

Evaluating Nutritional Outcomes and Progress: A Comprehensive Analysis of a National Nutritional Surveillance System in India

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Abstract: *The welfare of a population is impacted by health and nutrition outcomes, which are given the most weight in the indicators chosen to gauge the country's and the children's progress. One of the main objectives of the administration is to ensure uniform development across the entire nation. Children's nutritional status is evaluated using anthropometric and clinical assessments as well as surveys about food and nutrient intakes to determine whether they are stunted, wasted, or underweight. Although the Integrated Child Development Scheme (ICDS) of the government of Odisha has a strong track record for innovation, the rate of undernutrition has barely changed since then. In India, undernutrition among children under five has decreased dramatically over the past 10 to 15 years, but it is still a problem in a number of states, including Odisha. Therefore, the main goal of this nutritional surveillance system is to consistently build a reliable database on the nutritional status of communities based on systematic surveys conducted by adopting statistically valid sampling designs and using uniform standard methodologies across all States including all the vulnerable remote areas and tribes.*

Keywords: Child, Diet, Health, Malnutrition, Nutritional status

1. Background

In the past twenty years, Odisha, one of the eight socioeconomically backward States of India that make up the Empowered Action Group, has performed surprisingly well in terms of health and nutrition. Tribal communities continue to lag behind despite significant improvements in health outcomes. In Odisha's tribal tribes, 46% of the under five years of age children are stunted and more than half of them are underweight [1]. It is obvious that the Indian population is going through a transitional period where abundant food is replacing subsistence conditions but physical labour is being reduced, thus it is essential to comprehend how the nutritional landscape is changing [2]. There have been noticeable alterations in the food consumption habits and practices, which have been linked to the rapid increase in the burden of overweight, obesity, and other noncommunicable diseases in the country and the state [3]. Thus, a balanced diet is essential in order to promote healthy growth and development as childhood malnutrition may foretell risk of diseases in later life [4]. Evidence-based interventions must be developed, and corresponding health policies must be established to ensure that nutrient-rich diets are available and accessible, in order to combat various types of childhood malnutrition, including calorie undernourishment, micronutrient deficiencies, and

overnutrition. Accurate and thorough information on children's nutrition conditions should serve as the foundation for effective planning for such treatments[5]. More complete and efficient monitoring of the nutrition status at the district level which will support the development of national policy and local programme planning is needed. This will enable early warning of emergency situations. Data are also required to monitor the advancement of new objectives and targets [3].

Definition and history of nutritional surveillance

According to the 1976 initial guidance on the topic, "Surveillance should provide ongoing information about the nutritional conditions of the population and the factors that influence them," Information on nutritional results and measurements are routinely and systematically collected as part of the surveillance system in low-income nations [6]. The term "surveillance" was first used by Langmuir to describe population-wide disease trends rather than the risk of diseases in an individual, which sets the groundwork for nutrition surveillance in 1963 [7]. The FAO, the WHO, and UNICEF were invited to create a global nutrition surveillance system during the inaugural World Food Conference in 1974. An expert committee created the methodology, which was succeeded by a period of intense effort to establish national surveillance systems [3]. A

nationwide system of nutrition surveillance and monitoring is crucial to achieving these objectives. For the sake of public health in every country and region of the world, it is now crucial to regularly analyse and monitor the nutritional health status of both individuals and the entire population through national nutrition surveys. The results of the national nutrition survey can be used to pinpoint population-level nutritional and health issues, plan prevention initiatives, develop dietary guidelines and public health policies, monitor changes in nutritional status, and assess the efficacy of nutrition programmes [8]. This includes assessing the level of domestic food production, examining regional variations in household food spending, looking at household studies of food purchases and consumption at home and at work, and occasionally looking at individual consumption [9]. Every few years, large-scale surveys are useful for charting national and international trends, but because of how seldom they are and how long it takes to get the results, decisions on policies and programmes must be made swiftly. Only a select few countries have such organized methods for monitoring trends inside nations. The effectiveness and worth of the various methods used are not well studied. Therefore, the aim of this review involves compiling and presenting the information about the nutrition surveillance system in the country and the current nutritional situation across the State.

Determinants of nutritional surveillance

The nutritional state of a community is influenced by a variety of factors which includes,

- 1) The production of food and its availability, the purchasing power,
- 2) The dietary habits and intake,
- 3) Sickness trends, and other nutrition-related variables [11].

These nutrition metrics were chosen in accordance with WHO priorities. The three of the six WHO core nutrition indicators which comprises of stunting, wasting, and overweight are the anthropometric measures used for the children under the age of five. The WHO has also a section on overweight and obesity in school-age children which are the new Core Health Indicators for 2013.

Anaemia, vitamin A deficiency, vitamin D deficiency, urine iodine concentration, and goitre prevalence are the indicators relevant to vitamin and mineral deficiencies [5]. Laboratory-supported haemoglobin estimations at least once every five years may also be included because anaemia affects all demographic groups, especially pregnant women and young children [12].

To evaluate and compare dietary intake data with reference intake levels and/or recommendations, data on energy, macronutrients, and micronutrients are also crucial. Malnutrition can result from consuming the incorrect foods or insufficient amounts, as well as from having specific health issues. Models that concentrate on facets of nutritional status, involves connection between malnutrition and diseases, sanitation, or water supplies [11].

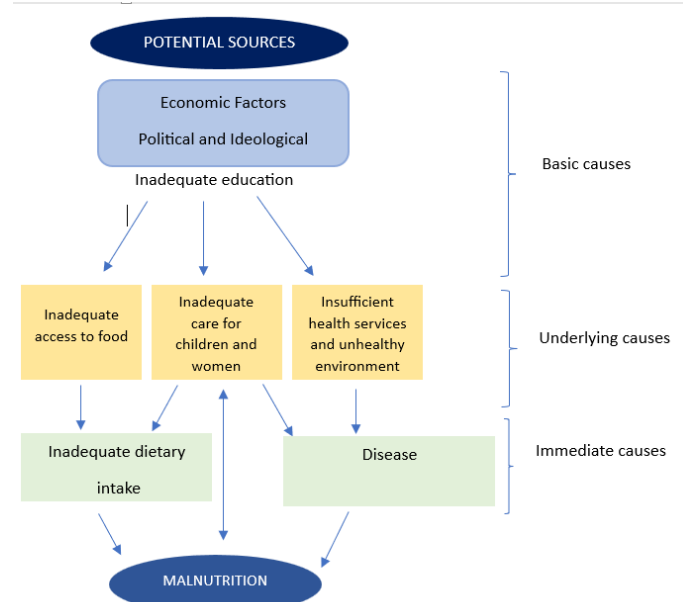


Figure 1: Determinants of malnutrition

- 1) Disease, dietary consumption of food and nutrients, and nutritional status are all related
- 2) A family's or an individual's food intake is influenced by the food they have access to and how well-informed they are about nutrition.
- 3) Food availability is influenced by the following three factors:
 - a) Market economy's relationship between food costs and profits;
 - b) Subsistence households' food harvests; and
 - c) The price-wage relationship and output in the mixed market and subsistence households.
- 4) Imports or food have a significant impact on the relationship between food prices and incomes.
- 5) A variety of interconnected elements, both inside and outside the nation (such as the weather), have an impact on local food production.
- 6) Food consumption is influenced by the physiological state of the human body, which in turn depends on the environment, the availability of clean water, and the morbidity status, which is caused by inadequate environmental conditions, access to clean water, and inadequate sanitation [11].

Measurement of undernutrition

Undernutrition and growth failure are quite synonymous. The most typical method of determining whether a population is malnourished is by measuring their weight and height. Anthropometry is the study of measuring human body dimensions in this way [13]. By measuring different body compartments, one can determine the body's energy reserves [14]. It is a low-cost, non-invasive way to assess someone's or a group of people's overall nutritional condition [13]. The most commonly used indices are-

- a) Weight for age
- b) Length for age or height for age
- c) Weight for length or weight for height

Underweight, stunting, and wasting are three nutritional conditions that can be detected using these three indices. Each of these markers is expressed as a standard deviation

(Z-score) from the reference population's median, which allows for the further classification of undernutrition as mild or severe [13].

Underweight

It is a combined indicator of wasting and stunting. It is used to determine how much malnutrition has changed over time, whether it be from acute or chronic malnutrition or both [13]. In accordance with child development guidelines, an underweight kid has a weight for age Z-score that is at least two standard deviations (-2SD) below the median [15].

Stunting

An indication of stunting is the failure to develop to the predicted height or length compared to children of the same age who are healthy and eat well. Linear growth retardation results from inadequate nutrition over time or recurrent infections [13]. A child who has height for age Z-score which falls below the median for child development requirements by at least two standard deviations (-2SD) has a stunted growth [13,15].

Wasting

This reflects a recent nutritional deficiency which might have been caused by recent diarrhoea episodes or any other acute conditions. It denotes present or acute malnutrition brought on by actual loss in weight or failure to put on weight [13]. A child that falls below the median for child growth standards has a weight for height Z-score that is at least two standard deviations (-2SD) below the median [15].

Process of the surveillance

On breaking down the process of surveillance, it's the four stages that form this intricate system. Beginning with straightforward measurements or characteristics of people and objects that lack much inherent value, to analysis and interpretation of the data which is used to produce suggestions and change in behaviour and to produce knowledge and understanding that will support in decision-making [10].

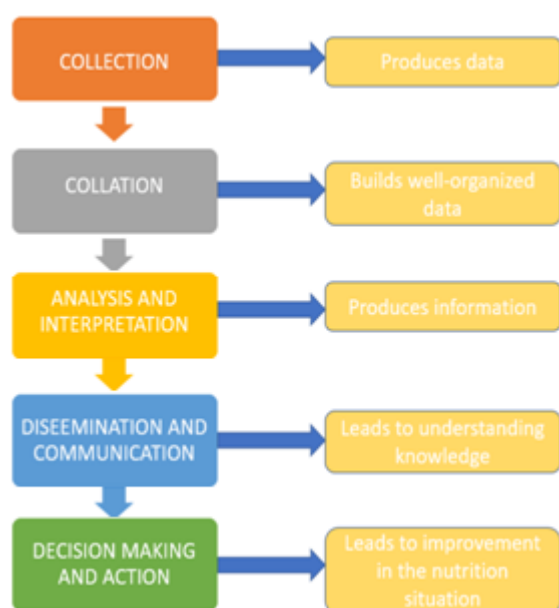


Figure 2: Flowchart for the process of surveillance

Approaches used for data collection

Five methods for gathering anthropometric data for monitoring in humanitarian settings were found by a recent review by Bilukha and colleagues [17]. Since this evaluation is not restricted to the humanitarian context, these are presented here along with two more techniques [5].

Collection of primary data

1) Large Scale nationally representative surveys- The programmes for household survey, including Multiple Indicator Cluster Surveys (MICS) financed by UNICEF and Demographic and Health Surveys (DHS) supported by USAID, provide accurate population statistics for each country [10]. These provide information on worldwide dietary patterns and have complemented the Millennium Development Goals (MDGs) [18]. One of these two types of surveys is typically conducted every three years so their results allow long-term trends to be seen which might be used to confirm the results of other, sources of data [19].

2) Repeated Cross-sectional surveys- It consists of a routine, national level survey conducted every 1, 3, 4, 6 or 12 months [13]. For nutrition surveys, a conventional form of sampling design, 30 × 30 (clusters × children) is recommended [20]. By demanding a predetermined sample size and gathering information for a small number of variables, surveys can attain the necessary precision and disseminate crucial results in 1 or 2 days of data collection. In terms of institutional administration, non-governmental organisations (NGOs) commonly work with national governments to conduct the surveys and may be funded by the UN or development organisations [3].

3) Community-based Sentinal Sites- Data are frequently collected from communities that is typically livelihood zone or an area which is vulnerable to malnutrition. Every one to three months, data are gathered from each study location, which typically includes 12 to 50 kids. NGOs employ this strategy the most. Within the district, the field of work, or ecological zone that has to be sampled, can be chosen at random or on purpose [20]. Within the sites, samples of kids are chosen at random. Each time at each location, a fresh sample of children can be chosen, as was done in South Sudan and Zimbabwe in November 2004 and October 2006, respectively. Alternatively, the same children can be used to study repeatedly with replacements when the children reach a specific age, stop being followed up on, or pass away [21, 22].

4) Data from schools- All the children in a specific phase of schooling are included and there is no sampling technique used [10]. Periodic height surveys of first-graders in elementary schools are still carried out to monitor the rate of stunting [23]. All first-graders, seventh-graders, and tenth-graders at those schools have their height, weight, and eating habits recorded annually [24].

Collection of secondary data

1) Anthropometry data from clinics- The primary source of anthropometry data used frequently by health systems is children's clinic growth monitoring. These data are collated and used for surveillance. This will serve as an early warning system for a health and food security crisis that is

getting worse [25]. The data is helpful in circumstances where there is inability to conduct surveys due to physical insecurity. This will highlight sensitive geographic locations. Resources are then directed to these clinics to boost the procedures of data collection and analysis. Sentinel clinics can be selected at certain specific sites which is a characteristic of a livelihood zone or vulnerable communities [10].

2) Anthropometry data collected in the community- Some instances of the health system gathering anthropometry data include community-based growth monitoring in Bangladesh [26], screening of children for referral feeding programmes in places like Chad [27], Maharashtra, India [28], and Haiti [29], and including child malnutrition screening as one of a series of activities during Child Health Days in places like Ethiopia in the Extended Outreach System [30].

3) Collection of secondary data from sentinel clinics- Because their locations are representative of a livelihood zone or because the populations are vulnerable, certain clinics or villages can be purposefully chosen for inclusion in community-based health programmes. Children who receive these medical treatments are sampled, and data are periodically gathered [10].

Nutrition story of Odisha

Although malnutrition is a global issue, low- and middle-income nations continue to have the highest rates of it [31]. The main cause of these premature fatalities is malnutrition of the mother and infant [32]. Odisha, a state with 46 million residents and all the difficulties, has improved nutrition indices dramatically [33]. Notably, the state's operational measures included adding eggs to the ICDS program, a crucial initiative for nutrition and early infant development [31]. Decentralised local structures were encouraged throughout the State for the delivery and oversight of the ICDS programme in order to improve access. It has been highlighted that Mission Shakti has implemented Jaanch and Matru (Mothers) Committees, two unique community-based monitoring platforms, and that women's self-help groups (SHGs) have taken part in giving food supplements and overseeing the services [34]. The chain for managing take-home rations is known as "Mo chhatua," which uses a fixed day schedule to mix the ingredients on the 23rd of each month and distribute them on the first [35]. The political and bureaucratic leadership in Odisha supported these reforms at the highest policy level, making the state a success story [31].

32.1% of children under the age of five in India are underweight (NFHS-5), indicating that malnutrition is still a problem that needs to be adequately addressed. It's possible that variations in nutrition-related variables and interventions are to blame for the extreme diversity in progress towards nutrition between and within Indian states [35]. In comparison to NFHS-4, Odisha has shown significant development in key nutrition parameters, according to CNNS & SRS statistics. According to the Comprehensive National Nutrition Survey (CNNS) report (2019) compared to NFHS-4, the anaemia levels in children (1-4 yrs) have further decreased to 30%.

Odisha's ranking in stunting, wasting, and underweight decreased from 19th to 14th, 20th to 12, and 21st to 16th, respectively, according to a CNNS report. It also demonstrates a greater decline in underweight (29%) and stunting (29%), wasting (14%), and wasting, respectively. Stunting rates among kids in Odisha have dropped from 45% (NFHS-3) to 34.1% (NFHS-4). According to NFHS-4, Cuttack and Puri are two of the top 10 districts in the nation for having the least amount of stunting. Children that are underweight are now 34.4% less common than they were in NFHS-3, a drop from 40.7%. But the percentage of youngsters that are wasting has gone up slightly, from 19.6% (NFHS-3) to 20.4% (NFHS-4) [35]. The percentage of children under the age of five in the state who are stunted (height-for-age) has steadily fallen from 48.2% in NFHS 1 to 31.0% in NFHS 5, with NFHS 3 being the exception. Children who are underweight (low weight for age) are also on the decline in the state. From 53.3% in NFHS 1 to 29.7% in NFHS 5, the prevalence of underweight children under the age of five has decreased. Overall, the state of wasting (low weight-for-height) in children has been inconsistent over time. From 20.4% in NFHS 4 to 18.1% in NFHS 5, the proportion of children under 5 that are wasted has steadily decreased. Overall, the state of wasting (low weight-for-height) in children has been inconsistent over time. From 20.4% in NFHS 4 to 18.1% in NFHS 5, the proportion of wasted children under the age of five has steadily reduced [35]. The total number of severely stunted and underweight children in the state has decreased overall as a result of the state government's effective implementation of interventions for the kids' nutritional needs. In comparison to both India and its adjacent states, which are mostly in the east, Odisha has a lower prevalence of anaemia, according to NHFS 5 [35].

Key programmes launched at the state level

The state of Odisha's government has launched a number of noteworthy initiatives to enhance the nutritional and health status of its residents. Some of the remarkable schemes are AMLAN (Anaemia Mukta Lakshya Abhiyan), SAMMPurNA (Sishu Abang Matru Mrutyura Purna Nirakarana Abhiyan), OjanUtsava, DAMaN (Durgama Anchalare Malaria Nirakarana), MSPY (Mukhyamantri Samproona Pushti Yojana), Odisha Millet Mission and so on. At the state level, the issues posed by poor nutrition outcomes can be better handled. Through particular and targeted budgetary commitments, malnutrition may be addressed and nutrition treatments can be provided to more people [36, 37].

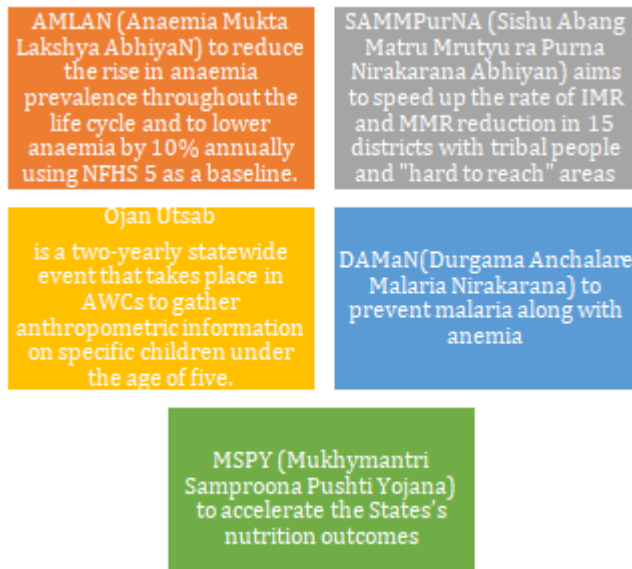


Figure 3: Nutrition programmes launched in the state of Odisha

2. Conclusion

Compared to other wealthier States, Odisha has achieved more rapid progress in lowering child undernutrition. The introduction of variety of nutrition-specific and sensitive policies through public distribution systems, agricultural policies and a number of other initiatives, between 2006 and 2016 made some encouraging improvements in the coverage of health and nutrition intervention. The efforts were initiated and sponsored nationally by a determined political and administrative leadership[38]. Odisha can learn from its past as it prepares for the next stage of its nutrition journey. Continued investments in the collection of data from the grassroot level and reaching out to the remote and vulnerable groups will aid in development of fresh perspectives. Additionally, promoting awareness through neighbourhood efforts would assist increase the use of health services. By enhancing the supply and demand for undernutrition services through a combination of strengthening current structures and innovations, and also boosting the ICDS to converge with other departments is the need of the hour[39].

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