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Food Security and Food Safety during Lockdown 2.0 in East Delhi-India

Research Article

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Abstract

Context: COVID 19 has brought with it the wrath of disrupted production, processing and distribution of food along with economic fall outs. This has increased the risk of food insecurity especially among the vulnerable. Data is required at national and community level to chalk out plan of action to curb the ill-effects of this pandemic.

Aims: To assess the impact of COVID 19 during lockdown 2.0 on the food security and safety (practices) as well as community preparedness.

Settings and Design: The e-survey was carried out during April-May 2020 with the help of volunteers from National Service Scheme by using a questionnaire developed, designed and pre-tested for the study.

Methods and Material: Out of 746 responses, 363 were sifted and analysed on the basis of inclusion exclusion criteria.

Statistical analysis used: Spreadsheet program (Microsoft Excel) was used for quantitative analysis of data.

Results: 49.6% worried about enough food at household level and an equal number were uncertain about food availability. 53.7% had curtailed diet diversity. 34.2% and 10.1% experienced mild and moderate food insecurity. Only 59.2% were able to maintain social distancing though 86.2% wore mask. Mean score of WASH and food safety practices was 0.70+0.39.

Conclusions: Food insecurity was prevalent among households of East Delhi. Data indicates moderate community preparedness. Lack of awareness and infrastructure could be reason for several respondents not being able to maintain social (physical) distancing..

Keywords: Food Security; Food Safety; lockdown; Covid-19

Key Messages: 44.3% were experiencing mild/moderate food insecurity. Mandatory precautionary measures such as washing hands and wearing mask were being practiced by majority. Social distancing got compromised during essential activities outside home. Greater awareness generation of masses is necessary. Hand holding of families experiencing mild/moderate food insecurity is need of the hour.

Introduction

Food security and food safety have witnessed several challenges since the evolution of mankind. Nearly 2 billion people across the globe still do not have access to safe, nutritious and sufficient amount of food [1]. While the world was tirelessly working towards achieving the sustainable development goals including the zero hunger challenge it was slammed with a deadly biological hazard in the name of novel corona virus (2019-nCoV) in 2019 [2]. Data indicates that the mortality rate in India has so far remained proportionately lower as compared to that in other regions of the world such as United States and Europe. Trends as per WHO situation report are summarized in Table 1 [3-7]. It is expected that the number of people suffering from acute hunger would nearly double to reach 265 million in the world due to COVID 19 [8-9].

Table 1: Trends of mortality as per World Health Organization

Data Reported	Cumulative deaths (in numbers)				
Data Reporteu	USA	Europe	India		
20-01-2020	0	0	0		
23-03-2020	402	10800	9		
13-04-2020	20444	82900	308		
25-05-2020	96909	173100	4021		
15-06-2020	115112	187600	9520		
27-07-2020	145727	205700	32771		
17-08-2020	168345	214500	50921		
28-09-2020	203329	236000	95542		
19-10-2020	217659	257400	114610		
15-11-2020	242542	341488	129635		
27-12-2021	328014	554716	147622		
24-01-2021	410667	706293	153339		
21-02-2021	491894	838761	156302		
21-03-2021	536008	929332	159755		

In conformity to the Disaster Management Act [10] and strategic preparedness, the country had to go for nationwide lockdown viz., 1.0, 2.0, 3.0 and 4.0. This decision was taken in view of the fact that the respiratory disease spreads through saliva and nasal discharge of active patients; nearly 78-85% of the transmission is at household level or in clusters and nearly 80% cases are asymptomatic [11,12]. India having the second largest population, and nearly 29.4% living in slums [13], with compromised health system, decision of nationwide lockdown was inevitable to curb community spread [14-18].

Subsequent to the lockdown, the food system of India faced several challenges. With a population of 1.3 billion people, Global Hunger Index (GHI) rank of 94 and GHI score of 27.2; 190.7 million already malnourished and 30.3% hungry [19-21]; feeding the masses and maintaining their nutritional status was a mammoth task during lockdown. This period coincided with the peak harvest time of several crops such as wheat, rice, barley, fruits and vegetables. Mass reverse migration, shortage of labour, transportation problems led to disruption in the harvest/post-harvest/food processing activities [22]. According to the Centre for Monitoring Indian Economy [23], the unemployment rate witnessed a sharp rise from 8.4% in mid-march to 23.5% in April 2020; being 30.9% in urban India as on 5th April 2020. Thus, ignorance, poverty, lack of resources and large population were a challenge to the food security and food safety of the masses [24,25].

Lockdown touched the lives of every individual physically, socially, emotionally and spiritually. Since, the masses were unaware of the future lockdowns, food insecurity may have trickled at household level. Thus, an attempt was made to:

- understand the impact of lockdown on the availability, accessibility and affordability of food
- know the psychological and social interactions of the community with regard to food during lockdown 2.0
- know the food safety practices adopted at household level in view of COVID-19 pandemic
- identify key areas of concern for supporting the community

Materials and Methods

Selection and Description of Participants:

a. Selection of the participants

The participants for the study were randomly enrolled through e-platforms such as email and social media. The locus of the diverse spectrum of respondents included families of students and community members associated with the volunteers of the National Service Scheme Committee of the college.

b. Eligibility criteria

Families residing in East Delhi, informed e-consent and accessibility through phone, responses received before 14th April 2020 and after 03rd May 2020

c. Exclusion criteria

Families residing outside East Delhi, not having phone, no informed consent.

d. Description of the source population:

Head of the family/family member managing day-to-day household expenses/ care-giver looking after the food related needs of the family/ adults living alone and taking care of their food needs.

Technical information:

Methods

It was a cross-sectional study. The study was carried out in ten steps (Figure 1).

Step-1: The study was planned on the basis of extensive review of literature. In addition to the review of literature, recent changes in the policies and programmes especially in context to Disaster Management Act and food supply chain at National and International level were studied in depth. The challenges associated with biological disasters at different levels; household/family level as well as at the National/International levels were studied.



Step-2: The tools, techniques and availability of various resources that could be utilized to undertake a study during lock down situation were carefully identified.

Step-3: Sample size for pre-test and for the survey was computed. The sample size for pre-test was 45 so as to achieve a power of 90% for detection of errors/problems; prevalence of problem 0.05 [26]. Sample size for the survey was computed by using the Fischer's formula and random sampling technique, at 90% confidence level. A minimum of 271 responses were required to be obtained.

Step 4: A structured questionnaire was developed and designed. The questionnaire was divided into three parts. The first part aimed to gather information on the socio-demographic profile, the second part on the food security issues (availability, accessibility, eating pattern, psychological and economic aspects) and the third part was related to the food safety practices adopted at household level. The questionnaire was subjected to peer-review and converted to a suitable dynamic e-form that could be easily circulated and used by respondents to enter the responses.

Step 5: The data collection team was formed and trained. It comprised of ten students; three from the Research and Innovation Club and seven from the NSS team of college belonging to various disciplines of study such as foods and nutrition, political science, history, sanskrit. Three students had also successfully completed the course "COVID 19: Operational Planning Guidelines and COVID-19 Partners Platform to Support Country Preparedness and Response". They were provided online training to assist them to collect data over non-android phones from subjects not having access to android phone and circulation of forms over social media platforms.

Step 6: Based on the results of the pre-test (64), minor changes were made in the online form developed and designed to gather data. It was subjected to peer-review once again.

Step 7: Online recapitulation session was organized with the data collection team. The finalized online form (questionnaire) was discussed in detail. Hand-holding was done by investigators of the study.

Step 8: The online or dynamic e-form link was circulated by email and social media platforms. Data/responses were collected during the period when lockdown 2.0 was imposed in Delhi. Case studies were also noted by NSS volunteers in case of some respondents who were contacted telephonically (non-android phone users).

Step 9: Data were automatically entered in excel sheet. The data were suitable analysed.

Step 10: The analysed data and case studies were used for preparing the research paper and would be used for academic purposes during teaching the students.

Results

A total of 746 responses were recorded during this online survey. On the basis of pin-codes and name of colony as provided by the Postal Department of India the responses obtained from East Delhi were sieved for further analysis. Thus, a total of 363 responses were received from East Delhi. 10% of the recorded responses (selected randomly) were verified to ensure authenticity of the data.

Part I: Socio demographic profile

The modified Kuppuswamy classification of socio economic status based on three parameters of education, occupation and total monthly per capita family income was used to compute the socioeconomic score [27]. 1/3rd (33.1%) of the respondents belonged to low economic status (32.0% upper lower group and 1.1% lower) while 25.1% were from lower middle, 30.6% from upper middle class and 11.3% belonged to upper class. Majority (44.9%) of households were having family size of 4-6 members. 33.1%households had less than four family members while 22.0% had large families (more than 6 members). 17.6% of the households had pets/ live stocks.

Part II: Anxiety towards the lockdown 2.0

About 49.6% of participants were worried about not having enough food during the lockdown 2.0 period.

Figure 2 indicates the psychosocial/emotional association of respondents with food. Since food is a primary necessity for life and also due to social distancing, limited transportation/communications and work from home, food became the pivotal point of several emotions during the lockdown period. According to 27.8% respondents, food became a source of uneasiness and discomfort. A few telephonic conversations indicated that the primary reason of discomfort was lack of availability of resources; monetary or food itself. Food was used by 71.9% households to enjoy, relax and share happy moments with each other during the stressful period of pandemic.

Part III: Food Insecurity

The survey tried to assess the constraints (if any) experienced by individuals/households in having access to adequate amount of food. The data are given in Table 2. 49.5% of the respondents were uncertain about the availability of food for themselves and their families due to the lockdown. Dietary diversity got curtailed in 53.7% cases as there was reduced variety of foods at their disposal. Food choices changed as 40.2% respondents reported to have consumed foods usually not liked/preferred by them. Such modifications in food consumption pattern can contribute to emotional changes/stress related behaviour and also alter the amount of food consumed thereby resulting in changes in the nutritional status.21.5% respondents informed that they and their family members ate fewer or smaller meals due to non-availability of food while 13.8% of the households reported that there were situations when there was no food to eat. Thus, these families were suffering from severe food insecurity. Thus, based on the classification of food insecurity given by FAO/WHO, 70.7% (257) households were experiencing moderate food insecurity while 13.8%



Food Insecurity Questions	Yes	Often	Sometimes	Occasionally	Rarely	No response		
	Worried not have enough food							
	180 (49.5%)	31 (17.2%)	51 (28.3%)	57 (31.7%)	34 (18.9%)	7 (3.9%)		
Moderate Food Insecurity	Self or any household member not able to eat the kinds of foods usually preferred to have because of lack of resources?							
	175 (48.2%)	16 (9.1%)	58 (33.1%)	59 (33.7%)	31 (17.7%)	11 (6.3%)		
	Did you or any household member have to eat a limited variety of foods due to lack of resources?							
	195 (53.7%)	17 (8.7%)	61 (31.3%)	84 (43.1%)	26 (13.3%)	7 (3.6%)		
	Did you or any household member have to eat some foods that you really did not want to eat because of lack of resources to obtain other types of food?							
\checkmark	146 (40.2%)	14 (9.6%)	51 (34.9%)	55 (37.7%)	24 (16.4%)	2 (1.4%)		
	Did you or any household member have to eat a smaller/ fewer meals than you felt you needed because there was not enough food?							
Severe Food Insecurity	78 (21.5%)	8 (10.3%)	29 (37.2%)	28 (35.9%)	8 (10.3%)	5 (6.4%)		
	Was there ever a situation of no food to eat of any kind in your household?							
	50 (13.8%)	7 (14.0%)	23 (46.0%)	11 (22.0%)	7 (14.0%)	2 (4.0%)		

(50) were suffering from severe food insecurity. Nearly 84.0% of the households experiencing severe food insecurity had more than four family members. 62% (31/50) of the households suffering from severe food insecurity belonged to lower/upper-lower income group.

We further analysed the data of respondents suffering from moderate food insecurity. Since several respondents answered 'yes' for more than one question related to non-availability/accessibility of food we gave a score of "1" for each "Yes" for first six questions/ parameters mentioned in Table 2. The analysis indicated that 17.1% of the respondents scored only 'one out of six' score and an equal number received score of 'two out of six'. Such families can be considered to be suffering from mild food insecurity. Nearly 10.1% of the respondents suffering from moderate food insecurity received score of 'six out of six'. Among the respondents suffering from moderate food insecurity, 38.6% belonged to lower/upper lower income group. These households could be at a high risk of experiencing severe food insecurity in future if the lockdown/ pandemic continues for a longer period. Details of the score are given in Table 3.

Food is primarily cooked by using piped natural gas or liquefied petroleum gas in India especially Delhi (India being the second largest consumer of LPG in the world). LPG (in cylinders) is used by majority of lower income households [28]. It was therefore important to know whether the supply of fuel for cooking food got affected during the lock down. Data of our survey indicated that majority; 90.8% (327) had access to fuel for cooking food.

Part IV Diet Diversity

As discussed above (part III) 53.7% households ate limited variety of foods during the lock down 2.0. Data were gathered regarding the non-availability (if any) of food items (food groups) by using an

Table 3: Moderate food insecurity score.

Moderate Food Insecurity Score (Maximum Score =6) N=257						
Score: 1/6	Score: 2/6	Score: 3/6	Score: 4/6	Score: 5/6	Score: 6/6	
44 (17.1%)	41(15.9%)	70 (27.2%)	49 (19.1%)	27 (10.5%)	26 (10.1%)	

open ended question. 354 responses were obtained. All foods usually consumed in daily diets were available in 68.3% (247) households. 29.5%(107) of the respondents reported that all food items which they usually consumed in daily diets were not currently available in their households. Majority (57.0%, 61) of these households belonged to lower income group. These 107 responses were further analysed by using the eight food group classification. The results indicated that staple cereals which are the primary source of energy in Indian diets were missing in 30.8% (33) households of which 30.3% (10) and 66.6% (22) belonged to households experiencing severe and moderate food insecurity respectively. Pulses were not available in 27.1% (29) households of which 41.3% (12)and 55.1% (16) belonged to households experiencing severe and moderate food insecurity respectively. Fats/oils were not available in 7.5% (8) households (Table 4).

Part V: Precautionary measures - WASH Practices and Behaviour modification

Several studies are indicating that SARS-CoV-2 RNA is found in waste water contaminated with upper gastro intestinal and upper respiratory system several days before the detection of COVID 19 through clinical surveillance [29]. India being a developing country has compromised environmental and social sanitation, in resource stricken segments of the population [30]. Compromised social and environment sanitation by food handlers could increase the risk of transmitting Covid-19 virus. Data were therefore gathered regarding the precautionary measures being taken by the community regarding WASH practices. This would help in knowing the level of community preparedness.

Data indicates that 82.6% of the participants had access to tap/ supply water as a source of drinking water and 76.6% of the participants were purifying the water. As a precautionary measure, 15.7% of the participants had modified (improved) the method of purifying water and 7.7% reported that the source of water had been changed.78.2% of participants used tap/ supply water to wash vegetables/ fruits as

Food Items Consumed Regularly NOT Available at Home						
Food Group Not Available	Total N (%)	Lower	Upper lower	Lower middle	upper middle	upper class
Cereals	35 (30.8%)	3 (9.7%)	21 (67.7%)	6 (19.4%)	4 (12.9%)	1 (3.2%)
Pulses	29 (27.1%)	1 (3.4%)	9 (31.0%)	11 (37.9%)	5 (17.2%)	3 (10.3%)
Vegetables	30 (27.1%)	1 (3.4%)	9 (31.0%)	12 (41.4%)	5 (17.2%)	3 (10.3%)
Oils	8 (7.5%)	0	7(87.5%)	0	1 (12.5%)	0
Milk and milk products	30 (27.1%)	0	19 (63.3%)	4 (13.3%)	4 (13.3%)	3 (10.0%)
Fruits	73 (68.2%)	2 (2.7%)	43 (58.9%)	20(27.4%)	5(6.8%)	3(4.1%)

Table 4: Non-availability of food items during Lockdown 2.0 (N=107).

Table 5: Adoption of Good Practices (N=363).

Food Safety Parameters	Mean ±SD
Did you wash or clean cartons/ packets of the food from outside after purchasing?	0.75±0.43
Did you wash bags every time/ discarded the bags after shopping groceries?	0.88±0.32
Did you wear mask while purchasing groceries?	0.86±0.35
While purchasing groceries how much distance were you able to maintain with other shoppers/ shopkeeper?	0.59±0.49
Did the concerned family member wash hands after coming back from grocery purchase?	0.97±0.16
Did the concerned family member wash footwear after coming back from grocery purchase?	0.67±0.47
Did you wash fruits and vegetable before storing/ chopping?	0.63±0.48
Did you wear mask while cooking/ serving food?	0.22±0.42
Mean Score	0.70±0.39

their usual practice while 15.7% used water purified by using reverse osmosis system. Only 3% used hand pump and 3.3% did not wash fruits and vegetables. 44.9 % of them had changed their practices of washing vegetables/fruits during this pandemic period as result during the lockdown 2.0, 75.2% of all was them always, 17.6% washed them occasionally and remaining did not wash fruits and vegetables. Data were also gathered regarding the practices adopted by the community regarding storing of fresh/raw produce. 62.5% washed vegetables/ fruits before storing them in refrigerator. Compromised practice such as storing unwashed raw food was practiced by 37.5% respondents. Data indicated that 75.2% participants always washed cartons/ packets purchased, 17.6% washed them occasionally while remaining participant did not wash.

Refrigerator was available in majority i.e. 91.1% households out of which 69.7% households had cleaned it in the past 15 days. Majority (48.3%) used soap and water for cleaning, while 20.0%, 13.5%, 4.8% and 3.0% used some readymade solutions, disinfectant, soda and water, sanitizers respectively. 24.2% of participants reported to have made changes in the choice of utensils for preparation and serving. 81.3% used stainless steel utensil for preparation and eating, 10.5% used disposables while few of them used melamine/glass.

In accordance to the WHO recommendations on precautionary measures for maintaining social distancing, 59.2% reported to have been able to maintain social distance and 86.2% participants wore mask while moving out from house (Figure 3). Data indicated that 22.0% wore mask while preparing and or serving food at home also. While 97.2% participants washed hands after coming back home, 66.7% washed their foot wares also. Maximum (68%) number of the participants washed hands with soap and water before handling food. 27.5% participants reportedly discarded the shopping bags after every use, 28.9% kept the bag aside for few hours, 32.0% washed bags after single/every use while remaining 11.6% had compromised practices.





82.6% made cash payments, 3.9% credit/ debit cards, 11.8% online while only 1.7% purchased groceries on credit.

We gave a score of one for each good practice adopted by each respondent. The results are summarized in Table 5. The mean score indicates that community preparedness was fairly good to protect themselves from Covid-19 virus.

Part VI: Community Support

During natural disasters/pandemics both government and community are stakeholders to social responsibility. Hand holding by the community was observed during the study as nearly 49.9% of the households reportedly provided monetary/food related support to the resource stricken community members (Figure 4). In the lower/ upper-lower income group, 47.5% and in the upper-middle income group, 26.3% of the respondents informed that they had received some kind of monetary/food related support from the community/ government.

Discussion and Conclusion

India has witnessed 11,787,534 confirmed cases and 160,692 deaths as on 24th March 2021; the numbers being lowest in December 2020 peaked in September 2020 and are once again rising in March 2021 after a hiatus. While the country has administered more than five crore vaccine doses, its health sector has to race against time. According to the estimate of the United Nations World Food programme (2020), 265 million people could face acute food insecurity by the end of 2020; up from 135 million people before the crisis. According to this study, the social protection programmes and the community hand-holding have been able to face the challenges of food insecurity which arose as an outcome of covid-19 pandemic during the emergent and sudden lockdown. However, surveillance on the status of food security should be done on a continuous basis especially during the unlock phases (when the economic meltdown would be most vivid) to avoid another pandemic, the pandemic of under nutrition in times to come.

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