

## **Health Care Delivery system in Tribal sub districts through PHCs in Visakhapatnam district in Andhra Pradesh, India**

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### **ABSTRACT**

The aim of this paper is to ensure the availability of infrastructure facilities in tribal sub districts in Visakhapatnam district. Our health is the result of not merely our own wisdom and care. It is also synchronised with the wonderful advancements in medical sciences that our doctors utilise to incorporate with a human touch into keeping them healthy. An attempt has made in the present study on Primary health care centers service based on multiple ring buffer analysis through GIS in 11 tribal Sub districts which were backward even since from independence. Identification of probable factors which responsible for inaccessible health care service in Sub districts. Moreover primary data accumulated through the questionnaire based on 34 questions connected to socioeconomic conditions and health care delivery in 11 backward tribal Sub district. The cartographic maps and buffer analysis have been prepared in GIS environment (Arc Gis 10.4.1) in study area.

**KEY WORDS:** *Health care inequities, Buffer analysis, PHCs Service area, Arc Gis 10.4.1.*

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### **I. INTRODUCTION**

The concept of Primary Health Centre (PHC) is not new to India. The Bhore Committee in 1946 gave the concept of a PHC as a basic health unit to provide as close to the people as possible, an integrated curative and preventive health care to the rural population with emphasis on preventive and promotive aspects of health care. First country to notice the importance of PHC was India. In 1946 three decades before the Alma Ata declaration concept of PHC was introduced by Sir Joseph Bhore with the recommendations of one primary health centre for 40000 populations and each primary health centre should include 75 beds for each of 10,000 -20000 population. Primary health structure in India has three tier system i.e Sub-centre, Primary health centre and Community centre. Primary health centre and community can be connected through the sub-centers. 100% assistance to all sub-centers is provided by Government of India. In every sub-centre there is one female and one male health worker. While as One Female Health Assistant (Lady Health Visitor LHV) and one male health assistant supervise six sub centers. First contact between the people and medical officer is Primary health centre. The main functions of PHC are curative, preventive, promotive and family welfare services. PHC consists of one medical officer and 14 paramedical staff. In every community centre there is a Physician, Gynaecologist and Paediatrician supported by 21 paramedical and other staff. Not only the Government but also, civil bodies, NGOs, private sectors Provide manpower and health services of primary care in India. Currently primary health care is facing the challenges like Primary Health Care and Non Communicable Diseases Primary Health Care and Elderly, Primary Health Care and Urbanization, Primary Health Care and Privatization<sup>3</sup>, Primary Health Care and Health action in Crises.

Every year on 7<sup>th</sup> April celebrated as a world health day. It was started after Second World War –II. For more than nine decades the entire world has significant variation in geographically (WHO-2021). However, according to the World Health Organisation one doctor for 1000 population in geographical area but in India the public health perspective one doctor for 1450 persons. Whereas, the funding has spent by some nations in the GDPs such as Brazil 9%, China 5%, in India it was 2% in 2021 in the GDP. The central government launched few satchems which is helpful to the desirable people in the various States. The health is a State subject, so the Central government provides basic needs to the States to deliver the health services through different schemes for primary care, secondary care and tertiary care. By 2025, the Indian government planned to increase of health care infrastructure to 2.5% of the GDP in 12<sup>th</sup> National plan (2012-2017). The health care delivery system plays very significant role to made healthy society across the globe. When health care accessible to everyone, where it

## Health Care Delivery system in Tribal sub districts through PHCs in Visakhapatnam district in Andhra Pradesh, India

necessary, it reduce the mortality of that district/Sub district or any region. For the earlier the society had many endemic, epidemic and pandemic experiences. The world health organisation released list of various disease outbreaks such as Chikungunya, Cholera, Crimean-Congo haemorrhagic fever, Ebola virus disease, Hendra virus infection, Influenza (pandemic, seasonal, zoonotic), Lassa fever, Marburg virus disease, Meningitis, MERS-CoV, Monkey pox, Nipah virus infection, Novel coronavirus (2019-nCoV), Plague, Rift Valley fever, SARS, Smallpox, Tularaemia, Yellow fever and Zika virus disease. As well as COVID-19 (Corona) which have been spread and create very terrible outburst across the globe (WHO). The COVID-19 Coronavirus Pandemic proved that in 222 countries and territories in the world (<https://www.worldometers.info/coronavirus/#countries>). Once again the entire world thought about the role of health care delivery in all the continents due to covid-19 outbreak. There was no disparity in the case of spread of disease but there is disparity to access health care service facilities due to inability of infrastructure facilities in Primary health canter which play very prominent role to deliver better healthcare in rural area.

Even more many schemes has been introduced such as National health Mission in 2005, which aims to give equal and universal access, equitable and affordable healthcare delivery services to the public. National AYUSH mission, National Rural Health Mission, National Urban Health Mission, National Health Assurance Mission, National Digital Health Mission, Child Health Programmes, Rashtriya Swasthya Bima Yojana (RSBY), Maternal Mortality Rate (MMR), Surakshit Matritva Aashwasan Scheme (SUMAN) and Ayushman Bharat etc. The NRHM Mission launched in 2005 to strengthen the rural public health system. The NRHM wanted to provide effective healthcare to the rural population through community health Centers, primary health canter, sub Centers and some social accredited activists where it required. The adequate and many obstacles created by the physical infrastructure (Altitude, aspect, climate, infrastructure, Transport), soft infrastructure (Services), and their socioeconomic conditions in many regions in hilly regions across the country. Here, focused on western hilly region of Visakhapatnam district in Andhra Pradesh.

According to Fertility Consultants expressed their views in “Women’s reproductive health is one of the neglected aspects in the Indian healthcare system and providing facilities. In 20127, as per WHO report, maternal mortality is unacceptably high and about 2, 95 000 women died during and following pregnancy and childbirth. Mostly women in backward tribal Mandals frequently face such above mentioned scenario while moving to the PHCs to get delivery. For suppose, many incidents taken place in undulated terrain conditions and lack of road connectivity, a pregnant woman of Injari in Pedabayalu mandal, died as she failed to get timely medical help (<https://www.newindianexpress.com/states/andhra-pradesh/2019/aug/26/pregnant-tribal-woman-in-visakhapatnam>). A tribal woman from Yerrampadu village under Cherla mandal in Bhadradi-Kothagudem district gave birth in the middle of a forest while she was being carried in a doli to the hospital (<https://www.newindianexpress.com/states/andhra-pradesh/2020/jul/19/tribal-carried-on-doli-gives-birth-in-forest>). Doctor carries tribal woman, new-born twins in doli for 5 km (<https://www.thehindu.com/news/national/andhra-pradesh/doctor-carries-tribal-woman-new-born-twins-in-doli-for-5-km>). With no road, ambulance, pregnant tribal woman carried in 'doli' for 2 km in Andhra Pradesh (<https://www.indiatoday.in/india/story/pregnant-tribal-woman-carried-doli-km-andhra-pradesh>). Tribals carry pregnant woman on Doli to S Kota (<https://www.thehansindia.com/andhra-pradesh/tribals-carry-pregnant-woman-on-doli-to-s-kota>). Quality of PHC care is important in ensuring that the needs of severely ill people are met to avert people mortality. However, the quality of hospital care for public in developing countries has often been found poor. As the first step of a country road map for improving hospital care for public, we assessed the baseline situation with respect to the quality of care provided to public sub-district level hospitals in Tribal region of Visakhapatnam district. The tribal population identified as the aboriginal inhabitants of India are seen in almost every state of India. There are some distinct backward groups among the tribal communities, who live more or less in isolation, inaccessible terrain and maintain a lifestyle that remains static through centuries. Assess the socio-educational status of Irula tribe school students (middle adolescents) in Coimbatore district of Tamil Nadu and it highlights their vulnerabilities and obstacles in accessing opportunities and services. The fact that they continue to be officially described as primitive highlights the persistence of inherited categories that are used to describe and classify entire populations in post-independent India (see Devi & Hemasrikumar, 2011). The following social and health geographers contribute their works about health, wealth, hygiene, literacy conditions, and crime on tribes in various ways. Dr. Anuja Tigga studied about very clear study on the 11 backward mandals in Visakhapatnam district.

**Study Area:** Visakhapatnam is the northern sub districts in Visakhapatnam district, which lies between the latitudes 17° 34' N to 18° 33'N latitudes and 81° 52' E to 80° 16' E longitudes (Fig.1). The whole hilly region

## Health Care Delivery system in Tribal sub districts through PHCs in Visakhapatnam district in Andhra Pradesh, India

bounded by on the north Odisha State and Pachipenta, Mentada sub districts of Vijayanagaram district. Bondapalle and Gantayada, Srungavarapukota, Vepada sub districts in Vijayanagaram district on the east, on the West Ramavaram sub district in East Godavari district and on the south interior sub districts of Visakhapatnam district. The eleven sub districts come under Paderu revenue division which were having very undulating terrain. The hilly region physiographically significance and it comprises in to eleven Sub District for the administration. The hilly region which lies in the Eastern Ghats rises above 600-1500 m elevation and out of the 11,161 km<sup>2</sup> Visakhapatnam district, it occupies an area of 6,233 sq. km in Visakhapatnam district which contains the coast line length around 132 km. Among the tribal (11) sub districts in Visakhapatnam district is being economically backward and culturally sound, occupies a unique place in the tribal map of the district and Andhra Pradesh state. Majority of the tribal region or undulating area more than 80 % inhabited by the following tribes belong to Andh, Bagata, Bhil, Chenchu, Gadaba, Gond/Naikpod, Goudu, Hill Redd, Jatapu, Kammara, Kolam Konda Dora, , Konda Kapu, Konda Reddy, Kondh, Kotia, Koya and Kuliya out of 34 tribes in Andhra Pradesh (2011 census) communities who make their livelihood from cultivation. Agriculture is the main activity about 70 % households in tribal region. According to the 2011 census total population of the district was 4.29 million. Out of total population the hilly region accounts for 0.66 million which constitute 14 % in the total population of Visakhapatnam district. The entire district covers an area of 40 percentage by vegetation. The backward tribal population constitute 14.42% in Visakhapatnam, and 5.53% in Andhra Pradesh State.

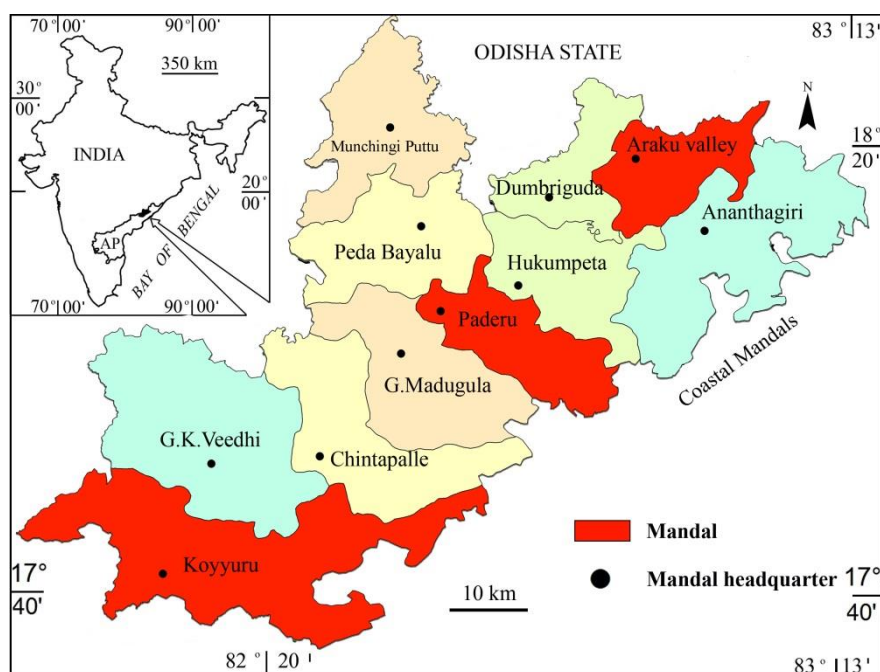


Fig.1 Location map of study area

**Objectives of the study:** The overall objective of this study is to obtain a better understanding of health care delivery facilities and variations in socio economic conditions in tribal sub districts in Visakhapatnam district. This study includes:

- An analysis of present PHCs healthcare delivery service status at sub district level in tribal region
- To enlighten the PHCs service area by multiple ring buffer analysis.
- Identification of probable locational points of PHCs and villages/hamlets in sub districts

## II. DATA AND METHODOLOGY

To fulfilment of the aim of this paper, data related to diverse aspects such as facilities of Primary Health Centers, tribal population, percentage of literates, occupational structure, and socioeconomic factors etc. were collected for the tribal areas at the Sub Districts level from District Census Handbook of Census of India, 2011. For this purpose, Landsat image LISS III (2016), Primary health Centers, Sub districts habitant and inhabitant locations that prominently identified from the Landsat image as well as the survey of India topographic maps which scaled 1: 50,000 km of the study area and brought them in to a common geographic coordinate system which helped in comparing them with their real locational points in study area. The multiple ring buffer analysis

used to analyse the service area by health care through primary health centers. The multiple ring buffers created at specified distances such as 5km, 10 km, 15 km and 20 km around the input features (PHCs). These buffers can optionally be merged and dissolved using the buffer distance values to create non-overlapping buffers in various environments in GIS. Often, spatial maps also have delineated by the Arc Gis 10.4.1 software.

### III. RESULTS AND DISCUSSIONS

As shown on table 1, officially the G.K.Veedhi sub district consist 6 PHCs (Pedavalasa, G.K.Veedhi, Sapparla, Jerrila, Darakonda and Sileru) they covers a population of over 63,174 people which constitute 14,944 households. The doctor and people ratio is inadequate in tribal region. For suppose in G.K.Veedhi, the total 14 doctors allocated in 6 PHCs. Among them 9 male and 5 female doctors, each male and female constitute the ratio is 4,512.4 persons (1:4512.4 persons) and 3,387.3 persons (1:3387.3 persons) respectively. Chintapalle, Araku Valley and Paderu sub districts has class V cities in tribal region which constitute the population between 25,000 to 1, 00,000. In Chintapalle covers a population of 71,640 (class-V city) whoever settled in 246 villages and 361 hamlets got health care service from the six Lambasingi, Lothugedda, Tajangi, Korukonda, and Chintapalle PHCs. Chintapalle sub district contains 10 doctors, out of 10 doctors 4 male and 6 female. The ratio between doctors and persons were very pathetic. (7,164 persons per doctor), each male and female constitute 8,804.25 persons, and 6,070.5 persons respectively. The rest of the sub districts represented in table 1. The Paderu sub district has 58,983 total population among them 28,644 male and 30,339 female. The healthcare service delivered from Minumuluru and Edulapalem PHCs through 8 male and 6 female doctors. Moreover availability of beds in two PHCs (Minumuluru and Edulapalem) was 42. The beds and population ratio was 1: 1404 persons.

Araku Valley is the one of the tourist hub in tribal region which has Borra caves. The total population of Araku Valley is 56,674, among them male 27,492 and female 29,182 people. Based on the population doctor ratio, one male doctor handle 4,582 persons (1:4582 persons) and one female doctor must be treat 5836.2 persons (1:5836.2 persons). Other hand 24 beds only available in tourist place. The beds and persons ratio was adequate in Araku Valley. One bed must be shared by 2,361 people (1:2,361 persons). The severe conditions observed in Peda Bayalu, Hukumpeta and G.Madugula sub districts in the case of availability of health care service by doctor and population ratio. Peda Bayalu sub district constitute 273 villages and 377 hamlets. The PHCs in Peda Bayalu delivered health care services around 51,890 people through 3 male and 1 female doctors. The ratio between people and doctors were worse as per WHO norms. One male doctor constitutes 8,514 male persons and the female doctor should be treat 26,348 female persons in this sub district. Whereas availability of beds in PHCs, Around 4,324 beds available in 3 PHCs (Peda Bayalu, Rudakota and Gomangi) for one bed must be share by the 4,324 persons (1:4,324 persons).

Hukumpeta have 8.55 % population from the total tribal population. The whole population gets healthcare service from Hukumpeta PHC through 2 male and female doctors. When observed doctor people ratio, each doctor must be serve 12,924.3 people, male doctor (1:12,568.5 persons) and female doctor (1:13,280). Similarly the beds ratio in Hukumpeta sub district has 1:1436 persons. G.Madugula is the fourth most populous sub district in tribal region. It consist two PHCs (G.Madugula and Pedavalasa) and five doctors (2 male and 3 female). They provide healthcare service to 53,884 total people, among them male 26,966 and female 26,918. The ratio of doctors and people were one male treat 13,483 persons (1:13483 persons) and female treats 8972.6 persons (1:8972 persons). On the other hand beds which play very utmost role to provide service in PHCs, their availability of beds were 12. The ratio of beds and persons in this region is 1: 4,490 persons. The northern most sub district Munchingi Puttu has 47,418 population, out of the total population 22,937 male and 24,481 female. For the total population of Munchingi Puttu, it has two PHCs such as Munchingi Puttu and Labburu, these two PHCs consist 3 male and 3 female doctors. The doctor and person ratio is one male doctor handle 7645.6 persons (1:765.6 persons) and one female doctor handle 1: 8160.3 persons. Although, the beds and persons ratio was 1: 3,952 in Munchingi Puttu sub district in study area.

Dumbriguda sub district have 8.1 % (49,029) share of population in tribal region. Out of 49029 persons 23,801 male and 25,228 female persons. The whole population gets healthcare service from Dumbriguda and Killoguda PHCs through 4 male and 1 female doctors. When observed doctor people ratio, each doctor must be serve 9,805.8 people, male doctor (1:5950.2 persons) and female doctor (1:25,228 persons). Similarly the beds and persons ratio in Hukumpeta sub district has 1:4086 persons. Ananthagiri sub district has total of 56,674 population, among them 24,427 male and 24,592 female. Health care delivered by Bhimavaram, Ananthagiri, Lungaparthu and Pinakota PHCs through 5 male and 4 female doctors. The ratio of doctors and persons in

## Health Care Delivery system in Tribal sub districts through PHCs in Visakhapatnam district in Andhra Pradesh, India

Ananthagiri is 1:6127.4 persons per doctor. Although, one male doctor treated 1:4885.2 male persons and one female doctor handle 1:8197.3 female persons. Similarly, in the case of beds 1:2042 persons.

Table 1. Demographic & PHCs profile of the sub districts in Tribal region

# S.No.	Sub districts	Persons	Male	Female	T.Village	Hamlets	P.H.Cs	Doctors			Beds
								Male	Female	Total	
1	Munchingi Puttu	47418	22937	24481	321	377	2	3	3	6	12
2	Peda Bayalu	51890	25542	26348	273	377	3	3	1	4	12
3	Dumbriguda	49029	23801	25228	87	284	2	4	1	5	12
4	Araku Valley	56674	27492	29182	168	271	4	6	5	11	24
5	Ananthagiri	49019	24427	24592	302	393	4	5	3	8	24
6	Hukummeta	51697	25137	26560	168	349	1	2	2	4	36
7	Paderu	58983	28644	30339	212	270	2	8	6	14	42
8	G.Madugula	53884	26966	26918	314	405	2	2	3	5	12
9	Chintapalle	71640	35217	36423	246	361	6	4	6	10	54
10	G. K. Veedhi	63174	30486	32688	173	205	6	9	5	14	42
11	Koyyuru	50639	25047	25592	161	244	5	6	4	10	30
	<b>Tribal Total</b>	<b>604047</b>	<b>295696</b>	<b>308351</b>	<b>2425</b>	<b>3536</b>	<b>37</b>	<b>55</b>	<b>41</b>	<b>96</b>	<b>300</b>

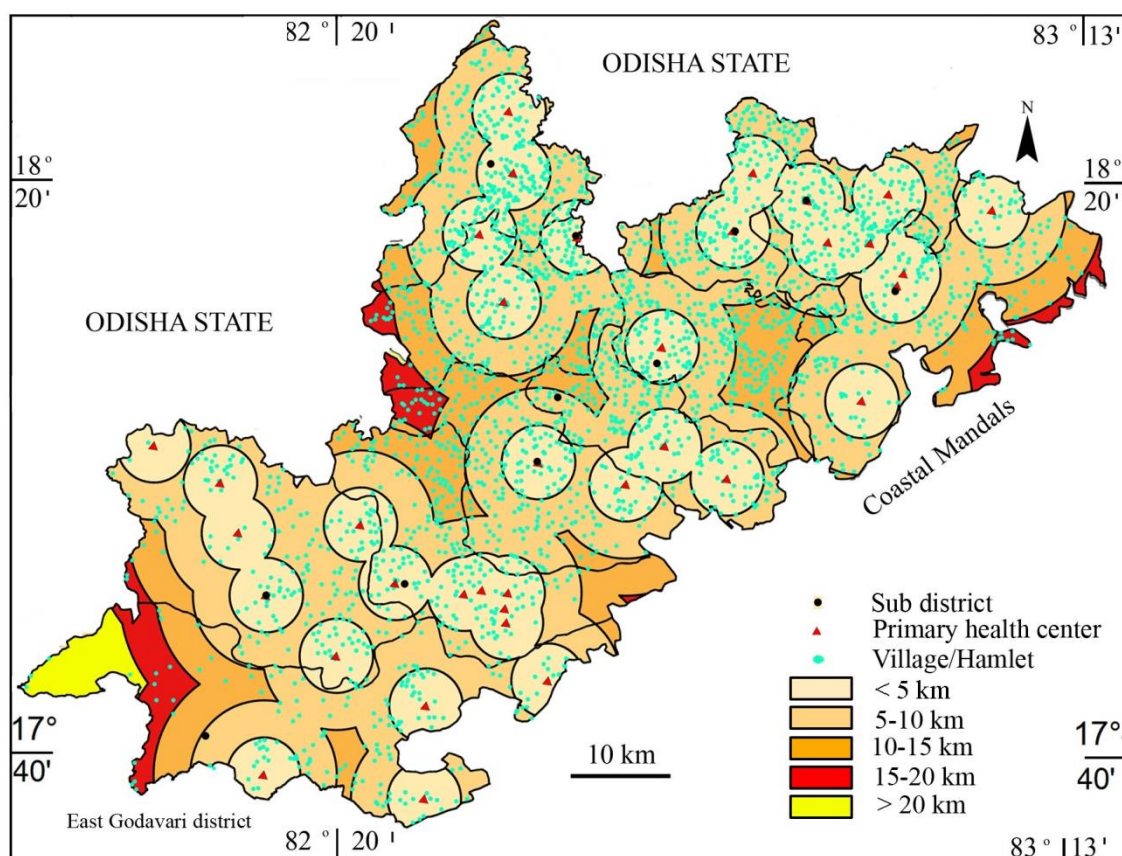
Source: 2011 Census and District Medical & Health office Visakhapatnam

**Primary health centers in Tribal sub districts:** Primary health Centers also known as public health Centers (The Hindu. 'Residents appeal for public health centre). As per Ministry of Health and Family Welfare (MHFW) report on 18 September 2020, the total Primary health Centers established for the defined population in rural areas and urban areas in India. About 24,855 PHCs established in rural area and 5,190 PHCs urban areas. In the case of Andhra Pradesh, it has a total of 1,509 PHCs out of those 1,145 in rural areas and 364 in urban areas (-). The PHCs can serve habitats in the following ways Provision of medical care, Safe water supply and basic sanitation, Prevention and control of locally endemic diseases, Collection and reporting of vital statistics, Maternal-child health including family planning, National health programmes, as relevant Referral services, Education about health, Training of health guides, health workers, local dais and health assistants and Basic laboratory workers. Health indicators in Visakhapatnam district (AP) is slightly better than the State average but lag considerably behind those of other districts of Andhra Pradesh. The health sector in AP faces typical problems: serious resource shortages, a failure to use existing resources efficiently, competition with a largely unregulated private sector in which moonlighting public sector medical staff spend a great deal of time (in spite of this being illegal in AP for those appointed after 1987), and a general lack of responsiveness to patient needs. According to the 2017-2018 statistics of DM&HO Visakhapatnam district, 36 primary health centers (Fig. 2) established in 11 sub-districts of Tribal region in different time periods for the 1,46,973 total households. Officially the 36 PHCs covers a population of over 6, 04047 people, but in practice due to inaccessibility majority of habitations may not be get health care benefits.

Figure 2 and table 1 shows the 36 primary health centers location in each sub district in tribal region. Hence, the multiple ring buffers could gave very clear visualisation about 36 PHCs and their health care service based on distance from their allocations. That HCS could measure in kilometres from their location to far. The distance from the PHCs it can be taken in to 5 km, 5-10 km, 10-15 km, 15-20 km and above 20 km in terms of geographical area. G.K.Veedhi sub district has 173 villages and 205 hamlets. Within the five kilometre range of distance they may get better health care delivery than the rest of the distance like 10-5 km, 15-20 km. But here, we identified few villages/hamlets could very far (Above 20 km from PHC) from the PHCs they are Gummarevu and Pulusumamidi in G.K.Veedhi sub district. On the other hand Burugubuddh, Annavaram, Nilajarta, Kondajarta and Kakanuru situated 15 to 20 km from the PHCs. In Koyyuru which covers more geographical area in tribal region also could not delivered proper health care delivery due to distance. For example few villages/hamlets far from the PHCs they are Revulapeta, Gangavaram, Palakajidi, Koppulabanda, Chidipalem, Cubbalamadugu and Velagalapadu. G.Madugula sub district is also having few villages / hamlets may not get healthcare deleviry due to distance (15-20 km) from G.Madugula PHC. They are Padimidigula, Algham, Munapalli, Tortali, Chintaguppa, Kotta Killamkota, Goddelakare, Serbram, Chilakapanasa, Killamkota,

## Health Care Delivery system in Tribal sub districts through PHCs in Visakhapatnam district in Andhra Pradesh, India

Cherukabayalu, Bandavidi, Buruguvida, Munalaba, Sidimetta, Sirapalli, Onakur, Rayalagedda, Buradavidi, Surupalli and Garisingi. The above mentioned villages /hamlets situated on west side of the G.Madugula sub district. In Peda Bayalu, on the south and south west side villages/hamlets such as Sujar, Kondapalli, Gadikunta and Sujari and Mettuguda, Kajjuruguda, Kenduguda, Sorigiguda, Jogiguda, Gabarla, Chintalavidi, Gunjuvada, Lamiguda and Kotturu far from the primary health centers. In the case of Ananthagiri sub district, Marupalle, Kottapalem, Mari, Gouripuram, Rayudipalem, Kittampalem, Bhavaninagar, Bhattapuram and Viswanathapuram villages/hamlets situated between 15-20 km range which has shown on map. Hence, many factors can control the healthcare delivery system in tribal region. In geographical perspective distance plays very utmost role to get any service from their location to the habitats. In the case of habitats location, while moving to get health medication numerous factors influence in tribal region. The geographical influenced factors they are topography of region (DEM), Aspect, transport, climate, and poverty.



Source: Prepared by author

Fig. 2 shows the locational points of sub districts, PHC and Village/hamlet along with buffer analysis map of study area.

### IV. CONCLUSION

We concluded the healthcare delivery system in tribal region after spatial and buffer analysis. Found few factors which restrict the health care delivery in few sub districts, they are G.Madugula, Peda Bayalu, Koyyuru and Ananthagiri which some villages/hamlets very far (15-20 km) from the PHCs. so they face very poor healthcare delivery due to distance, there is need to establish PHC to provide proper healthcare delivery. Another factor was shortage of doctors and beds in all the 36 primary health centers as per requirements. For suppose Peda Bayalu have 4 doctors and 12 beds out of 5, 1890 population. Similarly in Hukumpeta sub district also in pathetic conditions in availability of doctors (4) and beds (36). Other hand G.Madugula and Dumbriguda and Munchingi Puttu has been facing shortage of doctors and beds. It was very pathetic condition over the tribal region out of total population only 90 doctors and 300 beds available. In addition, many doctors are unable to perform their duties properly due to various reasons. There is need to improve healthcare delivery system all over the study area.

## V. ACKNOWLEDGEMENT

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Health Care Delivery system in Tribal sub districts through PHCs in Visakhapatnam district in Andhra Pradesh, India

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