

**PATIENTS PERCEPTION, ATTITUDE AND BEHAVIOURAL
CHARACTERISTIC OF PHC IN SEPAHIJALA DISTRICT, TRIPURA,
INDIA**

*Khakchang Debbarma¹, V. Saravanabavan^{*2}, C. Vinothini³*

¹Project Fellow, Department of Geography, School of Human and Environmental Sciences, North Eastern Hill University, Shillong-793022, Meghalaya, India.

²Associate Professor, Department of Geography, School of Human and Environmental Sciences, North Eastern Hill University, Shillong- 793022, Meghalaya, India.

³RUSA –Ph.D Research Scholar, Department of Geography, School of Earth and Atmospheric Sciences, Madurai Kamaraj University, Madurai -625 0212, Tamilnadu, India.

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***Corresponding Author: V. Saravanabavan**

Associate Professor, Department of Geography, School of Human and Environmental Sciences, North Eastern Hill University, Shillong- 793022, Meghalaya, India.

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ABSTRACT

This study explores healthcare utilization patterns and socio-economic factors influencing knowledge, attitude, and behavioural access to PHC patients in Sepahijala District, Tripura, a predominantly rural area. The district of Sepahijala is located in the southwest extreme in the state of Tripura, India. The study involved both primary and secondary data collection. A total of 300 respondents have been contacted by questionnaire survey method based on the stratified random sampling method in all 7 blocks of the district. Factor analysis is a multivariate statistical technique used to investigate health status, treatment satisfaction, patients' perception, knowledge, and socioeconomic level of the patients. The findings highlight significant healthcare access related to knowledge, attitude of patients and its behaviour. Health access and utilization factors, socioeconomic factors, patient perception, and the surrounding environment are the primary determinants for health care in the Sepahijal district, Tripura.

KEYWORDS: PHC- Sepahijala District -Patients Characteristic - factor analysis.

1.INTRODUCTION

Access to healthcare services is extremely limited in many rural areas and backward sections of the country. There is a major urban-rural divide in terms of the availability of healthcare skewed towards metropolitan areas ^(1,2,3). Access is vital, but people's perceptions of what the facility offers regarding medical care and whether it is worthwhile to use it are also important in determining their motivation to use healthcare facilities ^(4,5,6,7). Effective PHC (Primary Health Care) can only be administered if health facilities are well-equipped, adequately staffed, and have the necessary infrastructure, critical medicines, and commodities ^(8,9,10). Measuring the quality of the PHC system from patients' perspectives has been acknowledged as a critical step toward determining areas for improvement and evaluating the impact of change. Patient happiness has long been seen as a significant factor in assessing health outcomes and quality of care. ^(11,12,13). The growing importance of consumerism in society emphasizes the critical role patient attitudes play in health planning and delivery ^(14,15,16). Extended waiting time, the impression that medical staff lack understanding, poor interaction, and inadequate amenities are just a few of the things that might negatively affect patients' happiness and rural qualities. An attempt was made to investigate the existing healthcare delivery ^(17,18,19,20). The rural background of the district of Sepahijala, the causes of its system, lines how efficient it is in providing health services, as well as the level of patient satisfaction ^(21,22,23). In this context, the present study provides a research contribution related to the healthcare delivery system. As a result, the current study must leverage its importance at the local level to investigate the spatial distribution of health facilities and assess the interrelationship between disease prevalence rates and socioeconomic, environmental, and cultural aspects.

The study is an attempt to analyze the healthcare delivery system and the perception of patients with the satisfaction level in the primary health centre in Sipahijala district, Tripura. Assessing the views of patients and satisfaction levels in primary healthcare settings is critical for developing a healthcare system that truly satisfies the needs of the local population ^(24,25,26,27). When patients feel listened to, valued, and appreciated, they are far more inclined to participate actively in their health treatment, resulting in better health results ^(28,29,30). This study intends to highlight patient voices, provide insights into how they were treated, and discover opportunities for improvement in healthcare. Used the factor analysis technique to understand the spatial distributional patterns of public healthcare centres in the district level ^(31,32,33,34). Research conducted earlier has demonstrated that the health of individuals is influenced by environmental and socioeconomic factors, traffic patterns, or family

circumstances (35,36,37,38). To determine the level at which each micro-level health centre provides services effectively and efficiently (39,40,41,42). The variables were selected after careful screening, mainly through variables extracted from the main data.

2.OBJECTIVES

-This study was conducted with the main objective of analysing the spatial distribution of the PHC and its location pattern.

- To analyze the patient perception, attitude and behavioural characteristic and satisfaction level of people who avail themselves of these health care systems.

3.Study Area

The district of Sepahijala is located in the southwest extreme in the state of Tripura, India. The district occupies an area of 1043.04 sq.km with a population of 542,731, and it lies between 25°07" & 25°41" N latitude and 91°21" & 92°09" E longitude (Fig.1). Approximately 12% of the district is covered by minor steep ranges of the Baramura, while the remaining 88% is mostly plain, bordering Bangladesh on the west and south. According to the Health Statistics in Tripura 2019-2020, Sepahijala has 15 PHCs and 147 sub-centres.

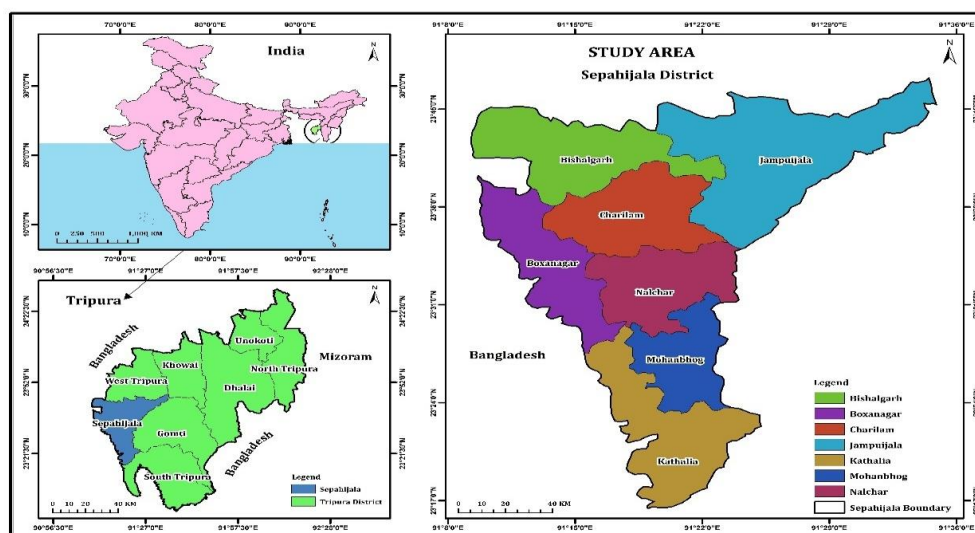


Fig 1 Location of Study area.

4METHODOLOGY

4.1 Research Design

The information has been gathered from primary and secondary sources to meet the specified goals. The data on the PHC location, patients 'environment, socioeconomic characteristics,

etc. were analyzed using appropriate statistical techniques such as multivariate analysis, known as Factor analysis

4.2 Source of Information

The primary data is collected by administering a questionnaire to the patients at all selected PHC centres in 7 blocks of Sipahijala district. The information collected through the questionnaire includes 42 variables are derived and included variables are derived and variables are age, gender, education level, family size, occupation, income level, health care, and socioeconomic status etc., The demographic and social variables for the Sipahijala district were obtained from the Statistical Handbook of Tripura 2024. The study's health statistical data and various other related healthcare information were collected from the district medical office in the study area.

4.3 Techniques Used

The primary survey was based on the method of stratified random sampling, and a total of 300 samples were collected. Research conducted earlier has demonstrated that the health of individuals is influenced by environmental and socioeconomic factors, traffic patterns, or family circumstances to determine the level at which each micro-level health centre provides services effectively and efficiently. The variables were selected after careful screening, mainly through variables extracted from the main data.

Factor analysis is a multivariate statistical technique used to investigate health status and treatment satisfaction level. This investigation found important dimensions of healthcare delivery systems (43,44). This study used factor analysis, a well-known method to identify the patient's level of perception. Factor analysis is used to identify statistical relationships between general health, socioeconomic, environmental, and health variables (45,46) .

5.RESULT AND DISCUSSION

5.1 Distribution Pattern of PHC

The impact of geographic distance has a distinct influence on the socio-economic groups and the variation in the moment pattern, age structure, and choice of mode of transportation (47,48) . It is relevant to note that the analysis of the geographic distance from the residence as one of the important determinants characterizing a particular type of utilization pattern and its influence on the PHC. The patients who live nearer the health centre are more likely to use the services efficiently, and if the centres are provided with an adequate number of health services and such infrastructure facility. (Fig 2) With the health manpower resources and good transportation, the PHC are bound to be used efficiently. The location efficiency of the

Primary healthcare centres in the study thus helps towards a general understanding of the health facility locations through a series of examinations of utilization patterns of the respondents.

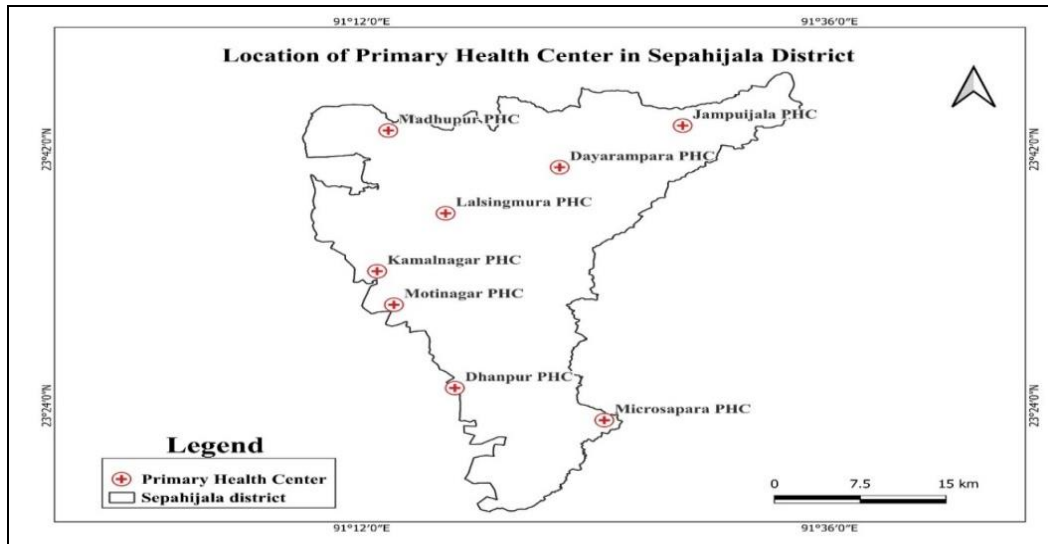


Fig 2 Location of Primary Health Centre in Sepahijala District.

5.2 Perception, Attitude and Behavioural Characteristic of PHC Patients

Research conducted earlier has demonstrated that the health of individuals is influenced by environmental and socioeconomic factors, traffic patterns, and family circumstances. To determine the level at which each micro-level health centre can provide services effectively and efficiently. The variables were selected after careful screening, mainly through variables extracted from the main data. Factor analysis is used to identify statistical relationships between general health, socioeconomic, environmental, and health variables. The importance of health centres can be assessed quantitatively by highlighting the interrelationships between the environmental and spatial functional organization of the research area. The results of factor analysis can be synthesized and presented in tabular form, naming dimensions appropriately based on high factor loadings.

The factor solution was derived by the dimension reduction from the 42*42 correlation matrix reduced taking 42*15 into account only factors with the Eigen values greater than unity. (Table 1, Fig 3) The 15 factors rotated by the varimax procedure account for 80.5% of the total variance. (Table 2)

Table 1 Eigenvalue and the total percentage variance explained by each of the Fifteen Dimensions.

| Factor | Name of the dimension | Eigenvalue | Percentage of Variance | Cumulative Percentage |
|--------|---------------------------------|------------|------------------------|-----------------------|
| I | Behavioural Characteristic | 4.75 | 11.32 | 11.32 |
| II | Patients attitude | 3.82 | 9.09 | 20.41 |
| III | Knowledge about Treatment | 3.16 | 7.51 | 27.92 |
| IV | Health care Performance | 2.92 | 6.94 | 34.86 |
| V | Patient Characteristics | 2.64 | 6.28 | 41.14 |
| VI | Source of Disease | 2.56 | 6.1 | 47.24 |
| VII | Local Medical Facilities | 2.2 | 5.24 | 52.48 |
| VIII | Doctor's Advice | 1.94 | 4.62 | 57.1 |
| IX | Diseases Health Personnel | 1.8 | 4.29 | 61.4 |
| X | Medical services and facilities | 1.73 | 4.11 | 65.51 |
| XI | Type of Medical System | 1.57 | 3.74 | 69.25 |
| XII | Previous Illness | 1.37 | 3.26 | 72.51 |
| XIII | Disease Pattern and Treatment | 1.22 | 2.91 | 75.41 |
| XIV | Morbidity status | 1.1 | 2.63 | 78.04 |
| XV | Income | 1.03 | 2.46 | 80.5 |

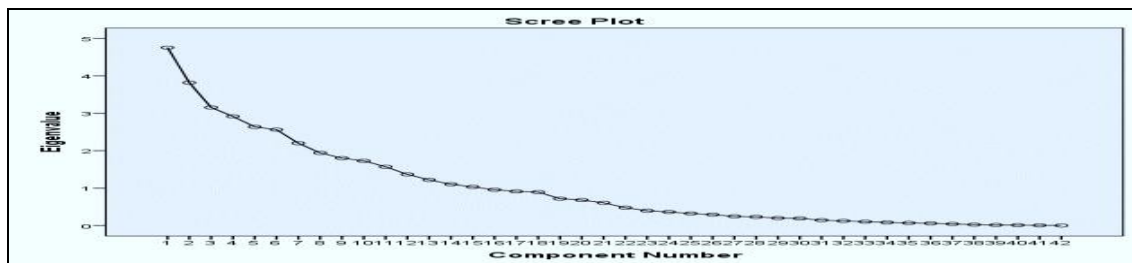


Fig 3. Total number of Dimension with Eigen Value.

5.3 Factor Solution

The factor analysis has identified 15 dimensions explaining a total variance of 80.5%. The first seven dimensions explained the total variance of more than 52.4 per cent with a range of Eigenvalue of 4.75 to 2.2. (cut off 1.00). The last eight dimensions account for about 27.6 per cent of the total variance of 4.62 to 2.46. The contribution of the last 8 dimensions altogether accounted for starting with an Eigenvalue of 1.94 and ending with an Eigenvalue of 1.03 are considered 8 minor factors. Thus, it is emphasized that all the first Seven dimensions were very much concerned with patients' characteristics and health care performance in the PHC of Sepahijala district.

Dimension: I Behavioural Characteristic

The first dimension is ‘Behavioural Characteristics. This dimension explains 8 variables with positive and negative loading explaining as much as 11.3 percent of total variance with Eigen value of 4.75(Table 3). The first dimension and the variables loaded in this dimension explained the patient’s age, type of education, distance from home, and duration of illness hence this dimension is named as ‘Behavioural Characteristic Very high negative loading was seen in the duration of illness (-0.60), Age (-0.47), and Availability of beds (-0.45). Similarly the high positive factor loading in Time period of health centre (0.75), Distance from home (0.74), time taken to reach the health centre (0.68), Access to the health centre (0.58), and as well as in education (0.46).The negative loadings associated with duration of illness, age, and bed availability suggest that longer illness, older age, and greater bed availability are associated with healthcare outcomes. Positive loadings on period, distance, travel time, quality of water source, and education suggest that these factors are associated with better health outcomes or better access to health services.

Table 2 Extraction Method: Principal Component Analysis.a.15 components extracted.

| Component | | | | | | | | | | | | | | | |
|-----------|-------|-------|-------|------|------|-------|-------|-------|------|-------|-------|-------|-------|-------|------|
| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 |
| VAR0001 | -0.47 | -0.35 | 0.49 | 0.01 | 0.05 | -0.16 | 0.21 | 0.21 | 0.06 | -0.11 | 0.26 | 0.09 | 0.02 | 0.05 | 0.09 |
| VAR0002 | -0.14 | 0.13 | 0.43 | 0.13 | 0.07 | 0.19 | 0.58 | 0.17 | 0.00 | 0.36 | 0.02 | 0.26 | 0.11 | 0.02 | 0.03 |
| VAR0003 | -0.31 | 0.08 | 0.19 | 0.11 | 0.11 | -0.22 | 0.26 | 0.16 | 0.04 | 0.27 | 0.14 | 0.44 | 0.24 | 0.13 | 0.05 |
| VAR0004 | 0.13 | 0.11 | 0.16 | 0.26 | 0.69 | 0.07 | 0.00 | 0.25 | 0.19 | 0.07 | -0.22 | 0.22 | 0.13 | 0.06 | 0.23 |
| VAR0005 | -0.11 | 0.11 | 0.33 | 0.04 | 0.35 | 0.56 | 0.16 | 0.16 | 0.14 | 0.22 | 0.07 | 0.23 | 0.14 | 0.15 | 0.07 |
| VAR0006 | -0.33 | -0.25 | 0.22 | 0.05 | 0.58 | 0.39 | 0.01 | 0.19 | 0.03 | 0.29 | 0.12 | 0.07 | 0.08 | 0.05 | 0.09 |
| VAR0007 | 0.12 | 0.21 | 0.39 | 0.18 | 0.45 | 0.06 | 0.22 | 0.48 | 0.06 | 0.01 | 0.27 | 0.11 | 0.12 | 0.03 | 0.06 |
| VAR0008 | 0.46 | 0.63 | -0.11 | 0.03 | 0.00 | -0.00 | -0.22 | -0.00 | 0.08 | 0.13 | -0.22 | -0.00 | -0.11 | -0.11 | 0.11 |

| | | | | | | | | | | | | | | | |
|--------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| | | | 3 | | | 9 | 7 | 6 | | | 7 | 5 | 4 | 2 | 8 |
| VAR0 0009 | 0.3 5 | 0.5 7 | 0.5 3 | 0.0 2 | 0.0 1 | 0.0 3 | 0.1 | 0.2 4 | 0.0 4 | 0.0 5 | 0.1 6 | 0.0 2 | 0.1 | 0.1 1 | 0.0 4 |
| VAR0 0010 | 0.4 | 0.2 1 | 0.2 9 | 0.2 7 | 0.0 2 | 0.0 9 | 0.0 9 | 0.4 2 | 0.0 9 | 0.0 3 | 0.1 7 | 0.0 4 | 0.2 6 | 0.1 8 | 0.3 4 |
| VAR0 0011 | 0.6 9 | 0.0 6 | 0.2 | 0.3 6 | 0.2 3 | 0.1 | 0.0 1 | 0.1 1 | 0.2 2 | 0.0 5 | 0.2 1 | 0.0 6 | 0.0 1 | 0.1 5 | 0.1 7 |
| VAR0 0012 | 0.7 6 | 0.0 1 | 0.3 5 | 0.3 3 | 0.0 1 | 0.0 6 | 0.0 5 | 0.1 5 | 0.0 8 | 0.0 1 | 0.1 2 | 0.1 | 0.0 1 | 0.1 5 | 0.0 2 |
| VAR0 0013 | 0.1 8 | 0.3 8 | 0.0 7 | 0.6 2 | 0.1 2 | 0.0 7 | 0.2 | 0.2 7 | 0.0 8 | 0.1 4 | 0.0 8 | 0.1 1 | 0.2 5 | 0.1 4 | 0.1 5 |
| VAR0 0014 | 0.1 5 | 0.0 3 | 0.3 5 | 0.3 3 | 0.4 3 | 0.0 1 | 0.3 4 | 0.0 4 | 0.3 1 | 0.1 3 | 0.1 1 | 0.2 1 | 0.1 6 | 0.2 3 | 0.0 4 |
| VAR0 0015 | 0.4 | 0.4 8 | 0.0 5 | 0.1 | 0.0 6 | 0.1 9 | 0.4 5 | 0.0 3 | 0.2 | 0.2 | 0.0 7 | 0.2 4 | 0.1 5 | 0.0 2 | 0.3 5 |
| VAR0 0016 | 0.0 5 | 0.0 7 | 0.1 9 | 0.5 3 | 0.1 3 | 0.0 4 | 0.4 6 | 0.0 7 | 0.4 | 0.0 2 | 0.0 5 | 0.1 1 | 0.2 1 | 0.1 5 | 0.1 9 |
| VAR0 0017 | 0.7 5 | 0.2 6 | 0.2 9 | 0.1 | 0.0 5 | 0.0 9 | 0.0 5 | 0.0 2 | 0.1 | 0.1 2 | 0.0 1 | 0.2 3 | 0.1 1 | 0.0 5 | 0.0 5 |
| VAR0 0018 | 0.0 2 | 0.2 | 0.0 2 | 0.0 6 | 0.0 5 | 0.2 3 | 0.2 5 | 0.0 2 | 0.6 5 | 0.2 8 | 0.2 3 | 0.0 9 | 0.1 | 0.1 1 | 0.1 3 |
| VAR0 0019 | 0.3 6 | 0.3 7 | 0.1 3 | 0.2 8 | 0.2 6 | 0.1 7 | 0.1 3 | 0.1 9 | 0.1 4 | 0.0 9 | 0.2 8 | 0.1 3 | 0.3 1 | 0.2 7 | 0.2 1 |
| VAR0 0020 | 0.1 5 | 0.1 3 | 0.2 8 | 0.3 7 | 0.4 2 | 0.0 2 | 0.1 2 | 0.0 2 | 0.1 | 0.4 3 | 0.0 5 | 0.3 2 | 0.0 7 | 0.2 8 | 0.0 7 |
| VAR0 0021 | 0.5 8 | 0.4 8 | 0.2 3 | 0.1 2 | 0.1 4 | 0.1 2 | 0.0 4 | 0.0 6 | 0.1 7 | 0.0 4 | 0.0 8 | 0.2 1 | 0.1 | 0.1 1 | 0.0 4 |
| VAR0 0022 | 0.0 1 | 0.7 | 0.2 4 | 0.3 6 | 0.0 7 | 0.0 3 | 0.1 8 | 0.0 6 | 0.1 | 0.0 9 | 0.0 1 | 0.1 3 | 0.0 8 | 0.0 6 | 0.2 7 |
| VAR0 0023 | 0.2 6 | 0.2 | 0.0 4 | 0.2 | 0.3 3 | 0.1 7 | 0.3 6 | 0.3 9 | 0.3 1 | 0.0 6 | 0.2 6 | 0.1 2 | 0.0 1 | 0.1 1 | 0.0 2 |
| VAR0 0024 | 0.1 2 | 0.3 8 | 0.3 1 | 0.3 7 | 0.1 5 | 0.2 6 | 0.0 1 | 0.2 8 | 0.1 | 0.0 6 | 0.1 1 | 0.2 2 | 0.2 | 0.1 9 | 0.3 3 |

| | | | | | | | | | | | | | | | |
|--------------|---------------|---------------|-----------------|---------------|---------------|---------------|---------------|---------------|----------|------------|------------|----------|---------------|----------|------------|
| VAR0 0025 | 0.2 | 0.1 4 | - 0.2 3 | 0.4 9 | 0.2 4 | - 0.0 5 | - 0.0 5 | - 0.3 2 | 0.2 1 | 0.2 9 | 0.2 8 | 0.1 5 | - 0.2 7 | 0.0 1 | 0.1 8 |
| VAR0 0026 | - 0.1 6 | - 0.1 5 | 0.0 9 | 0.0 8 | 0.0 4 | 0.2 9 | 0.1 2 | 0.5 1 | 0.1 7 | 0.2 4 | - 0.1 | 0.3 6 | 0.1 3 | 0.3 9 | 0.0 7 |
| VAR0 0027 | 0.3 4 | 0.0 8 | - 0.1 0.1 | 0.3 0.3 | - 0.1 4 | 0.3 1 | 0.2 9 | 0.1 5 | 0.0 8 | 0.3 5 | 0.4 2 | 0.1 7 | 0.1 5 | 0.0 6 | 0.0 4 |
| VAR0 0028 | - 0.6 | 0.1 1 | 0.2 2 | 0.1 2 | 0.2 2 | 0.2 1 | 0.1 4 | 0.2 2 | 0.4 1 | 0.0 1 | 0.1 0.1 | 0.1 1 | 0.2 9 | 0.0 2 | 0.0 2 |
| VAR0 0029 | - 0.2 1 | 0.2 5 | 0.4 7 | 0.2 8 | 0.2 1 | 0.1 0.1 | 0.2 6 | 0.1 7 | 0.0 1 | 0.2 5 | 0.2 3 | 0.2 2 | 0.0 6 | 0.2 2 | 0.1 1 |
| VAR0 0030 | - 0.0 3 | - 0.0 7 | - 0.3 1 | - 0.5 | 0.2 9 | 0.1 5 | 0.1 7 | 0.0 7 | 0.1 4 | 0.0 1 | 0.2 7 | 0.0 6 | 0.3 2 | 0.3 7 | 0.1 0.1 |
| VAR0 0031 | - 0.4 5 | - 0.0 2 | - 0.0 2 | - 0.2 9 | - 0.1 6 | 0.0 3 | - 0.2 | 0.1 8 | 0.3 2 | 0.3 5 | 0.1 5 | 0.1 5 | - 0.1 | 0.0 3 | 0.1 2 |
| VAR0 0032 | - 0.3 6 | - 0.1 4 | - 0.1 4 | - 0.1 8 | - 0.1 6 | 0.4 8 | 0.2 2 | 0.1 7 | 0.0 6 | 0.1 5 | 0.2 3 | 0.1 7 | 0.1 8 | 0.3 3 | 0.0 5 |
| VAR0 0033 | 0.0 9 | 0.0 4 | 0.1 8 | 0.2 1 | - 0.2 | 0.3 7 | 0.1 6 | 0.1 9 | 0.3 2 | 0.3 7 | 0.3 9 | 0.3 2 | 0.2 3 | 0.0 6 | 0.0 1 |
| VAR0 0034 | 0.3 5 | 0.0 2 | 0.3 3 | 0.2 4 | 0.2 2 | 0.1 5 | 0.0 7 | - 0.1 | 0.1 1 | 0.3 7 | 0.3 6 | 0.0 3 | 0.3 0.3 | 0.0 1 | 0.2 7 |
| VAR0 0035 | 0.1 4 | 0.2 4 | 0.5 1 | 0.1 0.1 | 0.3 0.3 | 0.0 1 | 0.2 1 | 0.0 3 | 0.0 6 | 0.1 9 | 0.0 5 | 0.1 8 | 0.0 0 | 0.2 4 | 0.1 7 |
| VAR0 0036 | 0.3 6 | 0.0 4 | 0.4 7 | 0.0 5 | - 0.1 | 0.5 2 | 0.0 4 | - 0.2 | 0.0 5 | 0.0 4 | 0.0 1 | 0.0 8 | 0.2 1 | 0.0 1 | 0.2 2 |
| VAR0 0037 | 0.1 6 | 0.7 3 | - 0.2 | 0.0 1 | 0.2 3 | 0.0 9 | 0.1 6 | 0.1 5 | 0.2 5 | 0.0 9 | 0.0 9 | 0.1 2 | 0.0 4 | 0.0 2 | 0.0 1 |
| VAR0 0038 | - 0.0 5 | 0.2 8 | 0.0 8 | 0.1 2 | - 0.1 | 0.4 9 | 0.4 5 | 0.0 9 | 0.2 4 | 0.1 7 | 0.0 1 | - 0.1 | 0.1 8 | 0.0 3 | 0.0 3 |
| VAR0 0039 | 0.1 6 | 0.2 4 | 0.1 6 | 0.1 7 | - 0.3 | 0.5 9 | 0.2 7 | 0.0 3 | 0.0 9 | 0.1 1 | 0.1 3 | 0.2 3 | 0.0 8 | 0.1 1 | 0.2 7 |
| VAR0 0040 | 0.3 | - 0.4 3 | 0.0 1 | 0.2 7 | 0.2 2 | 0.0 8 | 0.1 7 | 0.2 3 | 0.0 1 | 0.1 0.1 | - 0.1 | 0.1 2 | 0.1 2 | 0.2 9 | 0.0 3 |
| VAR0 | 0.1 | 0.3 | - | - | - | 0.3 | 0.1 | - | - | 0.3 | - | 0.0 | - | 0.0 | 0.1 |

| | | | | | | | | | | | | | | | |
|------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 0041 | 5 | 2 | 0.0 | 0.3 | 0.3 | 3 | 9 | 0.0 | 0.3 | 2 | 0.0 | 9 | 0.1 | 4 | 2 |
| | | | 5 | 1 | | | | 9 | 5 | | 7 | | | | |
| VAR0 | | 0.2 | 0.3 | 0.1 | 0.1 | - | - | | - | | - | - | | - | - |
| 0042 | 0.1 | 1 | 9 | 7 | 1 | 0.2 | 0.0 | 0.4 | 0.0 | 0.3 | 0.3 | 0.0 | 0.2 | 0.1 | 0.1 |
| | | | | | | 8 | 1 | | 9 | 1 | 6 | 9 | 6 | 2 | 8 |

Table 3 Dimension I: Behavioural Characteristic.

| Variable Number | Name of the Variables | Factor Loading |
|--------------------------|---------------------------------------|----------------------|
| 1 | Age | -0.47 |
| 8 | Education | 0.46 |
| 11 | Time taken to reach the health centre | 0.68 |
| 12 | Time period of health centre | 0.75 |
| 17 | Distance from home | 0.74 |
| 24 | Quality of water source | 0.58 |
| 31 | Duration of Illness | -0.60 |
| 34 | Bed strength | -0.45 |
| Eigen Value: 4.75 | | Percentage of |
| Trace: 11.32 | | |

Table 4 Dimension II: Patients Attitude.

| Variable Number | Name of the Variables | Factor Loading |
|--------------------------|---------------------------|----------------------------------|
| 8 | Education | 0.62 |
| 9 | Occupational status | 0.56 |
| 15 | Money spends on transport | -0.48 |
| 21 | Access to health center | -0.48 |
| 22 | Habits | 0.7 |
| 37 | Doctors at night-time | -0.73 |
| 40 | Emergency health facility | -0.43 |
| Eigen Value: 3.81 | | Percentage of Trace: 9.08 |

Dimension II – Patients' Attitude

The dimension of patient attitude explained a total variance of 9.08 per cent with an Eigenvalue of 3.81, seven variables are found to be significant in explaining the second dimension(Table 4) . The negative factor loadings of doctors at time (-0.73), access to the health centre (-0.48), money spent on transport (-0.48), and emergency health facility (-0.43) is seen and high positive factor loading is seen inhabit (0.70), education (0.62) and occupation (0.56). Positive loadings on distance, travel time, access to health centres, and education suggest that these factors are associated with better health outcomes.

Dimension III- Knowledge about Treatment

The third dimension of Knowledge about treatment preferences explained a total variance of 7.51 per cent with an Eigenvalue of 3.15(Table 5). The third dimension and variable loaded in the dimension explains the Patient’s perception of health conditions and the health utilization

of the people. The negative factor loading of occupational status (-0.52), access to other health centres (-0.51), and treatment opinion (-0.47), and high positive loading is seen in age (0.48), and present health condition (0.47). In the analysis, certain variables showed significant relationships with the measured factor. On the other hand, age and current health status showed a strong positive association with the factor, indicating that older age and better current health status are associated with higher factor scores.

Dimension IV- Health Care Performance

The fourth dimension on the surrounding environment explained a total variable of 6.94 percent with an Eigen value of 2.92. The fourth dimension and variable loaded in with the dimension explained the health care environment of the respondents. Hence, the dimension is named ‘Health Care Performance’. The high positive loading is seen in the medical system preferred (0.62), mode of transportation (0.52), and quality of water source (0.48). The negative loading is seen in this kind of disease (-0.49)(Table 6). The dimension indicates that the origin of different types of disease impacts the quality of water, the Medical system and the accessibility of transport.

Table 5 Dimension III: Knowledge about Treatment.

| Variable Number | Name of the Variables | Factor Loading |
|--------------------------|--------------------------------|----------------------|
| 1 | Age | 0.48 |
| 9 | Occupational status | -0.52 |
| 29 | Present health condition | 0.47 |
| 35 | Access to other health centres | -0.51 |
| 36 | Treatment opinion | -0.47 |
| Eigen Value: 3.15 | | Percentage of |
| Trace: 7.51 | | |

Table 6 Dimension IV: Health Care Performance.

| Variable Number | Name of the Variables | Factor Loading |
|----------------------------------|--------------------------|----------------|
| 13 | Medical system preferred | 0.62 |
| 16 | Mode of transportation | 0.52 |
| 25 | Quality of water source | 0.48 |
| 30 | Kind of disease | -0.49 |
| Eigen | Value: | 2.91 |
| Percentage of Trace: 6.94 | | |

Dimension V- Patient Characteristics

The fifth dimension of patient characteristics explains a total variance of 6.28 per cent with an Eigenvalue of 2.64. The negative loading is seen in occupational status (-0.58). The high

positive loading in the language (0.68), income (0.44), waiting time (0.43), and a mobile team from the health center (0.41) (Table 7). The factor shows that the income, waiting time, and the mobile team visiting villages from the health centre have better communication or access to healthcare services, whereas there is a negative loading on occupational status, which implies that most of the time, people with lower incomes tend to access the healthcare centre. The preferred medical system, mode of transportation, and quality of water sources are positively associated with better outcomes. Conversely, the type of disease is negatively associated, indicating that more severe or chronic diseases have a negative impact.

Dimension VI- Source of Disease

The six dimensions resources of disease with a total variable of 6.09 per cent with an Eigenvalue of 2.56. High loading is seen in type of family (0.56), opinion on health services (0.52), source of disease (0.47), and types of diseases (0.59) (Table 8). The above factor explains that almost all the families in the locale are alike with a similar number of members, the opinion towards healthcare is favourable and the type of disease and the source of the disease seem to be similar among the respondents.

| Table 7 Dimension: V Patient’s Characteristics. | | | | | |
|--|--------------------------------|-----------------------|--|--|--|
| Variable Number | Name of the Variables | Factor Loading | | | |
| 4 | Language | 0.68 | | | |
| 9 | Occupational status | -0.58 | | | |
| 10 | Income | 0.44 | | | |
| 14 | Waiting time | 0.43 | | | |
| 20 | Mobile team from health center | 0.41 | | | |
| Eigen Value: 2.63 | | Percentage | | | |
| of Trace: 6.28 | | | | | |
| Table 8 Dimension VI: Source of Disease | | | | | |
| Variable Number | Name of the Variables | Factor Loading | | | |
| 5 | Family type | 0.56 | | | |
| 32 | Source of disease | 0.47 | | | |
| 36 | Opinion on health services | 0.52 | | | |
| 39 | Kind of diseases | 0.59 | | | |
| Eigen Value: 2.56 | | Percentage | | | |
| of Trace: 6.09 | | | | | |

Dimension VII Local Medical Accessibility

The seventh dimension is on transport facility with a total variance of 5.24 per cent with an Eigenvalue of 2.20 (Table 9). High factor loading is seen in transport expenses (0.44), residence (0.58), mode of transport (0.45) and local medicinal facility (0.44). This factor explains that the health centre is located very close to the locals and therefore the travel fare

is low with a good local medicinal facility present in the area and the frequency of transport vehicles is low in the area. The factor analysis has identified 8 minor dimensions explaining a total variance of 15 and below the eigenvalue of 1. These factors are considered less significant in interpretation.

| Variable Number | Name of the Variables | Factor Loading |
|--------------------------|------------------------------|----------------------------------|
| 2 | Residence | 0.58 |
| 15 | Transport expenses | 0.44 |
| 16 | Mode of transport | 0.45 |
| 38 | Local medicinal facility | 0.44 |
| Eigen Value: 2.20 | | Percentage of Trace: 5.23 |

6.CONCLUSION

The placement and construction of housing settlements is the most basic way in which human-disease contact occurs. Social and behavioural resources and tools are therefore increasingly recognized as relevant to the management of communicable diseases in each PHC. Uneducated people and household water containers are the main determinants of infectious disease. The healthcare delivery systems are an unavoidable part of modern society. The health care of the people is mainly concerned with the differences in environment and way of life in various geographical areas. The patients who live nearest to the health centre are more likely to use the services efficiently.

If the centres are provided with an adequate number of health services and infrastructure facilities as well as health manpower resources and good transportation. Those PHC's are bound to be used efficiently. This pattern ensures that densely populated and accessible regions receive adequate healthcare coverage. However, the distribution also reflects the district's diverse geography and demographics, accommodating rural populations that face transportation challenges. The placement of PHC's in larger subdivisions like Jampuijala and Kathalia, with adequate distances between them, aims to improve healthcare accessibility and reduce the travel burden for residents. It is stressed that future studies must, therefore, represent an integrated approach linking service areas to the measurement of locational efficiency and the hierarchical distribution of healthcare locations.

Declarations

Conflict of Interest: On behalf of all authors, the corresponding author states that there is no conflict of interest

Ethical Approval: Ethical approval is not required.

REFERENCES

1. Saravanabavan, V., & Vinothini, C. (2026). Assessment Of Healthcare Performance: Knowledge, Attitude, Behavioral Characteristics of Patients and Spatial Distribution of PHC's In Sepahijala District, Tripura, India. *IRE Journals* 9 (11), 97-108 **DOI: <https://doi.org/10.64388/IREV9I11-1717261>**
2. Vinothini C, Suja Rose R.S , Saravanabavan V (2024) Demographic and Socio-economic Conditons of hte Patients of the Primary Health Care Centers in Madurai District, Tamilnadu, India, *Indian Journal of Spatial Science* 15 (4), 50-55
3. Nemcha Mate, T. , Saravanabavan, V., & Vinothini, C. (2025). Consumption of Areca Nut and its Socioeconomic and Health Impacts in Shillong, Meghalaya-A Geographical Analysis. *International Journal of Research Publication and Reviews*, 6(11), 899-909. <https://doi.org/10.55248/gengpi.06.1125.3842>
4. Vinothini C, Suja Rose R.S , Saravanabavan V (2025) Primary Health Care Utilization in Madurai District : a Cluster Approach to Socio-Economic and Infrastructure Barriers, *International multidisciplinary Innovative research Journal - An International refereed e-journal*, vol.9, Issue2, pp30-38.
5. Saravanabavan, V. (2011). GIS analysis of pedestrian problem and spatial risk areas for each buffer zone in uraban cities a case study of Madurai city in Tamlnadu, India. South Eastern University of SriLanka, 19th April 2011.
6. Dutta, B., Das, M., Roy, U., Das, S., & Rath, S. (2021). Spatial analysis and modelling for primary healthcare site selection in Midnapore town, West Bengal. *GeoJournal*, 1-30. <https://doi.org/10.1007/s10708-021-10528-w>
7. Vinothini, C., Suja Rose, R. S., & Saravanabavan, V. (2025). Patient's Satisfaction with Primary Healthcare Services and Its Link to Socio-Economic Conditions in Madurai District. *International Journal of Scientific Research and Engineering Development*, 8(2), 248-253.
8. Engjaipi, L., Saravanabavan, V., & Vinothini, C. (2025). Gender-wise travel pattern and utilization of primary health centers of Karbi Anglong district, Assam. *International Journal of Science and Research Archive*, 14(03), 1320-1330. Article <https://doi.org/10.30574/ijrsra.2025.14.3.0779>

9. Saravanabavan, V., Emayavaramban, V., Thangamani, V., Manonmani, I. K., Rose, R. S., Balaji, D., ... & Vinothini, C. (2023). Spatial variation of covid-19 morbidity status and identification of risk zone in Tamil Nadu (India) during first wave. *GeoJournal*, 88(2), 1341-1354. <https://doi.org/10.1007/s10708-022-10680-x>
10. Vinothini, C., Suja Rose, R. S., & Saravanabavan, V. (2024). Assessment of primary health care accessibility and patients' perception in Madurai district: a geo-medical study. *GeoJournal*, 89(5), 211. <https://doi.org/10.1007/s10708-024-11208-1>
11. Radhakrishnan, R., & Vaithialingam, S. (2023). Exploring the suitability of groundwater for domestic water quality and irrigation purpose in Dindigul district, Tamil Nadu. In *Surface and groundwater resources development and management in semi-arid region: strategies and solutions for sustainable water management* (pp. 253-277). Cham: Springer International Publishing. https://doi.org/10.1007/978-3-031-29394-8_14 Springer. Surface and Groundwater Resources Development and Management in ...
12. Ramphila A Shatsang., Saravanabavan, V., & Vinothini, C. (2025). Health and Socio-Economic Analysis of Adolescent Drug Abuse in Ukhrul District, Manipur. *International Journal of Research Publication and Reviews*, 6(10), 2479-2488. DOI: <https://doi.org/10.55248/gengpi.6.1025.3641>
13. Sheheersha S.K, Saravanabavan V(2021) Geo-Medical Analysis of Telemedicine Based Mobile Tele-Ophthalmology Screening For Cataract Cases in Thiruvananthapuram District, Kerala, India. *IOSR Journal Of Humanities And Social Science* 26 (10), 1-7
14. Balasubramani, K., Saravanabavan, V., & Kannadasan, K. (2012). A Comparison of Approaches for Automated Watershed Delineation: A Case study of NagalAr Watershed. In *Proceedings of the National Seminar on Geospatial Technology for Resource Evaluation and Management, Department of Geography, Madurai Kamaraj University* (pp. 200-208).
15. Saravanabavan, V., Vinothini, C., Vadivel, S., Sanjeevi Prasad, S., Katturajan, K., & Balaji, D. (2025). Assessing the performance of primary health centres in Meghalaya: An automatic linear modelling. *International Journal of Science and Research Archive*, 16(01), 454-465. <https://doi.org/10.30574/ijrsra.2025.16.1.2010>
16. Vinothini, C., RS, S. R., Saravanabavan, V., & Vadivel, S. (2025). Factors influencing healthcare accessibility in Madurai District: A spatial and factor analytical approach. *International Journal of Engineering Development and Research*, 13(3), 20-30.

17. Shakhshir, M., & Alkaiyat, A. (2023). Healthcare providers' knowledge, attitude, and practice on quality of nutrition care in hospitals from a developing country: a multicenter experience. *Journal of Health, Population and Nutrition*, 42(1), 15. <https://doi.org/10.1186/s41043-023-00355-9>
18. Saravanabavan, V., Vinothini, C., & Rose, R. S. (2023). Spatial distribution of primary health care centre and socio economic conditions of patients in Madurai district. *International Journal of Geography, Geology and Environment*, 5(2), 192-198.
19. Vinothini, C., & Saravanabavan, V. (2022). Spatial Distribution of Emerging Diseases in Madurai District: A Geo Medical Study. *International Journal of Innovative Science and Research Technology*, 7(6), 2456-2165.
20. Eswari, S., Saravanabavan, V., & Balaji, D. (2021). Structural equation modelling approach to determine the mother and child health care in Madurai district, Tamil Nadu. *International Journal of Scientific Research in Science and Technology*, 8(2), 335-344. <https://doi.org/10.32628/IJSRST218256>
21. Saravanabavan, V., Balaji, D., & Preethi, S. (2019). Identification of dengue risk zone: A geo-medical study on Madurai city. *GeoJournal*, 84, 1073-1087. <https://doi.org/10.1007/s10708-018-9909-9>
22. Singh, A., & Guite, L. S. (2023). Spatial accessibility analysis of public healthcare resources in Muktsar district of Punjab, India using geospatial technology. *GeoJournal*, 88(5), 5031-5042. <https://doi.org/10.1007/s10708-023-10907-5>
23. Saravanabavan, V., Reejo, R. J., Neethidevi, A., & Jayashree, R. (2006). Travel and health care utilization pattern of patients in Vadipatti panchayat union: A micro level study using GIS. *Journal of Deccan Geographer*, 44(2), 97-108.
24. Vinothini, C., Saravanabavan, V., & Suja Rose, R. S. (2025). Travel Behaviour Of Child Patients And Health Care Accessibility Of PHC In Madurai District, Tamilnadu. *International Research Journal of Education and Technology*, 7(02).
25. Vinothini C, R.S. Suja Rose, V. Saravanabavan (2024) Demographic and Socio-economic Conditions of the Patients of the Primary Health Care Centers in Madurai District, Tamilnadu, *Indian Journal of Spatial Science* 15 (4), 50-55
26. Saravanabavan, V., Vinothini, C., Suja Rose, R. S., & Balaji, D. (2025). A Geo-Chemical Study of Water Pollution Due to the Tanning Industry: A Case Study of Dindigul District, Tamilnadu, India. In *Groundwater Resource Management Planning Strategies: A Geospatial Approach: Volume 1* (pp. 651-683). Cham: Springer Nature Switzerland. https://doi.org/10.1007/978-3-031-88870-0_25

27. Vinothini, C., Suja Rose, R. S., & Saravanabavan, V. (2025). Non-communicable diseases and socio-economic disparities: A case study of Madurai District. *International Research Journal of Education and Technology*, 8(9), 50-63.
28. Sengnang S Mark, V.Saravanabavan, C.Vinothini (2026) Perception of Health Tourism in enhancing the quality of life of the Garo community: A case study of Daribokgre village, East Garo Hills, Meghalaya. *International Journal of Research Publication and Reviews* 7 (3), 3469-3477. <https://doi.org/10.55248/gengpi.07.0326.20635>
29. Reshma CU; SK Sheheersha, V Saravanabavan(2014) Enhancing The Quality And Accessibility Of Geographic Learning Through Modern Instructional Strategies In The School: Its Implications And Opportunities. *IOSR Journal of Research & Method in Education (IOSR-JRME Volume 4, Issue 3 Ver. II (May-Jun. 2014), PP 25-30*
30. Danyon DameshwaJyrwa ,V Saravanabavan, LaitpharlangCajee ,C Vinothini (2025) Spatial analysis and efficiency of healthcare delivery system in Meghalaya State, India: A ‘Z’ Score Approach *International Journal of Science and Research Archive* **15 (01), 1312-1324**. <https://doi.org/10.30574/ijsra.2025.15.1.1148>
31. Saravanabavan, V., Cajee, L., Sangma, M. C., & Vinothini, C. (2025). Spatial Distribution and Service Coverage Analysis of Primary Health Centres in South West Garo Hills District, Meghalaya, India. *Asian Journal of Geographical Research*, 8(4), 389-400. <https://doi.org/10.9734/ajgr/2025/v8i4344>
32. Vinothini, C., Ponnukalai, B., Rose, R. S., & Saravanabavan, V. (2026). Geoinformatics-based analysis of seasonal vegetation dynamics and mosquito-borne disease patterns in Madurai District. *International Journal of Scientific Research and Engineering Development*, 9(2), 1429–1437.
33. Eswari, S., Saravanabavan, V., Vinothini, C., & Balaji, D. (2025). Mother and Child Health Care In Madurai District: A Structural Equation Modelling Approach. *The Indian Geographical Journal*, 100(1), 39-54.
34. Vinothini, C., Suja Rose, R. S., Saravanabavan, V. (2026). Assessing Primary Healthcare Performance and Patient Perception Using Kernel Density Estimation in Madurai District. *Journal of Advance and Future Research*, Volume 4, Issue 4 April 2026,537-548. <https://rjwave.org/jaafr/viewpaperforall.php?paper=JAAFR2604192>
35. Saravnabavan, V., Ganesan, J., Vinothini, C., & Balaji, D. (2026). The Impact of BMI on the Health Status of Tea Plantation Workers in the Nilgiris, Tamil Nadu, India. *Journal of*

- Complementary and Alternative Medical Research*, 27(2), 59-74. DOI: <https://doi.org/10.9734/jocamr/2026/v27i2741>
36. Vinothini, C., Suja Rose, R.S & Saravanabavan, V. (2025) Patients' Perception and Health care Accessibility of Primary Health care centre in Madurai District-A Geo-Medical Study. December 2025. *Annals of the National Association Of Geographers India* 45(2):233-249 DOI:10.32381/ATNAGI.2025.45.02.8
 37. Saravanabavan, V., Reshma, C. U., & Preethi, S. (2021). Determinants of reproductive health in working women in Thrissur district, Kerala. *GeoJournal*, 86, 239-253. <https://doi.org/10.1007/s10708-019-10051-z>
 38. Vinothini, C., & Saravanabavan, V. (2023). Determinants of health care facilities and patients' accessibility to PHC in Madurai district. *International Journal of Geography, Geology, and Environment*, 5(2), 17-22.
 39. Vinothini, C., Saravanabavan, V., & Rose, R. S. (2024). Travel patterns of adult patients to primary health centers in Madurai district: A public health perspective. *International Journal of Science and Research Archive*, 13(1), 141-149. <https://doi.org/10.30574/ijrsra.2024.13.1.1605>
 40. Saravanabavan, V., Vinothini, C., & Suja Rose, R. S. (2024). Transport accessibility and efficiency of PHC location in Kanyakumari district, Tamil Nadu. *International Journal of Science and Research Archive*, 11(2), 1342-1351.
 41. Biferale, L., Brandano, M. G., Crociata, A., & Melo, H. P. (2024). The spatial dimensions of cultural consumption: how distance influences consumption levels in a spatial setting. *Journal of Cultural Economics*, 48(4), 499-525. <https://doi.org/10.1007/s10824-024-09506-0>
 42. Saravanabavan, V., Balaji, D., Reshma, C. U., Sheheersha, S. K., Sudharsan, R., Vimala Vinnarasi, J., & Balasubramani, K. (2021). Urban disease ecology and its spatial variation of Chikungunya in Madurai City, Tamilnadu, India: a geo-medical study. *GeoJournal*, 86, 2335-2350. <https://doi.org/10.1007/s10708-020-10192-6>
 43. Vinothini, C., Rose, R. S., & Saravanabavan, V. (2024). Spatial distribution and female travel behavior: Enhancing primary health care services in Madurai District. *International Journal of Engineering applied Sciences and Technology*, 9(05), 2455-2143.
 44. Saravanabavan, V., Nongspung, C., Vinothini, C., & Vadivel, S. (2025). Healthcare Accessibility in East Khasi Hills, Meghalaya, India: Age, Gender, and Socioeconomic

- Barriers to Primary Health Centre Access. *Asian Journal of Geographical Research*, 8(3), 488-505. <https://doi.org/10.9734/ajgr/2025/v8i3313>
45. Rahamath Nisha R, V Saravanbavan, R Sureskumar (2021) Effects of Population Density and Air Pollution on Covid -19 Morbidity and Mortality in India Using GIS International Journal of Contemporary Medical Research 8 (8), H1-H11.
<http://dx.doi.org/10.21276/ijcmr.2021.8.8.8>
46. Farrokhi, P., Zarei, E., Bagherzadeh, R., Irannejad, B., & Hashjin, A. A. (2023). Development and validation of primary health care quality assessment tool. *BMC Health Services Research*, 23(1), 1156 <https://doi.org/10.1186/s12913-023-10162-x>
47. Raab, C., Gambashidze, N., Brust, L., Weigl, M., & Koch, A. (2024). Motivation for patient engagement in patient safety: a multi-perspective, explorative survey. *BMC Health Services Research*, 24(1), 1052. <https://doi.org/10.1186/s12913-024-11495-x>
48. Khatri, R. B., Endalamaw, A., Erku, D., Wolka, E., Nigatu, F., Zewdie, A., & Assefa, Y. (2024). Enablers and barriers of community health programs for improved equity and universal coverage of primary health care services: A scoping review. *BMC primary care*, 25(1), 385. <https://doi.org/10.1186/s12875-024-02629-5>