

Health inequalities of tribal communities in northeast, central and south India

Mid-term Progress & THETA Project Workshop Report

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About THETA: THETA stands for Towards Health Equity & Transformative Action on tribal health. The research endeavor began in May 2017 with funding from the Wellcome Trust/Department of Biotechnology India Alliance Intermediate Fellowship to Dr. Prashanth Srinivas. For more details, visit the Health Equity Cluster website at <https://iphindia.org/health-equity/>.

The full protocol of THETA project is published and is openly available for download at the Wellcome Open Research: Srinivas PN, Seshadri T, Velho N et al. Towards Health Equity and Transformative Action on tribal health (THETA) study to describe, explain and act on tribal health inequities in India: A health systems research study protocol [version 1; peer review: awaiting peer review]. Wellcome Open Res 2019, 4:202 (<https://doi.org/10.12688/wellcomeopenres.15549.1>)



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SUMMARY

BACKGROUND

The THETA project began in May 2017 and as per the first (of three objectives) of THETA project, surveys are being conducted in seven sites across five states in India. Of these surveys at three sites are completed and two more are ongoing at the time of writing this report. A workshop was held on 27-28 August 2019 to assess progress and make any adjustments in the project implementation accordingly.

The THETA project team at IPH planned the workshop. Collaborators, mentor and all other members of the wider THETA project team were invited. The project also sought to identify potential outputs in the form of scientific reports, peer-reviewed publication and policy/public engagement opportunities arising out of the progress till date. The early-career researchers in the project were encouraged to consider proposing papers to be led by them based on work done in THETA project as part of the project's focus on building capacity and mentoring of early-career researchers.

PROGRESS TILL DATE

THETA project obtained ethics clearance for phase 1 (of three phases) on 5 July 2018. After ethics clearance, surveys were taken up and completed in sites in Karnataka, Kerala, Madhya Pradesh and Arunachal Pradesh. In December 2019, survey work began at a second site in Karnataka, the MM Hills. Additional sites in Tamil Nadu and a possible third site in Karnataka will be considered based on the interim results obtained till date. Preliminary results from the three sites were presented by the early-career researchers leading each site. Peer-feedback was provided by the full team and collaborators and plans for next steps in the form of peer-reviewed paper drafts, posters and other outputs were discussed. For each site, plans were made to assess feasibility for case-studies using the realist evaluation approach in phase 2. Early plans for phase 3 (action) were also discussed. An overall policy and public engagement plan was also discussed.

Under objective 1 (inequality patterns), a paper based on protocol is now published and will be openly peer-reviewed in Wellcome Open Research.

Image 1:
Screenshot of published protocol paper in *Wellcome Open Research*.

Wellcome Open Research Wellcome Open Research 2019, 4:202 Last updated: 23 DEC 2019

STUDY PROTOCOL

Towards Health Equity and Transformative Action on tribal health (THETA) study to describe, explain and act on tribal health inequities in India: A health systems research study protocol [version 1; peer review: awaiting peer review]

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In addition, plans for papers on the following were made: (a) the use and implementation of an index/gradient along which socio-geographic disadvantage was measured, (b) validation of a non-invasive handheld point-of-care device used for measuring haemoglobin levels in survey participants, (c) site-wise reports and papers for each survey site led by early-career researchers who led the surveys, (d) overall paper exploring findings related to patterns of non-communicable diseases among tribal populations in comparison with nearby non-tribal populations across multiple survey sites, (e) review of evidence-base for health system interventions that could address healthcare gaps in sickle-cell anaemia among tribal populations in Karnataka. Further under objective 1, plans for surveys in MM Hills (site number 2 in Karnataka) and around Kanha tiger reserve (Madhya Pradesh) were finalised. An overall paper based on a mixed effects model to explain the inequality pattern across sites was also discussed to be led by the PI.

Under objective 2 (inequity processes), a plan to be developed in visit to external sponsor (Institute of Tropical Medicine, Antwerp) was made. This objective will begin with the preparation of an analytical framework based on the current theories and how they relate to tribal health. A preliminary scan of theories that have been used in literature for explaining marginalisation is now available. In collaboration with Bruno Marchal and Werner Soors (ITM Antwerp), this shall be finalised into a framework that allows for an overarching explanatory foundation for possibly multiple and interacting processes over time and space that contribute to inequity. Such a framework will eventually guide the multiple case analysis proposed in this objective. In the workshop, preliminary findings from the survey and context-mapping by the researchers was used to identify possible cases which shall be used to develop the following aspects of context-mechanism interactions in relation to health inequities and how they are produced: (a) interaction between tribal identity and poor healthcare experience at hospitals upon referral driving delay/poor utilization possibly drawing upon explanations on cultural competence of health workers and complicated referral pathways, (b) the role of social networks in overcoming adverse effects of inequities through preferential access to schemes and services to some (and not for others) and possibly how NGOs/tribal community collectives too could be (inadvertently) choosing these processes over more broad-based ones, (c) explanations on the interaction between secure land tenure (with access to forest rights) and its role in mitigating broader social determinants of inequities beyond health and its role and interaction with health, (d) role of the state government studied through contrasting cases (tribal settlements of the Jenu Kuruba people) on two sides of the Karnataka-Kerala border. A realist inquiry approach based on formulating context-mechanism-outcome (CMO) configurations based on these four themes will be taken up and these CMO's will be refined across the 4-5 case studies planned in Karnataka and Kerala. Possible case study for Arunachal Pradesh is yet to be finalised.

Under objective 3 (action), discussions with the Zilla Budakattu Girijana Abhivruddhi Sangha, VGKK and officials from the district health department have begun. Possible courses of action will be along three lines, in line with overarching explanations being tested in objective 2: (a) How can we improve agenda-setting on particular needs and inequities of forest-dwelling/Adivasi tribal communities at state and district level through coordinated action across the stakeholders involved (Macro), (b) How can we plan a healthcare navigation system that addresses specific barriers to culturally competent and acceptable care for tribal communities in southern Karnataka (Meso), (c) how can we strengthen collective action and community processes at village-level institutions set up for improving community participation within the health system (the village health sanitation and nutrition committees, arogya raksha samithis) in tribal area PHCs (Micro). Under this objective, THETA has also established a collaboration with a visiting researcher who is studying how power is/has been shared in the (earlier) PLA project, that preceded THETA. Lessons from this analysis shall also inform participatory processes in THETA. One of the outputs foreseen from objective 3 could be the setting up of a Centre for Research in Tribal Health at BR Hills in collaboration with the VGKK. At its 2018 governing board meeting, VGKK has formally agreed to set this up as a multi-institutional centre hosted at VGKK but supported young researchers from IPH Bangalore along with community medicine departments from medical colleges and other research institutions. The purpose of the centre shall be to engage in high-quality but locally relevant research using implementation and participatory approaches focusing on improving health services and systems for tribal populations.

BACKGROUND

Indigenous communities are recognized for affirmative action by the Constitution and categorised as Scheduled Tribe (ST). These ST communities are mostly forest-dwelling and live in and around legally protected forest areas in south, central and north-east India. They have poor access to healthcare as well as poor population health outcomes like maternal and child mortality and morbidity, communicable disease prevalence and nutrition (Subramanian, Smith, and Subramanyam 2006; Ministry of Tribal Affairs 2010; Mohindra and Labonté 2010). Biomedical research on genetic disorders has contributed to a better knowledge of the genetic determinants of tribal health; however, the environmental and social determinants are less well studied (Ravindran and Gaitonde 2018). Among the social determinants of tribal health, geographical remoteness, proximity to forest areas, cultural distance from the “mainstream” population, historical isolation and social stratification have all been postulated to have a significant effect on their health outcomes.

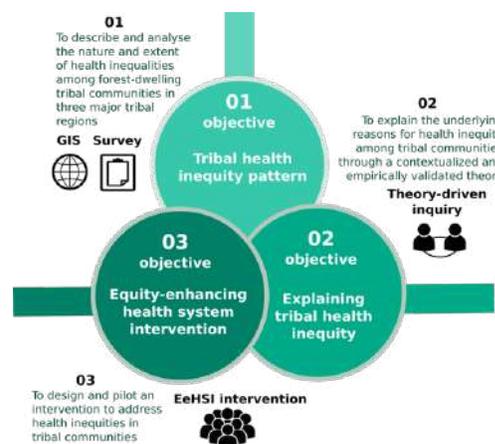


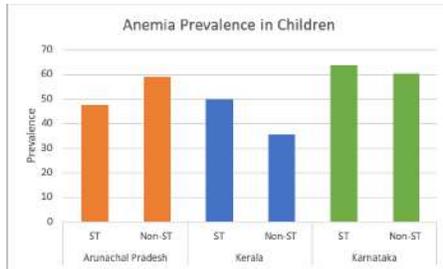
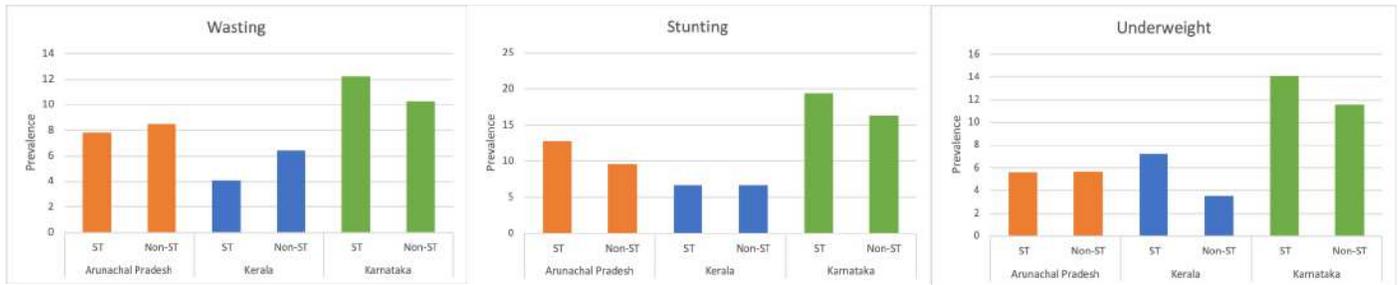
Figure 1: THETA Objectives

Poor tribal health status in India reflects a world-wide lagging behind of tribal population groups in terms of health status. A complex interplay between socio-political, economic and cultural conditions contributes to this situation (Anderson, Robson, and et. al. 2016). However, a global explanation lumping together all these social determinants does not address the specific differences within and across tribal and non-tribal communities, which varies from one region and/or state to another. There is a disparity in health outcomes of tribal communities compared to non-tribal populations, as well as disparities within and among tribal communities (Haddad et al. 2012). A panel of figures shows the variations in ST-Non-ST health indicator patterns from one state to another. Furthermore, within-ST differentials by tribe or fine-scale ST-Non-ST differentials are less well understood. THETA project aims to create a more fine-scale understanding of inequality patterns in multiple areas with tribal communities.

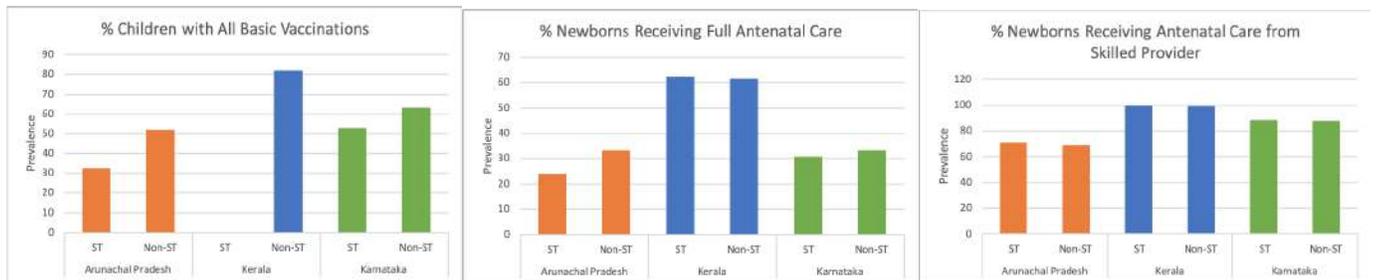
While poor healthcare coverage, utilization and health outcomes of several tribal communities in India is documented in various reports and publications (Mohindra and Labonté 2010; Subramanian, Smith, and Subramanyam 2006), there is scarce literature on the nature, extent and reasons for their poor health outcomes. Most health programs targeting tribal populations especially within government health services take only geographical remoteness into consideration while designing interventions to improve tribal health. However, whether their poor health status is merely because of remote location or if, and how social disadvantage plays a role in this is less well understood.

The THETA project aims to contribute to a better understanding of tribal health inequities and designing interventions to address the inequities. THETA workshop 1 is the first workshop planned mid-way in the project to bring together the results from different sites, engage in discussion regarding the findings and to decide on the way forward.

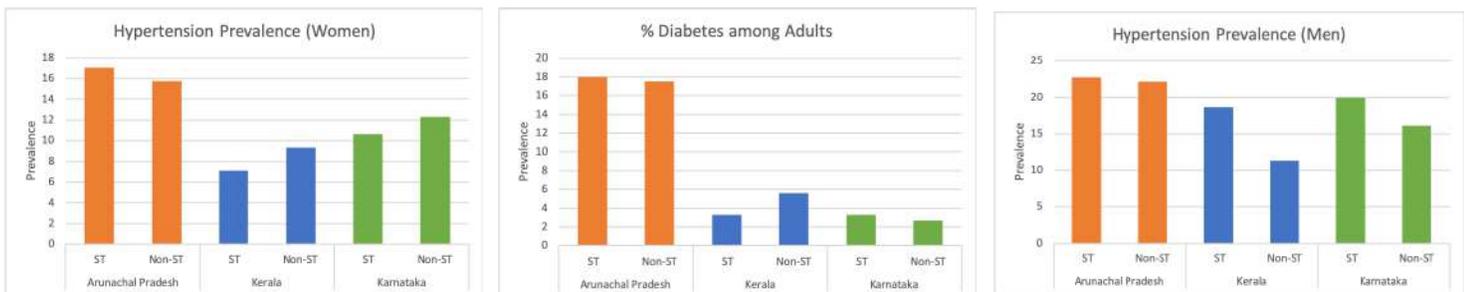
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Panel 1: Prevalence of anaemia, stunting, wasting, and underweight status among ST & Non-ST children. (Source: NFHS-4)



Panel 2: Antenatal and postnatal care among ST and Non-ST. (Source: NFHS-4)



Panel 3: Chronic Diseases among ST & Non-ST. (Source: NFHS-4)

THETA PROJECT OBJECTIVES

1. To describe and analyze the nature and extent of health inequalities among forest-dwelling tribal communities in three major tribal regions.
2. To explain the underlying reasons for health inequity among tribal communities through a contextualized and empirically validated theory.
3. To design and pilot an intervention to address health inequity in tribal communities.

WORKSHOP PREPARATION & OBJECTIVES

Early career researchers completed household surveys in three field sites. Each field site was in a distinct region of India, with unique forest-dwelling tribal populations. The three sites—shown in Figure 2—include BRT Tiger Reserve (Karnataka), Pakke Tiger Reserve (Arunachal Pradesh), and Wayanad (Kerala). A total of 1514 households were surveyed. 371 Biological samples (e.g. blood) were collected in addition to survey data in the BRT Tiger Reserve site. Prior to the workshop, researchers had completed a preliminary level of data analysis and were in the process of crafting frameworks to explain the disparities they witnessed.

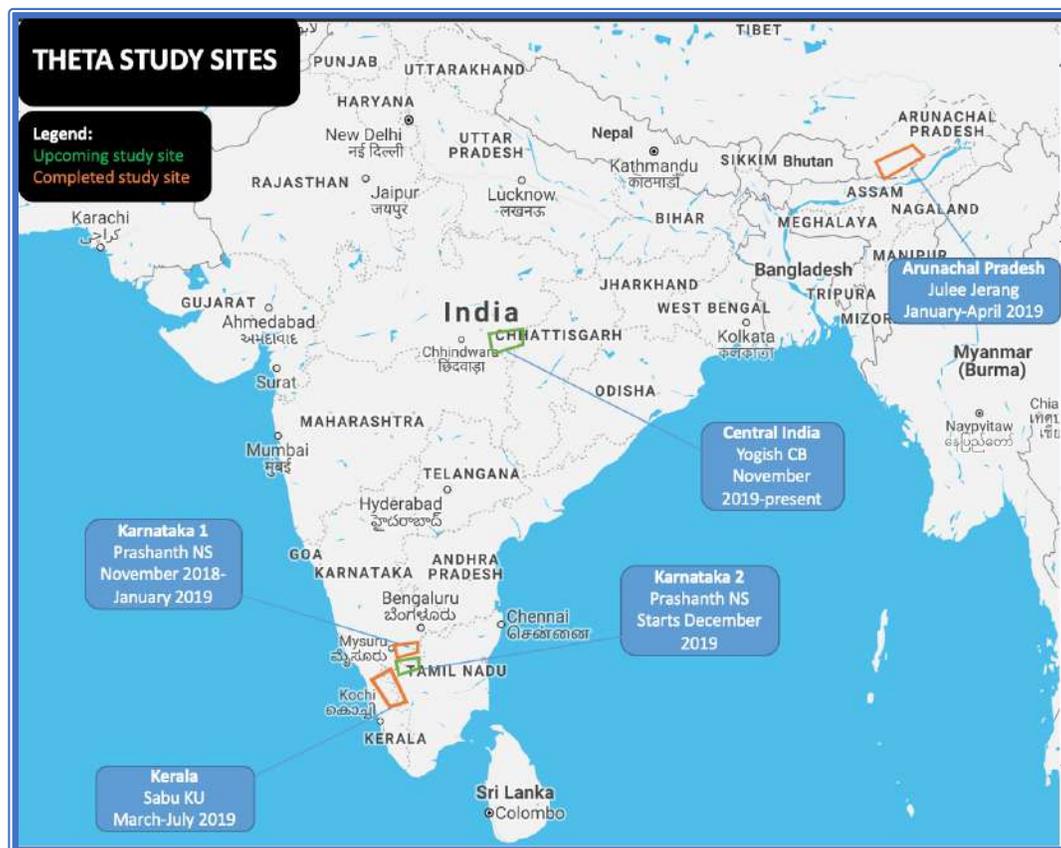


Figure 2: Map of THETA Study Sites.

Workshop Objectives:

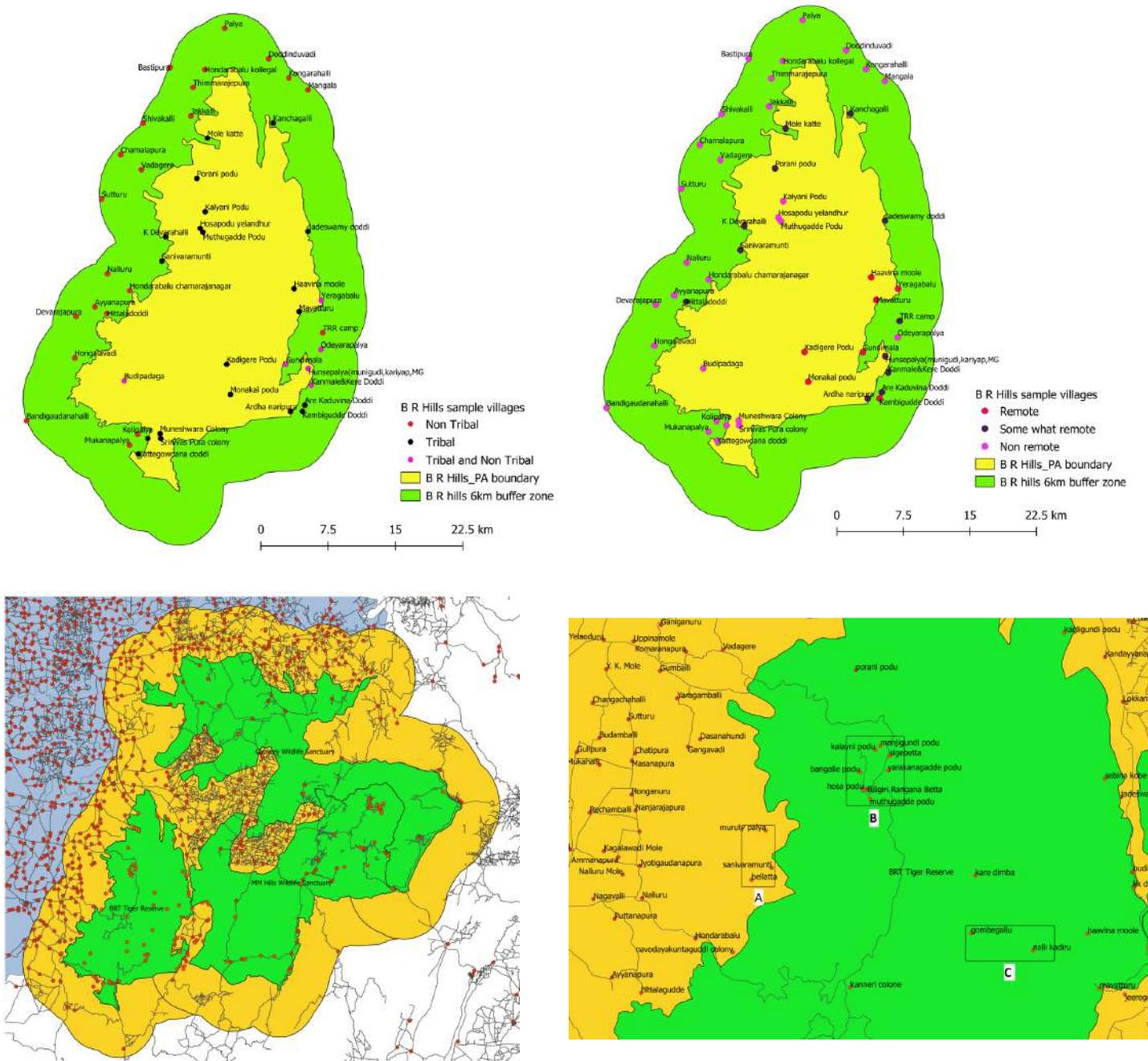
1. To provide researchers the opportunity to present preliminary results/findings in a low-stakes, professional setting for feedback as well as the chance to compare the results of different field sites.
2. To discuss preliminary findings and their ramifications for overall THETA objectives.
3. To narrow the scope of and assign outputs pertaining to research, community and policy engagement based on THETA findings.

SURVEY METHODOLOGY

A multi-stage stratified sampling technique was implemented. Non-tribal and tribal villages were mapped using geographic information systems (GIS) with vector layers of the protected forest area (PFA) boundary and the buffer zones from the edge of the protected area. The buffer zone for each site varied based on the level of forest dependency, perceived effects of nearby area on livelihoods, and other socioeconomic characteristics.

All villages and settlements within the PFA boundary and up to the designated buffer zone were selected. For the selected villages, an aggregate index score of socio-geographical disadvantage using a list of pre-identified variables was calculated. These variables included public transport travel time to the nearest municipal administrative city, district administration, access to a higher secondary school, primary health center, tertiary hospital, walking travel time to all-weather motor road, sub-center, population size, and proportion of houses having supply of improved drinking water, proportion of house having electric supply. Strata of settlements will be classified according to shared socio-geographical trait parameters. Principal component analysis was used to ensure intra-strata homogeneity and inter-strata heterogeneity with respect to socio-geographical traits. These groups of homogeneous strata serve as the primary sampling units. Approximately three to four strata were developed in each site, roughly consisting of villages in the remote or core forest area, villages on the edge or outside of the forest, well connected villages within the PFA and well-connected villages. The three strata for each site will be “remote,” “moderately remote,” and “non-remote.” One-third of the sample size for each site were divided between these three strata. All villages (secondary sampling unit) in each stratum were listed and one-third of the villages were randomly chosen from as the secondary sampling unit. The number of households sampled within each village was calculated in proportion to the population. The following images provide examples of maps of sampled villages in the BR Hills, with the first map showing the distribution of tribal and non-tribal villages and the second map featuring the distribution of villages in terms of remoteness.

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Figures 3-6: The above images illustrate the process of selecting settlement locations based on socio-geographic parameters to avoid treating settlements in Box B as if they are remote (as they are well-connected despite being within tiger reserve). In Figure 6, settlements marked in Box A and those in Box C are much more disadvantaged than those in Box B.

PRELIMINARY FINDINGS

Survey implementation and supervision: The primary survey implementation and supervision at each field site was led by an early career researcher from that area.

Karnataka 1 (BR Hills): Overall supervision by Sumanth and Prashanth; implemented by Yogish

Karnataka 2 (MM Hills): Overall supervision by Sumanth and Prashanth; implemented by Yogish and Mahantesh

Kerala (Wayanad): Overall supervision by Prashanth and Yogish; implemented by Sabu

Arunachal Pradesh (Pakke): Overall supervision by Prashanth and Nandini; implemented by Julee

As an exception at the Madhya Pradesh (Kanha) where survey has recently been completed, we were unable to identify an early-career researcher to lead survey implementation. Further, since there was no long-term engagement foreseen at this site, we chose to work with an agency instead under the overall supervision of Prashanth & Nandini and site supervision by Yogish, Mahantesh and Sumanth.

A summary of preliminary findings discussed is given below organized by field site.

FIELD SITE 1: ARUNACHAL PRADESH

The fieldwork in Arunachal Pradesh was implemented by Julee Jerang.

Indicators	ST	Non-ST
Anaemia Prevalence in Children	47.5	59
% Stunting	12.8	9.6
% Wasting	7.8	8.5
% Underweight	5.6	5.7
% Children with all basic vaccinations	32.5	52
% Full Antenatal Care	24.1	33.2
% Diabetes among adults	18	17.5
% Receiving antenatal care from skilled provider	71	69

Table 1: Detailing basic health indicators for the region of Arunachal Pradesh. Source: NFHS-4

In Table 1, we calculated weighted averages for the non-ST subgroups, and an average of the weighted averages is displayed here as the non-ST average.

Arunachal Pradesh's population is heavily rural. 23% of the population lives in urban regions, with 77% inhabiting rural villages. 69% of the population belongs to a Scheduled Tribe (ST).

BROAD CHARACTERISTICS

Sampled districts included West Kameng, East Kameng, and Pakke Kessang and she worked with the Nyishi, Aka, and Puroik tribes. The majority of people living around Pakke Tiger Reserve belong to the Nyishi and Aka tribe

while non-resident settlers also live in the area. The STs inhabiting these areas are Nyishi, Aka, Miji and Puroik as well as a smaller population of other STs: Memba, Sajolang, Monpa, Sherdukpen, Apatani, Wancho, Galo, Adi, Tai Khamti, Tangsa, and groups from different parts of the state who are often posted here while working for the government. The livelihoods in remote areas versus less remote areas often vary. In remote areas, agriculture is the main livelihood source while residents living in settlements close to roads depend not only on agriculture but also open small shops along the roadside. In Pakke Tiger Reserve, there are no settlements within the park. Hence people collect NTFP from the few accessible areas inside the core and from the adjacent forests. The semi-domesticated Mithun (*Bos frontalis*) is found around Pakke Tiger Reserve, these animals are left to forage in the forests and owners would go and check on these animals periodically (Velho et al. 2018). Hunting and fishing are also supplemental income and/or food sources. Non-STs Households also mostly clustered around roadside settlements, which

are working as casual labor in GREF (General Reserve Engineer Force) from Border Road Organization, and were from all over the country, with a concentration of people of Assamese origin. Many were involved in building highways where they don't stay longer than two to three years and move to places where there is work. Other non-ST households that are more affluent are shopkeepers and traders from the mainland.

SAMPLING METHOD

We selected villages from the 2011 Census of India within a 10 km radius around Pakke Tiger Reserve. For all selected villages, we created an aggregate index score of geographical disadvantage. We then identified villages in strata (non-remote, remote and somewhat remote) that had shared geographical advantage parameters based on the factor analysis. In order to account for the required number of non-tribal population, in the case of Pakke, we included a fourth strata consisting of roadside settlements which are not formally villages, but temporary settlements. Despite their relatively non-remote location by major highways, these settlements mainly consist of disadvantaged communities that do daily wage work and road construction for central agencies and do not enjoy ST status in Arunachal Pradesh, even if they are from ST households in their native states outside Arunachal Pradesh. We also did a field assessment of remoteness of the village we were going to survey; we first approached the ASHA or Anganwadi worker or village head where we asked about the supply of electricity and water supply, solar lighting, and presence of medical and educational institutions in the village. Further extensive field surveys were carried out so as to visit each household location as sampled in the villages around the Reserve.

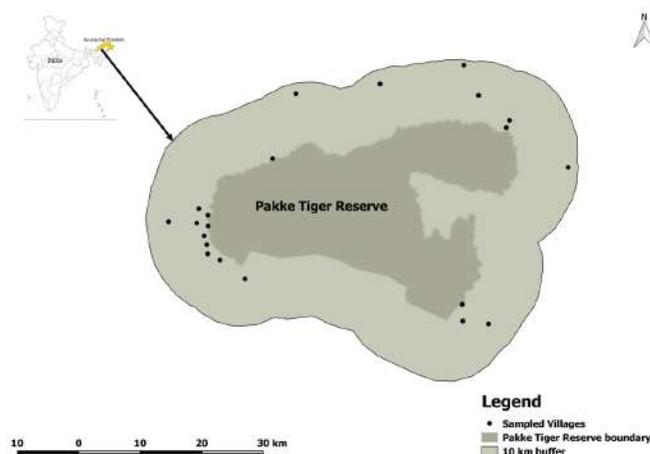


Figure 7: Villages sampled in Arunachal Pradesh

Julee visited 4 clusters in her field work, which lasted from January 2019 until May 2019. The clusters varied in remoteness as detailed on the following page.

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Table 2: Arunachal Pradesh Study Clusters

	Cluster 1: non-remote	Cluster 2: remote	Cluster 3: somewhat remote	Cluster 4: Roadside Settlements
Number of villages	4	6	4	7
Village names	Lower seijusa, Niti darlong, Kimi, Upper bhalukpong	Along topte, Ramda, Hote veo, Nere, Yorte pobe, Sessa	Bana, Giladhari, Tippi, Yangsey	Elephant flat, Kamla 1, Kamla 2, Nahor bridge, Panchuli, Pinchuli, Pinjuli
Number of ST households	84	86	84	0
Number of non-ST households	88	41	40	25
Tribal individuals	11 to 42	5 to 33	14 to 28	0
Non-Tribal individuals	9 to 53	2 to 16	7 to 13	42



Image 2: Julee Jerang discusses her findings

RESULTS

Julee's presentation examined the factors that contribute to gaps in healthcare knowledge and social determinants of health among ST and Non-Scheduled Tribe (non-ST) households in the Pakke Tiger Reserve. The factors examined included socioeconomic status, maternal/child health status, water & sanitation, types of fuel use, types of houses, economic status, literacy, along with details on non-communicable disease and pregnancy details. Julee detailed her sampling methods for clustering the villages by their remoteness. Julee's presentation highlighted that in Arunachal Pradesh, most of the population is classified as ST. Historically, the ST's have maintained bonded labor arrangements with non-STs, providing food, money, and education to non-STs. In some villages, non-ST families changed their last names and rejected the label of non-ST, due to the desirability of being an ST. Non-STs rarely own any agricultural land. Nandini Velho pointed this out during the presentation, asking how it was possible for non-STs to own land at all. Julee explained that while some non-STs may have land ownership, many may simply claim the land by constructing a hut or using the land for animal grazing without any legal backing.

NEXT STEPS

With support from Nandini Velho, the possibility of completing a case study on the ethnographic ramifications of identity. This could also feature a comparative case study with the Kerala field site tracing the role of bonded relationships within tribal communities. In Kerala, bonded labor arrangements have pushed tribal groups into social and geographic isolation, forcing them to reside in *padi* fields, which are prone to flooding. The need to specify exact outcomes to form the basis of comparison was established – perhaps examining the relationship between house type and health status in the Pakke Tiger Reserve.

The potential for conducting public engagement activity in and around Pakke Tiger Reserve shall be explored. Further, Julee shall explore the possibility of adding on a qualitative case-study to explain some of the findings and contribute to Objective 2 of THETA project.

CHALLENGES

Julee surmounted many challenges in working around the Pakke Tiger Reserve. Transportation was difficult, as paved roads were rare. She engaged a local tribal woman to assist with communication, but still encountered difficulties in convincing individuals to participate in the survey, despite her own origins in Arunachal Pradesh. Weather was unpredictable as well.

FIELD SITE 2: KERALA

BROAD CHARACTERISTICS

Wayanad, a mountain plateau in the Western Ghats in South India, is both an agrobiodiversity hot spot and poverty hotspot in Kerala (Kumar et al., 2015). With 83% of forest coverage in total geographical area in the district, Wayanad has the highest forest coverage in the state (Kerala Forest Department, 2016). All the same Wayanad has the highest concentration of tribal population in Kerala. While only 1.45% of the total population in Kerala belong to tribal community, 18.5% of the total population in Wayanad belong to tribal community and among the total tribal population in Kerala, Wayanad is home to 37.3% of the tribal population (Census, 2011). There are 11 ST groups found Wayanad with considerable variation in the geographical location of their habitation, land ownership, livelihood, health, education, and nutritional status and present inter and intra tribal inequality in health and nutritional status, health care utilization, and health care expenditure among them (Antoy, 2014; Haddad et al., 2012; Paul, 2013). The studies that compared the health status reported significant difference in the burden of underweight (46.1%), severe anaemia (9.9) and goitre (8.5) among tribal as compared to non-tribal (24.3%, 3.5%, and 3.6%) respectively (Haddad et al., 2012). Similarly, other studies also reported much high prevalence of anaemia and undernutrition

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among the tribal communities in Wayanad compared with state average. The recently published studies conducted among the tribal communities in Wayanad reported 89% of tribal women in Wayanad had anemia (Rohisha et al., 2019) while the state level prevalence is 32.8% (NFHS-4, 2015). Similarly, while 58.7% tribal children in Wayanad had at least one form of anthropometric failures (Philip et al., 2015), the state average shows 35.3%. A report published in 2013 also reported higher rate of infant and child mortality among the tribal community which was around six times higher than that of non-tribal community (India, 2013). In addition to the tribal and non-tribal inequality, the current study also underscores the severe inequality within the tribal communities in Wayanad district. Paniya, Adiya and Kattunaikka tribal communities reported lower socio-economic and health outcomes compared with those of the Kurichiya tribal community.

Tribal communities in Wayanad have shared a diverse set of historical trajectories of marginalization. While Paniya and Adiya community share a common history of slavery, the Kattunaikkan community is classified as a Particularly Vulnerable Tribal Group (PVTG) that has traditionally lived in remote forest areas or on the fringes and is less integrated with mainstream society. On the other hand, the Kurichiya tribal community was historically privileged due to their association with erstwhile Kottayam dynasty as warriors. The community was gifted with land and still continue to be the land-owning tribal group in Wayanad (Isac, 2011). The Paniya and Adiya tribal communities were historically subjugated by the dominant community through the means of physical and psychological violence. This has led to their geographical segregation and displacement, economic destruction, and cultural dispossession. This history of trauma is very much similar to that of indigenous communities globally (Atkinson et al., 2010; Elias et al., 2012; Evans-Campbell, 2008; Hill et al., 2010).

Table 2: Detailing basic health indicators from Kerala. Source: NFHS-4

Indicators	ST	Non-ST
Anaemia Prevalence in Children	49.9	35.6
% Stunting	6.6	6.6
% Wasting	4.1	6.4
% Underweight	7.2	3.5
% Children with all basic vaccinations	NA	82.1
% Full Antenatal Care	62.5	61.4
% Diabetes among adults	3.3	5.6
% receiving antenatal care from skilled provider	100	99.2

Table 3: Number of sampled villages across Wayanad.

Type of Villages	Remote	Somewhat Remote	Non-Remote
Tribal	48	18	38
Non-Tribal	1	0	0
Tribal & Non-Tribal	17	13	31

Sabu completed his survey work in Wayanad, a region of Kerala that is home to the highest concentration of tribal groups. It also features high forest coverage and low population density, creating a largely heterogeneous tribal population. Each tribal group inhabits its own sparsely population portion of the thickly forested region. Due to conservation policies, many tribal groups find themselves segregated near wetland.

RESULTS

Wayanad geographical features – creates geographic vulnerability that disadvantages tribal communities. In Kerala, tribal communities are exceptions to the typically high social, economic, and development indicators of Kerala. There are glaring disparities in these measures between tribal and nontribal populations. STs are significantly more illiterate and have the lowest percentage of Pucca houses. The general community has the highest percentage of Kutcha houses.

Sabu focused on nutritional status and found that caste is the main axis of inequality in nutritional status.

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At the individual level, Sabu reported that there were no substantial caste differences observed in three age categories surveyed (0-5, 6-17, and 18 years or older). A higher proportion of single mothers and women who were never married was observed among the ST population and illiteracy was higher among lower castes.

At the household level, the highest proportion of semi-pucca houses were observed among ST communities, with a significant difference observed in ownership of agricultural land—specifically, tribal groups were less likely to own agricultural land. More STs practiced open defecation and did not employ water treatment.

Within the ST communities, the Kurichiya group possess household level advantages in terms of quality of house, agricultural land ownership, water treatment and practice of open defecation. The Paniya, Adiya, and Kattunaikka communities. Among other backward castes (OBCs), there were significant differences observed in agricultural land ownership, with no other substantial differences noted in household factors.

The sample size was not adequate enough to draw conclusions regarding gender differences in BMI status. Females were more likely to be thin and less likely to be overweight and obese than men within the ST group, indicating they were more likely to face nutritional issues within the erstwhile vulnerable ST population. An increasing gender disadvantage was observed among the high-risk group in low BMI and overweight/obese BMI.

Sabu concluded that caste is the main axis of inequality in nutritional status but that inequality by gender and community identity within the most vulnerable group add additional layers to caste inequality.

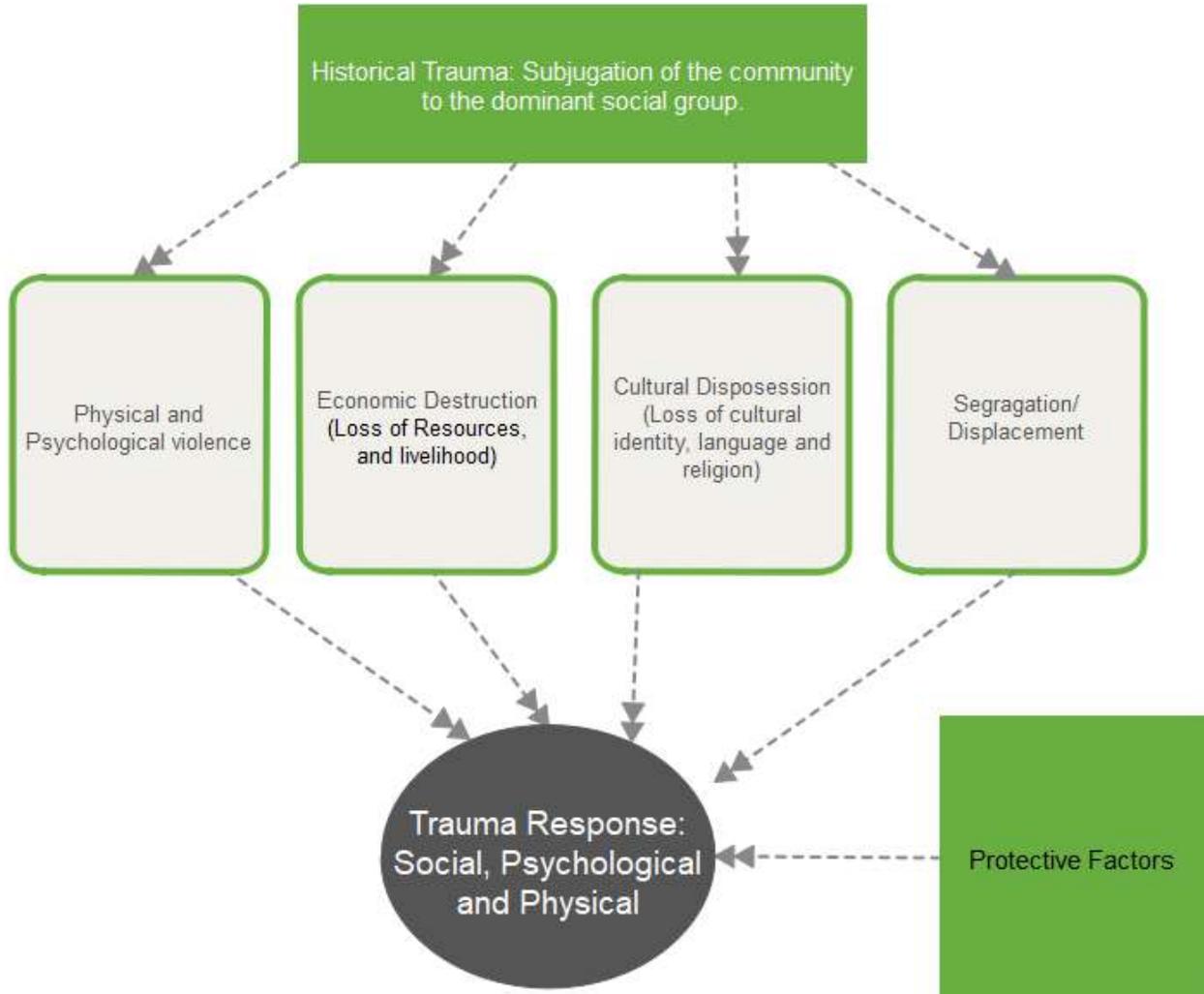


Figure 8: Draft framework under discussion to be used for designing a case-study to explain/theorise inter-tribal differentials in the Kerala site to be led by Sabu

NEXT STEPS

For future studies planned under objective 2, Sabu suggested completing a more detailed explanatory analysis of factors associated with inter and intra-community and gender inequalities in BMI status. Additionally, a further in-depth case study of vulnerable tribal settlements should be completed to examine pathways of how historical, contextual, and geographic factors are associated with differences in health outcomes, healthcare utilization, and standards of living in the tribal community. These findings should be subsequently disseminated to LSG and welfare agencies.

A suggestion to index the outcome of nutritional status to underline its role as a continuous variable and to avoid reducing the resolution with which the variable depicts reality. Further recommendations were made regarding optimal visualizations of Sabu's data, such as the development of scatterplots or other multilevel displays. Yogish also suggested Sabu return to census data and give different weights to group parameters to determine the weight by which they should be reduced to control for the effects of overrepresentation.

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Prashanth echoed Yogish's recommendation for implementing scatterplots to depict continuous variables. The use of scatter plots would also allow for depiction of multiple variables using a single figure, as opposed to a bar graph feature several variables. He also questioned the validity of the intertribal differences reported by Sabu Joseph.

Tanya Seshadri brought to the group's attention issues of diction, pertaining to the liberal usage of the terms "advantage" and "disadvantage." In the context of emancipatory research, such crutch words should be avoided and only utilized by the vulnerable population itself. Additionally, these terms often mask a larger positive or negative process that should be detailed, rather than merely being glossed over with vague semantics.

Tanya Seshadri also touched upon the practice of framing results for outcomes not accounted for by the study. She requested Sabu to develop an intermediate step to illustrate his sampling process using GIS outputs to view the full spread of the three settlements, specifically, the geospatial spread of the sampling. Through eventual disaggregated data analysis, theories and explanations of the outcomes can be explored later. Prashanth NS agreed with Tanya Seshadri that the visualization of the sampled villages and the proportion of the different communities covered needed to be strengthened.

Sabu is leading potential papers analysing Kerala ST malnutrition data through an intersectional lens using NFHS-4 data. He will coordinate with an external collaborator (Dr. Sanjeev, Pediatrician) on malnutrition pattern review paper along with Yogish and Prashanth. He will also coordinate with community medicine department at JSS Medical College to include another potential early-career researcher in the comparative Karnataka-Kerala case study.

CHALLENGES

A delay in obtaining permissions from the Tribal Department were eventually overcome by meeting officials and explaining the purpose of survey

FIELD SITE 3: KARNATAKA

Table 4: Detailing basic health indicators from Karnataka. (Source: NFHS-4)

Indicators	ST	Non-ST
Anaemia Prevalence in Children	63.7	60.5
% Stunting	19.4	16.3
% Wasting	12.2	10.3
% Underweight	14.1	11.6
% Children with all basic vaccinations	53.1	63.5
% Full Antenatal Care	30.8	33.2
% Diabetes among adults	3.3	2.7
% Receiving antenatal care from skilled provider	88.7	87.5

BROAD CHARACTERISTICS

Chamarajanagar district has a population of 10,20,791, and about 86% of the population is rural. It has a tribal population of 1,20,000 (Census of India 2011). Under the Wildlife Protection, Act 1972, the district has a large area classified as protected area including Bandipur, Biligiriranga Hills (BR Hills) Malai Mahadeshwara (MM Hills). Along with contiguous forests in neighbouring districts and states, the forests of Chamarajanagar are part of the Nilgiri Biosphere Reserve. In Chamarajanagar district most prominent tribes are *Soliga*, *Jenu Kuruba* and *Betta Kuruba*.

SAMPLING METHOD

For BR hills survey site villages were selected inside the protected area and from the 6 km radius around BR Hills Tiger

Reserve with the help of QGIS from 2011 Census and snowball list. For all selected villages, we created an aggregate socio geographical disadvantage index score. From the Index score we identified 3 strata. After selection of the villages, we then

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approached local Primary health centers for permission and contacted ASHA or village head for smooth survey implementation. with the help of 10 data collectors (5 women) household and individual data collectors were collected.

Table 5: Villages sampled in BR Hills. (Source: NFHS-4)

# Villages	Remote	Somewhat remote	Non-Remote
Tribal	12	17	14
Non-Tribal	0	6	64
Tribal & Non-Tribal	3	10	9

RESULTS

Since another site in Karnataka is yet to be surveyed, site-specific analysis for Karnataka has not yet been attempted. Instead, Yogish examined the overall pattern of non-communicable disease incidence across multiple sites for ST and non-ST.

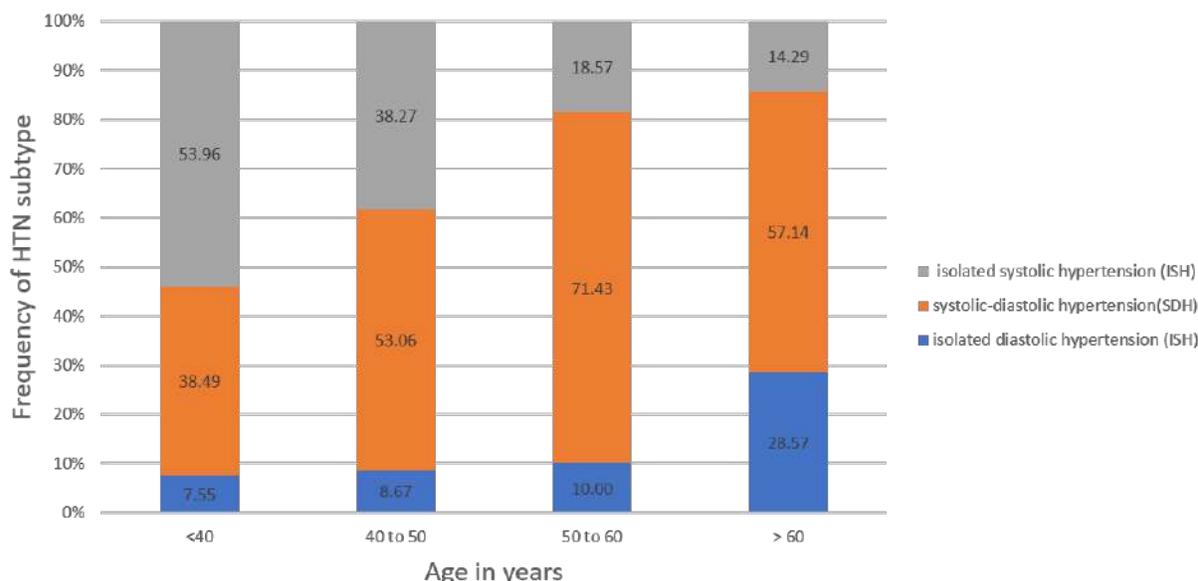
Table 6: Prevalence of High Blood Pressure (HBP) among ST and Non-ST communities across BR Hills, Pakke and Wayanad

Variable	ST			Non-ST		
	BR Hills	Pakke	Wayanad	BR Hills	Pakke	Wayanad
High Blood pressure	30%(136)	38.2%(123)	23.9%(138)	34.5%(145)	39.1%(90)	29%(150)
Normal	70%(318)	61.8%(199)	76.1%(439)	65.5%(275)	60.9%(140)	71%(368)

Table 7: Prevalence of HBP as per the Joint National Committee 7 on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure.

	ST	Non-ST
Normal	36.3% (491)	32%(374)
Prehypertension	38.2%(517)	39.9%(466)
Stage-1	16.8%(227)	19.7%(230)
Stage-2	8.7%(118)	8.4%(98)

Figure 9: Distribution of untreated HBP individuals by age and hypertension subtype



Some analysis of data from the BR Hills study site was presented in a poster titled “Prevalence of Hypertension and NCD risk factors among population in south Indian tribal region” at the 1st South East Asia Regional Group Meeting of the International Epidemiological Association and 24th Annual Academic Sessions of the College of Community Physicians of Sri Lanka conference in Colombo, Sri Lanka. At the conference, THETA project collaborator, Sumanth Mallikarjuna Majigi, presented on behalf of the team. The poster won “Best Poster in Non-Communicable Diseases” at the conference.

Figure 10: Poster presented by Sumanth at conference in Sri Lanka.



Image 3: THETA project collaborator Dr. Sumanth Mallikarjuna Majigi receiving award for “Best Poster in Communicable Diseases”

PP-31

Prevalence of Hypertension and NCD risk factors among population in south Indian tribal region

Sumanth Mallikarjuna Majigi¹, Prashanth N S², Yogish CB², Nityashil SM², Savitha N², Srikanth DM²
¹Assistant professor, Community Medicine, Mysore Medical College and Research Institute, Mysore, India.
²Institute of Public Health, Bangalore, India. ³Research Scientist, ICMR, IMRC & R, Mysore, India

Introduction: With increasing trends of hypertension, it is imperative that people living in remote areas like tribal areas also to be assessed for their risk of non-communicable diseases (NCD). There is also evidence of high stroke in tribal areas. With this, it is important to study 1. Prevalence of hypertension among population in tribal area. 2. To assess the risk factors contributing the hypertension

Methodology: Cross sectional study done among 882 adult participants in the tribal area of Biligiriranganatha Hills tiger reserve forest, Chamara Nagar district of Karnataka, India. The multistage stratified cluster sampling methodology was adopted (cluster was a village/hamlet). IDSP NCD questionnaire was used. chi square test and binary logistic regression were applied using SPSS 21.0 version

Results: The prevalence of hypertension in tribal area was 22.5% (198). Around 461 (52.3%) of study subjects were tribal. Sample was predominantly young & middle aged, female, labourers, married and below poverty line. 1/2.25th consumed fried & processed food, 1/3rd did not consume vegetables on daily basis, 1/4th had low physical activity, 1/5th were (overweight & obese), smoked regularly and 1/11th had high risk drinking. There was no significant difference between the tribal and the non-tribal prevalence of hypertension. Salaried employees (28%) and self employed (~47%) were having significantly higher prevalence of Hypertension compared to housewife (16%), casual labourers (22%).

Risk factor	OR (95%CI)
Age	5.5 (3.8-8.0)
BMI (>25 kg/m ²)	2.7 (1.9-3.9)
High visceral fat	2.9 (1.3-6.3)
High WC	2.6 (1.8-3.7)
Tobacco users	1.7 (1.2-2.4)
High Risk Alcohol	2.7 (1.6-4.4)
SGDI (Remote)	1.36 (0.93-2.0)

Discussion:
 -HTN comparable to other studies
 -high Smoking/visceral fat/fried food (~50%)/Aerated drinks/sweet drinks
 -hypertension in remote : genetic ?? Stress?
 - Rule of half prevailed

Conclusions: Study recommends setting up of surveillance for NCD in tribal areas, as there is high prevalence of hypertension and other NCD risk factors. Also, there exists poor NCD care. Further, there is need for genetic exploration of hypertension as it was high in remote area.

Funders: The Wellcome Trust/DBT India Alliance Fellowship number IA/CPHI/16/1/502548 awarded to Prashanth N S & MRU-ICMR to Sumanth MM

NEXT STEPS

Tanya Seshadri suggested the focus shift from Adivasi vs. non-Adivasi distinctions to what is actually occurring in BRT. As the ST vs. non-ST grouping masked the site-specific differences, she recommended focusing on site-specific patterns and inter-site variations to better represent the data.

CHALLENGES

Challenges were presented separately by Mahantesh. There were several challenges in completing both survey work and collecting biomedical samples from tribal groups in BRT. The remoteness of the villages, deep into the forest, posed difficulties in both transportation and maintenance of the cold chain for human specimens. The specimens had to be centrifuged within one hour of collection and put into a deep freeze to maintain their quality. The centrifugation was often performed at roadside shops due to time constraints and lack of electricity. Roads were often obstructed by trees and sometimes wildlife. It was difficult planning survey and sample collection work in synchrony with the daily work schedules of the participants, who would often go to work early in the morning and thereafter be unavailable for data collection or interviews. Regional weather meant sudden downpours in the morning that also complicated transportation.

Some participants had negative perceptions of allopathic medicine which precluded them from donating blood. Some believed they would become ill if they donated blood, while others simply saw no reason to provide their blood if they would not receive a direct benefit from it. These notions were combined with existing cultural differences that sometimes led to mistrust between survey participants and research staff. These were addressed by having more community meetings wherever these issues came up to clarify the role of the research, and respecting refusal to participate wherever households did not want to.



Images 4-5: Yogish CB and Mahantesh Kamble making presentations based on the Karnataka site

THETA OVERALL PROGRESS



Figure 11: The three objectives of THETA and the deliverables planned asunder are shown in this mindmap. Deliverables/activities planned under policy and public engagement and project administration are also listed. Public engagement activities are currently not funded under THETA project.

THETA PROJECT DELIVERABLES (PROJECT LEVEL)

1. Paper based on the socio-geographic disadvantage index: A paper on the social geographic disparity index, including why it was developed, how it was implemented, the validation process, and the possibility of scaling it up in the future. (SGDI paper)
2. Paper based on testing geographical remoteness as a potential predictor of health access, for example, maternal health services.
3. A scripted analysis of site and off-site data will be conducted using an R script scalable across sites.
4. The potential for adapting the survey work in Android Open Data Kit will be explored.
5. Maps showing village level info will be generated, including the BRT survey site for public visualisation on websites as well as in reports/papers. Team shall explore with collaborator (M D Madhusudan) & data analytics consultant (Akshay Dinesh) about the potential for public visualisation of pooled tribal health data in a dashboard manner or via RShiny App
6. Paper based on collective experience in planning and implementing surveys in tribal areas in multiple states especially providing a workflow/best practices based on experiences
7. Overall THETA objective 1 report along with site-wise reports for local dissemination to state government departments
8. Paper on ST-Non-ST health inequalities from Arunachal study site
9. Validation of the non-invasive hemoglobin estimation device piloted in hospital and survey sites led by Yogish and Sumanth
10. Health inequity quantitative data analysis Workshop to be conducted
11. Conceptualising remoteness as a socio-geographical construct
12. Explore potential of survey/case study participants expressing their idea of remoteness via song, art or other manners (Julie and Sabu to explore at respective sites)
13. List of internship tasks from the project to be prepared and put up on IPH website and health equity cluster sites

14. Public engagement video of different researchers sharing a key message and GIFs that communicate basic messages for social-media dissemination

WORKSHOP ACHIEVEMENTS

1. Presentations from 5 early career researchers

Five early career researchers presented their work of the last year for the first time. These presentations gave the researchers the opportunity to hone their presentation skills and the takeaways of their study. Bringing all the researchers together from their geographically disparate sites also allowed for the discussion of parallels between the different locales which helped sharpen the discussion of intended outputs.

2. Planned case studies based on preliminary results

Case studies of participants from the three field sites will be written and published as research outputs. These case studies will illustrate the unique determinants of health faced by each tribal population. Though geographic and social isolation is a common thread throughout all the field sites, it requires a more nuanced and layered analysis to fully appreciate its different manifestations.

3. Social science/humanities-based outputs to convey and express geographic and social isolation

Researchers in Kerala and Arunachal Pradesh have identified talented local artists. The team will explore commissioning these artists to create a series of artwork portraying the concept of geographic and social isolation as it pertains to the local tribal group. THETA Team will also explore commissioning these local artists to utilize art to communicate tribal group-specific information regarding health issues revealed by the survey results.

4. Tribecon presentation — dissemination and policy engagement @ TRIBECON

TRIBECON, National Conference on Tribal Health Research — Issues, Challenges & Opportunities — was a national conference held at Pravara Institute of Medical Sciences in Loni, Maharashtra 19-21 September 2019. The conference was organized by the Centre for Social Medicine and Centre for Research in Tribal Health and Services (CRTHS). It was co-sponsored by the Ministry of Tribal Affairs, Government of India (New Delhi), the Tribal Research and Training Institute, Government of Maharashtra (Pune), and the World Health Organization India. The conference brought together tribal health researchers from around the country. THETA Team members made poster and oral presentations at the conference. The conference featured six plenary sessions with three oral presentations per session and eight scientific sessions with varying numbers of poster and oral presentations per session. 333 delegates participated in the conference from 20 states of India. Presentations are listed on the following pages.

Prashanth NS presented “Distinguish the Health System from the *Services* for Improving Universal Health Coverage among Tribal Communities in India: Experiences from the THETA Project”



Sabu presented “Inequality between the Paniya and Kurichiya tribal communities in the Wayanad district of Kerala in the composite index of anthropometric failures: A community based cross-sectional study”

Inequality in the composite index of anthropometric failures between the *Paniya* and *Kurichiya* Tribal Communities in the Wayanad district of Kerala : A Community Based Cross-sectional study.

Sabu K U



Mahantesh presented “Challenges in planning and implementing good quality surveys in tribal areas: Insights from THETA project”

Challenges in planning, implementing and good quality surveys in tribal areas.
B.R.Hills (Dist. Chamarajanagar).

Principal Investigator-
Dr.Prashanth N S.

Presenter - Mr.Mahantesh
THETA project
IPH,Bengaluru

Julee Jeerang presented a poster titled “Comparing health outcomes and socio-demographic variables between scheduled and non-scheduled tribe populations around a forest in North-East India”

Comparing health outcomes and socio-demographic variables between scheduled and non-schedule tribe populations around a forest in north-east India

Julee Jeerang, Nandini Velho, Yogish C B, Prashanth N S

Institute of Public Health, Banashankari 2nd Stage, Bengaluru – 560070 | www.iphindia.org

Introduction:

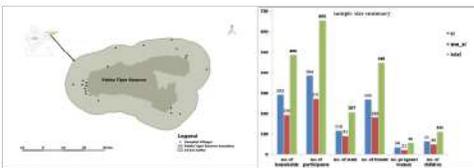
- World over indigenous tribal people have poor health outcomes.
- In India socio-economic and health status of Schedule Tribes (hereafter ST) communities are also poor.
- Tribal communities live around forest areas and poorly studied in north-east India.
- STs in north-east India likely to be different: constitute a majority of population (e.g. Arunachal Pradesh) and own land

Objectives:

- To understand health outcomes, health seeking behavior and socio-economic status of STs and Non-STs living around a forest area in Arunachal Pradesh.

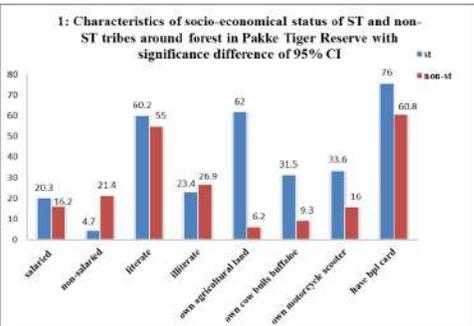
Methods and materials:

- Descriptive cross-sectional survey of 655 participants across 486 households around Pakke Tiger Reserve.



Results:

- STs have significantly higher education, agricultural land ownership (62%), domestic animal ownership, motor vehicle ownership (33.5%), BPL card (76%) compared to non-STs (agricultural land ownership: 6.0%, domestic animal: 9.3%, motorcycle/scooter: 16%, BPL card: 60.8%) (Table 1).



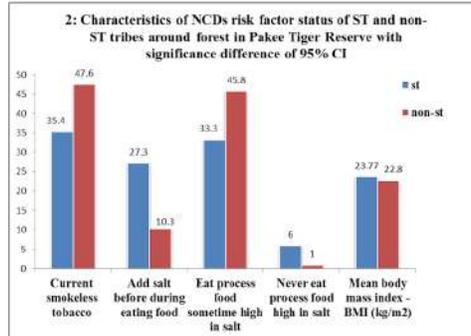
- No difference in self-reported health parameters (TB, hypertension, diabetes).

- Non-STs engaged in significantly more physical work (high-intensity work that causes increase in breathing or heart rate for at least 10 minutes).

- Hospitalization is more in STs, this pattern was reflected for ante-natal and post-natal care. ST pregnant women visited government and private hospitals for pre- and post-natal care more than non-STs.

- Risk factors for NCDs similar.

- Smoking tobacco and alcohol consumption significantly higher in STs. But higher intake of smokeless tobacco in non-STs.



Conclusion:

- Results indicates general better socio-economic characteristics of STs.
- Education in STs better than non-STs.
- Higher intake of smokeless tobacco in non-STs. But there is not much of difference in other factors.
- Poor socio-economic and health status of STs does not seems to be uniform in different tribal regions of India.
- We are in the process of analyzing more health outcomes and behaviors by accounting for unequal sample sizes and testing for significance.

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Selected Theme/Sub-theme in the Conf: Tribal health – Socio-economic and cultural aspects



Nityashri SN presented a poster titled “Exploring the role of healthcare experience and scope for healthcare navigation services for improving access to hospital care for Soliga communities”

Role of healthcare navigation services in improving healthcare experience of Soligas: an exploratory study within THETA project



Towards Health Equity & Transformative Action on tribal health

Health equity cluster

Supported by the Wellcome Trust/DBT India Alliance

Authors: Nityashri SN, Yogish CB, Prashanth NS; **Organisation:** Institute of Public Health, Bengaluru

Introduction

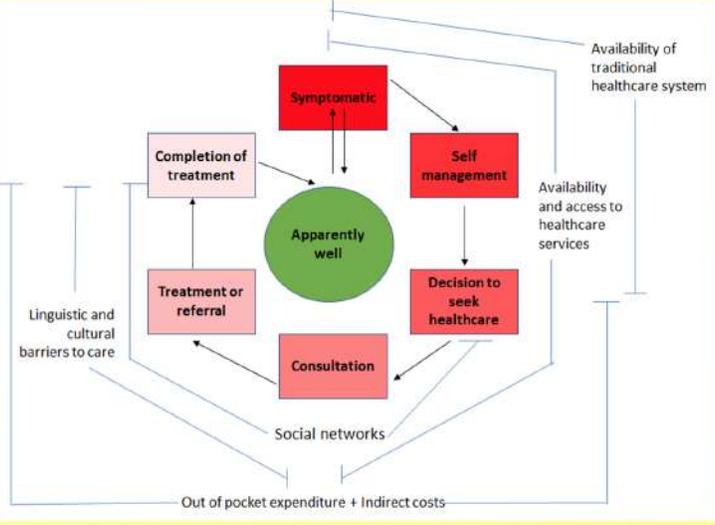
- Access to and utilisation of maternal health services by tribal communities has been studied
- Barriers - Healthcare costs, bad attitude of healthcare staff, lack of trust in doctors
- Literature review - No studies on healthcare experiences of tribal communities in Chamarajanagar

Methods





Results



Schematic representation of factors influencing healthcare seeking among Soligas in Chamarajanagar

Discussion

- Tribal households largely reliant on social networks to access and utilise government schemes.
- Multiple case studies planned in this region to develop a theory to explain the healthcare experiences.
- Scope for exploring healthcare navigation services for improving access to hospital care for Soliga communities.

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Partners and Funding



DBT wellcome

Zilla Buudakattu Girijana Abhivruddhj Sangha,
Chamarajanagar

Yogish presented a poster titled “Differences in behavioural risk factors for Hypertension: A cross-sectional study among Adivasi and non-Adivasi communities in forested regions in Karnataka, Kerala, and Arunachal Pradesh”

Differences in behavioural risk factors for hypertension: A cross-sectional study among Adivasi and non Adivasi communities in forested regions in Karnataka, Kerala and Arunachal Pradesh

Yogish C B¹, Sumanth M M², Nityasri S N³, Julee Jerang⁴, Sabu K U⁵, Prashanth N S⁶



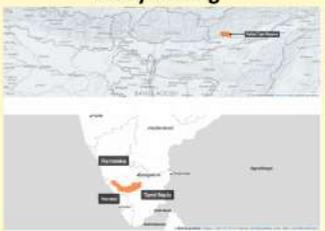
Background

Prevalence of high blood pressure (HBP) and stroke among rural and tribal communities is increasing in India. Fine-scale characterisation of behavioural risks among communities living in and around forested areas (especially Adivasi) is not available. We aim to examine behavioural risk differences for HBP among Adivasi and non-Adivasi communities who share similar social and geographical factors from the larger THETA project (*).

Method

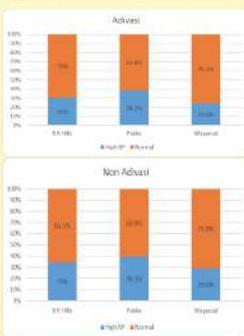
Design: Household cross-sectional study
Study population: A sample of 2521 adult population
Sampling Method: Representative multi-stage stratified sampling method as per THETA project sampling (*)
Variables: Socio demographic, physical activity, alcohol and tobacco use and anthropometric measurements
Analysis: Descriptive statistics and adjusted odds ratio were calculated.

Study setting



Study sites in Karnataka, Kerala and Arunachal Pradesh

High BP prevalence (JNC 7 classification)



Results

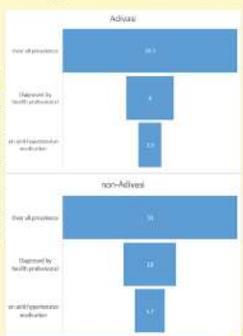
Risk profile for high BP (Adjusted Odds ratio)

Variables	Karnataka		Kerala		Arunachal	
	Adivasi	Non-Adivasi	Adivasi	Non-Adivasi	Adivasi	Non-Adivasi
Alcohol use	2.9	1.3	1.5(8)	1.5(8)	2.5	1.9(*)
Tobacco use	0.8(8)	2.3	1.4(8)	2.5	1(8)	1(8)
Abdominal obesity	2.1	1.7(8)	1.7(8)	1.9	1.3(8)	1.7(8)
Over-weight (BMI)	1.5(8)	0.9(8)	1.4(8)	1.3(8)	1.8(8)	1.8(8)
Obese (BMI)	4.9	2	1.9	3.8	1.9(8)	1.8

(*) 95% CI is <1 and >1
 (8) P value >0.05

HBP was independent of gender, education, vigorous or moderate activity

Diagnosis and on treatment



Discussion and Conclusion

1. Uniformly poor access to early detection and management of HBP for Tribal and non-tribal population
2. Limited primary and secondary preventive measures at primary health care levels
3. Context specific behavioural risk factors need to address

(*) Towards Health Equity and Transformative Action on Tribal Health (THETA) is a research project that examines fine-scale Health

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Towards Health Equity & Transformative Action on Tribal Health (THETA) Project Mid-term Assessment

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Towards Health Equity & Transformative Action on Tribal Health (THETA) Project Mid-term Assessment

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Image 6: August 2019 workshop attendees.



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