

Evaluation of the Digitalized Targeted Public Distribution System in Urban Vadodara, Gujarat, India

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ABSTRACT The National Food Security Act (NFSA) in India has a commendable objective to ensure the availability of Food at all times at subsidized cost under Targeted Public Distribution system (TPDS) and Ujjwala Yojana aimed to supply LPG (Clean Fuel) to Below Poverty Line families, thus working in synergy towards better FNS. TPDS got reformed into Digitalized system to ensure transparency across the system from procurement to distribution. The present investigation was conducted to study the association of functioning of Fair Price Shops (FPS) with the four determinants of Food and Nutrition security (FNS). A Cross-Sectional Study was carried out using stratified random sampling. Data were collected on adult members from 245 households on Socio-Demographic profile, Individual Dietary Diversity (IDD), Nutritional Status (Anthropometry), FNS and utilization of TPDS. Functioning of 16 FPS catering to the study population were evaluated using a pretested questionnaire and observation methods. Forty percent of the households reported that the food grains were not available during the first visit of the month and frequent visits had to be undertaken by subjects. Majority of FPS resorted to under-weighting of commodities which was distributed to beneficiaries. LPG under Ujjwala Yojana was procured by only 25% of BPL card holders, while others were using either paraffin oil or purchasing LPG from other sources at high prices. The revamped system has its due impact in terms of enhanced food and nutrition security among the beneficiaries, adequate infrastructure needs to be in place.

Keywords: India, Food security, Public distribution system, National food security act, Dietary diversity

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INTRODUCTION

The National Food Security Act (NFSA) came into effect on July 5, 2013 with the aim to ensure “food and nutrition security by adopting a human life cycle approach, by providing access to adequate quantity of quality food at affordable prices to people to live a life with dignity”^[1]. NFSA aims to create an umbrella under which the TPDS and other food safety net schemes (Integrated Child Development Services and Mid-Day Meal program) would work in synergy to improve food and nutrition security through a life-cycle approach. The Act provides a legal entitlement (or the ‘right to food’) of subsidised food grain to 67% (75% of the rural and 50% of the urban) of the population of India through TPDS. TPDS is operational in 34 states, 714 districts through 5,46,033 functional FPS (1,92,572 are GIS mapped) and supplies essential commodities like wheat, rice, sugar and kerosene to the beneficiaries at nominal price.

The beneficiaries are identified based on income and given appropriate ration cards namely, APL (Above Poverty Line), BPL (Below Poverty Line) and under NFSA, 2013 every card holder must have Annapurna Stamp on their cards to avail the subsidized grains from TPDS outlets. According to the system Fair Price shops are operational from Tuesday to Sunday, Monday being holiday for the owners. The timings of shop are from IST 8:30 am to 7:30 pm with a lunch break from IST 12:00 to 3:00 pm. Thus functioning of FPS on Sunday ensures availability and promotes Food and Nutrition Security.

The essential commodities mainly (rice, wheat, sugar, and kerosene) issued under APL, BPL and AAY has been increased to 35 kg per month per family w.e.f. 1st April, 2002 with a

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view to enhance the food security at the household level and to plug the nutritional deficit. The revised food grain allocation provides 59% of calories (Kcal/person/day), 58% of total protein and 13% of total fat from the intake of cereals^[2].

The purpose of digitalization of Public Distribution System was to plug the gaps in the system and ensure transparency in distribution of commodities to the beneficiaries. Linking of ration cards with the Aadhar card and introduction of the biometric system ensured the same. The states that adopted and implemented digitalisation show reduction in leakages over a period of 7 years (2004-05 to 2011-12) as compared to their counterpart states however, the leakages continue to be unacceptably high.

The availability of SMS alerts and biometric devices were essential for the digitalized reform to work efficiently. However, studies indicate that the absence of the infrastructure continues to be a major stumbling block in smooth functioning of revamped TPDS thereby hampering food and nutrition security. Another initiative towards better FNS, was by the Ministry of Petroleum and Natural Gas who launched the scheme, Pradhan Mantri Ujjwala Yojana with the aim to supply Liquefied Petroleum Gas (LPG) Cylinders to people belonging to Antyodaya Anna Yojana (AAY) and BPL families, to ensure food safety at household level. Besides LPG is a sustainable and efficient fuel^[3]. WHO (2018) estimates around 3 billion people used polluting open fires or stoves (fired by kerosene, coal, charcoal, animal dung) and close to 4 million people died prematurely from illnesses attributable to air pollution from inefficient cooking practices^[4].

Thus the present study was undertaken to evaluate the challenges faced by the service provider (FPS owner) in the implementation of revamped TPDS and the difficulties faced by the beneficiaries in availing and utilising the services from TPDS.

MATERIALS AND METHODS

A cross sectional study was undertaken using the stratified random sampling method. The study location was slums of Vadodara city Gujarat, India. The data collection was carried out from 2017 November-2018 January in Vadodara, Gujarat, India. The study was approved by the institutional review board of the Department of Foods and Nutrition, Faculty of Family and Community Sciences, The Maharaja Sayajirao University of Baroda. The ethical approval number of the study is IECHR/2017/13 dated 10/11 2017. Vadodara Municipal corporation records were referred to for sample size calculation. Total slum households were 61,780 with a total population of 30,000^[5]. The sample size calculation was done using the prevalence of Food insecurity in urban India

(77.2%) using an online sample size calculation tool - www.raosoft.com. The calculated sample size was 245 households (at a CI of 95%, 5% error, and attrition rate of 10%). Households with at least one adult male and female (18-64 years) were selected for the study. Each selected household was approached twice for data collection. Out of the 245 households 245 female and 212 male members could be included in the study as the remaining male members were unavailable during both the visits. Sixteen FPS catering to the subjects were also included in the study. A Semi-structured pretested questionnaire in the regional language (Gujarati) was used for collecting data from study households. Data were collected by interviewing the adult members from 245 households on Socio-Demographic profile, Individual Dietary Diversity Score (IDD) and Nutritional Status (Anthropometry). Food and Nutrition Security (FNS) in the households was assessed using Percent Expenditure on food, IDD score, Nutritional Status and utilisation of TPDS. Functioning of 16 Fair Price Shops (FPS) catering to the study population was evaluated using a pretested questionnaire and observation method.

RESULTS

Functioning of FPS-Vendor and Beneficiary Perspective

Questionnaire was used to assess the responses of the enrolled households (N = 245) for the functioning of Fair Price shops and the responses of Fair Price Shop vendors were also recorded to gain an insight into the working system and the availability of commodities under the program.

It was reported that majority (68%) of the households and FPS vendors (75%) were receiving subsidized grains by the first week of the month while 25% of TPDS vendors received grains in advance. The Food Corporation of India (FCI) procures and stocks food grains which are released to FPS every month for distribution through the TPDS.

The functioning of the FPS during the stipulated working hours was assessed through visits at random to the 16 selected FPS thrice during the entire study period. It was observed that more than half of the FPS were not working in the morning (56%) or/and evening (69%) thus jeopardising accessibility to the FPS (refer Table 1).

Findings from the present study endorse the report by Karnataka State Food Commission on FPS not being functional through the stipulated working hours^[6]. In a study conducted in the Sundargarh district of Orissa 20% of the households were not sure of the opening of TPDS outlets^[7]. The findings from present study too indicate that the FPS did not operate fully during the stipulated working hours.

I. Availability of Subsidized Grains	Responses by Beneficiaries	Responses by TPDS Owner
	N = 166	N= 16
	Frequency (%)	Frequency (%)
First Week	113 (68)	12 (75)
Second Week	53 (32)	0
Third Week	0	0
Advance	0	4 (25)
II. Working Hours of TPDS (By Observation)		
a. Morning Hours (9 am to 12 pm)	N = 16	
YES	7 (44)	
NO	9 (56)	
b. Evening Hours (3 pm-7 pm)		
YES	5 (31)	
NO	9 (69)	

Physical Accessibility to FPS

Attempts were made to look at the areas that were affecting the effectiveness of PDS, thus, physical accessibility was considered as the area of concern as it ensures that food is within the reach of the beneficiaries, for whom the programs and policies have been implemented. Thus it was important to study how far were the FPS from the households of the beneficiaries (refer Table 2).

It was observed that 87% of the households walked down to the TPDS outlet, as they were located within a distance of 0-2 kms (45%) to 3-5 kms (49%). People who had to travel more than 5km were those who had shifted homes and the formalities for change in residence were pending.

In a study conducted in Mudulipada district, it was observed

How Do HHs Travel to TPDS N = 166	Frequency (%)
Walking	144 (87)
Vehicle	22 (13)
The Distance of PDS Outlet	
0-2 km	65 (45)
3-5 km	70 (49)
More than 6 km	9 (6)

that 67% had to walk more than 4kms to reach TPDS as the road facilities were poor in the difficult hilly terrain^[8]. Another study conducted in Sundargarh district of Orissa found that 68% of APL and 70% of BPL families had to walk a distance of 2 kms to TPDS outlet, 14% BPL and 18% APL respondents had to cover 2 kms to 5 kms of distance and around 10% of APL and BPL families had to cover 5 kms to 7 kms of distance^[8]. Under the NFSA 2013 Government has given the beneficiary freedom to buy subsidized grains from any TPDS that is closest to their residence, which will further reduce the time and distances that they have to walk to TPDS to fetch their entitlements. Thus, persistent efforts are being made towards improving FNS through improved systems, however gaps do exist at implementation level.

Factors Affecting Utilisation of TPDS by the Beneficiaries

Various gaps reported in the functioning of the TPDS in the past have been related to targeting of beneficiaries for the allotment of ration cards and distribution of ration, followed by, leakages, diversion of grains to open market, charging high prices for the commodities, etc. Attempt was made to collect information on the above aspects from the beneficiaries (refer Table 3).

Eighty two percent of the study households reported that the quality of grains supplied through FPS was not acceptable due to the presence of straw, chaff and pebbles. Forty percent of the households reported non-availability of grains at the

Factors	N = 52(%)
Closed during official working hours	13 (25)
Poor quality of commodities	43 (82)
Non-availability of commodities	21 (40)

FPS during the first visit due to which frequent visits had to be undertaken by the subjects. Twenty five percent of households complained about non-functioning of TPDS during official working hours. In the observation conducted by researcher it was found that nearly 44% of the FPS were not working during the stipulated working hours either in the morning and/or in the evening. Results from a survey conducted in selected states across the country, indicate that the consumers were not satisfied with the quality of the grains supplied through TPDS. The dough from the wheat flour was dark and rice were little sticky on cooking that was a major deterrent to their utilisation. Sugar was not available on regular basis to the people through the FPS^[9]. Study conducted in Sangrur district of Punjab on 100 respondents, showed that 48% of the respondents were satisfied with the quality of commodities supplied through FPS, 28% were satisfied on an average level, 22% dissatisfied and 1% were highly dissatisfied. Respondents complained about the entitlement issues with 55% of the respondents from urban and 55% from rural area stating that they were not getting the full quota of their entitlements from FPS. Subjects also felt their poor health was a consequence of poor quality grains that they consumed from FPS^[10].

Observations on Functioning of FPS

Observational checklist were used for recording the functioning of the FPS and verify the same with the responses from the beneficiaries (refer Table 4).

All the grains were found to be adulterated with straw and chaff. Grains were available throughout the month in 75% of the FPS. Twenty five percent of the FPS lacked adequate grain storing facilities either in terms of insufficient space or containers. Twenty five percent of TPDS owners were not selling grains at the stipulated rate fixed by the government. It was observed that under-weighting was a common malpractice. Majority (88%) of the TPDS owners were practicing under-weighting of grains, in order to divert the grains to open market that fetch substantial financial gains ^[11]. Results from a study conducted in 398 villages and 24 towns from 6 states of India revealed that non-availability of commodities on time, poor quality of grains, under-weighting and the FPS charging higher price than that stipulated by the government were the major deterrents

Results of Observation	
I. Adulteration of Grains	
Yes	16 (100)
No	0
II. Availability of ration throughout the month	
Yes	12 (75)
No	9 (25)
III. Proper storage of leftover grains	
Yes	4 (25)
No	12 (75)
IV. Prices of grains as per the Government policy	
Yes	12 (75)
No	4 (25)
V. Under weighing	
Yes	2 (12)
No	14 (88)
Note: *Proper = Correct storing measures were being adopted by TPDS owners, where grains were protected by rodents, ectognatha, wind or moisture.	

towards utilisation of TPDS by the consumers^[9, 12]. The malpractices and leakages in the system thwart the accessibility and utilisation of safety net programs thus leading to food and nutrition insecurity.

Technology-Based Reforms in TPDS Implemented in Various FPS

Technology-based reforms in TPDS implemented in various FPS in selected shops. TPDS has under gone various reforms since its introduction, the most recent being introduction of bar-coded ration card. However, these reforms can be implemented effectively only if the supporting infrastructure is available. (refer Table 5).

Facilities in TPDS	N = 16
E-gram facility	0
SMS alert facility	0
Availability of fingerprint machines	7 (43%)
Maintaining stock inventory using laptop	7 (43%)

Random observational checks by the researcher revealed that E-gram Facility and SMS alert facilities were not functional in 100% of the FPS. Other facilities like availability of fingerprint machines and laptop to keep the records were present in 7 FPS shops out of 16. Biometric system was launched in TPDS due to pilferages; it was introduced to ensure that unauthorized persons do not get food grains that are meant for ration card holders. *Fair Price Shops* (FPSs) are now digitalized using electronic Point of Sale (PoS) machines^[13]. The PDS dealers are *no* longer required to maintain records of sales and stock, as the PoS machines electronically maintain these. However, there were few missing records as certain individuals like mine workers, construction site workers could not be traced to obtain the finger prints. In order to overcome the issue inspectors at the FPS outlets were appointed to maintain the record. In some states despite the presence of biometric machines, the record was not maintained due to ineffectiveness of the monitoring system^[14]. The new system has not addressed issues related to complaints of underselling, overcharging and quality of grains.

Ujjwala Yojana and FNS

The recently launched Pradhan Mantri (Prime Minister) Ujjwala Yojanascheme of the Ministry of Petroleum & Natural Gas provides free LPG connections to BPL households in India^[15]. The scheme is aimed at replacing the unclean cooking fuels mostly used in the rural India with the clean and more efficient LPG thus contributing towards improved Food and Nutritional Security. The presence of Gas connection in the households will allow families to cook food more than one time in a day and will also provide them with the facility to heat the precooked food, thus enhancing food safety and preventing food wastage and subsequently better food and nutrition security (refer Table 6).

Out of 89 households there were 18 APL card holders and 23 BPL card holders procuring LPG under Ujjwala Yojana, while 75% of BPL card holders were using either Kerosene or had bought LPGs from other sources at high prices (INR 700).

Cylinders Under Ujjwala Yojana	Frequency (%)
APL HHs procuring LPG	18 (44)
BPL HHs procuring LPG	23 (56)
Total	41
Families Procuring Kerosene from TPDS	
BPL card holders (89)	58 (65%)
APL card holders (135)	0

Kerosene which is the major component of TPDS, was procured by 65% of BPL card holders who out of which 80% of the families did not find it sufficient to cook two square meals for a month.

Individual Dietary Diversity of the Study Population

The IDD scores of households utilizing TPDS was significantly higher than those not utilising the same. The findings indicate that TPDS has contributed towards improving the food and nutrition security in the study population. An improved dietary diversity in populations utilising TPDS can be attributed to diversification of money saved from buying grains at subsidized rates towards purchase

Indicators	Mean IDD Scores	T-test Value
		P value (<0.05)
I. IDD Scores According to Gender		
IDD score of Male	3.7	
IDD score of Female	3.9	
II. IDD Scores of food habits of the study population		
IDD score of Vegetarians	3.7	0.000*
IDD score of Non-vegetarians	4.3	
III. IDD scores of people Utilizing of Subsidized grains from TPDS		
Utilize TPDS	4.1	0.03*
Do not utilize TPDS	3.4	
IV. Nutritional status and IDD Scores of the study population (F-test)		
Underweight	3.9	0.860 ^{NS}
Normal	3.8	
Overweight	3.9	
V. Income Quartiles (INR) and IDD scores of the study population		
333-1166	3.4	0.73 ^{NS}
1167-1800	3.4	
1801-2500	3.8	0.00*
2501-17500	4.4	
Note: Significant at *P= <0.05, NS= Non Significant.		

of foods from other food groups. It was observed that during breakfast the common food items that were consumed were biscuits, tea, breads (cereals) whereas for lunch and dinner the diet mainly consisted of Wheat chapatti and rice (Cereals) Brinjal and potato as vegetable and daal (legumes). The most common missing food groups were milk and milk products, fruits and green leafy vegetables. The mean IDD scores of subjects from normal, underweight and overweight category did not vary significantly. Mean IDD scores of subjects from lowest income quartiles (INR 333-1166 and INR (1167-1800) did not vary significantly whereas, a significant difference between mean scores of subjects from upper income quartiles (INR 1800-2500 and INR 2501-17500) was observed indicating an improvement in dietary diversity with increase in per capita income. Mitra *et al.* (2019) have reported low per capita expenditure (< INR 650/month) and irregular utilisation of TPDS as major factors influencing food and nutrition security in households from West Bengal^[6]. In a study from Eastern India households with higher per capita expenditure had higher dietary diversity scores. Households that were self-reliant in cereals and those with good non-farm income did not utilise the TPDS. Households headed by educated males were more food secure than their counterparts^[7] (Refer Table 7).

CONCLUSION

The TPDS with its countrywide reach is the answer to the problem of Food Security. Provisions under TPDS help in plugging the food deficit and makes way for incorporating nutrient rich foods in the diet for the target population. The TPDS is thus contributing towards improved dietary diversity and thereby nutrition security in the target population. There is a need to address the gaps in the system through provision of adequate infrastructure and generate awareness amongst the intended beneficiaries for better outcome.

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