

Actigraph: a case study of the processes vis-a-vis perceptions around food intake and energy expenditure!

-Astha Upadhyay

Why do we eat food? Are they so important for life? What happens inside our body when we eat food? These are few of the questions many of us would have asked during our childhood. But as we grow older, we realize that how the food we eat matters a lot.

*“The doctor of the future will no longer treat the human frame with drugs, but rather will cure and prevent disease with nutrition.”- **Thomas Edison**.*

The food we consume acts as a fuel, providing energy for our bodies. They provide nutrients to our body in the form of carbohydrates, vitamins, fat, minerals, fiber, etc. And according to WHO, they must come from food. However, even though food plays a vital role in human health, growth as well as in prevention of several diseases, achieving and maintaining balanced nutrition is still a central challenge for Global health.

Status of Health & Nutrition:

As per the latest edition of Global Nutrition Report (GNR) released in November 2018, the current status of malnutrition is unacceptably high across the world. In India, the situation is even worse. According to the Global Hunger Index report-2020, India ranked 94 among 107 countries. With a score of 27.2 and 14 per cent population undernourished, the country is in the ‘serious’ hunger category where states like Bihar and Uttar Pradesh has played an important role in affecting the national average. These are the states which are densely populated and have high level of malnutrition. The GNR also says that women have a higher burden than men when it comes to certain forms of malnutrition: one third of all women are anaemic and millions are still underweight.

TIGR2ESS collaborating with PRADAN towards a symbiotic goal:

TIGR2ESS (Transforming India’s Green Revolution by Research and Empowerment for Sustainable food Supplies) programme revolves around the concept of integrated to improve lives and livelihoods leading to better health, nutrition and economic outcomes. PRADAN, having an intensive grassroots connect, working directly with the community to attain the objectives of improved health and nutrition. Therefore, the aim was to understand the traditional vis-a-vis current dietary practices of the Santhal tribal community in Chakai block of Jamui district in Bihar state.

Accelerometer devices:



An accelerometer is an electromechanical device used to measure acceleration forces. Since, there is a strong relationship between the food we consume and the degree of physical activities. Hence, in our study, we used Actigraph to measure the energy expenditure by capturing movements done by human body in three planes (left, right and frontal bend).

Actigraph device

Initiating the process:

The concept of using accelerometers in our research project emerged from an interest in understanding the direct relationship between food intake and energy expenditure among communities in our location, Chakai. The study was conducted with the help of two enumerators: Kusum and Sonalal who went through training at ICRISAT of how to use Actigraph.



In picture: Kusum and Sonalal travelling to Hyderabad (left) an attending session at ICRSIAT (right)



“I thought we will be going by train but then I saw, we entered an airport. I was mesmerized. Oh God! I was going through the flight (Kusum)

Our visit to ICRISAT, one of the collaborators on the TIGR2ESS project, gave us an opportunity to learn how the actigraph device is used in their projects. The method involves a simultaneous monitoring of data collected on the device, the actigraph while simultaneously collecting data from respondents on their energy and consumption. To this end, we were also trained in keeping Time-use sheet to map out 24 hours activities, Consumption using 24 hours dietary recall. All this was accompanied by the participant observation method, which required a full-time engagement from enumerators and dedication.

Pragmatic challenges and Contextual Adaptation:

While planning around execution of the process in our location, I and our enumerators re-realized pragmatic realities and constraints. We found it was not possible to imitate the exact procedure shown by ICRISAT in Santhal Parganas as both contexts differed greatly in terms of institutional resources as well as in consumption practices.



In
picture:
dubu &
pyla
(left)
and
pyla
(right)



In a research process, we are stringently told to not to impose our ‘things’ on the participants and coping what ICRISAT has done was not at all possible. The training which enumerators went through was based on the eating habits of ICRISAT site. However, the eating habit of people of Santhal paraganas is different as compared in ICRISAT sites. Another difference was units of measurement, where communities in Chakai had local measures like *pyla* and *dubu*. So, when ICRISAT gave them utensils as incentives and ask them to eat only in those utensils had changed the unit of measurement and the way of their eating. Thus, this difference would change the course of eating pattern. Hence, the study had to be redesigned to accommodate these differences.

Apprehensions:

- many people had doubts how was it going to be used, will it be something to wear
- does it cause any abnormalities in the body or it can be a blood-sucking device
- People had suspicion that this device may contain explosive and it may blow them off

Kusum was quite apprehensive about the consumption part of this process and suggested to be removed from the questionnaire. She said that no one would tell what do they eat, and especially to an outsider. She mentioned - “*They (respondents) will eat a different thing and will tell something different. And when you match the data, it won’t make any sense. Similarly with the activities they do. They will not tell correctly.*”

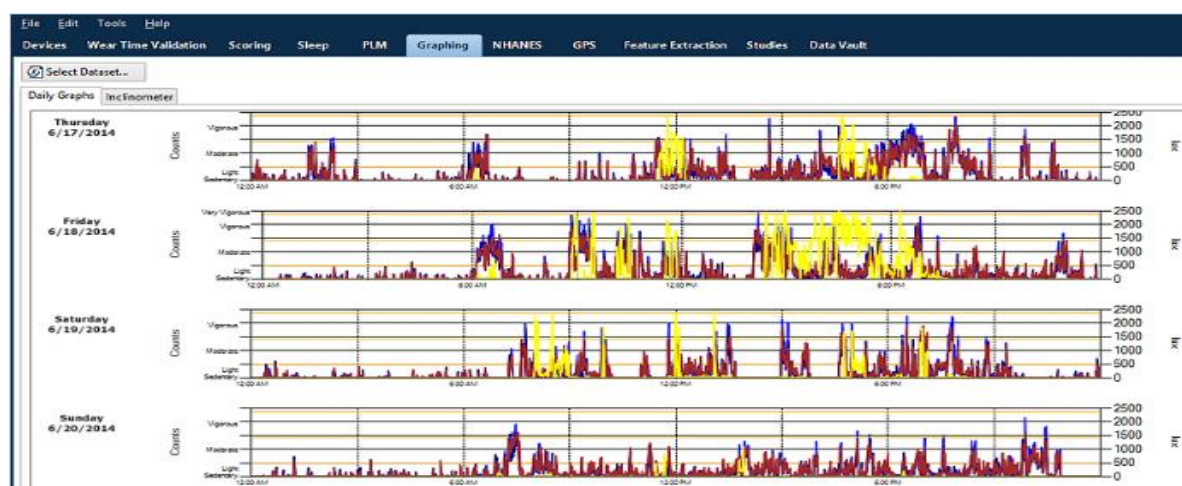
Where & how was the study conducted?

The study was conducted in two villages of Nawadih panchayat: Govindpur and Naiwadih with five individuals. The reason for doing the study in Nawadih panchayat was that the time period was the end of December and *Nawadih* (having plain and rolling topography) was the only TIGR2ESS panchayat where farmers were still involved in harvesting of paddy. Because this could have been clearly depicted the different range of activities where variations in energy expenditure would be observed and mapped.

Participants were told to wear the device just after they wake up in the morning that is six O'clock and remove while going to sleep. Our enumerators were available over there to check and to remind about the same.

Methods:

- Time-use sheet to map out 24 hours activities
- Consumption using 24 hours dietary recall
- Participant observation method
- Actigraph data: *Picture below: Graph showing variations in the rate of energy expended while working (high graph shows that the person wearing the device is performing more laborious activity and thus energy expenditure is high and lower ranges show the lower rate of energy expenditure)*



Major Findings:

- In terms of consumption: there is no fixed time for women to consume meal but for men, the time-interval is fixed. Women preferred green leafy vegetables, rice, kurthi pulse and men preferred vegetables such as: cauliflower, potatoes and tomatoes including what women consume. Also, the quantity and variety of food and consumed by men are more than what women consume. Men, apart from food prepared at home, also consume snacks, jaggery, and liquor.
- In terms of activities: women do not consider most of the household work as 'work'. Around 50% of activities done by women have been recorded on the basis of participant's observation method. Women showed a diverse and varied range of activities, from agricultural to household chores. Whereas, when a man gets involved in money-generating activities like construction work, etc. they work for around 8 hours and then no other activities have been recorded on their part.

- The time-use data also shows that travelling for recreation or leisure is only seen in the case of men and not of women.

Areas to build on:

- Capacity building: Our enumerators can be further trained to conduct more scientific studies and surveys. Building skills of Santhal youths for such activities and research work would be helpful for future.
- Statistical/organizational expertise also can be built upon from such study(ies) We have data of time-use, consumption and actigraph data (in the form of graphs) of five individuals for four days which can be utilized in several ways, such as:

Kusum, our enumerator said “*when it comes to work, both men and women are working, therefore, we’ll check and measure that who does more labour. However, men do much more labour or work than women. They plough lands and do much heavier work than women do.*” This is a common notion around ‘work’ in village.

- To understand the reality v/s perceptions around working of men and women
- To understand the patterns of consumption and activities both men and women are involved in
- If there is a gap/ are gaps in nutritional requirements; can it overcome? How? Since we have National statistics for recommended dietary allowances and the degree of work supposed to be done as per nutritional requirements. We can compare this data with what we have collected (if the recipes get standardized to get the difference/s or gap/s between the standard measurements and ground-level realities.).

Food Items	Adult Man			Adult woman		
	Sedentary	Moderate worker	Heavy worker	Sedentary	Moderate worker	Heavy worker
Cereals	460	520	670	410	440	575
Pulses	40	50	60	40	45	50
Leafy Veg	40	40	40	100	100	50
Other Veg	60	70	80	40	40	100
Roots and tubers	50	60	80	50	50	60
Milk	150	200	250	100	150	200
Oil and Fat	40	45	65	20	25	40
Sugar or Jaggery	30	35	55	20	20	40

(Summary of RDA (recommended dietary allowances) for Indians (source: National Institute of Nutrition, 2020 edition)



Astha Upadhyay is currently working in PRADAN'S Research Wing as a Research Associate and is working in two projects: TIGR2ESS and GRTA-CHIRAG. Prior to this, Astha also was a Development Apprentice with PRADAN. She holds a Masters degree in Journalism and Mass Communication from Benaras Hindu University, India. Her key research areas are Capacity building of youth, Sustainable Food systems and Development Communication.