



(RESEARCH ARTICLE)



## Inadequate healthcare facilities despite Endosulfan affected area in Kasaragod District

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### Abstract

At Kasaragod district in Kerala state the inhabitants here suffer due to the negligence of states own Plantation Corporation by 20 years spraying of Endosulfan pesticide in 2000 hectares of cashew plantation. It has no choice but to compensate for the unparalleled misery caused by the silent killer Endosulfan for a quarter of a century. More than thousands of people have been suffering by this environmental manmade disaster but the ratio between doctor and population rate is lower than the recommendation of World health organization. Unemployment in the district pushes international and national migration of the Kasaragod citizens. The rate of migration and birth are high in Kasaragod district. Lack of Tertiary hospitals in Kasaragod the Inhabitants in the district not only depends by near city for multi-specialty healthcare but also for better education, employment and other facilities. This dependence is the main reason for inadequate healthcare system and under development of the district. The statistical methods are used to measure healthcare facilities and population in Kasaragod district. Accessibility towards nearby cities have analyzed by Geographical Information System software. Here Patients were struggled for consultation in the emergency of Covid pandemic period. Basic facility of a society can measures by considering its quality of health care centers. But in Kasaragod patients are rely for multi-specialty hospital to neighborhood cities. If they have to take effort for treatment by long journey pointing out that the district has insufficient health care system in it.

**Keywords:** Endosulfan Pesticide; Manmade disaster; Tertiary Hospital; Unemployment; Migration

### 1. Introduction

Kasaragod Healthcare system lags behind all other districts healthcare system in Kerala. The lack of growth of the healthcare system in Kasaragod is due to the fact that the people here are increasingly dependent on the nearby city of Mangalore. The underdevelopment of the healthcare system in Kasaragod doesn't affect the economically advanced people because they rely on private hospitals in Mangalore but the economically backward ones who suffer the most. The inadequacy of the healthcare system was greatly affected during the Corona Pandemic. A society needs an effective health sector that is commensurate with the population. The influx of people from Kasaragod for better treatment, education, employment, shopping and entertainment move towards Mangalore city in the neighboring state of Karnataka. Since everything depends on Mangalore city there is no proper growth in health sector of Kasaragod district.

Kasaragod district is a region plagued by manmade natural disasters. The victims of the deadly poison Endosulfan are an innocent population. A group of disabled people are living in the district as a result of the Endosulfan disaster. People over the age of 45 are at higher risk of contracting deadly diseases such as Cancer due to Endosulfan disaster. The Endosulfan toxin was sprayed on the government of Kerala's own plantation corporation. Then it is the responsibility of the government to strengthen the health sector here. But there is still a tendency for people to rely on the nearest state as a major treatment. The health sector here is not proportion to its population. The people here are still living

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with the tragedy as the soil is contaminated with toxins that are less likely to decompose. In such a situation, it is the duty of the Kerala government to improve the health sector and protect the people here. But here we can see people rushing for the surgery hospital to neighboring cities north Mangalore in Karnataka and south Kannur district in Kerala.

India is the fastest growing economy in the world in spite of the country has poor healthcare parameters. “There are 57 countries facing human resources in health crisis, India’s ranking is 52<sup>nd</sup> (WHO, 2010)”. The Modern medicine Allopathic has been regulated by medical council of India governed by under ministry of Health and Family Welfare.

“In spite of development in other field, the healthcare parameters remain poor in India (Pal, 2018)”. There is an urgent need to focus on the development of healthcare system both public and private sector for growing population. In developing countries, the health care sector in the high amount of population still stands poor, in the same time the growth rate of population is increasing. If the Health of population becomes strong, the society’s standard of living would increase.

“Some groups in American society such as AMESH, black Americans, Hispanics and Native Americans are still faced by accessibility and affordability problems even though the United States spends more amount than Australia on Health care” (Mohammed, 2019). “There is a necessity to increase more care on newborn by implementing certain policies, programs, quantitative and qualitative care. Then only it leads for the progress of mother and new born child in our society” (Chokshi, 2021).

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## 2. Diffusion of Endosulfan Pesticide in the Environment

20 out of 48 Grama Panchayath in Kasaragod district have been victims of Endosulfan. The Public sector’s 12000 acres cashew Plantation corporation of Kerala had aerially sprayed insecticide chemical Endosulfan between the year 1975 to 2000.

- Farmers in Kasaragod favored Endosulfan pesticide in that time because it had been imprinted in farmers mind that if they used Endosulfan pesticides would quickly disappear at a lower cost. It summarizes that a conditioned learning happened in farmers mind about the usage of Endosulfan. They could purchase the Endosulfan pesticide in each fertilizer shop. So here most of the peasants had begun to be used in all other agricultural crops. This was reasoning the disaster spread worse a greater number of Gramapanchayath in Kasaragod district.
- Endosulfan is a highly in potent Neurotoxin. It is non-readily biodegradable and it can travel long distances from where it is used by natural agent’s wind, Rain water, and stream and agriculture product such as dairy items, vegetables, fruits and cereals.
- The district has more than 3000 congenital disabled children. More than 6000 People have been suffering by this poison. In 2001 the plantation corporation of Kerala stopped spraying of Endosulfan. But this Pesticide Tragedy of Endosulfan spread residential area far and wide by wind and rain; it made destruction in the environmental biodiversity.
- That is why Endosulfan disaster has to be extended to other more villages in Kasaragod district. There were reports in 2013 that Endosulfan was available at fertilizer depot it had been renamed even after the ban of the pesticide. Because it seems that the demand of the product was high among the farmers after the ban by the conditioned learning of the poor and illiterate farmers.
- Thousands of people killed by major diseases. Its impact is still being in Kasaragod District. Infants still are born with genetic disorders those who have not done the three Ultrasound scans during Pregnancy.

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## 3. Study area and research methodology

### 3.1. Study area

Kasaragod is the northern most districts of Kerala state in India. The location of Kasaragod is North Latitudes - 12\*-2', 12\*-45'; East Longitudes - 74\*-52', 75\*-26'. Total area of Kasaragod is 1992 Km<sup>2</sup>.

### 3.1.1. Historical fact

Kasaragod district had been the part of Mysore the south Canara district of Madras state till on November 1 1956. Kerala state was formed on November 1956 following the passage of the state Reorganisation Act. In the year 1956 to 1984 Hosdurg and Kasaragod taluks were the part of undivided Kannur district. Kasaragod district was formed on 24th May 1984. Kasaragod the Northern most district of Kerala has a deep cultural bond with Dakshina Kannada District of Karnataka because of decades old cordial relationship. It was earlier the part of the south Canara district of the Madras Presidency under the British and even after the independence of India. The 3 districts of Udupi, Dakshina Kannada and Kasaragod together formed Tulunadu before reorganization on linguistic of states in 1956. The formation of Kerala was on 1<sup>st</sup> November 1956 Kasaragod become a part of Kannur district and Kasaragod was declared a district on 24<sup>th</sup> may 1984. The Languages Tulu, Kannada, Malayalam, Marati, Kongini, Beary and Urdu have been spoken in Kasaragod since ancient time. So it is known as SAPTHA BHASHA SANGAMA BHOOMI.

### 3.1.2. Population Information

“According to the 2018 vital statistics published by the government of Kerala, Kasaragod district has a population of 13,90,894”. The Population is 1307375 (2011 census). Population density in the district is 654 inhabitants per square kilometer. Growth rate: 8.18% Literacy: 92%- Male: 95.5%, Female: 88.9% (census: 2011). In 2013 the Kasaragod district classified in to four as 1. Manjeshwaram, 2. Kasaragod, 3. Hosdurg, 4. Vellarikundu. Kasaragod has 128 villages.

### 3.1.3. Soil and Drainage

The soil in Kasaragod district has most predominantly covered by Laterite soil. Brown hydromorphic soil, alluvial soil and Forest loam soils are all other soil types in Kasaragod. Laterite soil is infertile. Therefore, good yields can be obtained only by applying fertilizers. The laterite rocks are extracted widely from Kasaragod as building stone mining which are used for building purpose.

Kasaragod district has 9 rivers. The Chandragiri River (105km) is the largest among these. Manjeshwaram River (16km) is the shortest river in Kerala located in Kasaragod district. Kasaragod consists of the hill tracts villages in the eastern side and coastal villages in the western side and it is the 14th district in the State.

### 3.1.4. Endosulfan tragedy in Kasaragod: (1977 to 2001- Areal spray of Endosulfan)

In 1977 the plantation corporation of Kerala started growing Cashew sapling on 2000 hectares of land in Kasaragod. Ever since that time Endosulfan was sprayed in the area aerielly three times a day.

The spraying of Endosulfan in the cashew plantations of State-owned Plantation Corporation of Kerala caused a disaster on the biodiversity of the area. Endosulfan is a restricted-use pesticide that is particularly effective against aphids, fruit worms, beetles etc.

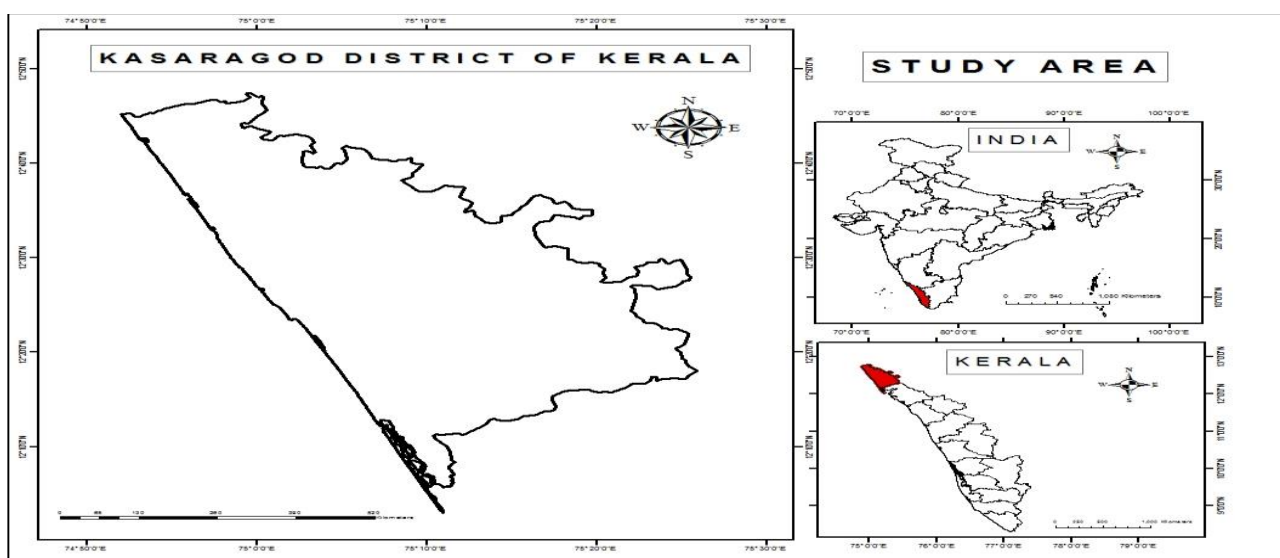


Figure 1 Location map of Kasaragod district

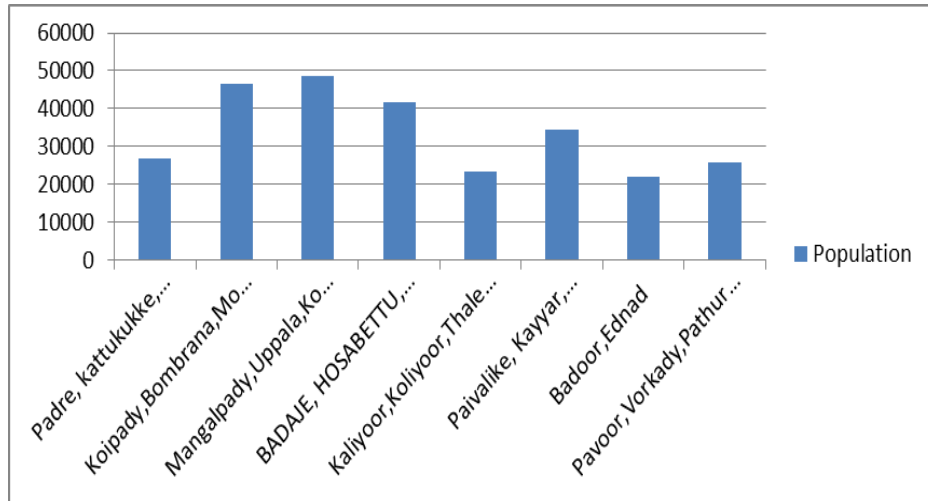


Figure 2 Population in Manjeshwaram Taluk (source: The creation of author using census data 2011)

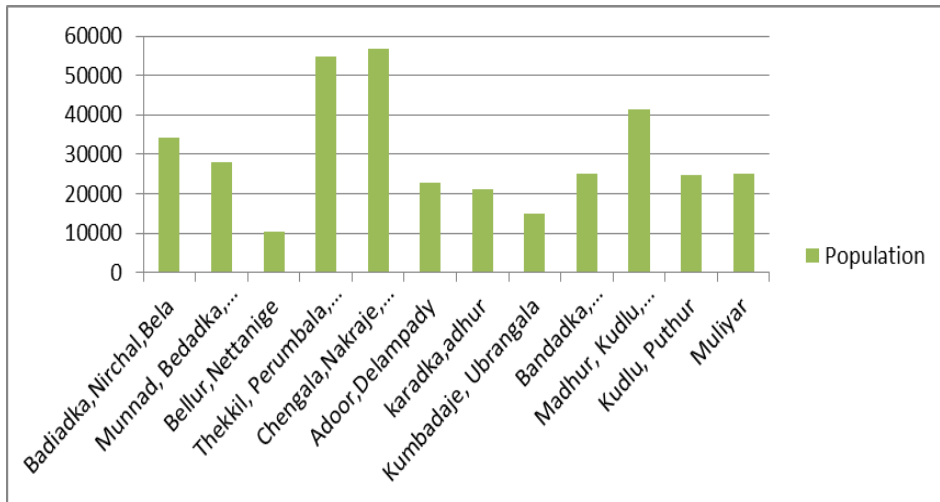


Figure 3 Population in Kasaragod Taluk (source: The creation of author using census data 2011)

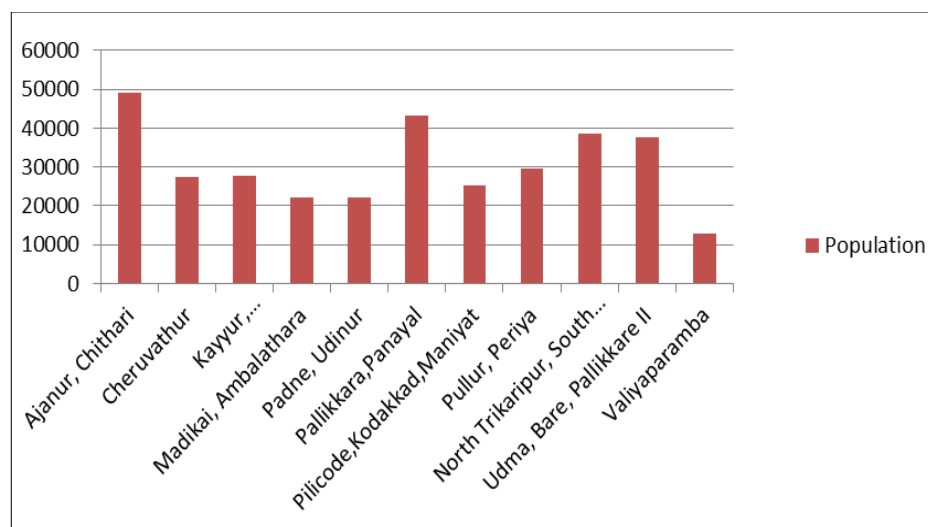
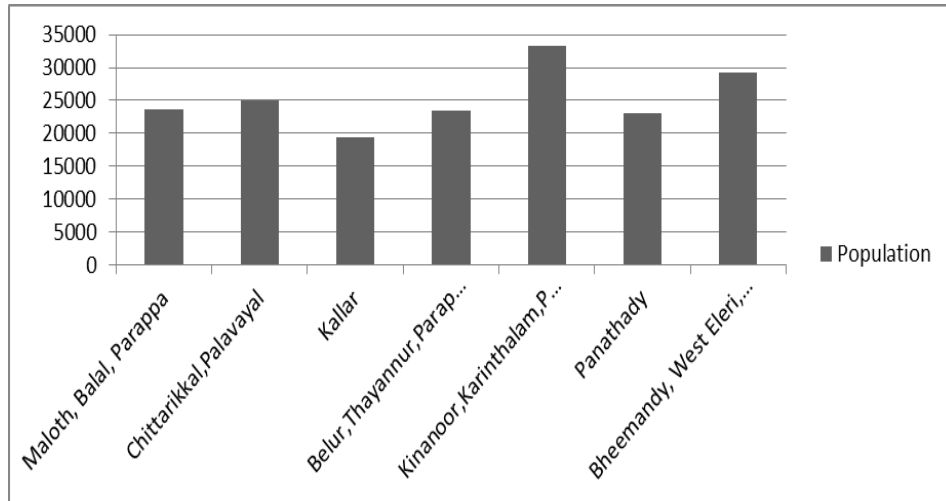
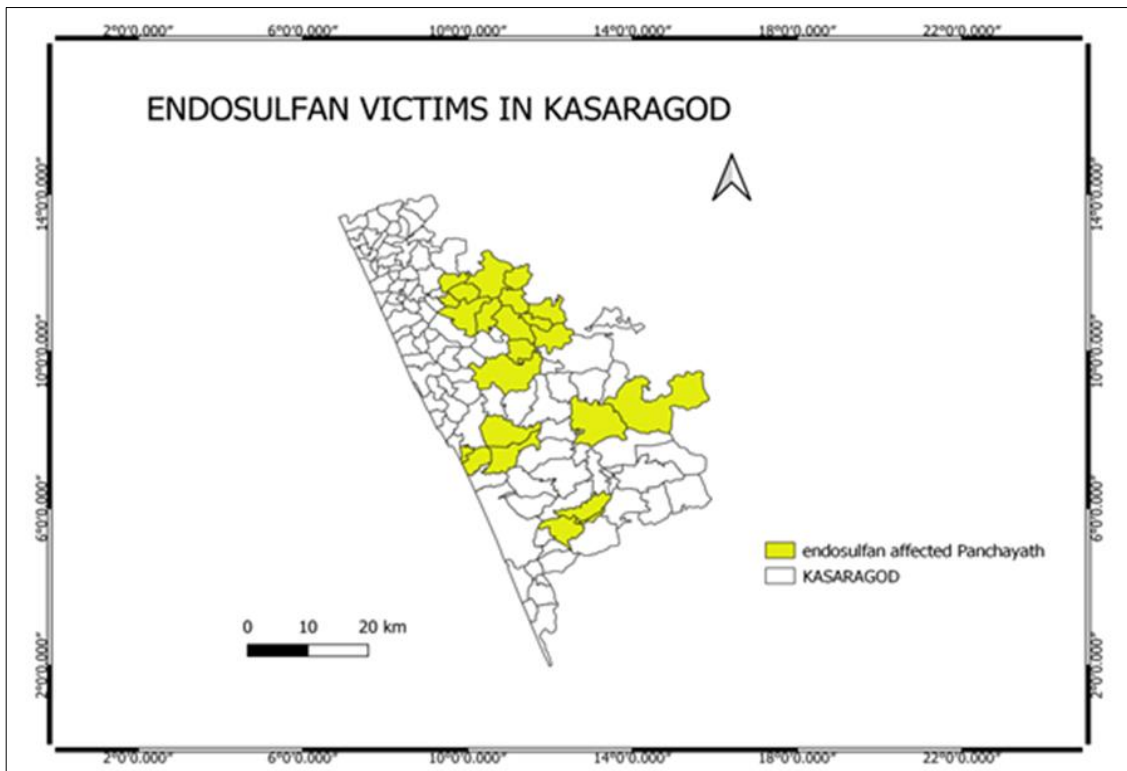


Figure 4 Population in Hosdurg Taluk (source: The creation of author using census data 2011)



**Figure 5** Population in Vellarikundu (source: The creation of author using census data 2011)



**Figure 6** Endosulfan victims in Kasaragod (source: The creation of author using GIS software)

### 3.2. Materials and methods

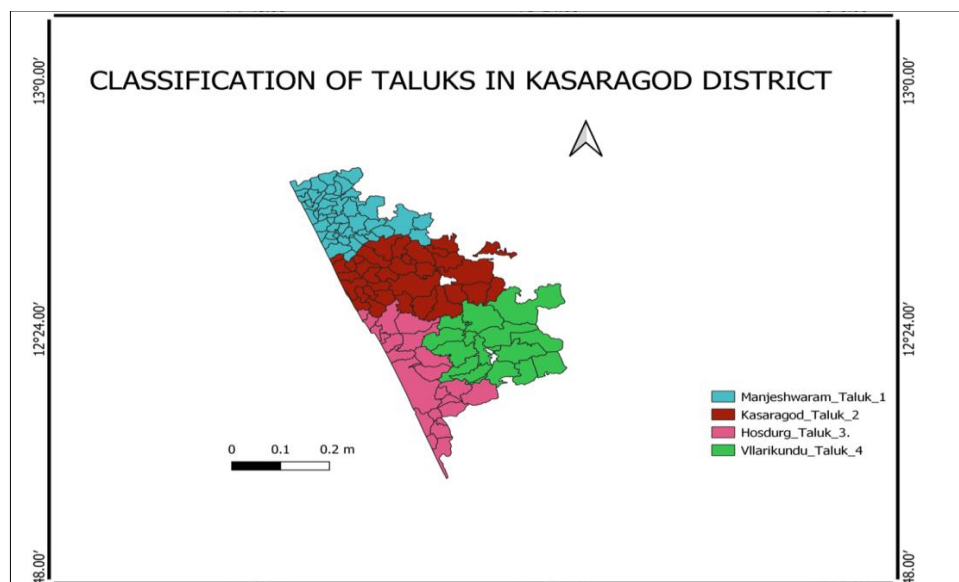
The aim of the study is to analyse the poor health infrastructure in Kasaragod district. Geographical information system software is used for the preparation of maps to represent spatial and attribute data. The statistical methods were applied to analyse the data on population and healthcare facility.

The primary data were collected randomly. Information was collected from medical officers, Asha workers and major ailment Patients through the interview method. Interviews were taken from medical officers in the study area to understand current situation. Patient's information was collected from Asha workers in four Taluks of Kasaragod district. Data were collected from close relatives of patients with terminal illnesses. Author of this research paper lives in Kasaragod district so data collection can be made more efficient through personal experience.

Frequency analysis is used to understand respondent's reply. The patients details were collected from Asha workers in the 4 Taluks of Kasaragod district (Manjeshwaram, Kasaragod, Hosdurg, Vellarikund) by Random sample. Primary Data were collected from patient's close relatives through interview method by phone call because of pandemic limitation. 122 patient's responses collected for this study. GIS software used for analysis of accessibility, which are the Tertiary Hospitals those 122 respondents' take treatment. The secondary data were collected from different articles, thesis, and website and census data 2011.

- Aim of the study is to know about the difficulty of travelling length those who have major diseases.
- To know about Patient's Inconvenience of treatment due to absence of multispecialty hospitals in densely populated Kasaragod district.
- The Kerala government has proposed four suitable districts for setting up of an AIIMS hospital in the state. They are:
  - Open jail compound, Nettukaltheri, Thiruvananthapuram district, Kerala
  - Land at Kilanur in Kozhikode with industries department, Kozhikode district, Kerala
  - Land of Medical college in Kottayam district, Kerala
  - HMT land at Kalamassery in Ernakulam district, Kerala (from thehindu.com)
  - Kasaragod health sector is very poor and why not include Kasaragod district (in Kerala) in this group.

### 3.2.1. Four Taluks of Kasaragod District



**Figure 7** Classification of taluks in Kasaragod district (source: The creation of author using GIS software)

## 4. Results

### 4.1. The condition of the Inhabitants here

Comparing to the entire districts in Kerala the rate of migration in Kasaragod also has highest number and most of the working peoples migrate abroad for better job opportunity. By immigrants in Kasaragod district larger number of corona cases rose sharply in the first and second transmission stages of Covid 19 in the months of March, April, and May 2020, Kasaragod had maximum number of Covid cases tally and became the worst affected district in India in 2020. For better education, medical facility, entertainment, shopping and job People in Kasaragod mostly depends the neighbouring city Mangalore in Karnataka state. So, people affected verily by closing the border of Karnataka state around five months since March to August in 2020 due to highest number of corona hotspot in Kasaragod.

Commuters lost their job, patients struggled for medical facility and daily wages did not get proper job in this pandemic period. Many associations or political parties began to serve the people in these periods but it has not sufficient. The health infrastructure of Kasaragod has limitations. The health care system in Kasaragod has not developed well because of this dependence to near cities like Mangalore in the north and Kannur in the south. Almost Ten people in the

Kasaragod district have died due to lack of medical facility in this corona lockdown period. The road to Karnataka was blocked with mud due to Corona Lockdown in 2020. More than a dozen people have had to sacrifice their lives on the road by lack of emergency treatment that closed the Karnataka border during the corona first lockdown period, at that time Kasaragod was a hotspot centre because of migrants. The district has been in existence for 37 years, but still our health sector is unable to provide even the treatment required for a major accident. Most of the Multi-specialty hospitals in Mangalore are private hospitals that require a lot of money for treatment. Most of the patients in Kasaragod go for treatment at Kannur Pariyaram Medical College and Multi-specialty Hospitals in Mangalore. Patients were unable to go to Mangalore Hospital due to corona restriction.

#### **4.2. Unemployment and weak Education system**

The main reason for backwardness of Education, Technical skill development programme and Employment in Kasaragod district is leads to the position that the most backward district in Kerala. Unemployment is the main problem in Kasaragod. Most of the Bureaucrats in the district are from other districts of Kerala. Candidates from other district in Kerala has the opportunity as it is easy to get government job here. It is the tradition that male citizens here migrate to Arabian countries for better job and most of the females here is common to get married at an early age and they engaged only do family related works. It is the duty of the government to provide skill full and technical education system to the children and improves the current status by giving quality of education system in this society to eradicate unemployment. But regardless of the backwardness of the place, all the status and things are going on like in any other district. As a backward district, there is no concession of government tax is provided here. In this situation, if AIIMS Hospital comes to Kasaragod, it will be a big boost to the development of the district and employment opportunity for the residents. It will be of great help to the Endosulfan victims, poor farmers and those who are economically backward of Kasaragod district, Kodagu in Karnataka and residents of Kannur.

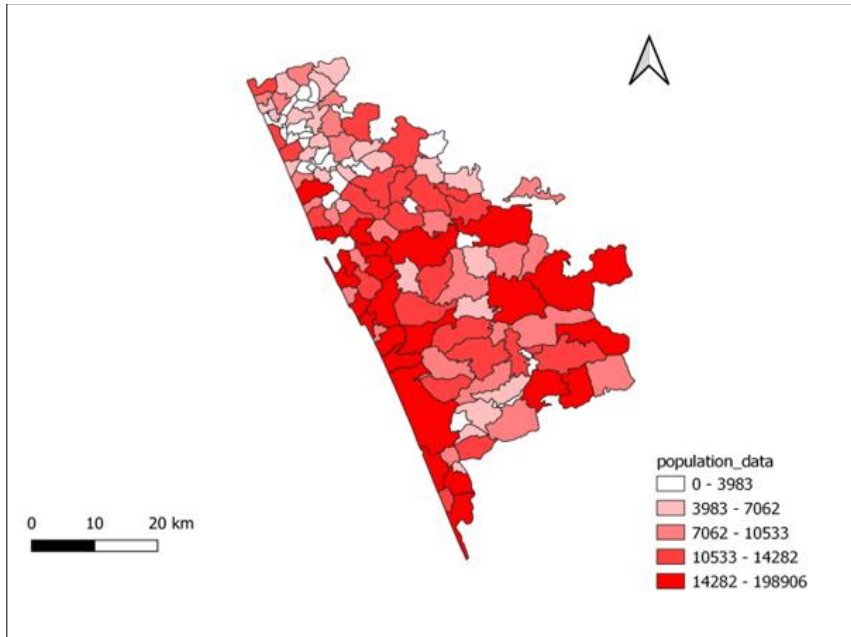
#### **4.3. Hospital that came up in weeks**

Cooperate division of social responsibility of Tata group organization has been sponsored by 60 Crore rupees to build the first corona hospital in Kerala. It has 541 isolation beds and quarantine facility for 450 people. It was constructed in 2020. It has been set up using prefabricated technology within 124 days at Thekkil village of Chemnad panchayath in Kasaragod. Kasaragod is a region that receives heavy Rainfall. With the onset of the rainy season in the month of May/ June/ July/ August 2020, the rain water started leaking inside the hospital. This may be due to the very busy construction. After that some repairs were made, to prevent rain water leaking inside this hospital. The administration of the state and central government must provide better facility and implication of development strategies for the habitants in the bordering states of rural area will be relevant for their wellbeing. All India Institute of Medical sciences (AIIMS) have been established to make available the services of best doctors and modern medical facilities. It is the best medical institute in the country. There are 13 AIIMS collages in India that grant admission to MBBS courses (studywoo.com 2021). AIIMS universities have been awarded the label 'institute of national importance' by an act of parliament. If the AIIMS Hospital comes to Kasaragod, it will help the people here a lot and this society will have progress.

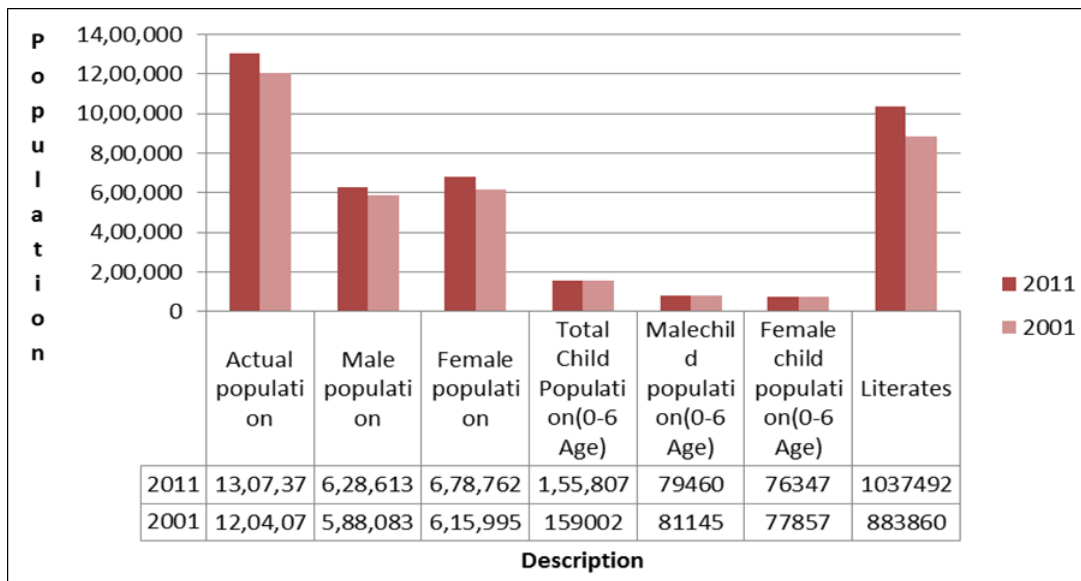
#### **4.4. Current condition of Endosulfan victims**

Endosulfan can enter the human from water, food or soil. The people who were living near by the affected area have been suffering from various diseases thereafter. Congenital diseases in children, cancer, physical deformity, skin allergy, and cerebral alloy, Epilepsy, Mental Retardants, Asthma and Infertility are some of them. Endosulfan mainly affected areas are Enmagajje, Ukkinaduka, Marpinadukka, Karuvathadukka, Mundithadukka, Vaninagar, Adhur, Chemeni, Rajapuram, Periye, Bovikaanam, Padre, etc..... There are approximately above 2500 children (in the age group of 0 to 18) continued to suffer physical and mental health risk in the affected areas. Rural to Rural migration after marriage is the reason for presence of victims in other parts of Kasaragod around the area where the Endosulfan disaster took place. That is why the birth of children with disabilities is seen in other parts of the district. The Endosulfan poisoning has been reported in the blood of people in the Endosulfan affected area.

Over 20 years of aerial spraying on cashew plantations in Kasaragod, Kerala has left many with mental and physical disorders and life killing deceases. They live in a poor economical backward condition. The use of Endosulfan is being restricted to certain crops and is scheduled to be cancelled for all uses by 2016. Studies saying that Endosulfan is hardly decomposed and it can cause Cancer in elderly people approximately after 45 years old. Many Labourers, students and patients depend on Mangalore city for job, better studies and super specialty hospitals. Nearly 3 lakhs of inhabitants in Kasaragod district cross the border and they depend on Mangalore city every day. More than 50 to 60 per cent of patients in multispecialty hospitals of Mangalore are from Kasaragod district because of insufficient facility in healthcare system in the district.



**Figure 8** Population distribution in Kasaragod (source: The creation of author using GIS software)



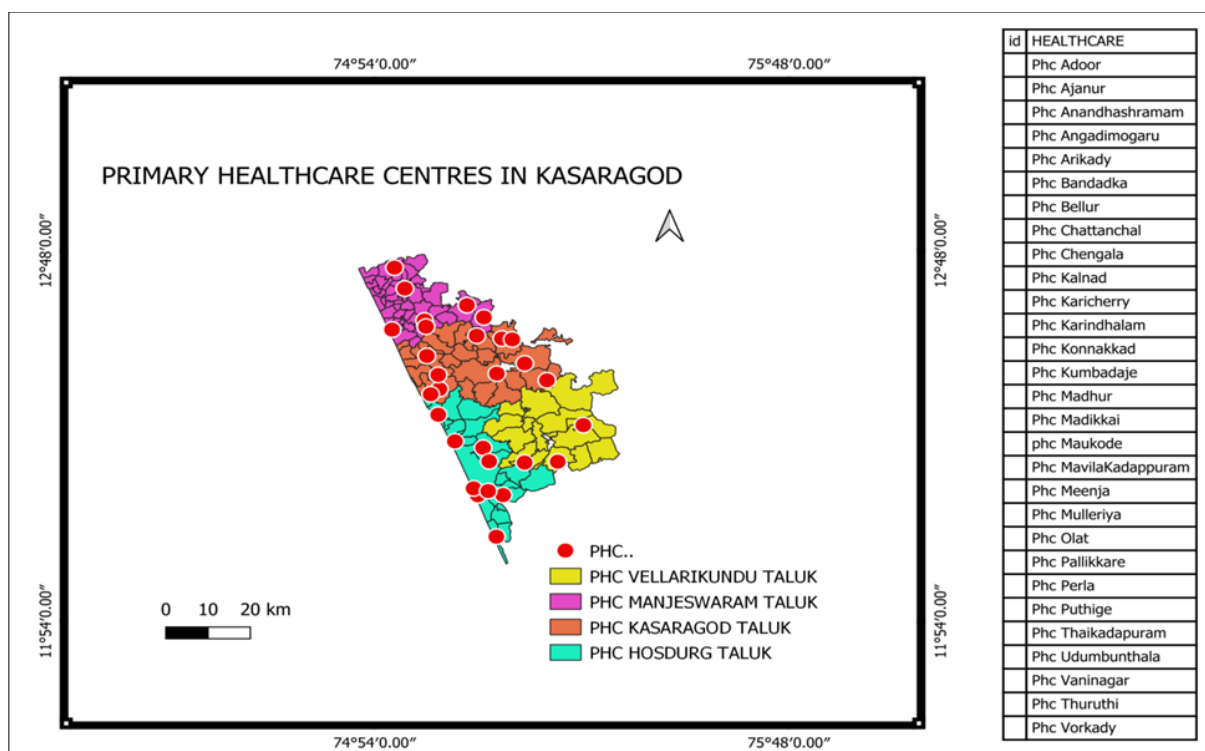
**Figure 9** Population data of Kasaragod (source: The creation of author using census data 2011)



**Table 1** Public Health care system in Kasaragod

1.	<b>Tertiary care Hospitals: - Higher level of Specialty care</b>
	<ul style="list-style-type: none"> <li>• Medical College- The foundation of building was laid on 2013, but the construction has not been completed for 8 years.</li> <li>• General hospital=1- Doctors= 49</li> <li>• District hospital=1- Doctors= 47</li> </ul>
2.	<b>Secondary care Hospitals: - To take treatment from a Specialist</b>
	<ul style="list-style-type: none"> <li>• District Medical office=1- Doctors = 6</li> <li>• District T.B Centre= 1- Doctors= 2</li> <li>• TATA Hospital=1(it was built on October 2020 for Covid Patients)- Doctors= 30</li> <li>• Taluk Hospitals=5- Doctors= 56</li> <li>• CHC=6- Doctors= 40</li> <li>• FHC=7- Doctors=35</li> </ul>
3.	<b>Primary care Hospitals: - To stop the symptoms and medical concerns.</b>
	<ul style="list-style-type: none"> <li>• (PHC24*7) =7- Doctors= 28</li> <li>• PHC=26- Doctors= 52</li> <li>• Blood Bank=2</li> <li>• Running Ambulance= 8, but total=13</li> <li>• Asha workers= 930</li> </ul>

Source: DMO (Health) Kasaragod (2021)



**Figure 10** Primary healthcare centres in Kasaragod (source: The creation of author using GIS software)

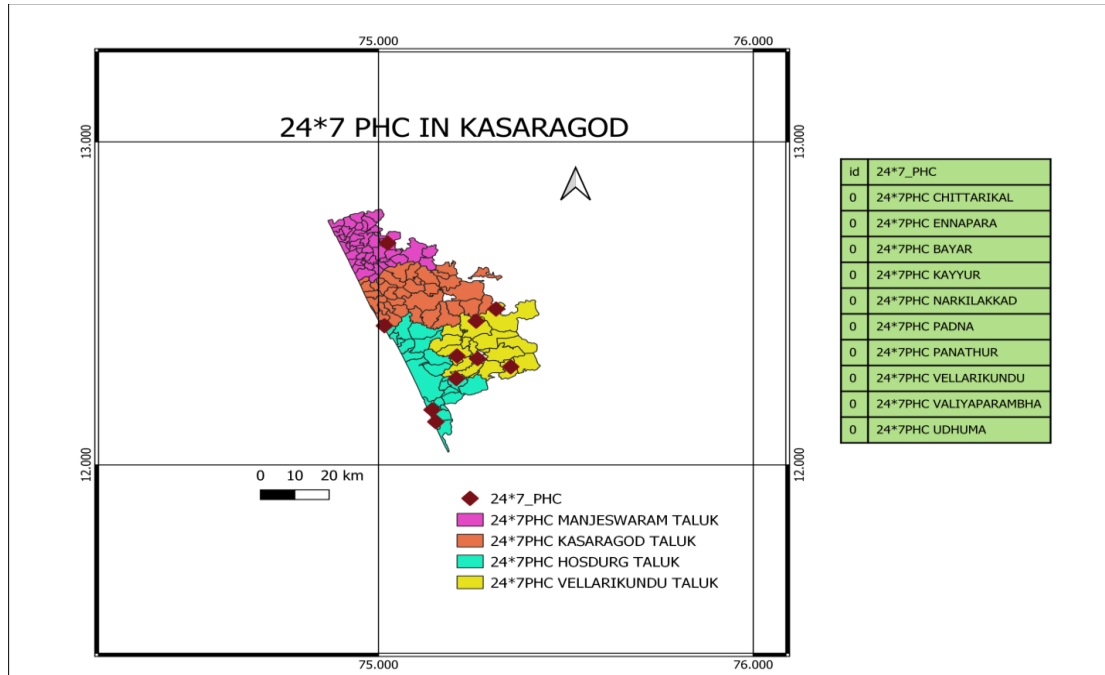


Figure 11 24\*7 PHC in Kasaragod (source: The creation of author using GIS software)

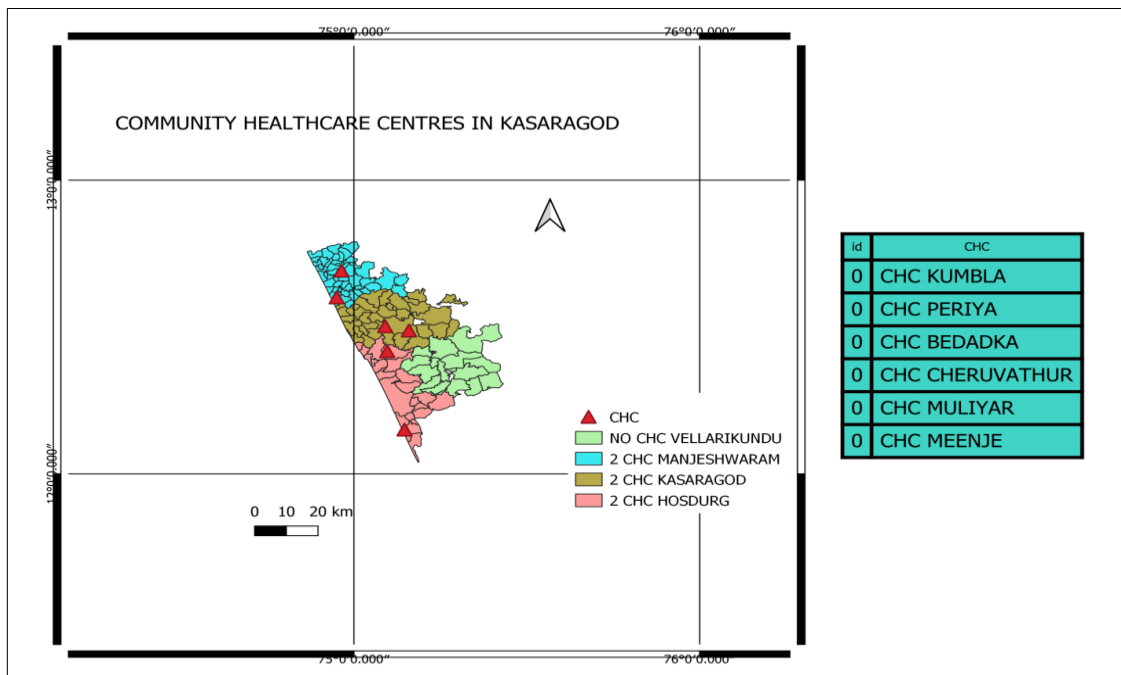
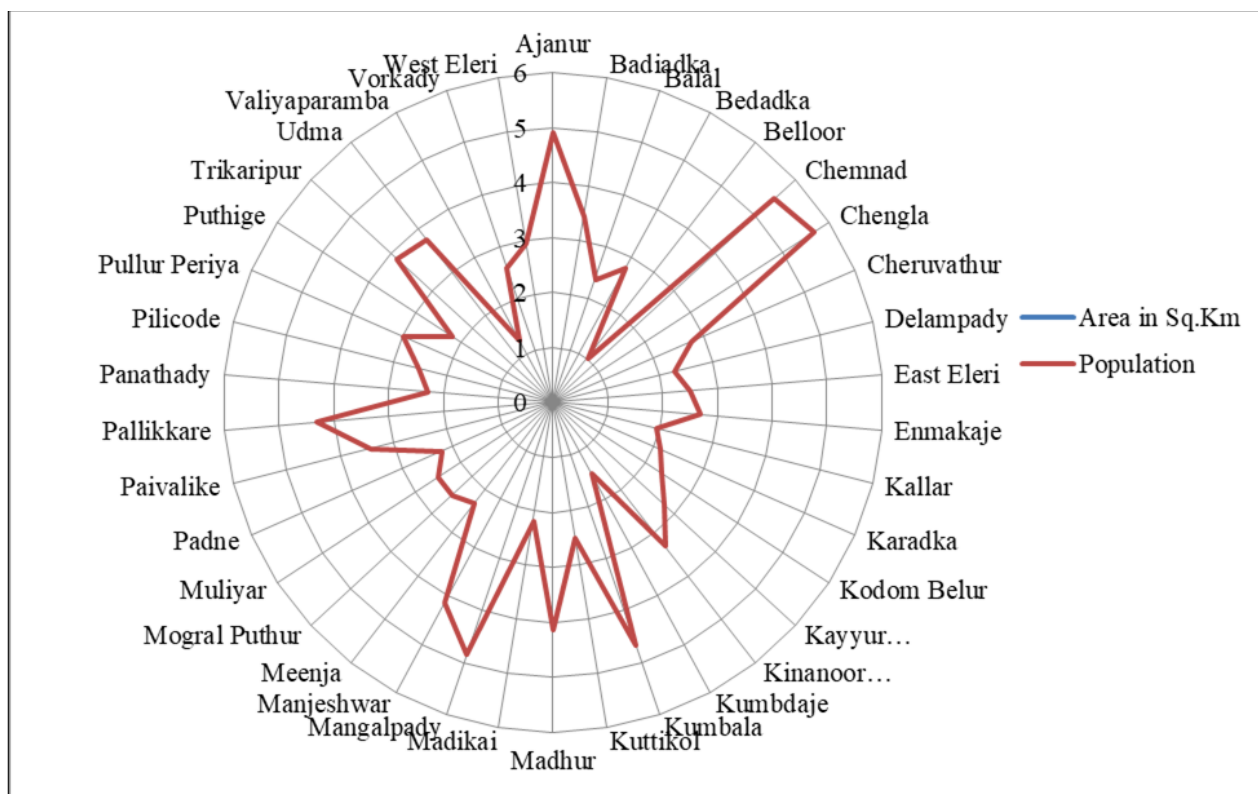


Figure 12 Community healthcare centres in Kasaragod (source: The creation of author using GIS software)



**Figure 13** Panchayath Wise Population and Area of Kasaragod (source: created by author using census data 2011)

## 5. Discussions

As country gives strengthen to health system and its population should provide better improvement in Primary Health care centres and its total public health services.

Unfortunately, the current international health care environment system is suffering by global pandemic COVID19. Global health is in precedent attention of corona virus and struggling for social protection, improve the health equity and make policies for secure healthier community. The district has the density of population of 654 persons per square kilometre. The population growth rate of 2011 census was 8.18% and a literacy rate of 90.09%.

The Kasaragod district does not have any tertiary super speciality hospitals for Cardiology, Neurology, Interventionist, and Gastroenterology (digestive disorders) to cater to the 13 Lakh of population. There are only 7 ventilator facilities in Kasaragod district, one in public hospital and 6 are in private hospitals (in 2020-2021 report).

In Kasaragod 1.5 lakh of people who live abroad. People of Kasaragod need to travel nearby city Mangalore for tertiary level of healthcare. The inadequate medical infrastructure in Kasaragod traditionally depends on Mangalore across the border in Karnataka for its Medical Emergencies. Around eleven Panchayath have more than 2500 children been Endosulfan victims living with critical health issues. The people in the boarder district of Kasaragod rely on medical colleges the nearby city Mangalore in Karnataka state in the north and neighbouring district Kannur in Kerala in the south for the emergency treatment.

The foundation of Medical College laid on 30<sup>th</sup> November 2013 at Ukkinadka in Badiadka Gramapanchayath in Kasaragod, it is near in Endosulfan affected area. In the eighth (2021) year also, it has still work in progress lack of financial support. In the Covid pandemic period, the Academic block was converted to a Covid hospital. But it does not have an ICU (Intensive care unit) facility and lack of adequate doctors; critical patients are referred to Kannur Pariyaram Medical College, the neighbouring district.

“In Kasaragod district the doctor- population ratio is 1:1925 but the rest of Kerala the doctor- population ratio is 1:300 (TimesofIndia-2021 report)”. According to Economic survey 2029-2020, doctor- Population ratio of India is 1:1456. The WHO recommendation of doctor- population ratio should have 1: 1000.

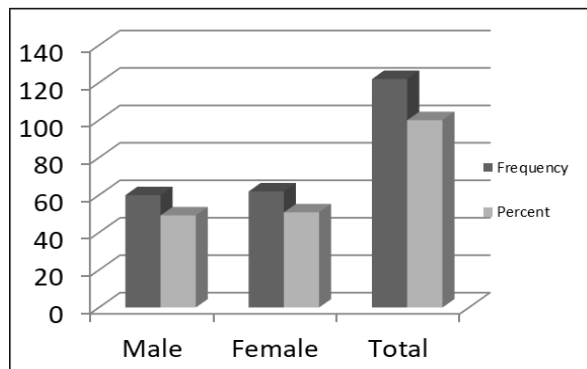
This is one of the reasons for those who have financially strong they consult for the treatment in multispecialty hospital the nearby city Mangalore. But the financially weak population are struggling for treatment. It is very necessary to increase both health manpower and ICU facilities in Kasaragod.

We have only 7 Ambulance and 2 blood bank facility in public healthcare.

The patients in the Endosulfan manmade disaster region do not have proper health care facility. Patients who have major disease want to travel a longer distance for their treatment makes mental depression. This study clearly shows inadequate healthcare facility in the district. When the health care system improves in a society then only the people in that society gets peaceful life. The following is information collected through primary data.

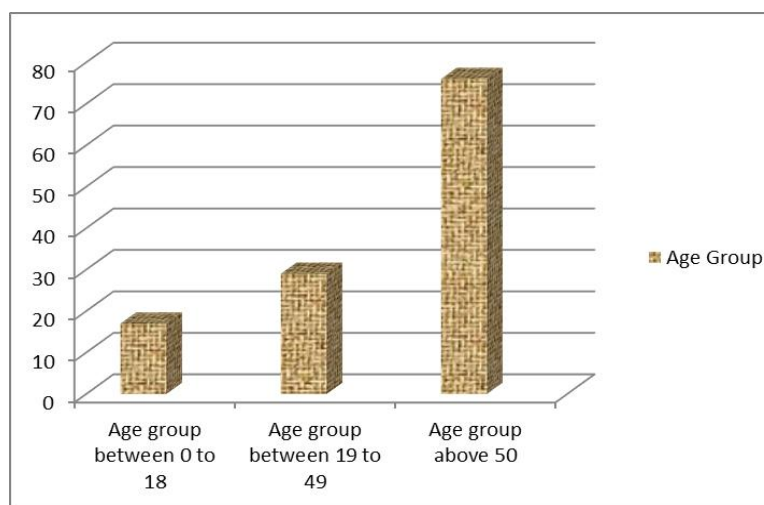
**Table 2** Frequency and Percentage of Male and Female Respondent

Gender	Frequency	Percent
Male	60	49.2
Female	62	50.8
Total	122	100



**Figure 14** Bar Diagram of Frequency and Percentage of Male and Female Respondent (source: created by author)

The most of the women have the habit of taking care of their family members; do not care their health for wellbeing. They would not spend time for exercise and avoid healthy food. In Kasaragod child birth in Muslim community is very high and it may lead to malnutrition of Parents.

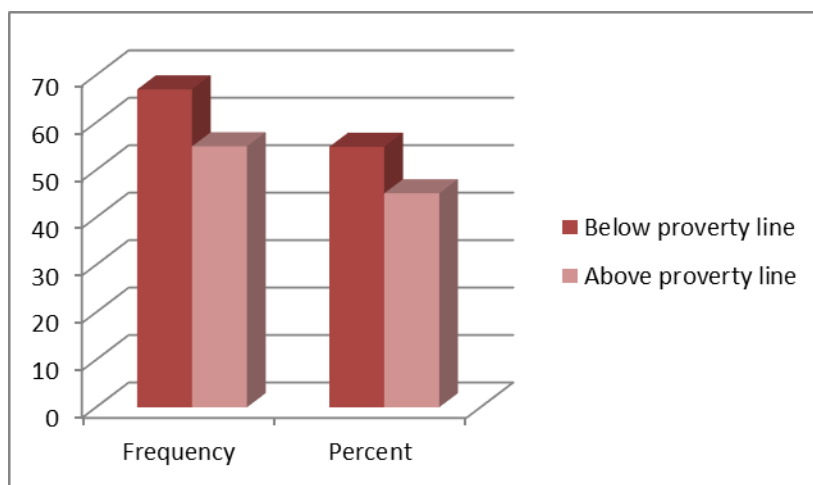


**Figure15** Bar Diagram of Age group of Respondent (source: created by author)

**Table 3** Respondents fall under the Age Group

AGE GROUP	FREQUENCY	PERCENT
Age group between 0 to 18	17	13.9
Age group between 19 to 49	29	23.8
Age group above 50	76	62.3
Total	122	100
Age group of Male	Frequency	Percent
Age group between 0 to 18	7	11.7
Age group between 19 to 49	12	20.0
Age group above 50	41	68.3
Total	60	100.0
Age group of Female	Frequency	Percent
age group between 0 to 18	10	16.1
age group between 19 to 49	17	27.4
age group above 50	35	56.5
Total	62	100.0

Those who fall under above 50 years have major disease. According to scientist the Endosulfan environmental disaster has the possibility for carcinogenic among the inhabitants after 45 years.



**Figure 16** Bar diagram of Economic Background of Respondents (source: created by author)

The above Bar diagram shows that most of the respondents are below Poverty line. Economic backwardness is due to lack of permanent income.

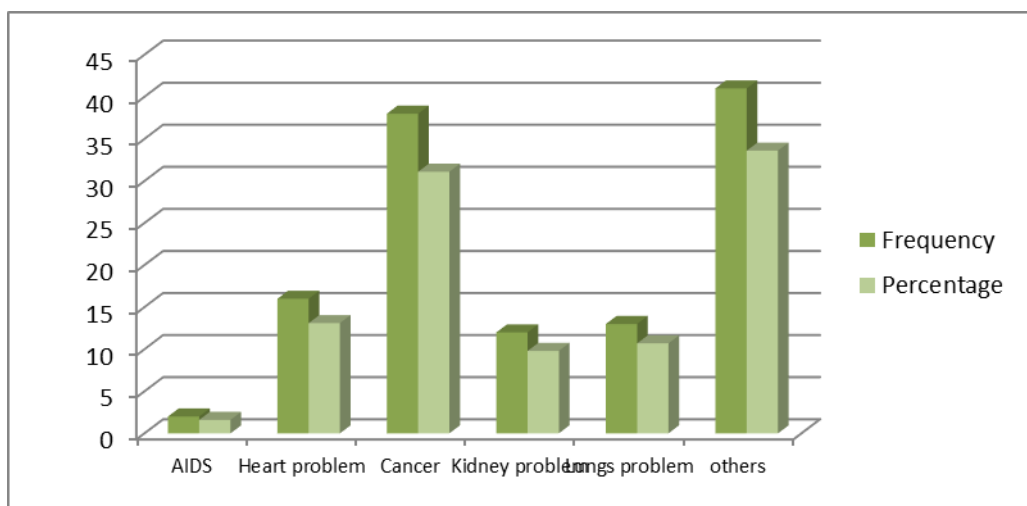
**Table 4** Economic Background of Respondents

Economic background	Frequency	Percent
Below poverty line	67	54.9
Above poverty line	55	45.1
Total	122	100

The patients belong to above poverty line consult for treatment in the private hospitals and their consultation centre in Mangalore city's super specialty hospitals. This dependence to other cities leads insufficient healthcare system in Kasaragod and the district administration does not get financial support for adequate development in healthcare system from Kerala state government. But those who have below poverty line consult their treatment in Kasaragod and Kannur public hospitals.

**Table 5** Major Disease of Respondents

Major Diseases	Frequency	Percentage
AIDS	2	1.6
Heart problem	16	13.1
Cancer	38	31.1
Kidney problem	12	9.8
Lung's problem	13	10.7
others	41	33.6
Total	122	100



**Figure 17** Bar diagram of major diseases of the Respondent's (source: created by author)

This study shows that the highest number of patients are suffering due to Cancer disease because the study area affected by Endosulfan Tragedy. Endosulfan is the carcinogenic toxic insecticide chemical widely use in the agriculture field. Actually, once the farmers in Kasaragod were used Endosulfan that was available in the local market also. But now it banned in the district. So, some farmers or their servants bring harmful chemicals from Mangalore for the solution of insecticide because the difficulty to change 25 years of habit of experience in the agriculture field to destroy insecticide.

**Table 6** Major Disease of Female and Male Respondents

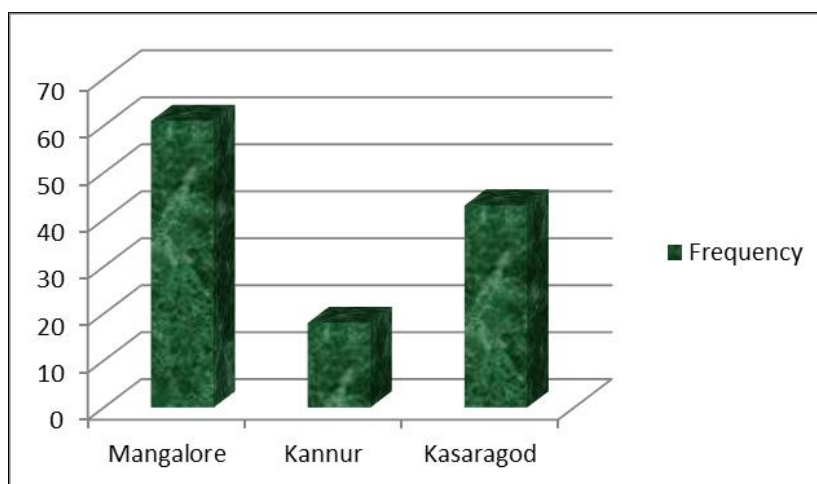
Major Disease of Female Respondents		
Major Disease	Frequency	Percent
AIDS	1	1.6
Heart problem	6	9.7
Cancer	24	38.7
Kidney problem	5	8.1

Lung's problem	4	6.5
others	22	35.5
Total	62	100

<b>Major Disease of Male Respondents</b>		
<b>Major Disease</b>	<b>Frequency</b>	<b>Percent</b>
AIDS	1	1.6
Heart problem	10	16.7
Cancer	14	23.3
Kidney problem	7	11.7
Lung's problem	9	15
others	19	31.7
Total	60	100

**Table 7** Patient's Location of Tertiary Hospital

<b>Location of Consultation</b>	<b>Frequency</b>	<b>Percent</b>
Mangalore	61	50
Kannur	18	14.8
Kasaragod	43	35.2
Total	122	100

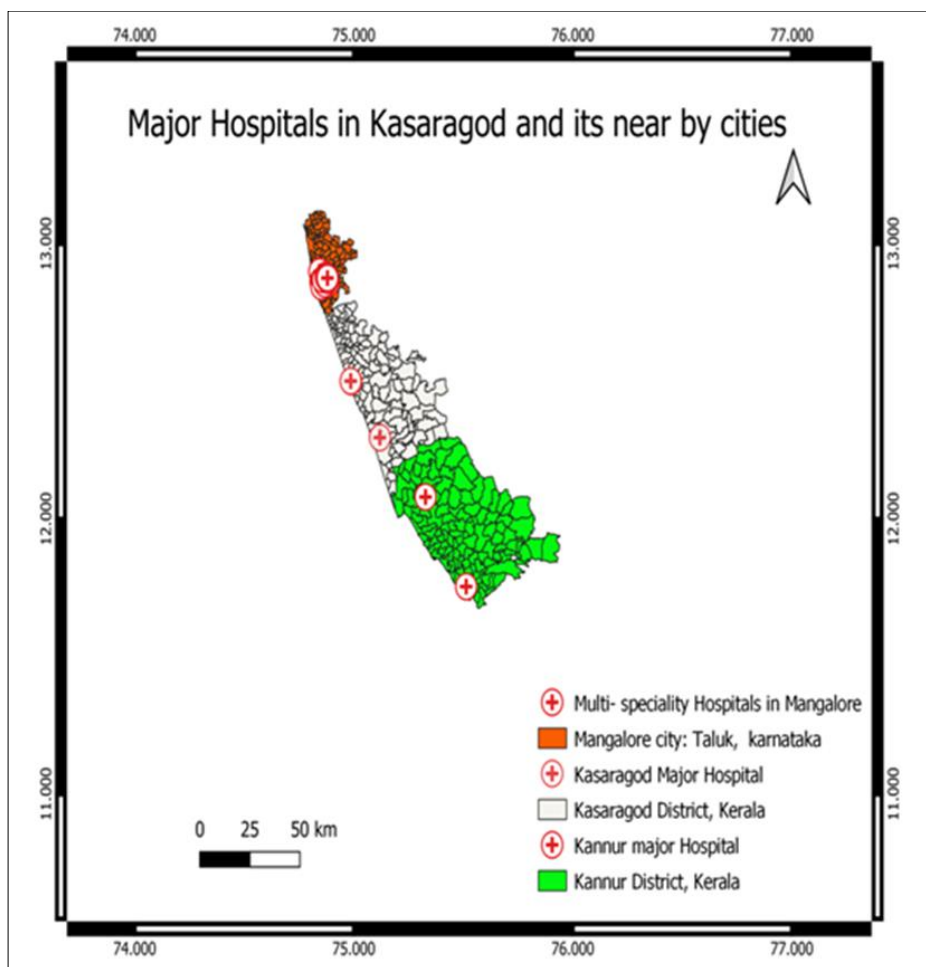


**Figure 18** Bar Diagram of Location of Tertiary Hospitals of Respondent's (source: created by author)

This study shows that 50% of Kasaragod patients go for treatment at Mangalore city in Karnataka. 35% of patients take treatment in Kasaragod district itself and 15% of patients from the here go for treatment in Kannur district.

**Table 8** Patients dependence on Tertiary Hospitals

Male Respondents Location of Tertiary Hospital	Frequency	Percent	Female Respondents Location of Tertiary Hospital	Frequency	Percent
Mangalore	35	58.3	Mangalore	26	41.9
Kannur	8	13.3	Kannur	10	16.1
Kasaragod	17	28.3	Kasaragod	26	41.9
Total	60	100.0	Total	62	100.0



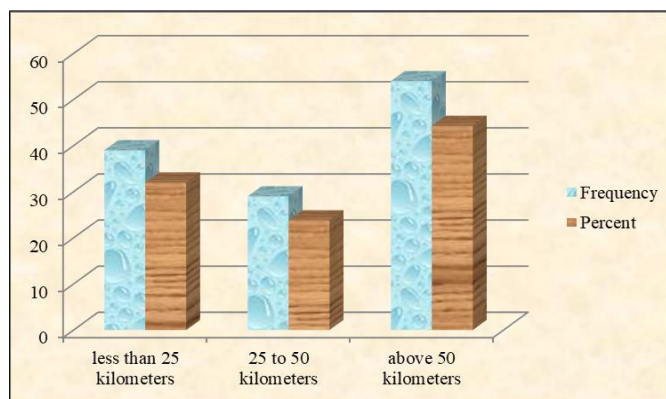
**Figure 19** Major hospitals in Kasaragod and its nearby cities (source: created by author using GIS software)

The above figure shows that most of the patients in Kasaragod district depending nearby cities Mangalore and Kannur for major treatment because of lack of treatment in their own district.

**Table 9** Patient’s Travelling Distance for Tertiary Hospital

Distance	Frequency	Percent
less than 25 kilometres	39	32
25 to 50 kilometres	29	23.8
above 50 kilometres	54	44.3
Total	122	100



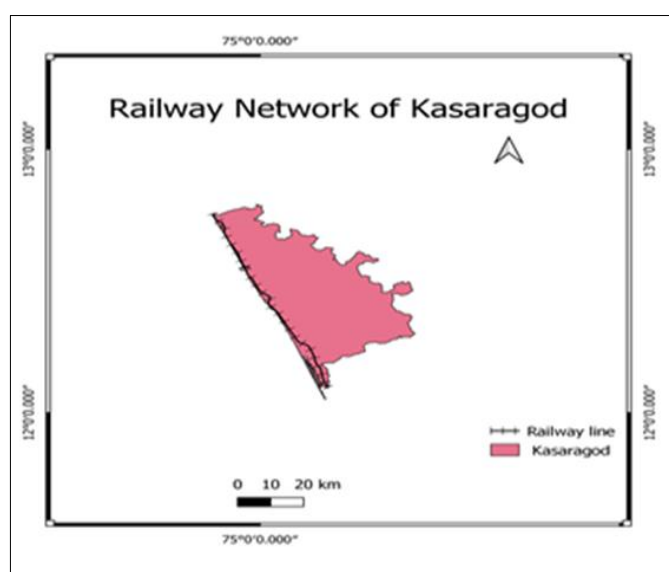


**Figure 20** Bar Diagram of Patient's Travelling Distance to Tertiary Hospital (source: created by author)

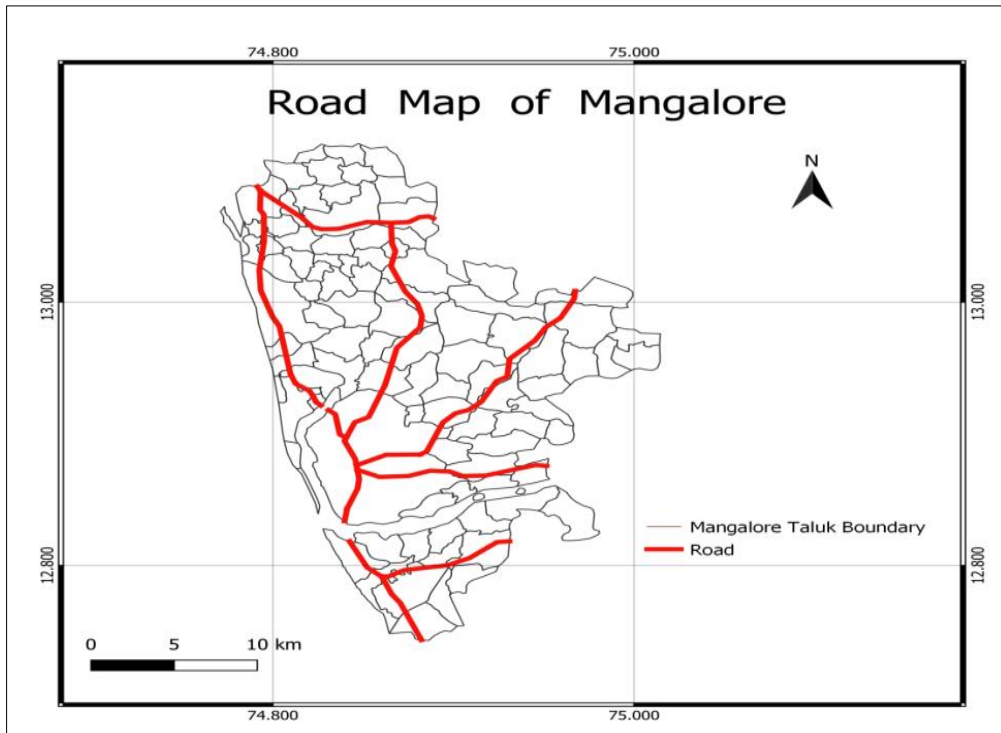
Those who have major diseases and they belong to economic backwardness are struggling for treatment in a longer distance. Usually, their close relatives collect donations from the society before going to treatment.

**Table 10** Male and Female Respondent's Travelling Distance toward Tertiary Hospitals

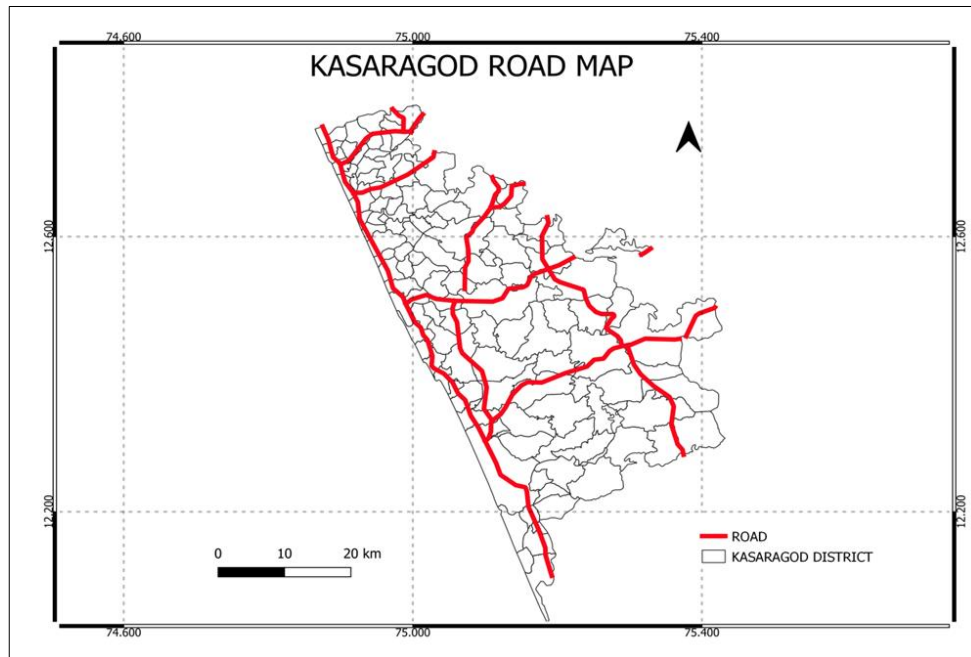
Male Respondents Travelling Distance for Tertiary Hospitals		Frequency	Percent
less than 25 kilometres		16	26.7
25 to 50 kilometres		18	30.0
above 50 kilometres		26	43.3
Total		60	100.0
Female Respondents Travelling Distance for Tertiary Hospitals		Frequency	Percent
less than 25 kilometres		23	37.1
25 to 50 kilometres		11	17.7
above 50 kilometres		28	45.2
Total		62	100.0



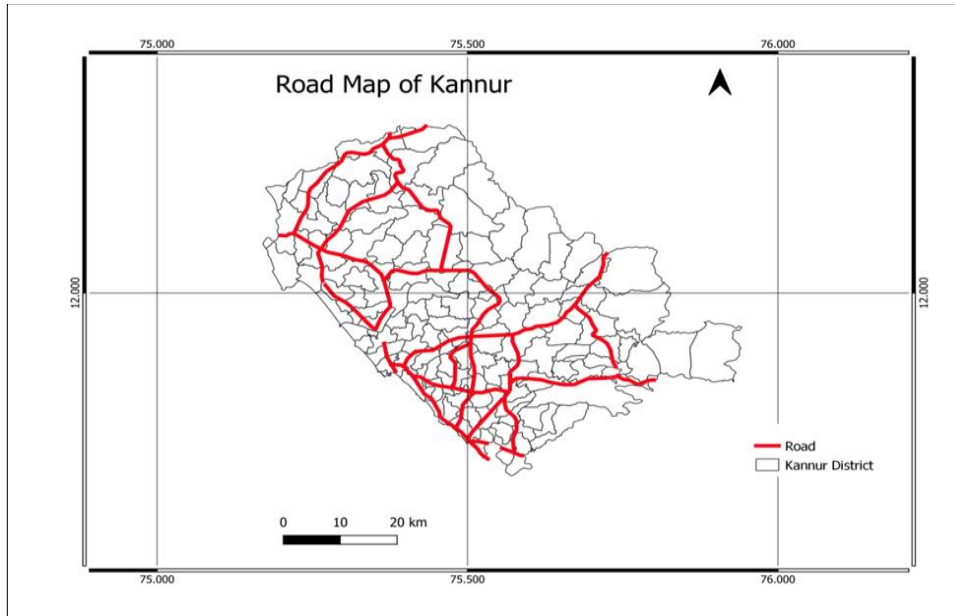
**Figure 21** Railway network of Kasaragod District (source: created by author using GIS software)



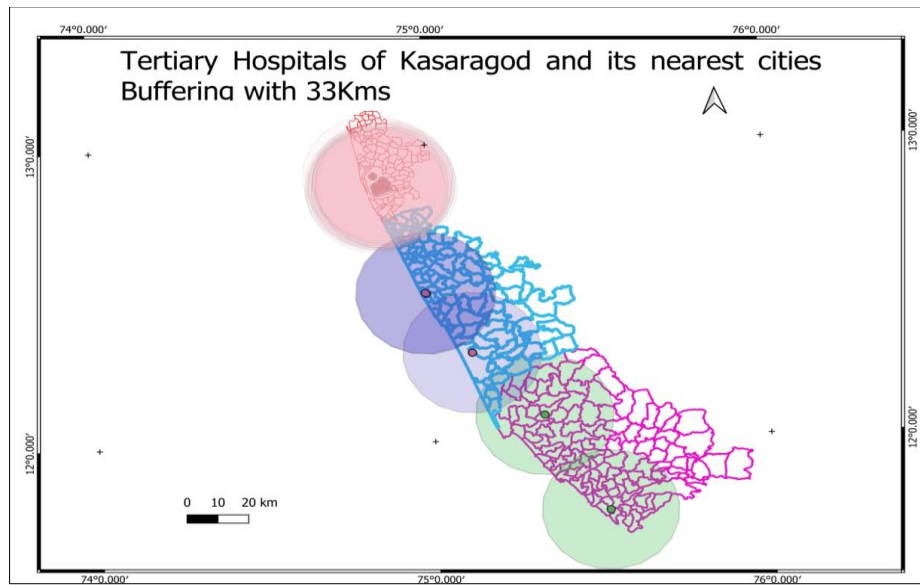
**Figure 22** Road map of Mangalore (source: created by author using GIS software)



**Figure 23** Kasaragod District's Road map (source: created by author using GIS software)



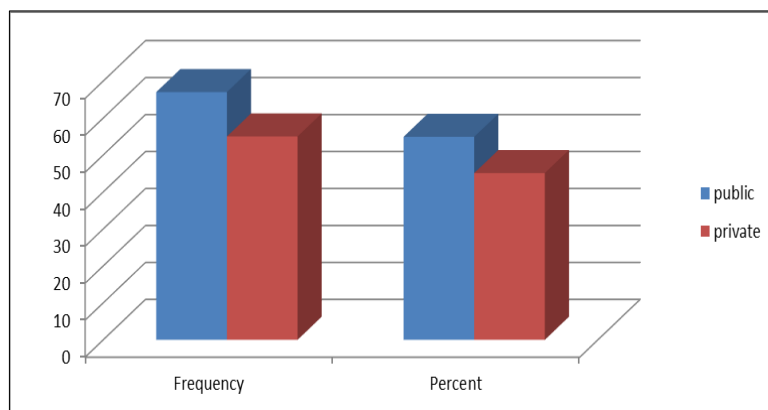
**Figure 24** Road map of Kannur (source: created by author using GIS software)



**Figure 25** Tertiary hospitals of Kasaragod and its nearest cities buffering with 33 kms (source: created by author using GIS software)

**Table 11** Consultation of Respondent's in Private and Public Tertiary Hospitals

Hospital	Frequency	Percent
Public	67	54.9
Private	55	45.1
Total	122	100

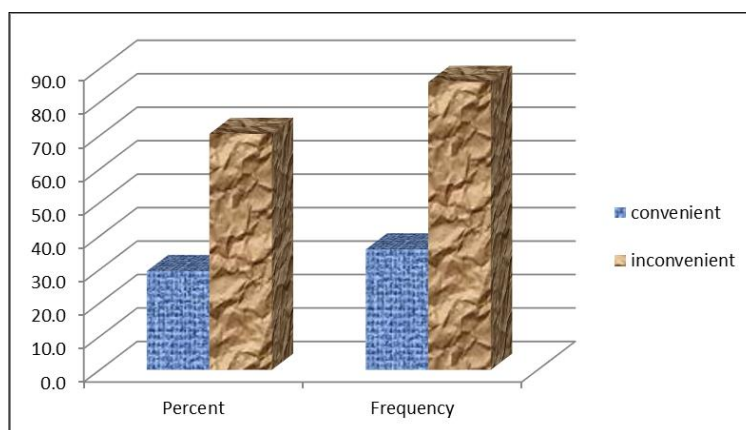


**Figure 26** Consultation sector of Respondent's (source: created by author)

The consultation sector and economic status of patients are directly proportional. Those above poverty line take treatment on the private hospitals and below poverty line depend only on the public hospitals.

**Table 12** Respondent's Convenience of Location of Tertiary Hospitals

Convenience of location	Percent	Frequency
convenient	29.5	36
inconvenient	70.5	86
Total	100.0	122

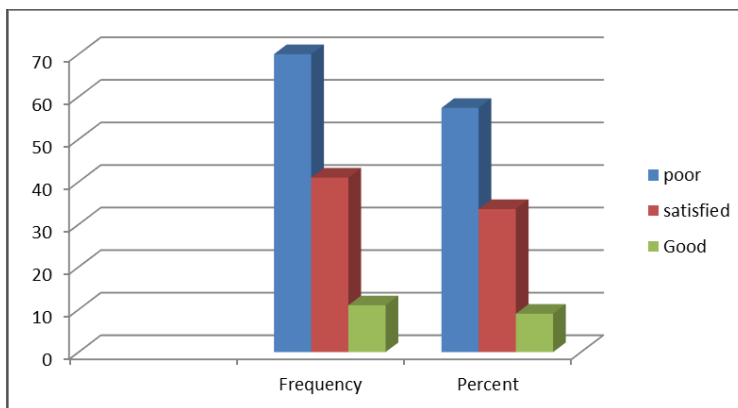


**Figure 27** Respondent's Convenience of Location (source: created by author)

Those belongs to Above Poverty Line patients and those take treatment in Kasaragod were answered convenience for the location of consultation centre. So, the economic background and location of hospitals are directly proportional.

**Table 13** Kasaragod Patients Evaluation on Local Hospital's in their Area

Respondent's Evaluation on Local Hospital	Frequency	Percent
Poor	70	57.4
Satisfied	41	33.6
Good	11	9.0
Total	122	100.0



**Figure 28** Kasaragod Patients Evaluation on Local Hospital's (source: created by author)

Those patients have major diseases they go for consultation in super specialty hospitals so the majority of patients answered that in their locality they have poor health care facility.

**Table 14** Statistics of male and Female Respondent's Age and Distance travelling for Tertiary Hospitals

Statistics of Male Respondent's Age and Distance travel for Tertiary Hospitals		
Statistics	Age	Distance
Mean	53.5167	50.3500
Std. Deviation	18.99375	30.48580
Minimum	13.00	7.00
Maximum	88.00	150.00

Statistics of Female Respondent's Age and Distance Travel for Tertiary Hospitals		
Statistics	Age	Distance
Mean	48.5161	50.5323
Std. Deviation	20.59504	30.60468
Minimum	2.00	10.00
Maximum	80.00	120.00

(Source: created by author using statistics)

In this study the average age of male patient is 53 years and the average age of female patient is 48 years. The mean distances of male and female patients want to travel for treatment is 50kms. The Kasaragod patients travelling long distances as a treatment for major ailments can be very painful. The following is the year in which the Medical Colleges were established and Population in these districts:

The foundation stone of Utkinadka Medical college in Kasaragod district was laid on November 2013, but still, it is work in progress (2021) because insufficient financial support from state government. Kerala Government has the responsibility to facilitate the health care system in Kasaragod district. As per the policy decision of the Central Government in 2014, all the states will get one AIIMS Hospital and Kerala is eligible for this. Accordingly, the proposal of 2015 Thiruvananthapuram, Kottayam, Ernakulam and Kozhikode districts was submitted by the Kerala State Government. But these districts have medical colleges and many super specialty hospitals.

**Table 15** Medical colleges in Kerala state

Medical College	Established Year	Population (2011 Census)
Medical College Trivandrum	1957	3,301,427
Medical College Kottayam	1960	1,974,551
Medical College Ernakulam	2000	3,282,388
Medical College Kozhikode	1957	3,086,293
Medical College Kasaragod	The foundation stone was laid on November 2013, but still, it is work in progress (2021)	1,307,375

## 6. Conclusion

The important qualitative aspects of human resource are Education and Healthcare. Education is the major role in molding skilled people and Healthcare means physical, mental and social wellbeing of the individual in a society. Then only each individual can work for the economic development of a society. But in Kasaragod the Education sector and Healthcare sector are in a deplorable state. To meet the sudden surge of Covid pandemic in patients at Kasaragod the 275-government allopathic (modern medicine) doctors and 300 nurses worked hard around 15 to 18 hours without any leave and weekly off during pandemic in 2020. The government of Kerala has not yet been able to adequately empower health workers, including doctors and nurses to care for Covid patients in Kasaragod district in 2021. In Kasaragod, there are 64 doctors and 118 nurses post are vacant now. The biggest crisis in the district is the severe shortage of nurses trained to handle patients in ICU beds.

If the public healthcare sector developed in a society that will leads to improve the health of individuals, families, communities and everywhere in our nation. Covid Pandemic related tiff in the Mangalore (Karnataka state) and Kasaragod (Kerala state) border at Talapady has affected the normal life of border district inhabitation of Kasaragod. Due to Karnataka government kept its border closed with Kerala on March, April 2020, 15 patients from Kasaragod have died denying medical treatment. The district has not sufficient healthcare system that's why Kasaragod inhabitants relay nearby cities for Tertiary treatment. These difficulties are the examples for lack of proper healthcare system in border district of Kasaragod.

Why Kasaragod is not included in this list, even though there is a group of Endosulfan victims in Kasaragod? AIIMS Hospital is a world-class health system controlled by the Central Government. The uniqueness of the hospital is that it has all the specialists who can treat all diseases by conducting proper study and research. If the patients reach at AIIMS Hospital do not have to go to another hospital, where they receive complete treatment and the poor patients can receive free treatment. The health sector of Kasaragod is currently facing a crisis that does not answer the question of which treatment will be effective for Endosulfan victim's disease such as skin irritations, destruction of nerve tissues and reproductive and developmental damage in human beings and children born with unequal diseases in soil that has been Endosulfan poisoned for over 20 years.

Kasaragod inhabitant's strikes for AIIMS hospital (2020-2022):

The aim of the strike is to get the Kerala state government to include Kasaragod in the Proposal for AIIMS Hospital.

- Manjeshwaram to Trikkaripur marched for 6 days.
- Vehicle campaign rallies were held in 5 constituencies.
- Held a fast at Kasaragod town, the MLA and all political party's representatives were participated in the fast.
- The inhabitation went for fasting in front of the Kerala secretariat in Trivandrum.
- The strikes are going on.

The only hope is in the AIIMS hospital to find a cure for the disease that will last for generations. Kasaragod, Kannur, Kozhikode, Malappuram, Wayanad and Dakshina Kannada all these areas will benefit from the arrival of AIIMS Hospital in Kasaragod and it will be a very comforting hospital for Kasaragod district which includes these 20 Panchayaths which are Endosulfan affected areas. Through this study it can be understood that there is still a need to improve the healthcare system in this study area.

## Compliance with ethical standards

### *Acknowledgments*

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### *Disclosure of conflict of interest*

There is no conflict of interest in this study.

### *Statement of informed consent*

There is no informed consent in this study.

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