locations was more than the number that we expected at the time of planning the survey. Also, the refusal to participate in the survey was negligible.

The research associates cross-checked every death survey conducted by the health worker before approving the VA survey uploaded in the ODK server. These regular evaluations and interim training for the field workers contributed to collecting good quality data with rich information for detailed evaluations.

The results provided in this report are only the preliminary observations and distributions based on the verbal autopsies conducted in the study and the causes determined by the SmartVA tool. The number of deaths and the percentages from the total deaths recorded in each population are given in this report, and no specific rate calculations were incorporated in this study report. So, the comparisons based on these tables should be with caution. The numbers and percentages given in the tables in the result section of this report may not be adequate to make accurate comparisons between the study populations

as the population size and structure of age and sex distribution will be different for different study locations and populations. Standardizations incorporating population-specific indicators such as sex and age distribution are needed to generate valid estimates for comparing study populations. We will conduct further analysis to generate such rates and create reports in the future to make valid and reliable comparisons.

## **Conclusion**

The automated verbal autopsies provide valuable information regarding the health indicators in the populations without extensive medical facilities or specialised physicians. It can provide rapid feedback on causes of death and allows prompt interventions or resource allocations from a public health perspective. Its accessibility, affordability and consistency in producing results will benefit poor or remote settings. It will give insights into disease patterns, trends, and risk factors within a population and strengthen the healthcare systems to better understand and address the healthcare needs in the communities. Implementing automated VA programs also provides opportunities to train local healthcare workers and build capacity in data collection, analysis, and interpretation.

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**To download the PHMRC full questionnaire and SmartVA analyze 2.2 Manual**

Use the following link for downloading the PHMRC full questionnaire for Verbal autopsy (English Version) and the SmartVA analyze 2.2 Manual for analysis and output interpretation.

**<https://www.healthdata.org/data-tools-practices/verbal-autopsy>**

**Annexure:1 Death information form for the informers (prepared in RedCap application)**

## മരണം റിപ്പോർട്ട് ചെയ്യുന്നതിനുള്ള ഫോം

AAA  
□ □

ശ്രീചിത്ര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജി , തിരുവനന്തപുരം

<b>1</b>	<b>ജില്ല</b> <small>* must provide value</small>	<input type="text"/>
<b>4</b>	<b>മരണപ്പെട്ടയാളുടെ പേര്</b> <small>* must provide value</small>	<input type="text"/>
<b>5</b>	<b>മരണപ്പെട്ടയാളുടെ ലിംഗഭേദം</b> <small>* must provide value</small>	<input type="button" value="ആൺ"/> <input type="button" value="പെൺ"/> <input type="button" value="മറ്റുള്ളവർ"/> <span style="float: right; font-size: x-small;">reset</span>
<b>6</b>	<b>_____ മരണപ്പെട്ട തീയതി</b> <small>* must provide value</small>	<input type="text"/> <input type="button" value="Today"/> <span style="font-size: x-small;">D.M.Y</span>
<b>7</b>	<b>_____ മരണപ്പെടുമ്പോഴുള്ള ഏകദേശ പ്രായം</b> <small>* must provide value</small>	<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> <input type="button" value="28 ദിവസത്തിൽ താഴെ (നവജാതശിശു)"/> <input type="button" value="12 വയസ്സിൽ കൂടുതൽ (കൗമാരക്കാർ , മുതിർന്നവർ)"/> </div> <div style="width: 45%;"> <input type="button" value="28 ദിവസം മുതൽ 11 വയസ്സുവരെ (കുട്ടികൾ)"/> <input type="button" value="അറിയില്ല"/> </div> </div> <span style="float: right; font-size: x-small;">reset</span>
<b>9</b>	<b>മരണപ്പെട്ടയാളുടെ വിലാസം/വീട്ടുപേര് / വീട്ടുനമ്പർ</b> <small>* must provide value</small>	<input style="width: 100%; height: 40px;" type="text"/> <span style="float: right; font-size: x-small;">Expand</span>
<b>11</b>	<b>കൂടുതൽ വിവരങ്ങൾക്കായി സമീപിക്കേണ്ട വ്യക്തിയുടെ പേര്</b> <small>* must provide value</small>	<input type="text"/>
<b>10</b>	<b>ലാൻഡ് മാർക്ക് (വീടിനു സമീപമുള്ള പ്രധാന കവല / ആരാധനാലയം / ഇടവഴി )</b>	<input type="text"/>
<b>12</b>	<b>____ , എന്ന വ്യക്തിക്ക് മരണപ്പെട്ടയാളുമായുള്ള ബന്ധം</b> <small>* must provide value</small>	<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> <input type="button" value="കുടുംബാംഗം"/> <input type="button" value="അയൽവാസി"/> </div> <div style="width: 45%;"> <input type="button" value="ബന്ധു"/> <input type="button" value="മറ്റുള്ളവർ"/> </div> </div> <span style="float: right; font-size: x-small;">reset</span>
<b>13</b>	<b>_____ എന്ന വ്യക്തിയുടെ ഫോൺ നമ്പർ</b>	<input type="text"/>
<b>14</b>	<b>ഈ വിവരങ്ങൾ ഞങ്ങളെ അറിയിക്കുന്നത്</b> <small>* must provide value</small>	<div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> <input type="button" value="വാർഡ് മെമ്പർ"/> <input type="button" value="ആശ വർക്കർ"/> </div> <div style="width: 45%;"> <input type="button" value="അജ്ഞാത വർക്കർ"/> <input type="button" value="മറ്റുള്ളവർ"/> </div> </div> <span style="float: right; font-size: x-small;">reset</span>
<b>15</b>	<b>താങ്കളുടെ പേര്</b> <small>* must provide value</small>	<input type="text"/>
<b>16</b>	<b>____ , താങ്കളുടെ ഫോൺ നമ്പർ</b> <small>* must provide value</small>	<input type="text"/>

Powered by REDCap

## **Annexure:2 Information Sheet and Consent form English**

**Achutha Menon Centre for Health Science Studies,  
Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum  
Thiruvananthapuram - 695011, Kerala.**

### **Information Sheet**

“My name is [.....]. I am an interviewer for a study conducted by Sree Chitra Tirunal Institute for Medical Sciences and Technology, Trivandrum. I got the information that a death has occurred in your household. I am very sorry to hear that a member of your family has passed away. Please accept my sympathies.

To improve healthcare, we are collecting information on all recent deaths in this area. I wish to talk to the mother or primary caretaker of [the deceased’s name] and ask some questions about the events and any symptoms that [the deceased’s name] had during her/his illness before death.

The study details are given below.

**Study Title:** Documenting cause of death among tribal population through automated verbal autopsy using Information and communication technology (ICT)

**Purpose of the study:** The proposed research is a survey using automated verbal autopsy tools, among close relatives of individuals who died in the study area, to assess the causes of death among tribal and nontribal populations in Wayanad and compare the death profile with that of the general population in Trivandrum.

**Your participation:** If you are willing to share the information related to the death of the diseased, I will administer an interview with you, and it will last 45-60 minutes. I will record the information given by you. I may contact you again only if it is found that information documented is either incomplete or any further clarification is needed.

**Benefits from the study:** The study will not directly benefit you. There will be no incentive in any form for participating in the study. We hope that this research will help us to explore the underlying risk factors of death in the population.

**Possible harms from the study:** This study requires you to recall & report the events or any symptoms that [the deceased’s name] had during her/his illness before death, which may make you uncomfortable. In such a case, you are free to take time to answer, or if you are not willing to answer, you can ask me to skip the question. If still, you are not ready to explain further, you will be free to terminate the interview without any obligation.

**Confidentiality of your data:** I would like to assure you that whatever information you share will be kept confidential and will only be accessible to the present research purpose. Your details will not be shared with anyone at any stage. The data other than your

identifiers will be used for the analysis of the study & results of the survey will be published and presented. We will not disclose your identity to anybody, and the provided information will be kept confidential. Only a collective summary of the results will be published in scientific journals.

**Withdrawal from the study:** Your participation in the survey will be entirely voluntary. You are free and have the right to withdraw during the interview at any time. There will be no penalty for withdrawal or not participating in the study. If you feel not comfortable, you can withdraw your participation at any point of time without any explanation. If you have any queries or doubts related to this study, please feel free to ask. We shall do our best to answer you. You may also contact the investigators directly or by phone.

### **Investigators**

Principal investigator: Dr.Jissa VT, Scientist C, AMCHSS , SCTIMST.  
Phone- 0471-2-524270 (office), e-mail:[jissa@sctimst.ac.in](mailto:jissa@sctimst.ac.in)

Co-Principal Investigator: Dr.Biju Soman, Professor, AMCHSS , SCTIMST,  
Phone-0471-2-524230, e-mail: [bijusoman@sctimst.ac.in](mailto:bijusoman@sctimst.ac.in)

Co- Investigator: Mr.Suresh Kumar B, Engineer E, Computer Division, SCTIMST  
Sree Chitra Tirunal Institute for Medical Sciences and Technology  
Medical College PO, Trivandrum.

If you have any doubt/query on the authentication of this study, you may contact the  
**SCTIMST Institutional Ethics Committee Secretary –**  
Dr.Srinivas G; Contact No. – 0471-2524689  
Sree Chitra Tirunal Institute for Medical Sciences and Technology  
Medical College PO, Trivandrum.

Are you willing to participate in the study? - Yes / No.

If yes – please fill up and give a signature/thumb impression on the informed consent provided.

## Consent form

I \_\_\_\_\_, have read/heard and understood all the information provided in the 'information sheet'. By signing/putting thumb impression, I confirm my voluntary participation in this study. Also, the nurse/interviewer clearly explained to me about this study. I understand that my participation is entirely voluntary, and I am free to discontinue the study at any time. Also, I know that my identity and the given information will be kept strictly confidential. I do agree to take part in this study. I received a copy of the information sheet and the signed consent form.

Signature of the respondent or

Thumb impression (if unable to sign):

Date:

Place:

Name of field interviewer:

Signature:

Name of Witness:

Signature:

**Annexure:3. Information Sheet and Consent form Malayalam**

**അച്ചുത മേനോൻ സെന്റർ ഫോർ ഹെൽത്ത് സയൻസ് സ്റ്റഡീസ്,  
ശ്രീ ചിത്ര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ്  
ആൻഡ് ടെക്നോളജി, ട്രീവാൻഡ്രം , തിരുവനന്തപുരം, 695011 .**

**പഠന വിവരണം**

"എന്റെ പേര് [.....]. തിരുവനന്തപുരത്തെ ശ്രീ ചിത്ര തിരുനാൾ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജി നടത്തുന്ന ഒരു പഠനവുമായി ബന്ധപ്പെട്ട് ഒരു അഭിമുഖം നടത്തുന്നതിനാണ് ഞാൻ വന്നത് . നിങ്ങളുടെ വീട്ടിൽ ഒരു മരണം സംഭവിച്ചുവെന്ന വിവരം എനിക്ക് ലഭിച്ചു. നിങ്ങളുടെ കുടുംബത്തിലെ ഒരാൾ അന്തരിച്ചുവെന്നറിഞ്ഞതിൽ എനിക്ക് വളരെ വേദമുണ്ട്. എന്റെ അനുശോചനം അറിയിക്കുന്നു.

ആരോഗ്യ പരിരക്ഷ മെച്ചപ്പെടുത്തുന്നതിന്, ഈ പ്രദേശത്തെ സമീപകാല മരണങ്ങളെക്കുറിച്ചുള്ള വിവരങ്ങൾ ഞങ്ങൾ ശേഖരിക്കുന്നുണ്ട്. [മരണപ്പെട്ടയാളുടെ] പ്രാഥമിക പരിപാലകനോട് സംസാരിക്കാനും മരണത്തിന് മുമ്പ് [മരണപ്പെട്ടയാളുടെ പേര്] അദ്ദേഹത്തിന്റെ/അവരുടെ അസുഖവുമായി ബന്ധപ്പെട്ടു ഉണ്ടായ സംഭവങ്ങളെക്കുറിച്ചും അസുഖ ലക്ഷണങ്ങളെക്കുറിച്ചും ചില ചോദ്യങ്ങൾ ചോദിക്കാനും ഞാൻ ആഗ്രഹിക്കുന്നു. പഠന വിശദാംശങ്ങൾ ചുവടെ നൽകിയിരിക്കുന്നു.

**പഠന ശീർഷകം:** ഇൻഫർമേഷൻ ആന്റ് കമ്മ്യൂണിക്കേഷൻ ടെക്നോളജി (ഐസിടി) ഉപയോഗിച്ച് വിവരശേഖരണത്തിലൂടെ മരണകാരണം രേഖപ്പെടുത്തുന്നു.

**പഠനത്തിന്റെ ഉദ്ദേശ്യം:** പഠനമേഖലയിൽ മരണമടഞ്ഞ വ്യക്തികളുടെ അടുത്ത ബന്ധുക്കൾക്കിടയിൽ നടത്തുന്ന വിവരശേഖരണത്തിലൂടെ, വയനാട്ടിലെ ആദിവാസി, ഇതര വിഭാഗങ്ങളുടെ ഇടയിലുള്ള മരണകാരണങ്ങൾ രേഖപ്പെടുത്തുന്നതിനും, തിരുവനന്തപുരത്തെ ജനങ്ങളുടെ ഇടയിലുള്ള മരണകാരണങ്ങളുമായി ഒരു താരതമ്യം നടത്തുന്നതിനും വേണ്ടിയുള്ള ഒരു സർവ്വേയാണ് ഇത്.

**നിങ്ങളുടെ പങ്കാളിത്തം:** രോഗികളുടെ മരണവുമായി ബന്ധപ്പെട്ട വിവരങ്ങൾ പങ്കിടാൻ നിങ്ങൾ തയ്യാറാണെങ്കിൽ, ഞാൻ നിങ്ങളുമായി ഒരു അഭിമുഖം നടത്തും, ഇത് 45-60 മിനിറ്റ് നീണ്ടുനിൽക്കും. നിങ്ങൾ നൽകിയ വിവരങ്ങൾ ഞാൻ രേഖപ്പെടുത്തും. രേഖപ്പെടുത്തിയ വിവരങ്ങൾ അപൂർണ്ണമാണെന്നോ കൂടുതൽ വ്യക്തത ആവശ്യമാണെന്നോ കണ്ടെത്തിയാൽ മാത്രമേ ഞാൻ നിങ്ങളെ വീണ്ടും ബന്ധപ്പെടുകയുള്ളൂ.

**പഠനത്തിൽ നിന്നുള്ള നേട്ടങ്ങൾ:** പഠനം നിങ്ങൾക്ക് നേരിട്ട് പ്രയോജനം ചെയ്യില്ല. എന്നാൽ നമ്മുടെ സമൂഹത്തിലുണ്ടാകുന്ന മരണകാരണങ്ങൾ വിശദമായി മനസ്സിലാക്കുന്നതിനു ഈ വിവരശേഖരണം സഹായിക്കുമെന്ന് ഞങ്ങൾ പ്രതീക്ഷിക്കുന്നു.

**നിങ്ങൾക്കു ഏന്തെങ്കിലും ബുദ്ധിമുട്ടു ഉണ്ടാകുമോ:** മരണത്തിന് മുമ്പ് [മരണപ്പെട്ടയാളുടെ പേര്] അവളുടെ / അവന്റെ അസുഖത്തിനിടെയുണ്ടായ

സംഭവങ്ങളോ ഏതെങ്കിലും ലക്ഷണങ്ങളോ ഓർമ്മിക്കാനും റിപ്പോർട്ടുചെയ്യാനും ആണ് ഈ പഠനം ആവശ്യപ്പെടുന്നത്. അത്തരം ഓർമകൾ നിങ്ങളെ ചിലപ്പോൾ വിഷമപ്പെടുത്തുകയോ അസ്വസ്ഥരാക്കുകയോ ചെയ്തേക്കാം. അത്തരമൊരു സാഹചര്യത്തിൽ, ഉത്തരം നൽകാൻ നിങ്ങൾക്ക് സമയമെടുക്കാൻ സ്വാതന്ത്ര്യമുണ്ട്, അല്ലെങ്കിൽ നിങ്ങൾ ഉത്തരം നൽകാൻ തയ്യാറല്ലെങ്കിൽ, ചോദ്യം ഒഴിവാക്കാൻ നിങ്ങൾക്ക് എന്നോട് ആവശ്യപ്പെടാം. ഇപ്പോഴും, കൂടുതൽ വിശദീകരിക്കാൻ നിങ്ങൾ തയ്യാറല്ലെങ്കിൽ, ഒരു ബാധ്യതയുമില്ലാതെ അഭിമുഖം അവസാനിപ്പിക്കാൻ നിങ്ങൾക്ക് സ്വാതന്ത്ര്യമുണ്ട്.

**നിങ്ങൾ നൽകുന്ന വിവരങ്ങളുടെ രഹസ്യാത്മകത:** നിങ്ങൾ പങ്കിടുന്ന ഏത് വിവരവും രഹസ്യാത്മകമായി സൂക്ഷിക്കുമെന്നും നിലവിലുള്ള ഗവേഷണ ഉദ്ദേശ്യത്തിലേക്ക് മാത്രമേ ഇത് ഉപയോഗിക്കൂ എന്നും ഞാൻ നിങ്ങൾക്ക് ഉറപ്പ് നൽകുന്നു. നിങ്ങളുടെ വിശദാംശങ്ങൾ ഒരു ഘട്ടത്തിലും ആരുമായും പങ്കിടില്ല. നിങ്ങളുടെ വ്യക്തിവിവരങ്ങൾ ഒഴികെയുള്ള വിവരങ്ങൾ പഠനത്തിന്റെ വിശകലനത്തിനായി ഉപയോഗിക്കുകയും സർവ്വേ ഫലങ്ങൾ പ്രസിദ്ധീകരിക്കുകയും അവതരിപ്പിക്കുകയും ചെയ്യും. നിങ്ങളുടെ വ്യക്തിഗതവിവരങ്ങൾ ഞങ്ങൾ ആരോടും വെളിപ്പെടുത്തില്ല, നൽകിയ വിവരങ്ങൾ രഹസ്യാത്മകമായി സൂക്ഷിക്കും. ഫലങ്ങളുടെ സംഗ്രഹം മാത്രമേ ശാസ്ത്ര ജേണലുകളിൽ പ്രസിദ്ധീകരിക്കുകയുള്ളൂ.

**പഠനത്തിൽ നിന്ന് പിൻവാങ്ങൽ:** സർവ്വേയിലെ നിങ്ങളുടെ പങ്കാളിത്തം പൂർണ്ണമായും സ്വമേധയാ ആയിരിക്കും. നിങ്ങൾക്ക് ബുദ്ധിമുട്ടു തോന്നുന്ന പക്ഷം അഭിമുഖത്തിനിടെ നിങ്ങൾക്കു പിന്മാറാൻ അവകാശമുണ്ട്. പിൻവാങ്ങുന്നതിനോ പഠനത്തിൽ പങ്കെടുക്കാതിരിക്കുന്നതിനോ യാതൊരു പ്രശ്നവുമില്ല. നിങ്ങൾക്ക് തോന്നുകയാണെങ്കിൽ, വിശദീകരണമില്ലാതെ ഏത് സമയത്തും നിങ്ങളുടെ പങ്കാളിത്തം പിൻവലിക്കാം.

ഈ പഠനവുമായി ബന്ധപ്പെട്ട് നിങ്ങൾക്ക് എന്തെങ്കിലും ചോദ്യങ്ങളോ സംശയങ്ങളോ ഉണ്ടെങ്കിൽ, ദയവായി ചോദിക്കാൻ മടിക്കേണ്ടതില്ല. നിങ്ങൾക്ക് ഉത്തരം നൽകാൻ ഞങ്ങൾ പരമാവധി ശ്രമിക്കും. നിങ്ങൾക്ക് നേരിട്ട് അല്ലെങ്കിൽ ഫോണിലൂടെ അന്വേഷകരെ ബന്ധപ്പെടാം.

പ്രധാന ഗവേഷക: ഡോ.ജിസ്സ വി.ടി, സയന്റിസ്റ്റ് സി, എ.എം.സി.എച്ച്.എസ്.എസ്.  
ഫോൺ- 0471-2-524270 (ഓഫീസ്), ഇ-മെയിൽ: [jissa@sctimst.ac.in](mailto:jissa@sctimst.ac.in)

പ്രധാന ഗവേഷകൻ: ഡോ. ബിജുസോമൻ, പ്രൊഫസർ,  
എ.എം.സി.എച്ച്.എസ്.എസ്, ഫോൺ -0471-2-524230, ഇ-മെയിൽ:  
[bijusoman@sctimst.ac.in](mailto:bijusoman@sctimst.ac.in)

ഗവേഷകൻ : ശ്രീ. സുരേഷ് കുമാർ ബി, എഞ്ചിനീയർ ഇ, കമ്പ്യൂട്ടർ ഡിവിഷൻ, ശ്രീ ചിത്ര തിരുനാൽ ഇൻസ്റ്റിറ്റ്യൂട്ട് ഫോർ മെഡിക്കൽ സയൻസസ് ആൻഡ് ടെക്നോളജിമെഡിക്കൽ കോളേജ് പി.ഒ, തിരുവനന്തപുരം.

ഈ പഠനത്തിന്റെ സാധ്യതയെ കുറിച്ചു നിങ്ങൾക്ക് എന്തെങ്കിലും സംശയം / അന്വേഷണം ഉണ്ടെങ്കിൽ, നിങ്ങൾക്ക് SCTIMST ഇൻസ്റ്റിറ്റ്യൂഷണൽ റിവ്യൂ ബോർഡ് മെമ്പർ സെക്രട്ടറി - ഡോ. ജി ശ്രീനിവാസുമായി ബന്ധപ്പെടാം. ബന്ധപ്പെടേണ്ട നമ്പർ - 04712524689

പഠനത്തിൽ പങ്കെടുക്കാൻ നിങ്ങൾ തയ്യാറാണോ? - അതെ അല്ല.  
ഉണ്ടെങ്കിൽ - ദയവായി അറിയിച്ച സമ്മതത്തെക്കുറിച്ച് താഴെ കൊടുത്തിരിക്കുന്ന ഫോം പൂരിപ്പിച്ചു ഒരു ഒപ്പ്/ തള്ളവിരൽ അടയാളം നൽകുക.

### അനുമതി പത്രം

പഠനവിവരണത്തിൽ നൽകിയിട്ടുള്ള എല്ലാ വിവരങ്ങളും ഞാൻ വായിക്കുകയും കേൾക്കുകയും മനസ്സിലാക്കുകയും ചെയ്തു. ഒപ്പിടുന്നതിലൂടെ / പെരുവിരൽ അടയാളം നൽകുന്നതിലൂടെ, ഈ പഠനത്തിലെ എന്റെ സ്വമേധയാ ഉള്ള പങ്കാളിത്തം ഞാൻ സ്ഥിരീകരിക്കുന്നു. കൂടാതെ, ഈ പഠനത്തെക്കുറിച്ച് നഴ്സ് / അഭിമുഖം നടത്തുന്ന ആൾ എന്നോട് വ്യക്തമായി വിശദീകരിച്ചു. എന്റെ പങ്കാളിത്തം പൂർണ്ണമായും സ്വമേധയാ ഉള്ളതാണെന്ന് ഞാൻ മനസ്സിലാക്കുന്നു, എപ്പോൾ വേണമെങ്കിലും വിവരങ്ങൾ നൽകുന്നത് നിർത്താൻ എനിക്ക് സ്വാതന്ത്ര്യമുണ്ട്. കൂടാതെ, ഞാൻ നൽകിയ എന്റെ വ്യക്തിഗത വിവരങ്ങളും, മരണപ്പെട്ട ആളുടെ വിവരങ്ങളും കർശനമായി രഹസ്യമായി സൂക്ഷിക്കുമെന്ന് എനിക്കറിയാം. ഈ പഠനത്തിൽ പങ്കെടുക്കാൻ ഞാൻ സമ്മതിക്കുന്നു. പഠനവിവരണത്തിന്റെയും ഒപ്പിട്ട സമ്മതപത്രത്തിന്റെയും ഒരു പകർപ്പ് എനിക്ക് ലഭിച്ചു.

പ്രതികരിക്കുന്നയാളുടെ ഒപ്പ് അല്ലെങ്കിൽ

പെരുവിരൽ അടയാളം (ഒപ്പിടാൻ കഴിയുന്നില്ലെങ്കിൽ):

തീയതി:

സ്ഥലം:

അഭിമുഖം നടത്തുന്ന ആളിന്റെ പേര്:

കയ്യൊപ്പ്:

സാക്ഷിയുടെ പേര്:

കയ്യൊപ്പ്



Dr Biju Soman ( HOD AMCHSS)/ (Co-PI of the project), Dr Jissa VT (PI), Suresh Kumar G (Engineer G, Co Investigator of the Project), Ramya PM (Senior Project Associate) and Sabeley Jose (Research Associate- Trivandrum) along with nurses from Trivandrum during a refresher training programme



Dr Jissa VT (PI), Ramya P M (Senior Project Associate) and Shamsudheen E (Research Associate- Wayanad) along with Nurses during a training program in Wayanad.



Interactive session with Field Data Collectors in Wayanad during refresher training



Interactive sessions with Field Data Collectors - Trivandrum



During field visit @ Waynanad

For any queries related to the study:  
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