Secular trends in prevalence of diabetes, prediabetes and its association with lifestyle factors in a rural south Indian population

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Study period:
2019- 2023

BACKGROUND OF THE STUDY

- The IDF estimates, around <u>463 million</u> people (20-79 yrs) had diabetes (DM) and 373.9 million had IGT in 2019 and this is expected to rise to <u>700 million</u> and <u>548.4</u> million by 2045. (IDF, 2019)

- India has a large rural population (>70%) and the prevalence of diabetes in rural areas is rising rapidly. The **ICMR-INDIAB** study reported the prevalence of diabetes in rural areas based on 15 states of India is <u>5.2%</u> (Anjana et al., 2017)

- The **ICMR-INDIAB** study also reported that the ratio of undiagnosed to diagnosed diabetes is higher in rural areas compared to the urban areas.

Prevalence of Diabetes in rural areas

Study	Year	Prevalence %
The Prevalence of Diabetes in India Study (PODIS)- Sadikot et al., 2004	2004	2.7 %
The WHO-ICMR NCD Risk Factor Surveillance Study Mohan et al., 2008	2005	3.1%
The **ICMR-INDIAB** study (Anjana et al., 2017)	2017	5.2%

Only limited number of studies have compared the secular trends in diabetes within the same population at different time points using similar methodology (Frank et al., 2011)

Though earlier studies have documented a rising prevalence of diabetes in India they have compared data from different regions of India or different parts within a state (Ramachandran et al., 2004) (Mohan et al., 2006) .

To compare secular trends, it would be more accurate to document the prevalence of diabetes within the same region.

OBJECTIVES

1. To study the secular trends in the prevalence of diabetes and pre-diabetes in a rural south Indian population.

2. To evaluate the factors contributing to the burden of diabetes among rural Indians.

3. To identify the real -life challenges in the screening for diabetes and its complications in a rural setting.

4. To study the perceptions about diabetes prevention and control through focus group discussions among the rural population.
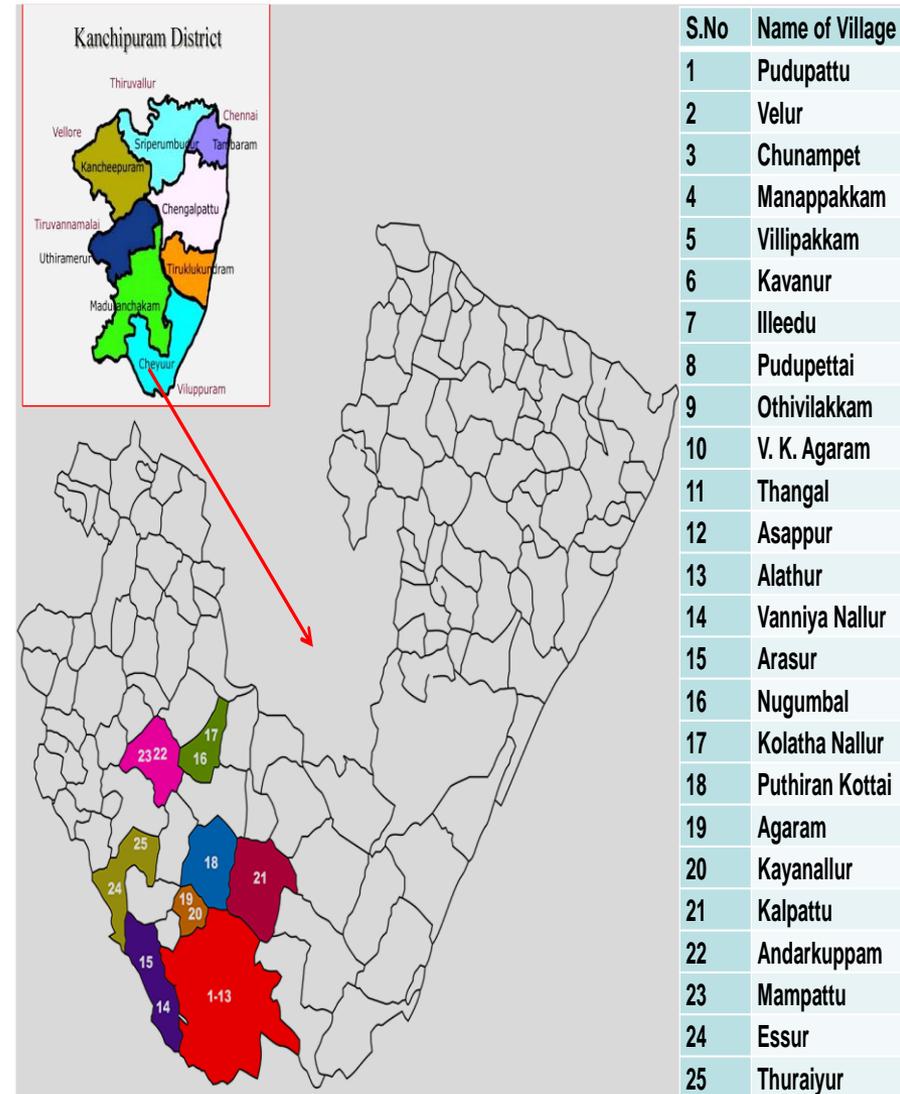
STUDY METHODOLOGY

Study Design- Population based cross-sectional study with mixed –method approaches (Quantitative and Qualitative)

Sample size-Total population of 25 villages consists of approximately 29,000 -30,000 individuals. Assuming that 50% would be adult population and hence 15,000 individuals will be surveyed.

Study Area: 25 selected villages in Kancheepuram and Chengalpet districts of Tamil Nadu state in southern India

Study Duration: 3 years (2018-2021)

S.No	Name of Village
1	Pudupattu
2	Velur
3	Chunampet
4	Manappakkam
5	Villipakkam
6	Kavanur
7	Illeedu
8	Pudupettai
9	Othivilakkam
10	V. K. Agaram
11	Thangal
12	Asappur
13	Alathur
14	Vanniya Nallur
15	Arasur
16	Nugumbal
17	Kolatha Nallur
18	Puthiran Kottai
19	Agaram
20	Kayanallur
21	Kalpattu
22	Andarkuppam
23	Mampattu
24	Essur
25	Thuraiyur

STUDY -1

- To study the secular trends in the prevalence of diabetes and pre-diabetes in a rural south Indian population.

Secular trends will be obtained by comparing the prevalence rates of diabetes and prediabetes from the **T**elemedicine P**R**oject For Scre**EN**ing **D**iabetes And its Complications in Rural Tamil nadu (TREND) Project (2020) with the CRDPP- **C**hunampet **R**ural **D**iabetes **P**revention **P**roject conducted earlier in 2010.

Chunampet Rural Diabetes Prevention Project (CRDPP)- Methodology

Study Aims: To increase awareness, screen and provide treatment plan of diabetes in the underserved regions

Study Design: Population based cross-sectional study

Sample size: Adult population of ≥ 20 yrs of age (N=27 014)

Study Area: A cluster of 42 villages in and around Chunampet in the Chithamur block in the Kancheepuram district of Tamil Nadu state in southern India

Study Duration: 4 years (2006-2010)
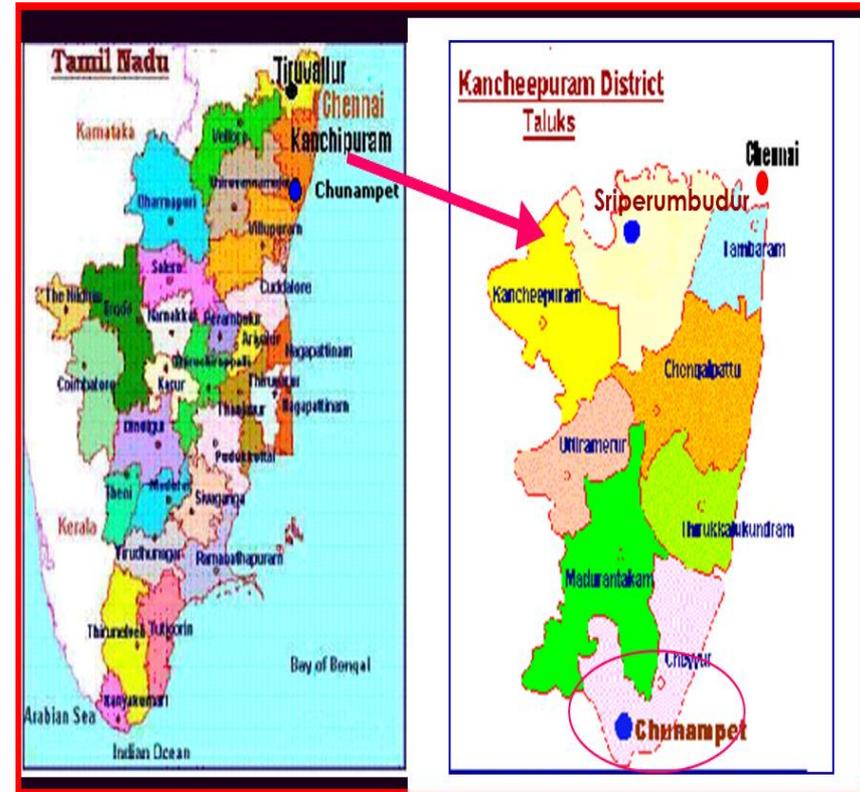
TREND METHODOLOGY

SCREENING FOR DIABETES/PREDIABETES

In all adult population (aged ≥ 18 yrs) (N=15,000)

Diabetic individuals

(Self-reported & newly diagnosed diabetes)

❖ **Questionnaire**

Details related to diabetes for self reported diabetes

❖ **Biochemical assays**

HbA1c , Lipid profile, Urea, Creatinine, P/C Ratio, Liver function test & Microalbuminuria

❖ **Questionnaire**
Household details: Demography, migration, medical history, behaviour changes, diet, physical activity, perception & knowledge

❖ **Anthropometric measurements**
Height, Weight, Body fat, Waist circumference

❖ **Clinical measurements**
Blood pressure

❖ **Biochemical assays**
Venous Fasting blood glucose and, 2hr blood glucose [post glucose load - excluding self-reported diabetic individuals]

Only individuals aged ≥ 20 yrs will be included in Study 1

COMPARISON BETWEEN TREND & CRDPP

	TREND (2018-2021)	CRDPP (2006-2010)
Study design	Population based cross-sectional study	Population based cross-sectional study
Methods	A door-to-door survey was carried out to screen for diabetes in subjects aged **≥ 18 years**	A door-to-door survey was carried out to screen for diabetes in subjects aged **≥ 20 years**
Data collection tool	Structured questionnaire: Demographic and socioeconomic characteristics, health behaviour, medical history, perception of health, diet, physical activity, anthropometric and clinical measurements	Structured questionnaire: Demographic and socioeconomic characteristics, health behaviour, medical history, perception of health, diet, physical activity, anthropometric and clinical measurements
Blood sample & Diagnostic criteria (WHO CRITERIA, 2006)	OGTT (Venous plasma) FBG ≥126 mg/dl- Diabetes FBS ≥110 mg/dl and <126 mg/dl – Impaired fasting glucose 2 h post load of glucose - ≥140 mg/dl to <200 mg/dl and fasting value <126 mg/dl –Impaired Glucose Tolerance	Capillary whole blood CBG ≥126 mg/dl- Diabetes Fasting CBG ≥100 mg/dl and <126 mg/dl – Impaired fasting glucose 2 h post - ≥140 mg/dl but <200 mg/dl and fasting value <126 mg/dl –Impaired Glucose Tolerance

Comparison with Venous vs Capillary blood glucose diagnosis

- A study on "The comparison of venous plasma glucose (VPG) and whole blood capillary glucose (CBG) in diagnoses of Type 2 DM: a population-based screening study" reported that the prevalence of diabetes determined by CBG is not remarkably different from that using VPG (Sandbæk et al, 2005)

- A comparative study of CBG with VPG measurements in the fasting state and after a standard glucose load in Asian Indians indicated that there is a good correlation between the CBG and the VPG for diagnosis of diabetes and IGT. The accuracy of identifying diabetes was 83.3% by the ADA and 90.9% by WHO criteria, for IGT it was 85.3%, and for IFG it was 66.3% by the ADA and 72.2% by the WHO criteria. (Priya et al, 2011)

- Fasting values for venous and capillary plasma glucose are identical (WHO, 2006)

FIELD ACTIVITIES IN TREND
Data collection & Clinical assessment

Team meeting with field investigators and field technicians

Screening after COVID-19 pandemic

PREVALENCE OF DIABETES IN THE TREND STUDY POPULATION(n=7640)
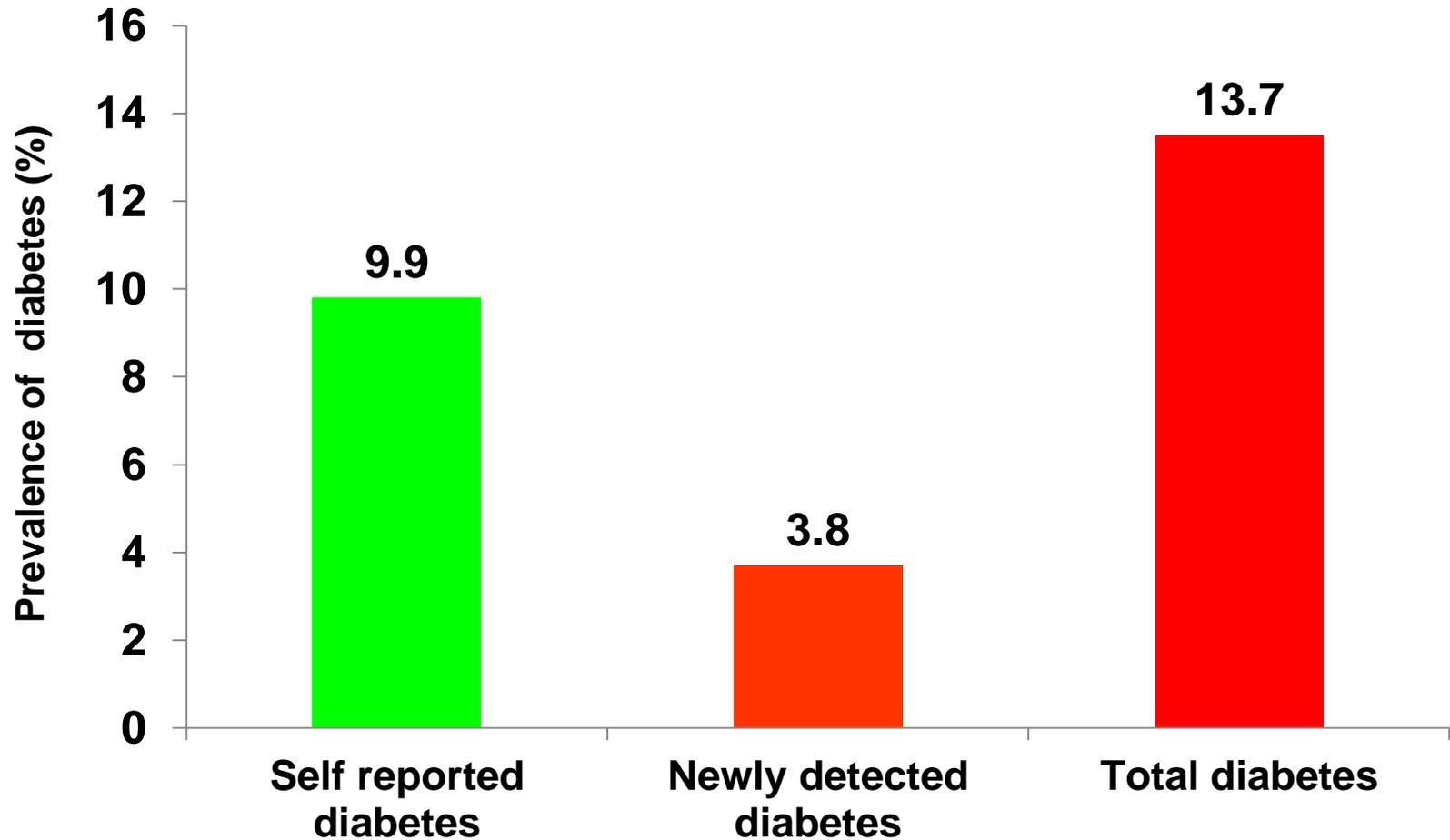
STUDY 2

- To evaluate the factors contributing to the burden of diabetes among rural Indians.

❖**Questionnaire**
   Household details: Demography, migration, medical history, behaviour changes, diet, physical activity, perception & knowledge

❖ **Anthropometric measurements**
   Height, Weight, Body fat, Waist circumference

❖ **Clinical measurements**
   Blood pressure

❖ **Biochemical assays**
   Venous Fasting blood glucose and, 2hr blood glucose [post glucose load - excluding self-reported diabetic individuals]

STUDY 3-To identify the real -life challenges in the screening for diabetes and its complications in a rural setting

Recruitment of Local village health workers (VHW) as Field Investigators & Field Technicians

Training on the study components- at 6 monthly intervals

In-Depth Interviews

2018
Process
Completed

2018-2020
Ongoing

It will commence after the completion of study
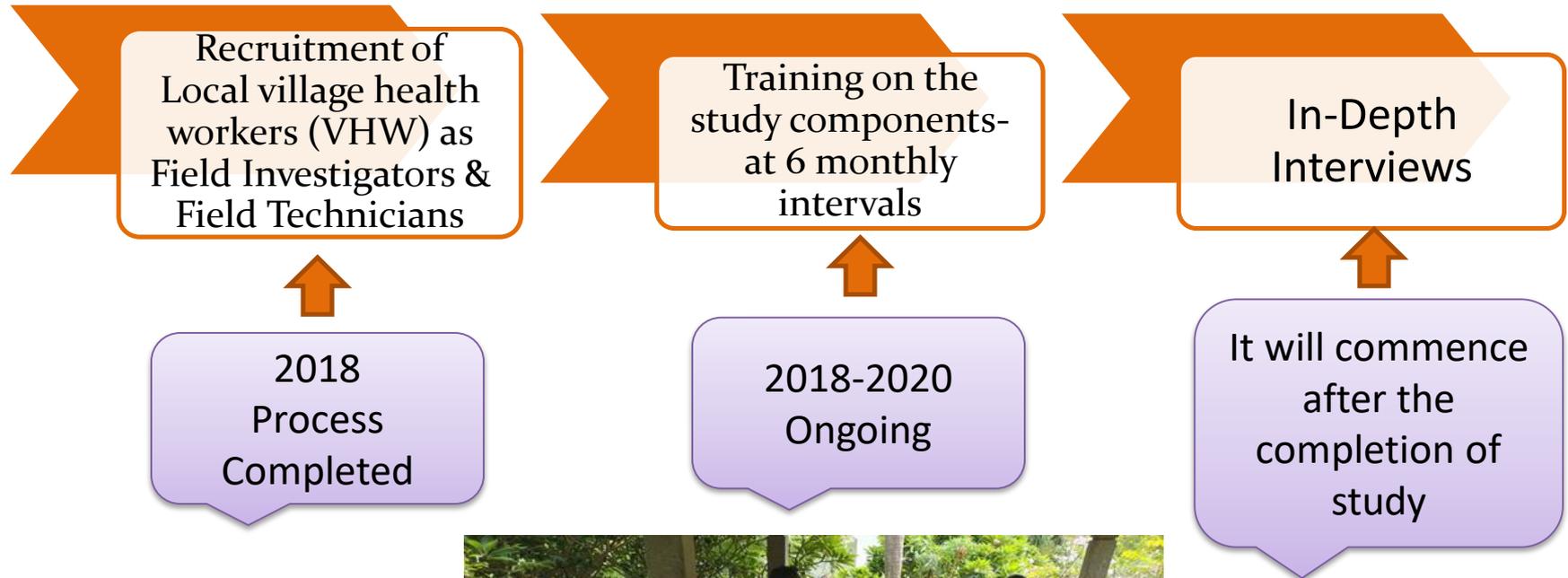
STUDY 4-To study the perceptions about diabetes prevention and control through focus group discussion among the rural population.

Development of interview guide for focus group discussion

Focus group discussion will be conducted (10 to 12 groups) in selected Diabetes and Prediabetes individuals until the discussion reaches a saturation point

A qualitative Data will be collected, transcribed , coded and analyzed to study the perceptions about diabetes prevention and control.

It will commence after the completion of study recruitment

Work done so far....

- Diabetes awareness pamphlet was developed in the local language to be distributed to each household before the day of screening.

- This is will help to increase awareness about the importance of screening for diabetes in this population.

Work done so far....

Training was provided to the team at 6 monthly interval. Strategies were discussed to overcome the challenges in order to improve the recruitment status

Quarterly recruitment status (n=8167)

Period	Value
Dec 19' - Mar 20'	2447
Aug 19' - Nov 19'	2420
Apr 19' - Jul 19'	2041
Nov 18' - Mar 19'	1259
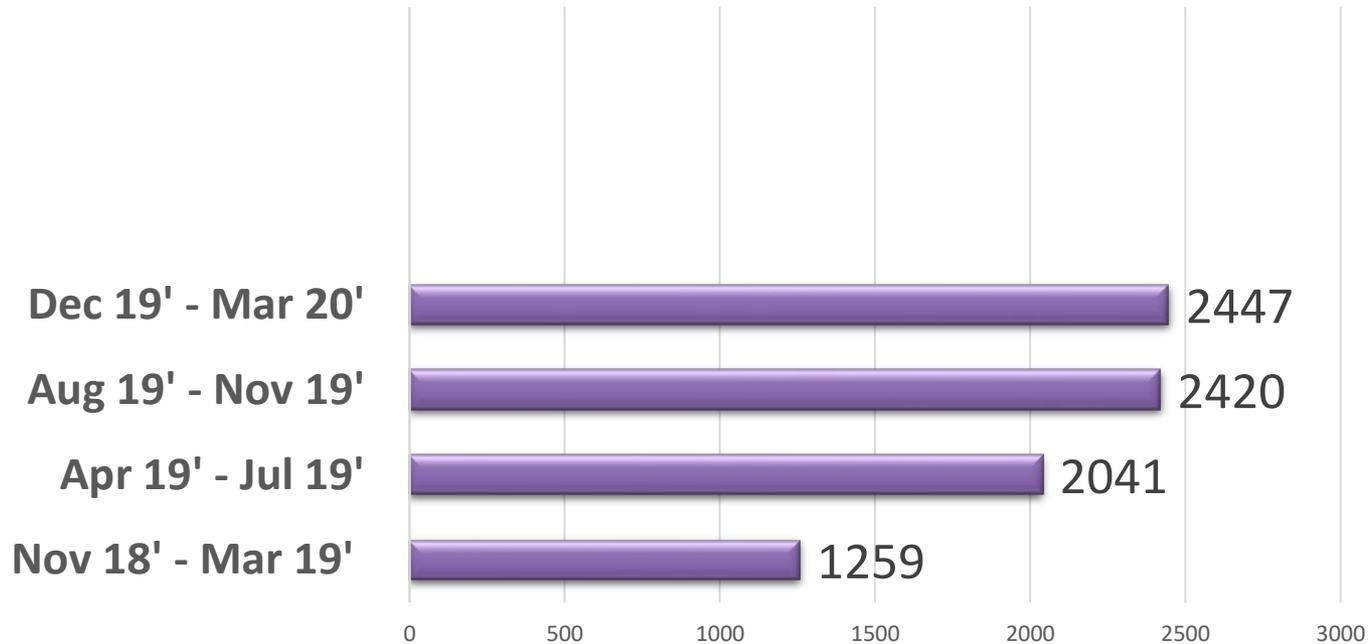
Future timelines

- To write a review titled "A review on the prevalence of prediabetes and diabetes among rural Indian population"
- To publish a study methodology paper.
- To create a study recruitment template for periodic updates.
- To develop structured interview guide for Study 3
- To develop structured focus group discussion guides for Study 4

TREND TEAM

THANK YOU