

A Comparative Study of Diseases Prevalence among Tribal Women in Different Villages of Khowai District, Tripura: A Hospital Data - Using GIS

Palaniyandi Masimalai¹, Jebina Kaipeng², Probhu Boro³

¹Associate Professor, ²Graduate student, ³Research Scholar, Department of Geography and Disaster Management (Health and Medical Geography) Tripura University (A Central University), Suryamaninagar, Tripura (W), India.

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Abstract

The both communicable and non-communicable diseases that are interfering with normal biological functions which cause mortality or misery on a physical, psychological, or social level impact. Numerous things might cause it, such as infections, genetic flaws, dietary inadequacies, environmental influences, or even lifestyle decisions. The present study is made to assess the disease's prevalence among tribal women in different villages of Khowai district in Tripura. The study focuses on understanding the health conditions of tribal women based on the government hospital registry. The mapping of spatial distribution and pattern of women cases is carried out using GIS (Geographic Information System) the study shows the diffusion of diseases across the district. In order to determine the frequency of the diseases in the district, the side specification of 499 cases were analysed, and the result revealed that the categorization of diseases, such as; fever, stomach discomfort, anaemia, weakness, infections, and respiratory issues, are classified. The most affected age-group of 21-30, and 41-50 are found in the three villages namely; Kalyanpur, Tulakshikhar, and Champa Hour. The results revealed that a Chi-square value (X^2) of 15.03, and p-value < 0.005 , and hence, the disease prevalence is statistically high significant with the age groups of 21-30 and 41-50, are the most affected susceptible women community in the district. The study also examined variables that may impact disease transmission and healthcare availability, such as temperature, slope, and rainfall. This study emphasises the need for improved healthcare infrastructure, education, and prompt treatment among tribal communities.

Key words: Communicable and Non-communicable diseases, spatial distribution, health care delivery services, women community, Geographic Information System (GIS)

Introduction

The availability and accessibility of hospitals, including primary health centres (PHCs), sub-centres, and private hospitals and health clinics in

various places are referred to as the spatial dispersion of healthcare delivery services. The unequal distribution of healthcare facilities in Khowai district, thickly populated tribal areas, frequently reported

Corresponding Author: Palaniyandi Masimalai, Associate Professor, Department of Geography and Disaster Management (Health and Medical Geography) Tripura University (A Central University), Suryamaninagar, Tripura (W), India.

E-mail: palaniyandimasimalai@tripurauniv.ac.in

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issues like stretched travel times, a lack of health care clinical service centres, and hospitals with poor infrastructure facilities. Further influencing healthcare-seeking behaviour are traditional beliefs and reliance on indigenous healing methods, which can occasionally postpone or replace contemporary medical interventions among the tribal community. To find service delivery gaps and provide the efficient health care clinical services, it is crucial to comprehend the spatial distribution of healthcare services in the Khowai district. The purpose of this study is to evaluate the current healthcare system, how easily tribal groups may use it, and what all the factors affect clinical service utilisation. Teenage gestation, practices, and utilisation of Reproductive and Child Health (RCH) Services by the ethnic and Non- ethnic population of West and South Tripura shows the frequency of adolescent gestation.

The use of reproductive and child health (RCH) services by both tribal and non-tribal people in West and South Tripura are excavated^{1,2}. Outbreak of waterborne acute diarrheal disease in a South District village of Tripura needs a public health emergency in the Northeast region of India³. Pulmonary function of adolescents from Tripura gives the information on respiratory health and evaluates the pulmonary function of teenagers among the racial inhabitants in the area, Tripura⁴. A determinant of child commerce rate in West and South Tripura, India provides the information on demographic trends of tribal communities¹. A Comprehensive Rural Health Project highlights the contribution of village healthcare

workers enhancing the health of tribal and rural communities⁵. The accessibility and economic aspects are important to tribal women when it comes to institutional births in rural India^{6,7}. The mixed-methods provides how cultural practices, beliefs, and perceptions affect how people seek medical attention and how they use maternal and new-born health services in Northeast Indian among the tribal communities⁸. A study of non-communicable diseases risk factors among the tribal population of Tripura, facing tribal adolescent girls in Tripura, to use various ailments, and provides information on the life-course⁹.

Study Area

Khowai district, in the north-eastern state of Tripura, India, is distinguished by its various tribal people and distinctive natural features. The Atharamura range to the east and the Baramura range to the west border the district, which is named after the Khowai River. The district's healthcare system consists of one district hospital (Khowai Hospital), five Public Health Centres (PHCs), and 43 health sub-centres (Fig.1). The district's rugged terrain, extensive forests, and scattered rural settlements all have an impact on healthcare service accessibility and distribution. The tribal tribes rely heavily on traditional medicine and government-provided healthcare, but access is inconsistent across the region. The district's healthcare system consists of one district hospital, several Public Health Centres (PHCs), health sub-centres, and a few private healthcare providers.

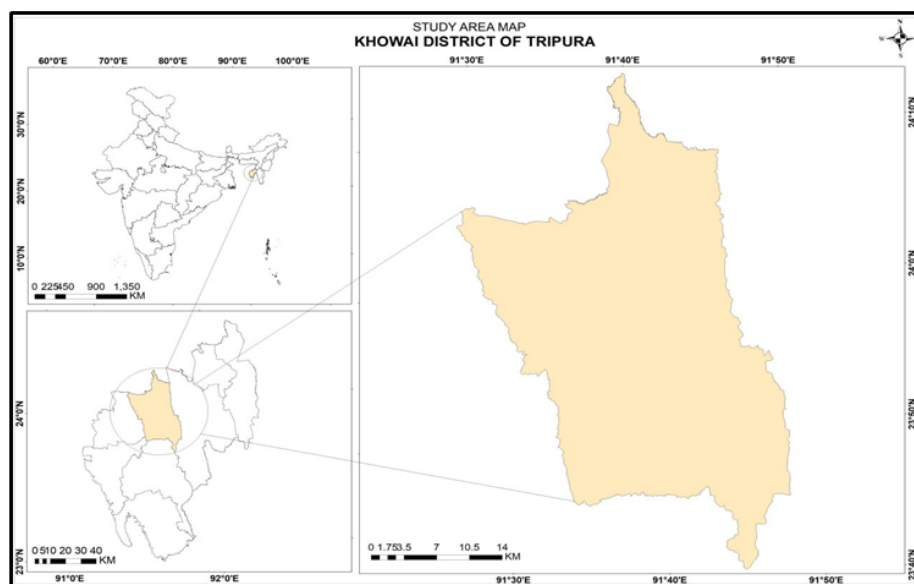


Fig 1. Study area-Khowai District, Tripura

Objectives

1. To mapping the spatial distribution of women's patients in different villages in Khowai district, Tripura
2. To study the diseases prevalence among tribal women in different villages of Khowai district, Tripura
3. To evaluate the accessibility of the healthcare facilities, and study the healthcare seeking behavior of tribal women in different villages in the Khowai district, Tripura

Material and Methods

The clinical data are pertaining to the OPD patients of tribal women's patients' collected from the government district hospital registry. The Quantum Geographical Information System (QGIS) 3.30.1 and Statistical Package for Social Scientists (SPSS) IBM SPSS Statistics 21.0 are used for mapping the spatial distribution and the geographical analysis of the patient's clusters of both vertical and horizontal structure of the diseases. Totally, 499 tribal women's patients are collected from district hospital Khowai,

Tripura, and are exported to the QGIS platform for mapping the spatial distribution of tribal women patients for the period of 2020 -2024. The longitudes and latitudes are generated from the Google map and Google earth pro for mapping patient's household site specification. Hospital OPD data are analysed using geo-statistical tools to assess the affected vulnerable age groups.

Result and Discussion

The mappings of spatial distribution of 499 women's patients in Khowai district are carried out the year 2020-2024 (Fig.2). It is observed that the patient's site specifications are found ubiquitous and random spatial distribution in the different villages across the district. The most affected villages of Khowai district, which have the highest concentration of patients. Among the 499 cases of women's patients these are the most affected villages that have the high suggesting of Khowai area may be a hotspot for women's health care issues.

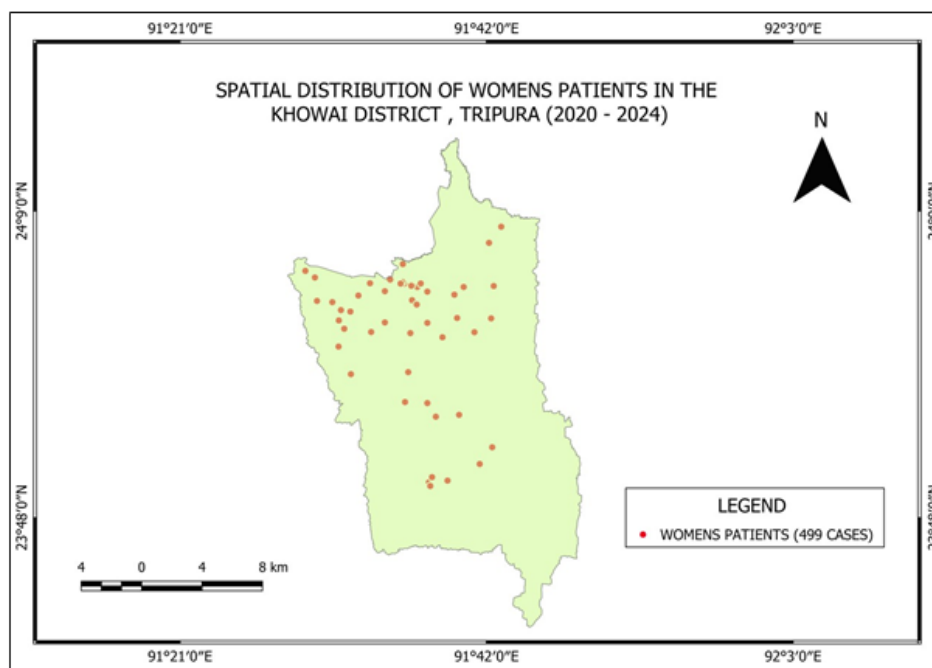


Fig 2. Spatial Distribution of Women's Patients in Khowai District, Tripura

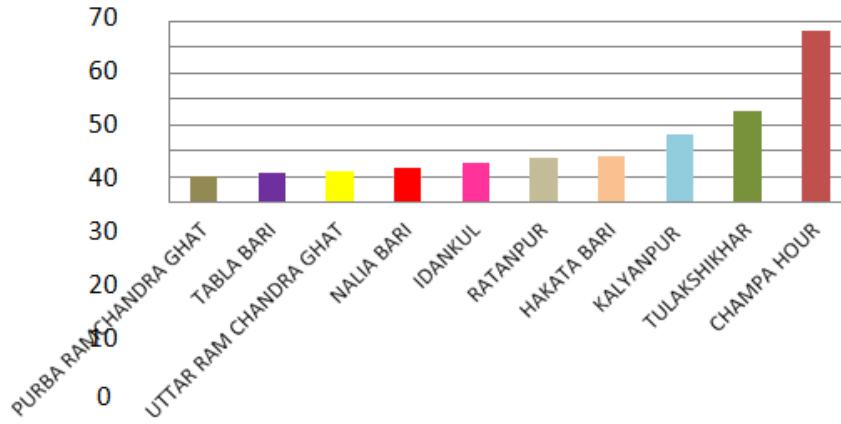


Fig. 3. Most affected villages Women’s Patients in Khowai District, Tripura

From the year 2020 to 2024 these are the most villages are situated in the areas which are easier to undergo better health care clinical services due to good transportation network systems, villages like Champa Hour, Tulakshikhar, and Kalyanpur are located in the district’s middle and southern regions, which display a cluster of high patient counts. Hence, Champa Hour is the most impacted community, with 66 patients (13.2%) reported there alone. A regional health concern or environmental, climate and socio-economic risk factors are playing vital role in the incidence of diseases. Tulakshikhar and Kalyanpur are located in semi-urban areas with comparatively superior health infrastructure, which perhaps helps explain the higher reporting rates with 35 and 26 instances reported, respectively. Moderate-case villages like Hakata Bari and Ratanpur, which had 18 and 17 patients reported, respectively, are the examples of places where there area less number of patients at this time but not yet at a critical level. Purba Ramchandra Ghat and Uttar Ramchandra Ghat are two examples, which badly need of new health care clinical service centres nevertheless of population size in the village (Fig 3).

The most prevalent health apprehensions of 499 women patients in the Khowai district are classified as *Fever* (92 patients) and *Abdomen Pain* (88 patients), *Shortness of Breath* (25 patients), *Vomiting* (20 patients), *Weakness* (17 patients), and *Severe Gastroenteritis* (16 patients) (Fig.4). Most of the health issues are caused by infections, poor food and water hygiene, and an inadequate health care services. *Anaemia* was identified in 37 women,

indicating that poor nutrition is also a serious concern (Fig.4).

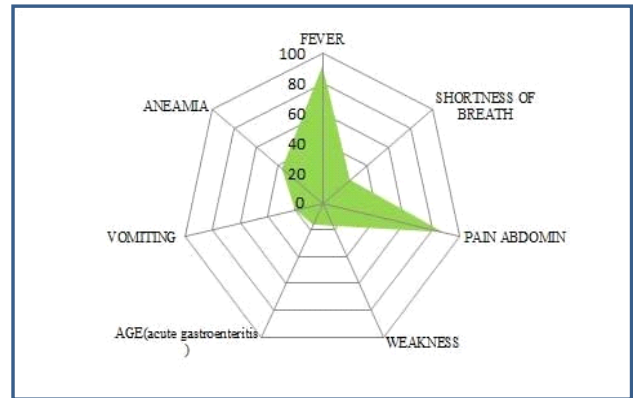


Fig.4 Graphical Presentation of High Impacted Disease (2020-2024), Khowai district, Tripura

Abdominal discomfort is the most prevalent health problem, affecting 88 women, because, in rural regions, women frequently refer to “pain in the stomach” when they are ill, even when the condition may be connected to menstruation, digestion, urinary tract infections, or other internal problems. There were also 2 patients of *Gastritis* this can cause pain in the upper abdomen, it is often described as burning, 2 patients of *Epigastric Pain*, 1 patient of burning micturition this causes the discomfort when urinating, burning or pain during urination, 1 patient of *Dysmenorrhoea* menstrual discomfort, 1 patient of *Ascitic Fluid* this causes the fluid that builds up in the abdomen, and 1 patient of *Polytrauma* this causes multiple pain to different parts of the body or organ system, it can also include severe pain, bleeding, etc. Despite the fact that these problems are

prevalent among women, these figures are quite low. It's likely that the local health care centres don't have the necessary tools or skilled staff to identify specific

diseases, so doctors record broad symptoms like "abdominal pain" (Fig. 5).

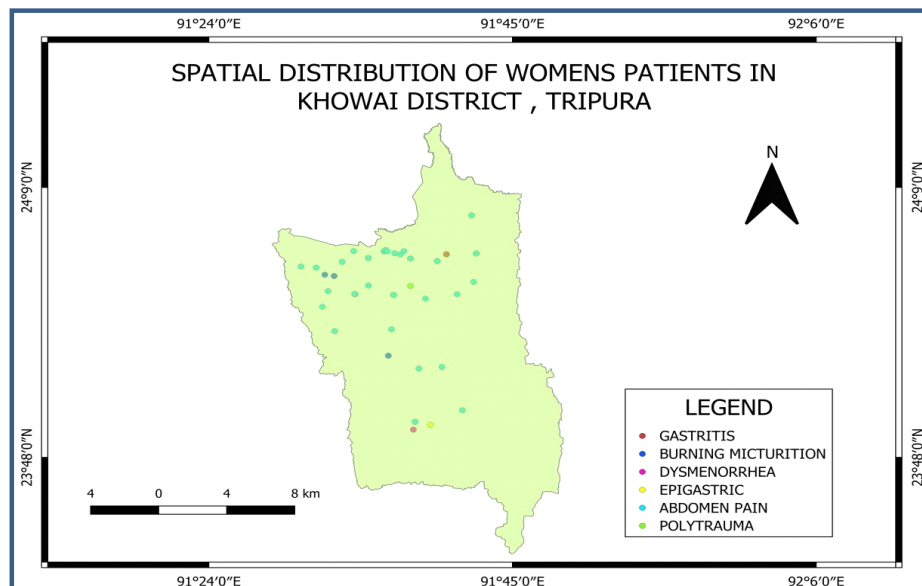


Fig. 5 Spatial Distributions of Women's Patients in Khowai District, Tripura

Fever is the most commonly reported health issues in the study villages, recorded 92 women cases, it clearly shows that fever is a widespread problem in the region may be linked to infections such as seasonal flu, malaria, and water-borne diseases, etc. Fever is also a typical early sign of many illnesses. The second problems was *Acute Gastroenteritis* (AGE), which affected 16 women's. This illness is mainly caused by drinking hazardous water or unsanitary food. It produces symptoms such as diarrhoea, vomiting,

and abdominal pains. Back pain, which is reported in 6 women's, is another common problem, particularly among women in rural areas who frequently do heavy housework, farming, and physical works. If not treated properly, this might result in chronic physical pain, and 3 cases reported with *Accidental Falls*, these might occur as a result of bad flooring in homes, slippery outdoor settings, or even health concerns such as dizziness or poor vision (Fig. 6).

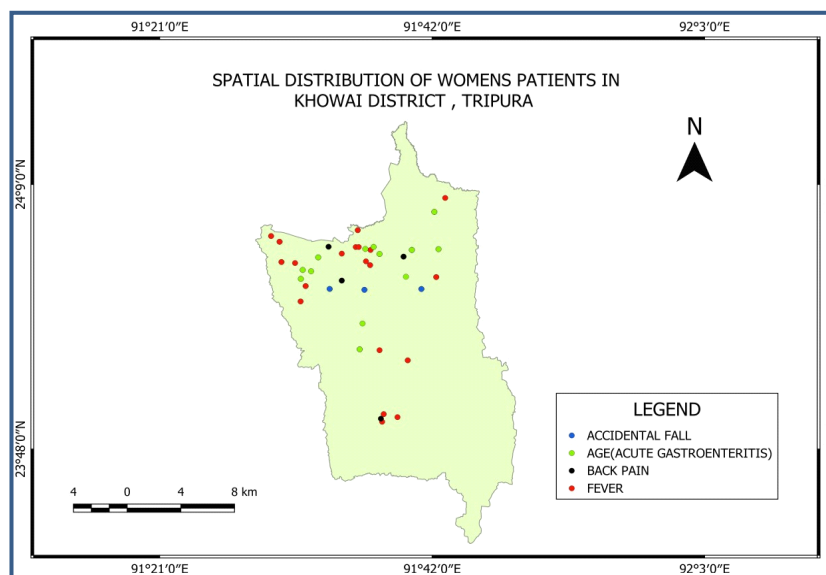


Fig. 6. Spatial Distribution of Women's Patients in Khowai District, Tripura

The women patients in Tripura, Khowai district are described on their health concern relevant to the body pain, among the 499 patients, 6 patients are having back discomfort with pain, making it most prevalent type of pain both *Knee Pain* and *Leg Pain* having with 1 case in each. Back pain that continues over time might result from straining the muscles and spine while carrying heavy goods, firewood, or water, and the issue may worsen if you sleep on hard or uneven surfaces or have poor posture. *Leg* and *Knee Pain* may be caused by ageing, joint stress, or minor injuries, but even though the numbers are low, they indicate that musculoskeletal problems exist and should be addressed because many women may not seek treatment until the pain becomes severe. This highlights the Based on the data, *Shortness of Breath* is the most common among these patients, and

25 patients are recorded with severe symptoms of heart disease, lung infections, or asthma. *Chest Pain* with 11 patients is the indication of cardiac disease, but it might be because of acidity or strained muscles. In order to rule out dangerous illnesses, early diagnosis is essential. *Cold and Cough* with 4 patients, although these are typical seasonal issues, improper treatment might result in more severe respiratory infections. Headache and Reeling with 8 patients are recorded as stress, weakness, inadequate nutrition, or underlying illnesses like high or low blood pressure may be connected to these symptoms. In hypertension (high blood pressure) with 4 patients identified, if untreated, it can result in heart disease and stroke, on the consequence; they should be undergone for periodical health check-up (Fig 7a, b).

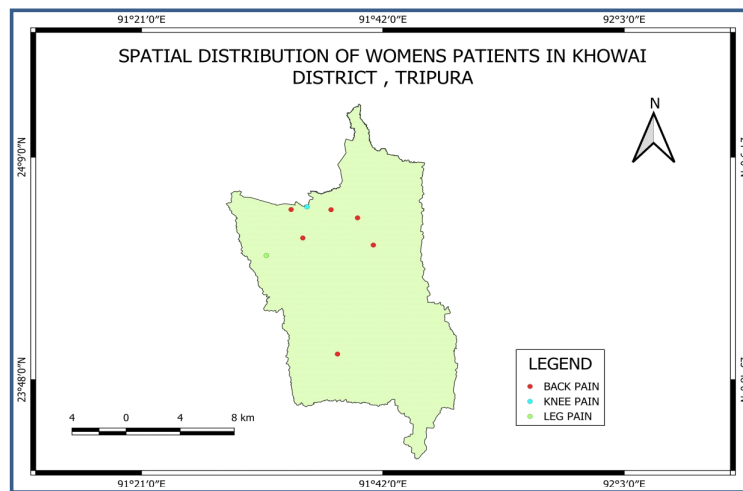


Fig. 7(a). Spatial Distribution of Women’s Patients in Khowai District, Tripura

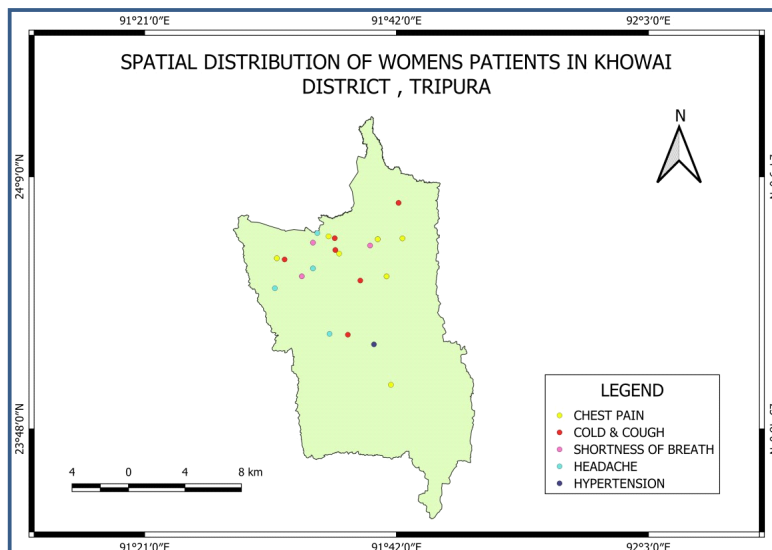


Fig. 7(b). Spatial Distribution of Women’s Patients in Khowai District, Tripura

The general health issues like malnutrition, *Anaemia*, irregular menstrual flow, and chronic disease are found common in the villages of Khowai district, and 37 *Anaemia* cases are recorded during the study period mainly caused due to insufficient vitamin, and minerals among the women patients, and most specifically, below the Indian Council of Medical Research (ICMR), and World Health Organization (WHO) standard of health indicators, are causing fatigue, pale skin, and poor energy, which makes it hard for women to go to their everyday work (Fig. 8). Another case is *Weakness* recorded 17 patients along with anaemia, *giddiness* 7 patients, and

dizziness 3 patients caused by etiological effect, such as; poor diet, excessive labour, or lack of sleep could be the cause of this disease. These symptoms may be appeared minor, but they can indicate underlying concerns such as low blood pressure, dehydration, or iron deficiency. Women who frequently feel dizzy or faint may be at risk of injury or falling and should be evaluated on a regular basis. These symptoms indicate that nutritional health is a major concern for women in the region. There is a need to enhance nutrition quality, boost anaemia awareness, and urge women to seek treatment early (Fig 8).

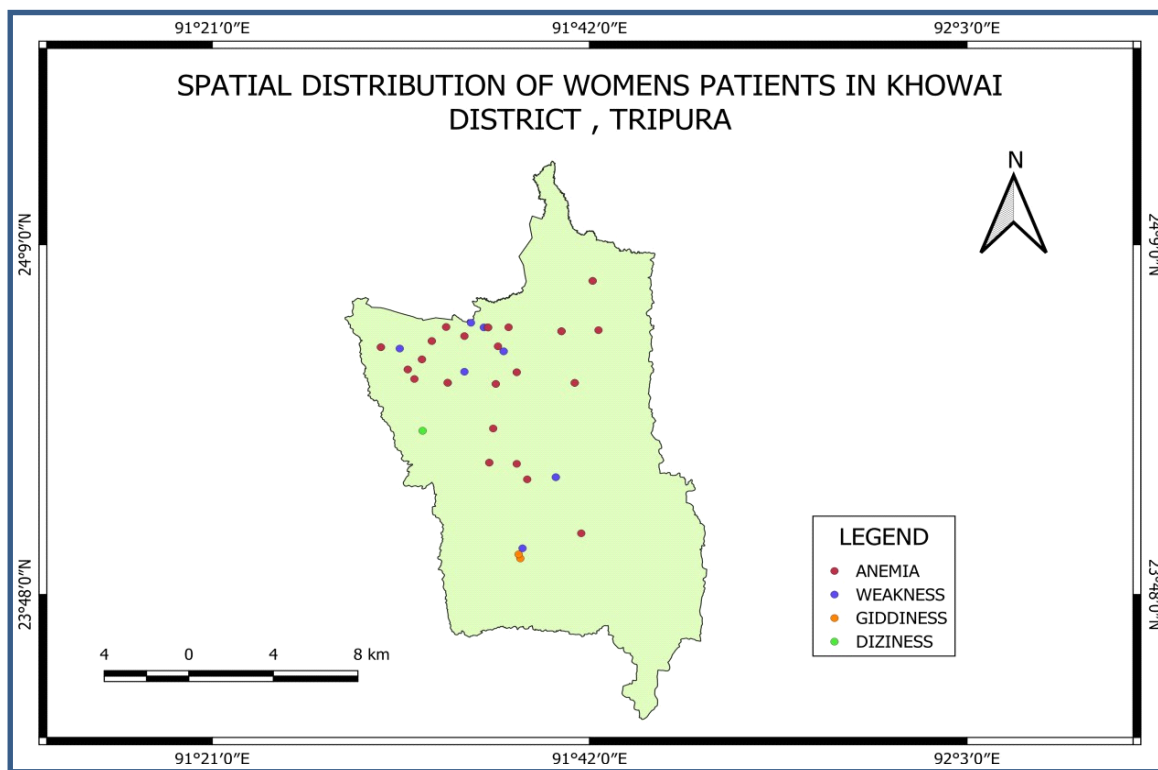


Fig. 8. Spatial Distribution of Women's Patients in Khowai District, Tripura

Body pain withoedema 5 women patients are reported, mainly due to overwork, exhaustion, and lack of sleep are most prevalent in the rural communities, where women are engaged as daily wage physical workers involved in the agricultural farm, construction, and the small scale industries. Additionally, there were isolated instances of particular pains: 1 incidence of *Lumbar Spine* discomfort, which is a term used to describe *lower backpain*. This might result from bending for extended periods of time at work or from lifting large objects. *Shoulder Ache* with (1 women

patient) which could be caused by joint problems or repetitive activities. There was additional *Swelling* with (2 patients), manifested as overall body swelling. This can cause due to of poor circulation, fluidretention, infection, and injuries canall contribute to swelling. Despite being few in comparison to other diseases like *fever* or *anaemia*, these symptoms are nonetheless significant. They are a reflection of physical stress and potential long-term conditions that can interfere with a woman's everyday life and professional capacity (Fig 9).

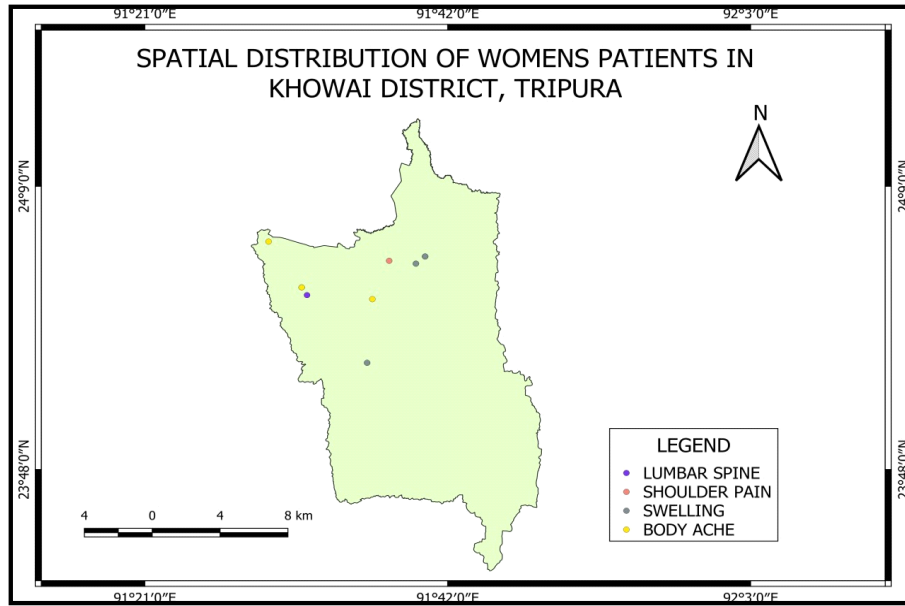


Fig. 9. Spatia l Distribution of Women’s Patients in Khowai District, Tripura

In the Khowai district, women were found to have digestive and urinary difficulties. Constipation was the most common issue among this group, with seven recorded cases. *Constipation* can be induced by a low-fibre diet, insufficient water intake, or a lack of physical activity. It might cause discomfort, stomachache, and loss of energy. There were also 5 cases of *loose motion* or *Diarrhoea*, which is typically

caused by illnesses, dirty water or food, or poor hygiene. Though it may appear to be a minor issue, if not addressed appropriately, it can result in dehydration and weakness, only one case of *Lack of Appetite* was reported, but it is nonetheless significant, and is concerned about their basic digestive and urinary health (Fig.10).

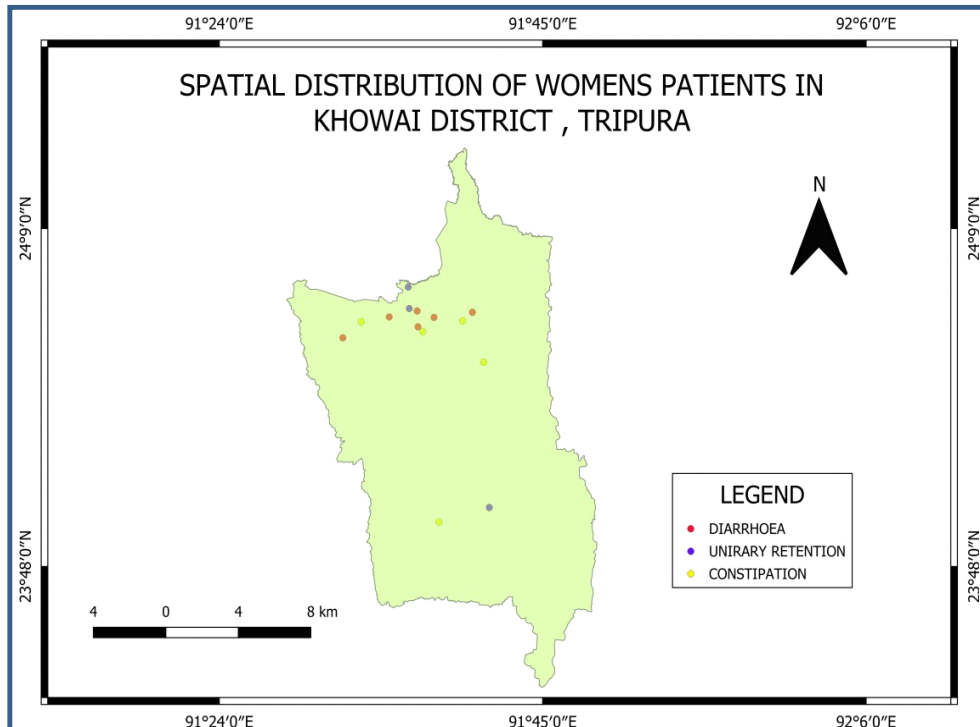


Fig. 10. Spatial Distribution of Women’s Patients in Khowai District, Tripura

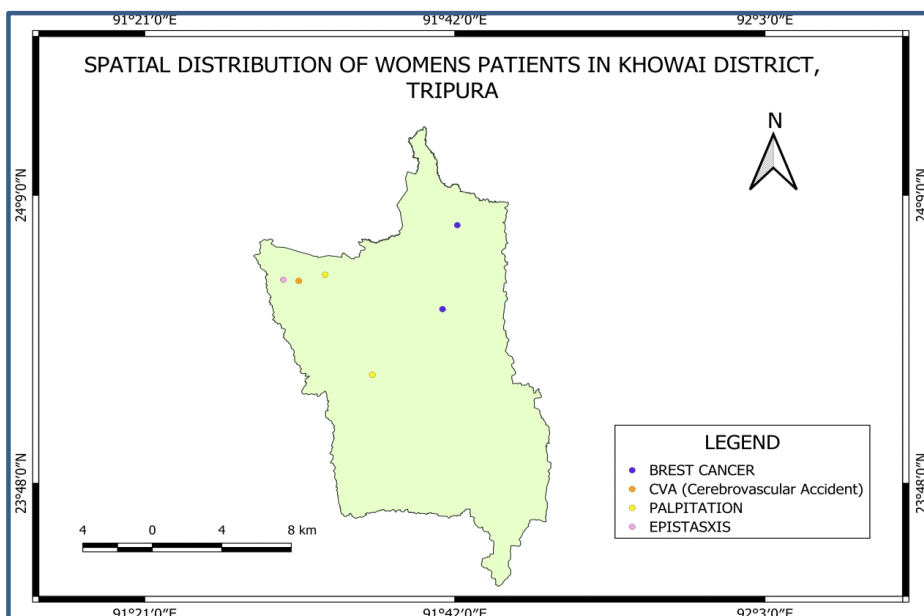


Fig. 11. Spatial Distribution of Women’s Patients in Khowai District, Tripura

Breast cancer was reported 2 cases, despite the modest number; this ailment is dangerous, emphasizing the importance of frequent check-ups, awareness, and early identification in rural settings. CVA (stroke), reported with 2 cases, it is a major health concern, particularly among older women and

those with high blood pressure or other underlying conditions. *Palpitations* with 2 cases are registered irregular or fast heartbeats, 1 patient shows epistaxis (nose bleeding) and 1 case was identified with *Chronic Liver Disease (CLD)*, which could be caused by hepatitis, prolonged alcohol use (Fig.11).

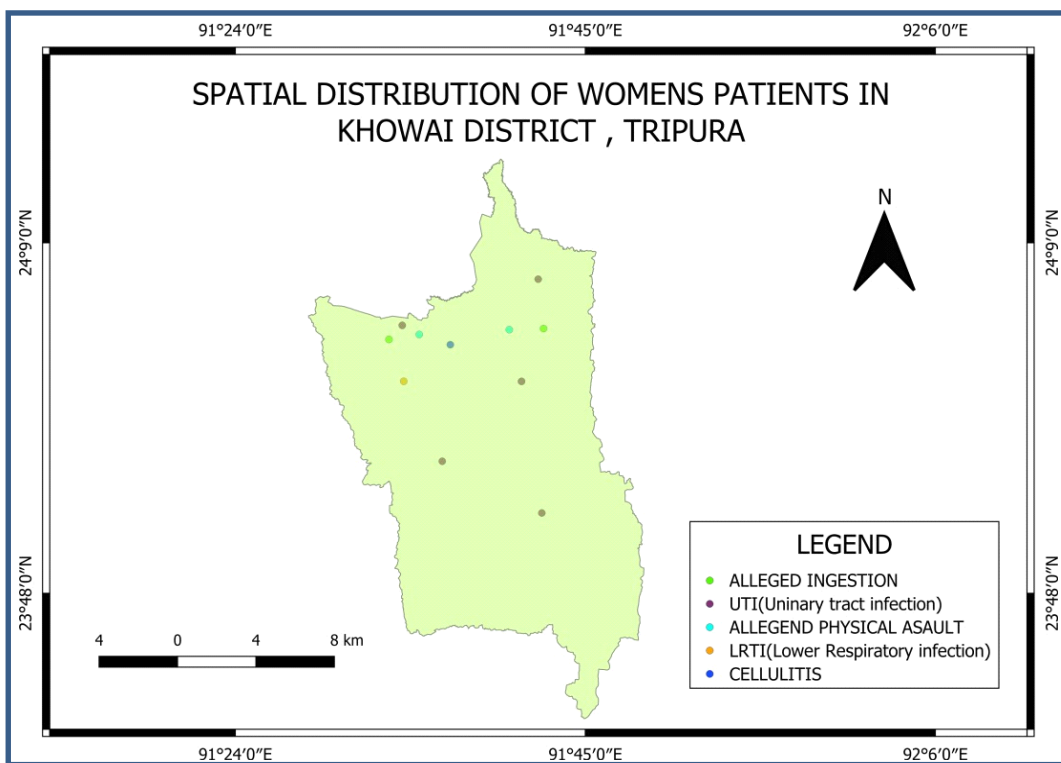


Fig. 12. Spatial Distribution of Women’s Patients in Khowai District, Tripura

Patients with *Ingestion Incidents* 3 cases, and 1 *Acid Ingestion* case were among the most serious issues identified. There were two recorded incidences of *Alleged Physical Assault*, highlighting the continued threat to women's safety and domestic abuse. One case of LRTI (Lower Respiratory Tract Infection) was reported. Early identification and antibiotic therapy are critical for controlling these infections. *Cellulitis*, a bacterial skin infection, was found in one patient and can be deadly, if left untreated, particularly in those with diabetes, one case with *Urinary Tract Infection* (UTI) was registered, and are found common and followed by *Abdominal Pain* (88 cases) are recorded (Fig 12).

Shortness of breath with (25 patients), which could indicate a respiratory illness, asthma, or cardiac problem. *Vomiting* was reported with (20 patients), and it was frequently associated with *Acute Gastroenteritis* (AGE), which included 16 instances, indicating that digestive health concerns are also prominent. *Anaemia* affected with (37 women), indicating significant nutritional deficits. *Weakness* (17 cases), *Headache or Reeling* (8), and *Giddiness* (7) were also often reported, most likely due to anaemia or other underlying issues. *Back discomfort*, *Low Back Pain* (LBP), *Body Ache*, and *Chest Pain* all accounted for more than 30 instances, indicating the need for musculoskeletal health care. *Constipation* -related problem such as *Not Passing Stool/Constipation* (7 patients) and *Not Passing Urine/Urinary Retention* (5 patients) also occurred. There were also ten cases of *General Infection and Poisoning*, as well as a few serious disorders such as *Malaria with PF* (3 patients) and *Renal Tubular Acidosis* (4 patients). Some women have reported *Dizziness*, *Black Stool*, and *Passing Blood in Their Stool*, which suggests gastrointestinal problems. Other prominent complaints were *Unintentional Falls* (3 patients), *Epileptic-Related Hemiplegia* (3 patients), and *Claimed Ingesting* (3 patients), which could indicate self-harm. Overall, the data reveals a significant number of cases related to infections, abdominal issues, and fever among women in the community. A few emergency cases, such as poisoning, accidental falls, and shortness of breath, highlight the importance of quick response services. The occurrence of significant but uncommon instances such as malaria, hemiplegia, and renal problems emphasises the necessity for accessible medical care.

The miscellaneous data reveals a wide spectrum of less common but substantial health issues reported by women, although most diseases only have one or two cases. These, though fewer in number, nevertheless reflect the diverse healthcare needs of the community. In certain situations, digestive and gastrointestinal issues may arise, such as ache gastritis, acid reflux, epigastric discomfort, and upper gastrointestinal haemorrhage. These symptoms may indicate underlying infections, gastrointestinal abnormalities, or possible dietary problems. Furthermore, there are cases of chronic illnesses like breast cancer, hypothyroidism, CVA (stroke), and chronic liver disease (CLD), indicating that certain people are affected by long-term health problems (Fig 13).

Musculoskeletal difficulties, which can be brought on by ageing, bad posture, or strenuous physical labour, include knee pain, lumbar spine issues, shoulder discomfort, neck pain, and spondylosis. The need for emergency care services was highlighted by the reports of trauma-related injuries, including polytrauma, ear trauma, knee injuries, and body trauma. Cases such as *Bilateral Salpingo-Oophorectomy* (BSO) and *dysmenorrhea* were documented in relation to reproductive health, highlighting the significance of gynaecological assistance. *Fibroadenoma*, *Burning Micturition*, and *Dyselectrolytemia* are further isolated disorders that need to be evaluated and treated by a doctor. Additionally, uncommon genetic and metabolic conditions such as *Mucopolysaccharidoses* (MPS) were discovered. The range of issues is further expanded by neurological or psychological disorders such as *Post-Traumatic Amnesia* (PTA) and cardiovascular symptoms like palpitations. The age group between 21 and 30 are reported 94 cases, followed closely the age group of 41 and 50 recorded 88 cases, and those between the ages of 31 and 40 and 51 and 60 (each age group recorded 69 cases). The disease occurrence mostly among the young to middle-aged adults groups like, conditions linked to lifestyle may be more common in the age group between 21 and 50, and the age group between 21 and 30 is found under a stress which leads to health problems (Fig 14).

This is important to observe that, with 21 and 4 cases, respectively, the youngest age groups (1-10

years) and oldest (91–100 years) have the fewest diseases reported. Although the low number in the extremely elderly may seem unexpected, it could be because of the smaller population in that age group because people in this range might not receive as many diagnoses or have less access to healthcare. Better childhood vaccinations and less exposure to chronic

disorders are responsible for the comparatively low frequency of diseases among children below the age of 1 to 10, 55 cases are recorded in the age group of 11–20, and the occurrence of diseases in the 61–80 age group gradually decreases from 46 (61–70) to 19 (71–80), indicating either a decline in the population or improved chronic condition.

Table 1: Comparative Analysis of Age Group and Disease Prevalence (2020–2024)

Year	Chi-square Value (X^2)	Degrees of Freedom (df)	p-value	Statistical Significance
2020	15.03	4	0.0046	Significant ($p < 0.01$)
2021	6.73	5	0.2416	Not Significant
2022	7.55	4	0.1096	Not Significant
2023	11.36	3	0.0099	Significant ($p < 0.01$)
2024	6.11	5	0.2956	Not Significant

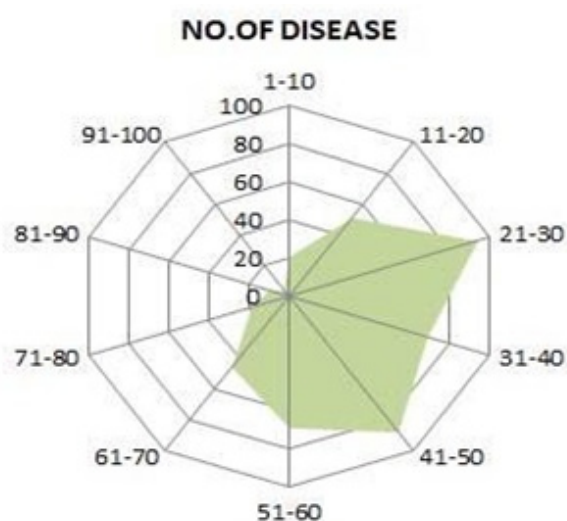


Fig. 14. Chart Represent the Number of Diseases in Age Group

The result shows the middle-aged adults especially those between the age group 21 and 50, is the greatest vulnerability p value < 0.005 . The distribution of disease prevalence across different age groups during 2021 indicates that there was no significant difference in disease prevalence among the different age groups. In other words, the occurrence of disease appeared to be relatively evenly distributed across the various age groups, p value > 0.01 . The disease prevalence among different age groups for the year 2022, is not statistically significant, and shows that there was no difference in the prevalence

of disease among the different age groups in 2022, and thus, the distribution of disease cases across the age groups was relatively evenly distributed p value > 0.05 . The distribution of disease prevalence among different age groups in 2023, has statistically high significant, and thus, the prevalence of disease is not evenly distributed across the age groups; and the age groups of 21–30 and 41–50 are most affected susceptible to disease infection p -value < 0.01 , which indicates that there was a significant difference in disease prevalence among the various age groups for the year 2023. The distribution of disease cases was relatively even across the different age groups in 2024, with no particular age group being extremely affected p value > 0.05 .

Conclusion

Across the five-year study period, a significant variation in disease prevalence among age groups was observed only in the years 2020 and 2023. In 2020 age group of 21–30 and 2023 age group of 41–50, this showed that a significant difference ($p < 0.01$), that some age groups were more affected than others age group during these years. However, in 2021, 2022, and 2024, the results were not significant ($p > 0.05$), indicating that the disease cases were almost equally distributed across all age groups. Overall, this suggests that while age played an important role in disease prevalence during some years, in other years,

the effect of age group was not reliable. The women patients between 21 and 50 years old are suffered the most. Children and older people have fewer reported cases, but that might be due to underreporting or less exposure.

Competing Interests: Authors have declared that no competing interests exist.

Ethical standards: Not applicable

Source of funding: Nil

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