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Research Article

Changes in the household expenditure basket in India during COVID-19

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Contents

1	Introduction	406
2	COVID-19 in India: Policy context	408
3	Hypotheses	410
4	Data: Delhi Metropolitan Area Study	412
5	Analytical strategy	412
5.1	Alternate measures of food expenditure	413
5.2	Changes in overall expenditure	414
5.3	Change in the food basket	416
6	Descriptive statistics	416
7	Multivariate results	420
7.1	While consumption declined, food expenditure did not	421
7.2	Food subsidies played an important role in protecting eligible households	422
7.3	Subsidized grains associated with greater dietary diversity	425
8	Robustness checks	427
9	Discussion	428
10	Acknowledgement	430
	References	431
	Appendix	436

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Pallavi Choudhuri¹

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Abstract

BACKGROUND

The COVID-19 pandemic wreaked havoc across countries, causing an unprecedented healthcare crisis and supply chain disruptions. Our paper focuses on how households coped and the role of expanded Indian government food subsidies in mitigating food insecurity.

OBJECTIVE

We use panel data from two rounds of household surveys (2019 and 2021) to examine changes in per capita household expenditure and how these differed across occupation and income groups. We also discuss the role of in-kind assistance, extended during the pandemic, in smoothing food consumption.

METHODS

We use fixed effects panel regression to estimate changes in per capita expenditure on various items in the household budget before and after the onset of the pandemic. We also estimate shifts in the composition of the household food basket between the two time periods.

RESULTS

In the survey area, both per capita incomes and per capita household expenditure decreased, but the expenditure decrease was largely concentrated in discretionary items, leaving food consumption unchanged. The government policy of distributing practically free cereals, combined with household emphasis on protecting food expenditure, helped avert a substantial decline in food consumption and even led to a slight increase in dietary diversity.

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CONCLUSIONS

The pre-existing social safety net in the form of a food distribution program helped cushion the impact of the pandemic-related income decline.

CONTRIBUTION

Our examination of India's expanded free food program during the pandemic contributes to the literature on the role of in-kind assistance during catastrophic emergencies.

1. Introduction

As the COVID-19 pandemic fades from memory, it is important to draw lessons from our experiences for future emergencies. The pandemic affected health outcomes around the world both directly through infection-related morbidity and indirectly through the economic hardships imposed to prevent the spread of the infection. While many governments tried to mitigate the impact of this economic hardship, it is important to evaluate the success and failure of these policies, a topic we seek to explore with panel data from India.

Efforts to contain the spread of the COVID-19 pandemic by restricting mobility led to severe economic distress in many parts of the world, including India. India instituted one of the world's most severe nationwide lockdowns from March to June 2020. This was followed by several subsequent lockdown and unlocking phases through the first and second waves of infection in 2020 and 2021. In the wake of supply chain disruption (Mahajan and Tomar 2021),³ along with economic hardship (Kesar et al. 2021; Choudhuri, Pramanik, and Desai 2023) triggered by the lockdown, policies were implemented to ensure food security through the public distribution of grain. In this paper, we examine changes in how households sought to absorb income shocks during the pandemic by modifying their household expenditure, and explore broader implications for the role of public policy in providing relief in the face of catastrophic exogenous shocks.

Households in both developed and developing countries tend to adopt a range of coping mechanisms to smooth their household expenditure when faced with idiosyncratic shocks to their income (Cochrane 1991; Morduch 1995; Dercon 2002). Conventional mechanisms adopted by households to smooth household expenditure, such as informal risk sharing (Townsend 1994; Udry 1994; Chiappori et al. 2014), sale of assets (Deaton

³ Using data from a large online retailer, Mahajan and Tomar (2021) find evidence of a 10% drop in the availability of food products such as vegetables, fruits, and edible oils, and a 20% decline in quantity arrivals from the farm-gate side, triggered primarily by supply chain disruptions.

1991), and increasing labor supply or borrowing (Maitra 2001; Cameron and Worswick 2003) may not work in the event of dramatic external events that are shared by the whole community (McKenzie 2003). Examining the Mexican Peso crisis, McKenzie (2003, 2006) found that in response to the economy-wide crisis, households devoted much of their income to buying food, curtailing expenditure on durable goods and health. Similar trends have also been documented during other crises (Thomas and Frankenberg 2007; Stillman and Thomas 2008). COVID-19, however, was unique in that it was a combination of several shocks: loss of income, rising prices, and exposure to disease. It is important to understand how households cope with these diverse calamities, particularly regarding food consumption – a gap we seek to fill.

Household distress during the pandemic was not limited to India. Multiple studies have documented increased economic distress across both developing (Hirvonen, De Brauw, and Abate 2021; Mahmud and Riley 2021; Amare et al. 2021; Josephson, Kilic, and Michler 2021; Egger et al. 2021; Kim, Koh, and Zhang 2022) and developed countries (Zhang and Kolady 2022).

Some studies have found evidence that loss of income leads to food scarcity (Zhang and Kolady 2022). However, others have noted the absence of a one-to-one correspondence between income and declining expenditure. Despite a large fall in income in rural Liberia and Malawi, Aggarwal et al. (2020) found no evidence of food insecurity. On the contrary, the authors found that cash transfers extended during the pandemic improved dietary quality above the baseline levels. Similarly, Hirvonen, De Brauw, and Abate (2021) found that household dietary diversity and food consumption remained fairly stable during the pandemic in Addis Ababa, Ethiopia, despite reports of job loss and income decline. Hence, as we evaluate the impact of the COVID-19 pandemic on households it is important to carefully examine the interaction between changes in income and the nature of government response, and to use these observations to build evidence for future social assistance programs.

In addition to pandemic-specific results, our paper also adds to the growing literature in three areas: (1) the welfare-enhancing effects of social protection programs on household expenditure and their effect on poverty reduction (Niño-Zarazúa 2019), (2) government policies concerning social assistance in cash vs. kind (Currie and Gahvari 2008), and (3) demographic and public health literature on dietary composition (Van Hook et al. 2016; Frisco, Baumgartner, and Hook 2019; Kaschula 2008).

We use data from the two rounds of face-to-face household surveys of the Delhi Metropolitan Area Study (DMAS), conducted in rural and urban areas surrounding Delhi, to examine how households coped during the pandemic and changes in their food consumption as incomes dropped. The first wave of the survey was conducted before the onset of the pandemic, from February to May 2019. These households were re-interviewed between August and October 2021, after the first and the second waves of

the pandemic in India that led to widespread infection and severe lockdowns. This provides us with a unique opportunity to examine a matched panel of 4,292 households in the Delhi National Capital Region (NCR) and look at how households fared in response to the exogenous shock ensuing from the pandemic, thus contributing to the broader discourse on social safety nets.

Specifically, we address three questions:

1. What are the medium-term impacts of COVID-19-related economic changes on household expenditure, particularly expenditure on food?
2. What role did the pre-existing food distribution program, which was expanded by the government in the wake of the pandemic, play in allowing households to avoid drastic reductions in food expenditure?
3. What broader lessons can be learnt from India's pandemic experiences in order to understand how households react to economic emergencies and how social safety nets can be designed to synergize with household behaviors in order to enhance nutritional security?

The rest of the paper is organized as follows. Section 2 discusses the economic context of the pandemic in India and the government's response. Section 3 discusses the hypotheses. Section 4 describes the data. Section 5 presents the analytical strategy and measures used in the paper. Section 6 discusses descriptive statistics. Section 7 presents multivariate results. Section 8 concludes by discussing the implications of these results for developing robust social safety nets.

2. COVID-19 in India: Policy context

On March 25, 2020, without any warning, the Indian government announced and implemented a complete lockdown. This lockdown was slowly relaxed but continued well into June 2020. The pandemic took a particularly harsh toll on the urban poor in India, especially the urban informal workers (Afridi, Dhillon, and Roy 2020; Dhingra and Machin 2020; Kesar et al. 2021; Basole et al. 2021; Choudhuri, Pramanik, and Desai 2023), and there was a sharp decline in employment, particularly wage employment (Deshpande 2020; Desai, Deshmukh, and Pramanik 2021). However, the consequences of declining incomes and employment for food security are not clear. Cross-sectional studies have found evidence of a fall in food expenditure during the initial lockdown (Gupta, Malani, and Woda 2021), suggesting a surge in food insecurity (Drèze and Somanchi 2021; Mishra, Madan, and Dutta 2021; Kumar and Sonkar 2022) which often lasted well beyond the initial lockdown, into October–December 2020 (Drèze and

Somanchi 2021). Gupta et al. (2022) also found a fall in household expenditure on non-staple items such as meat, eggs, vegetables, and fruit in May 2020, with women disproportionately affected by the lack of dietary diversity. However, many of these studies are based on cross-sectional data and often fail to consider the government's response.

Since the 1960s, the Indian government has provided highly subsidized grains, mainly rice and wheat, under its Public Distribution System (PDS), which has now evolved into Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY).⁴ Under the PDS, eligible households with Below Poverty Line (BPL) ration cards (about 75% of rural and 50% of urban households) receive a practically free distribution of 5kg of rice and wheat per person per month. Prior to the pandemic this was the only category that qualified for food support at subsidized prices. BPL ration cards were distributed based on eligibility criteria linked to the 2011 Socio-Economic and Caste Census. Typically, access to PDS requires a ration card denoting the household as eligible. However, during the pandemic this requirement was waived to cover all households (Government of India 2020).

Following the announcement of lockdown, this quota was doubled by adding 5 kg of grain, free of charge, as part of a INR 1.7 lac crore (25 billion USD) social assistance program to provide assistance to those left vulnerable during the pandemic (Government of India 2020). This was particularly important as households, particularly those working in the informal sector, faced declining incomes, and across the country a near freezing of transportation and logistics choked the supply-chain network and severely limited the availability of food in the open market. As the pandemic continued to rage for much of 2020, and with a second, more infectious 'Delta' wave peaking in India during the first half of 2021, the grain subsidy was extended well into 2021 (a portion of this enhanced subsidy continued as of 2025), the period during which the second phase of our data was collected. The additional 5kg of free PDS subsidized grain was also made available to any household with an Above Poverty Line (APL) ration card, who previously had only been able to purchase 5kg of rice and wheat per person per month from the PDS facility at the market price.

While most of the studies cited earlier in this section were undertaken when the lockdown was at its height, the data we use were collected towards the end of the pandemic. This allows us to examine the role of the additional food subsidies in changing the composition of the food basket during a period when economic insecurity was still high but the immediate emergency was past, which has broader implications for food policy. The active debate on social protection remains divided as to the best strategy for offering nutritional assistance: food distribution (in-kind transfers) or cash transfers (Alderman, Gentilini, and Yemstov 2017). Much of this debate has focused on households potentially diverting cash away from food to other urgent needs, and weak

⁴ PMGKAY translates as Prime Minister Food Welfare Scheme for the Poor.

institutional oversight mechanisms. India's food subsidy program, the largest in the world, often plays an important role in this debate (Bhattacharya, Falcao, and Puri 2017). However, the pandemic was a unique emergency and allows us to introduce a different dimension into this debate.

3. Hypotheses

Our goal is to provide insights from pandemic-related changes and draw broader implications for developing social safety nets by examining the following hypotheses:

H1: Households will cope with the sudden drop in income by first curtailing discretionary expenditure while protecting food expenditure.

Earlier studies (McKenzie 2003, 2006) have shown that when faced with financial emergencies, households reorient their budget, focusing on food expenses while curtailing expenditure on durables. If these insights hold during the pandemic, we should see a decline in other expenditures while food expenditure remains more or less intact. This is likely to hold irrespective of the source of income.

Current income does not fully capture the vulnerability imposed by the pandemic. Small businesses were particularly affected by the lockdown, with many losing their investments and/or having to incur debt to pay rent, even when they had no income. Hence, we expect that even after controlling for income, occupation will play an important role in determining expenditure patterns, with households whose incomes come from risky occupations, such as petty entrepreneurship or informal salaried work, curtailing a greater proportion of their discretionary expenditure.

H2: Access to modest in-kind food subsidies will not lead to a reduction in expenditure on food and diversion towards other non-food items.

The unexpected expansion of food assistance in India offers an opportunity to contribute to the debate on transfers in cash vs. in kind (Alderman, Gentilini, and Yemstov 2017) by examining whether increased access to free or highly subsidized grain leads to households reallocating these savings for other expenditures. If this reallocation takes place, it may help bolster the argument for cash transfers over in-kind transfers.

Much of the debate around social assistance in cash versus in kind centers around the paternalism inherent in in-kind assistance and the inefficiencies it may introduce in the system (Currie and Gahvari 2008). The argument for cash transfers says 'Why not give people money to spend and let them choose whether to spend on food or other

things? It may be that their need for other items is greater than that for food.’ A somewhat related argument against food subsidies relates to the assumption that it costs the government far more to provide grain than its value to households, while it still does not improve nutrition since households will simply use the savings to buy other items, including indulging in harmful spending. By contrast, advocates for in-kind transfers, particularly grain, suggest that beneficiaries in many developing countries continue to prefer food assistance over cash (Hirvonen and Hodinott 2021), often because it helps address price gauging and logistical challenges in obtaining food items (Khera 2014; Dreze and Khera 2017).

The additional food subsidy program rolled out right after the announcement of the nationwide lockdown provides a unique opportunity to contribute to this literature by examining changes in the composition of the food consumption basket that may have resulted from this social welfare assistance. We argue that free provision of grain acts as an implicit income transfer and may result in restructuring of the household food basket, allowing households to spend the freed-up cash on food items that complement carbohydrate-rich grains, such as pulses and vegetables (cereal complements), improving their diet. If this holds, the overall food expenditure will not necessarily drop, which would have happened if households had instead allocated the cash to non-food items. The effect is likely to be higher for those who previously did not have the extra cash to spend on cereal complements, in comparison to wealthier households and those above the poverty line.

H3: Subsidized grains will change the kind of foods households eat, possibly reducing dietary diversity.

A related debate focuses on providing specific food items or providing food vouchers (Basu et al. 2019) that allow the recipient to choose what to eat, with the possibility that supplying specific kinds of food items (e.g., cereals or pulses) shifts food consumption towards these items and reduces dietary diversity. Since the Indian PDS expansion focused mainly on supplying rice and wheat, we examine whether it skewed food consumption towards cereals and items typically eaten with rice or bread (e.g., lentils, vegetable curries) and away from other foods such as milk, fruit, and meat. Prior studies suggest that access to subsidized or free grain leads to greater consumption of starchy foods (Desai and Iyer 2016), and due to the longitudinal nature of the present analysis, with data collected over a short time span, we are able to contribute greater analytical rigor to this debate.

4. Data: Delhi Metropolitan Area Study

The Delhi Metropolitan Area Study was launched before the pandemic to examine the feasibility of carrying out a short-term panel study of income dynamics in India, and continued post-pandemic to monitor the pandemic's impact. This sample covers a total of 31 districts and 270 primary sampling units consisting of villages or urban neighborhoods (PSUs) across the three states of Haryana, Rajasthan, and Uttar Pradesh, and the Union Territory of Delhi. The households in the sample were selected using a three-stage stratified cluster sampling design, with a representative random sample selected at each stage.⁵ The first wave of the survey was conducted between February and April 2019, well before the pandemic. The households were revisited during the end-line survey, launched in August 2021, with a re-contact rate of 82%. The survey provides a wealth of information on the sources of income, household expenditure, and health status of the sample households. The income and expenditure questionnaire of the baseline and end-line surveys was based on the Indian Human Development Survey (IHDS) (Desai and Vanneman 2010), which has been used extensively. We excluded 112 observations (56 households from each round of the survey) with incomplete interviews.⁶ We also deleted 963 households (18% of the sample) that were interviewed in the baseline but for which no response was received in the endline survey (see Section 8 for attrition analysis and robustness checks). The final matched sample comprises 4,266 households.

5. Analytical strategy

The survey collected detailed information on households' total expenditure, consisting of 54 expenditure categories. It includes questions about food consumption (whether homegrown or purchased), expenditure on clothing, major and minor purchases, and health and educational expenditures. The modules are largely replicated from those used by major Indian surveys such as the National Sample Survey and the India Human Development Survey.

⁵ The detailed sampling methodology adopted is available on request.

⁶ 9 households from the baseline survey and 5 households from the endline survey had missing data for all expenditure categories. Additionally, 14 households from the baseline survey had no data for any of the variables used to derive household income. This amounts to 0.43% of the baseline sample and 0.09% of the endline sample, which were treated as incomplete interviews. These households were missing at random, distributed across different categories of the household assets quintile (42% amongst the poorest, 6 households in the 2nd quintile, 8 in the middle quintile, and 12 in the 4th quintile, with no data on household assets for 1 household. These were treated as incomplete interviews and deleted from both rounds.

The household expenditure module was designed with a mixed recall period based on the frequency of purchase. The total household expenditure is constructed from a set of 33 categories that comprise commonly used items (food and daily necessities), restricted to a 30-day recall period, and another 19 categories that are reported with a recall period of 365 days (non-food items such as durable purchases, social expenditures, and educational expenditures).

5.1 Alternate measures of food expenditure

We use two alternate measures of per capita annual household expenditure, based on alternate measures of food expenditure – expenditure at purchase price (whether purchased from the market or the fair-price ration shop) and expenditure at regular market price. The data provides information on the quantity of food items consumed by a household during the previous 30 days, and the source from which they were purchased.⁷

The distinction between purchase price and market price for food items refers to imputing the value of government subsidies:

- a) Purchase price: In calculating food expenditure at purchase price, we use the prices at which the consumers purchased the respective food items from the fair-price PDS shops. This includes the heavily subsidized prices of cereals, mainly rice and wheat.
- b) Regular market price: In calculating the regular market price, we re-estimate the value of subsidized grain by using the prevailing market prices – households were asked how much they would have had to pay per unit if they had had to buy the subsidized grains on the free market instead. This second method allows us to compute the implicit value of the subsidy that the household received each month for their grain consumption.

We explain below the role of ration cards in receiving food subsidies and how it differed following the pandemic.

- a) For those without ration cards, who received no subsidy, the subsidized purchase price and market price was the same, since the grains had to be purchased on the market.

⁷ The food consumption section in the survey captured the amount consumed in the last 30 days, rather than the amount purchased. The amount consumed can be greater or less than the food expenditure during the previous 30 days, depending on non-perishable items that may have been carried over from the previous month or stored for future use.

- b) Prior to the pandemic, BPL ration card holders received 5kg of grain per person per month at highly subsidized (near-zero prices). After the onset of the pandemic, they received an additional 5kg of grain per person per month at zero cost. If BPL ration card holders had purchased this subsidized grain from the fair-price shops, the purchase (subsidized) price would have differed from the market price (i.e., purchase price + subsidy amount) for the quantity purchased.
- c) APL ration card holders received no subsidy prior to the pandemic. After the onset of the pandemic they received 5kg of grain per person per month at zero cost from the fair-price shops. The subsidy amount for any additional grain bought from the market at prevailing market prices would have been zero.

We separately examine changes in (a) food expenditure, (b) non-food expenditure, and (c) expenditure on discretionary items. We focus on two alternative measures of changes in expenditure: changes in overall expenditure and changes in budget share.

5.2 Changes in overall expenditure

To test hypotheses H1 and H2, we examine the changes in annual per capita expenditure in the following categories: (1) total expenditure (at purchase price), (2) total expenditure (re-estimated at market price), (3) food expenditure (at purchase price), (4) food expenditure (re-estimated at market price), (5) non-food necessities, (6) discretionary items.

Using data from 2019 and 2021, we estimate the following equation, which measures the effect of the change in the logarithm of per capita income on the change in per capita household expenditure (in logarithms) using a household-level fixed effects model:

$$\log(C_{i,t}) = \beta_0 + \beta_1 \log(Y_{i,t}) + \beta_2 X_{it} + v_i + s_t + \varepsilon_{it} \quad (1)$$

where $C_{i,t}$ captures the per capita annual expenditure in household i during period t , $Y_{i,t}$ denotes the per capita current income of household i during period t , v_i are household fixed effects, s_t represents time dummies, β_0 , β_1 , β_2 , are parameters to be estimated, and ε_{it} is the idiosyncratic error term. Standard errors are clustered at the PSU level. All expenditure figures are reported in real terms, adjusted for 2019 prices using the monthly consumer price index (CPI), across states and sectors (rural versus urban). X_{it} represents a range of time-varying covariates at the household level that can affect household expenditure, including:

- (a) Household size (in logarithm) to take into account economies of scale.
- (b) Whether the household consumed food it had produced itself, from either agriculture or livestock.
- (c) Year interacted with the principal source of income before the pandemic (2019) in 5 categories: (1) agriculture and allied activities, (2) household business, (3) daily wage work, (4) salaried work, (5) relying on non-labor income (e.g., pensions and remittances).
- (d) Year interacted with the household's eligibility for subsidized food as reflected in their access to Below the Poverty Line (BPL)⁸ ration card. This variable is coded in 3 categories:
 1. Has the BPL card, making the household eligible for 5kg of heavily subsidized grain at near-zero prices before the pandemic and an additional 5kg after the pandemic, totaling 10kg of grain per person per month from the PDS facility.
 2. Has an Above Poverty Line (APL) card that allowed purchasing food at the ration shop before the pandemic but not at subsidized prices. After subsidies were announced in April 2020, APL households were also eligible for 5kg of free grain per person per month.
 3. No card: affluent households cannot apply for a card; migrants may not have sufficient documentation to obtain one.

Since occupation (providing the principal source of income) and ownership of ration cards come from pre-pandemic interviews and are time-invariant, we include their interaction with only the year of interview and not with the main effect.

β_1 provides an estimate of the elasticity of household expenditure with respect to income, measuring the percentage change in expenditure for a 1% change in income. Following hypothesis H1, we expect β_1 to be higher for non-essential spending than for food consumption. We also expect β_1 to be low for food consumption expenditure, as the food subsidy is likely to enable households to smooth their food consumption. Further, the effect on food consumption is likely to be stronger for households with BPL ration cards, who had overall greater access to subsidized grain.

⁸ Approximately 0.08% of the total sample had Annapurna cards, for those aged 65 years and above and living below poverty line, while 0.68% of the sample had Antodaya Anna Yojana (AAY) cards, for the poorest of the poor. These have been clubbed together with BPL cards.

5.3 Change in the food basket

Additionally, to understand the household response to both declining incomes and increased allocation of cereals through the PDS, we examine changes in the composition of the food basket. To this effect, we look at how the budget share of food groups evolved across households' different socioeconomic characteristics as they struggled to cope with pandemic-related income changes. This follows from the third hypothesis, H3, which proposes that the budget share of cereal complements is likely to increase with increases in food subsidy. We estimate Equation (2) for changes in the overall budget share of food items: the budget share of cereals, the budget share of cereal complements, and the budget share of cereal substitutes. We classify food items in the following food groups, based on the classification adopted in Desai and Iyer (2016):

1. Cereals: comprising rice, wheat, and other coarse cereals.
2. Cereal complements: comprising vegetables, pulses, eggs, and oil.
3. Cereal substitutes: comprising meat and fish, fruit, nuts, milk, and milk products.
4. Other food items: comprising sugar, sweeteners, salt, and spices, along with expenditure incurred on eating out in restaurants.

The following household-level fixed effects equation is estimated.

$$w_{it} = \partial_0 + \partial_1 X_{it} + \partial_2 Q_{i,t} + v_i + s_t + \varepsilon_{it} \quad (2)$$

where w_{it} represents the budget share of the respective commodity group for household i during period t , $Q_{i,t}$ represents the primary independent variable of interest, the rank of the household based on asset quintile group (a proxy for wealth or long-term household wellbeing), and X_{it} is a vector of household correlates, such as the number of household members, home production of crops, amount of per capita food subsidy received, and the presence of a food ration card. ∂_0 , ∂_1 , and ∂_2 are parameters to be estimated. v_i represents household fixed effects, s_t represents time dummies. Following hypothesis H3, we expect the budget share of cereal complements to go up, particularly for lower quintile groups.

6. Descriptive statistics

Descriptive statistics presented in Table 1 and Figures 1–4 offer stylized observations that we further explore in Section 6 via multivariate analyses.

Table 1: Average real per capita household expenditure in 2019 and 2021 (in INR)

Year	2019	2021	CAGR %	2019	2021	CAGR %
	Purchase price			Regular Market price		
Per capita annual household expenditure	58,913	53,085	-5.1	59,437	53,820	-4.8
	(73,942)	(56,488)		(73,864)	(56,381)	
Per capita food expenditure (annualized, frequently purchased, 30-day recall)	20,021	20,372	0.8	20,543	21,096	1.3
	(10,938)	(13,946)		(10,826)	(13,853)	
Per capita non-food expenditure (annualized, frequently purchased, 30-day recall)	15,692	15,539	-0.5			
	(15,822)	(13,830)				
Per capita expenditure on discretionary items (infrequently purchased, 365-day recall)	22,509	16,303	-14.9			
	(65,396)	(45,749)				
Year		2019			2021	
Per capita annual income		78,897			50,759	
		(5,31,262)			(1,26,436)	
Sample Total				4,266		

Source: Authors' computation based on matched panel data from the baseline survey (February 2019 – June 2019) and end-line survey (August 2021 – Sept 2021).

Note: Figures in parentheses show standard deviation. All 2021 figures have been adjusted for 2019 prices, using the monthly consumer price index, by state and sector (urban vs. rural). The regular market price for food items bought from PDS shops reflects the purchase price plus the implicit value of the subsidy. INR = Indian Rupee.

Inflation-adjusted per capita income dropped from INR 78,897 in 2019 to INR 50,759 in 2021. This corresponds to a drop of 19.8% CAGR (Compound Annual Growth Rate) in real terms (Table 1). However, per capita household expenditure declined only modestly, by 4.8% CAGR, with the greatest drop being concentrated in discretionary purchases such as clothing, appliances, and school fees (14.9% CAGR), with per capita food expenditure increasing slightly at market prices⁹ (1.3% CAGR) (Table 1).

Most of the expenditure decline is concentrated in the 8th, 9th, and 10th income deciles (Figure 1). This may be because these households had greater discretionary expenditure, where most decline is concentrated. Much of the expenditure decline is concentrated among small business owners and households surviving on non-earned income, mainly remittances (Figure 2).

The stability of food consumption is also reflected in the quantity of cereals consumed, which changed only modestly in the wake of the pandemic, with a slight increase in rice consumption and a slight decrease in wheat consumption. What changed was the source from which cereals were purchased, with a sharp increase in cereals being purchased from the PDS shops for both BPL and non-BPL households (Figure 3). Around

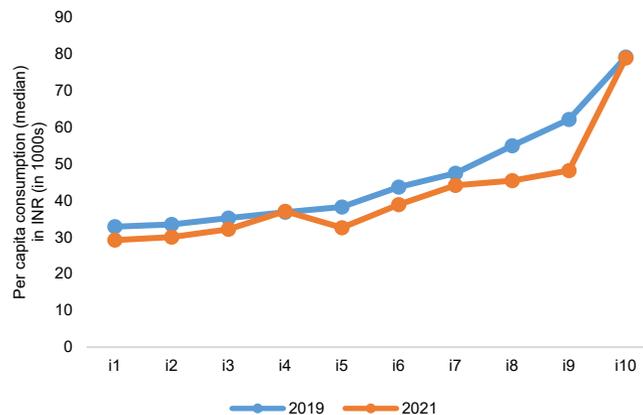
⁹ This includes the subsidized value of grain obtained from the fair-price PDS shops.

47.8% of the households in the sample bought grain (rice or wheat) from PDS shops in 2019, increasing to 57% in 2021.

All households with ration cards benefited from the increased subsidy, whether they were above or below the poverty line (Figure 4). Towards the latter part of the pandemic, the government recognized that some of the most vulnerable households, e.g., migrants with no residential documentation and hence no ration cards, were being left out of the safety net and attempted to reach these households. However, only 27.5% of these households (i.e., about 250 households) were able to obtain these benefits. These are distributed across the different states in our sample.¹⁰

In the following section, we examine these associations in a multivariate framework while controlling for household characteristics and conduct robustness checks for selective attrition between the two periods.

Figure 1: Per capita real annual household expenditure (at market prices) by income decile

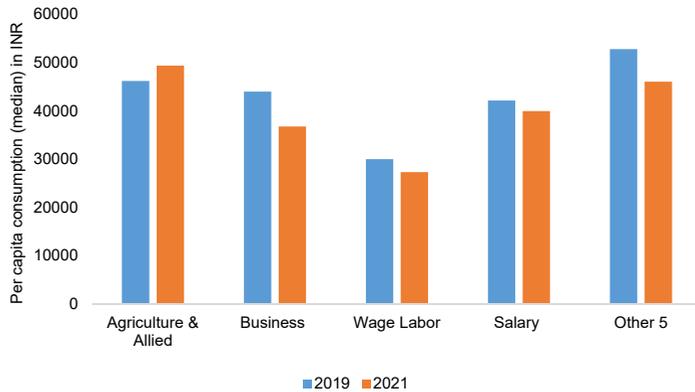


Source: Authors' computation based on panel data from the baseline and end-line surveys.

Note: All 2021 figures have been adjusted for 2019 prices, using the monthly CPI, by state and sector (urban vs. rural). In the figure, i1–i10 represent the income deciles constructed using 2019 household income. The market price for food items bought from PDS shops reflects the purchase price plus the implicit value of the subsidy. INR = Indian Rupee.

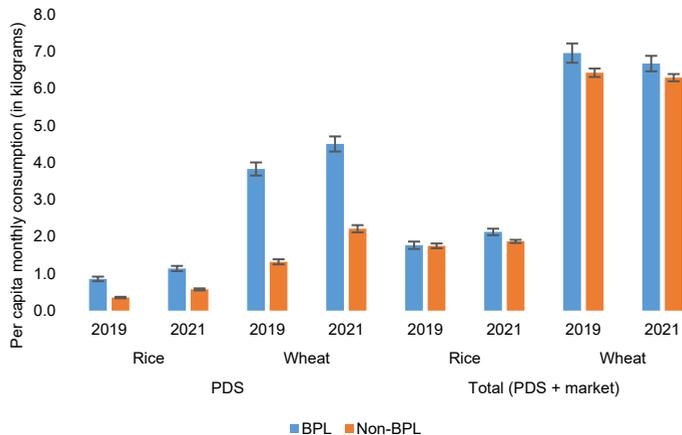
¹⁰ Among the 250 households that received subsidies without a ration card, following the pandemic, 66% lived in Uttar Pradesh, 18.4% in Delhi, 11.6% in Haryana, and 4% in Rajasthan.

Figure 2: Per capita real annual household expenditure by primary source of 2019 income



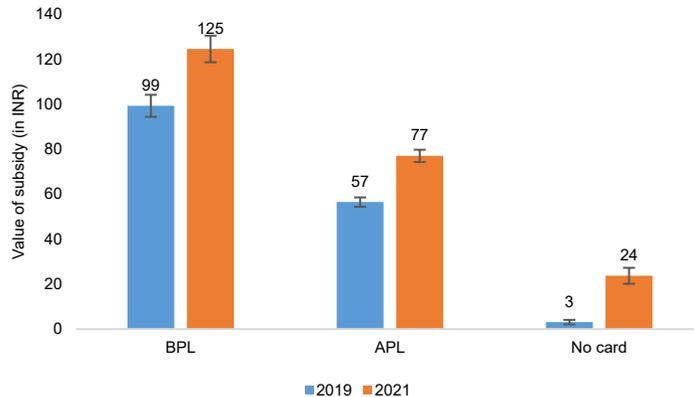
Source: Authors' computation based on panel data from the baseline survey and end-line survey.
 Note: All 2021 figures have been adjusted to 2019 prices, using the monthly CPI, by state and sector (urban vs. rural). In Figure 1A, i1-i10 represent the income deciles constructed using 2019 household income. The market price for food items bought from PDS shops reflects the purchase price plus the implicit value of the subsidy. INR = Indian Rupee.

Figures 3: Average per capita monthly consumption of grain in quantities: BPL vs. non-BPL



Source: Authors' computation based on panel data from the baseline (February 2019 – June 2019) and end-line (August 2021–Sept 2021) surveys.
 Note: PDS grain refers to subsidized grain obtained through fair-price ration shops. The standard error bars represent 95% confidence intervals.

Figure 4: Average real monthly value of per capita grain (rice and wheat) subsidy



Source: Authors' computation based on matched panel data from the baseline survey (February 2019 – June 2019) and end-line survey (August 2021–Sept 2021).

Note: Estimates are adjusted to 2019 prices using the monthly CPI, by state and sector (urban vs. rural), to reflect real values. The standard error bars represent 95% confidence intervals. APL = above poverty line, BPL = below poverty line. INR = Indian Rupee.

7. Multivariate results

The results from the multivariate analyses presented below highlight three trends. First, declining income and pandemic-related uncertainty are associated with declining expenditure. However, this drop is largely concentrated in discretionary expenditure and not in food consumption (confirming Hypothesis H1). Second, increased access to subsidized grains helped protect food consumption for households with the requisite paperwork to obtain this subsidy and did not lead to resources being diverted from food to other items (confirming Hypothesis H2). Third, for the poor households, increased access to free or subsidized grains led to increased consumption of food items typically consumed with rice and wheat (cereal complements). For the richer households, it also led to increased consumption of other items such as milk, so a reduction in dietary diversity was not confirmed (Hypothesis H3).

7.1 While consumption declined, food expenditure did not

Results from Table 2, providing estimates from Equation (1), indicate a substantial drop in real per capita household expenditure between 2019 and 2021. It was driven by two factors: (1) Overall incomes declined, although a 1% increase or decrease in income changes household expenditure by only 0.07%, reflecting the possibility that households may have been involved in per capita expenditure smoothing. (2) Irrespective of income decline, and keeping all other covariates constant, there was around a 7.7% decline in expenditure between 2019 and 2021, capturing the overall effect of the pandemic. This can be interpreted as the result of uncertainty associated with the pandemic and that some normal expenditure (e.g., on travel and social functions) may have been postponed.

We further examine the effect on different groups of items between 2019 and 2021. For columns 1A and 2A, grain obtained from fair-price shops (PDS) at subsidized prices (i.e., purchase price) have been recalculated at prevailing market prices (as recorded by the households) – this also allowed us to calculate the value of the food subsidy received. Columns 1 and 1A of Table 2 capture the broad aggregate per capita expenditure, while columns 2–4 show the per capita expenditure for different groups of items.

Table 2: Change in real per capita expenditure (in log) between 2019 and 2021

VARIABLE	Per capita expenditure (purchase price) (1)	Per capita expenditure (market price) (1A)	Per capita food expenditure (purchase price) (2)	Per capita food expenditure (market price) (2A)	Non-food expenses (30 days) (3)	Discretionary expenses (365 days) (4)
Year dummy (2021: 1/0)	-0.08 (0.004)	-0.08 (0.006)	0.00 (0.927)	0.01 (0.633)	0.07 (0.021)	-0.42 (0.000)
Per capita income (in log)	0.07 (0.000)	0.07 (0.000)	0.06 (0.000)	0.06 (0.000)	0.06 (0.000)	0.12 (0.000)
Number of household members	-0.08 (0.000)	-0.08 (0.000)	-0.07 (0.000)	-0.07 (0.000)	-0.08 (0.000)	-0.04 (0.014)
Home production of food/milk (1/0)	0.09 (0.001)	0.09 (0.001)	0.14 (0.000)	0.13 (0.000)	0.01 (0.759)	0.01 (0.918)
Income Source (5 categories) *year	yes	yes	Yes	Yes	yes	yes
Ration Card (3 categories) *year	yes	yes	Yes	Yes	yes	yes
Constant	10.39 (0.000)	10.43 (0.000)	9.48 (0.000)	9.55 (0.000)	9.24 (0.000)	8.09 (0.000)
Number of observations	8,532	8,532	8,532	8,532	8,532	8,532
R-squared	0.079	0.078	0.099	0.103	0.053	0.097

Note: Models are estimated using household fixed effects, with standard errors clustered at the PSU level. P-values are reported in parentheses in the second rows. All consumption and income figures are in real terms, adjusted for 2019 prices.

In the multivariate models, after adjusting for background factors, per capita expenditure dropped by 7.7%¹¹ between 2019 and 2021 (columns 1A and 1B). This was primarily driven by expenditure on discretionary items, which dropped by 41% (column 4). Per capita food consumption did not change, but expenditure on frequently purchased essential items increased by 6%. Our results also show that households consuming agricultural or animal products that they produced themselves observed a 16% increase in the value of food consumption (see column 2). The consumption expenditure includes home-produced items valued at market price. This indicates that home production of crops and allied products enhanced food security during the pandemic.

The elasticity of per capita real total expenditure with respect to current income in real terms is less than 1 in all cases. A 1% change in per capita income corresponds to a 0.07% change in annual per capita total expenditure, 0.06% for food consumption expenditure, and 0.05% and 0.12% for non-food essential items and discretionary purchases respectively. This suggests that changes in expenditure are only mildly responsive to a fall in current income, and households resorted to alternate mechanisms to smooth their expenditure over the two periods, particularly their food consumption expenditure.

7.2 Food subsidies played an important role in protecting eligible households

Results from Table 2a indicate that per capita food expenditure increased by 5% ($p < 0.05$) for those with BPL cards. Access to subsidized grain from the PDS shop was an important coping mechanism for BPL families, while those without any card were worse off than before. However, these changes are modest in size. Per capita food expenditure also increased for those holding APL cards, by 2.1% ($p\text{-value} = 0.127$) at purchase price and by 3.3% ($p\text{-value} < 0.01$) at market price.

Per capita food expenditure dropped by 4.5% for those with no ration card ($p\text{-value} = 0.023$); re-estimated at market prices it dropped by 2.8% ($p\text{-value} = 0.142$). These households would find it difficult to access subsidized grain due to the lack of a card. Only about 27.6% of households in this category received subsidized grain. The median household in this category did not receive any subsidy. We carried out three robustness checks¹² to investigate the difference in estimates for per capita food expenses at purchase price (column 2) versus market price (column 2A) for those with no ration card. First, we conducted the panel fixed effects regression exclusively for 657 households without a ration card and with no subsidy. We observe near identical coefficient estimates for both specifications, i.e., purchase price and market price (column 2 vs. column 2A). The

¹¹ Calculated as $100[\text{exponential}*(\text{coefficient}) - 1]$ for dummy variable in the log-linear model.

¹² These results are available on request.

marginal effects show that per capita food expenses dropped by 4.4% in 2021 compared to 2019, with a p-value < 0.01. Second, we dropped households that had no ration card but received the subsidy, and reran the panel regression for the remaining households. The per capita food expenses at purchase price dropped by 2.5% (p-value = 0.223) while those at market price dropped by 2.7% (p-value = 0.180) for households without a ration card. Third, we ran the regression without households that had no ration card and received no subsidy. The per capita food expenses at purchase price decreased by 9% (p-value = 0.017) and at market price by 2.5% (p-value = 0.488) for households that received subsidies but had no ration cards, indicating that some of the differences in coefficients between columns 2 and 2A, for those without ration cards, stemmed from this category. Coefficients for other ration card categories remained robust to the original specification.

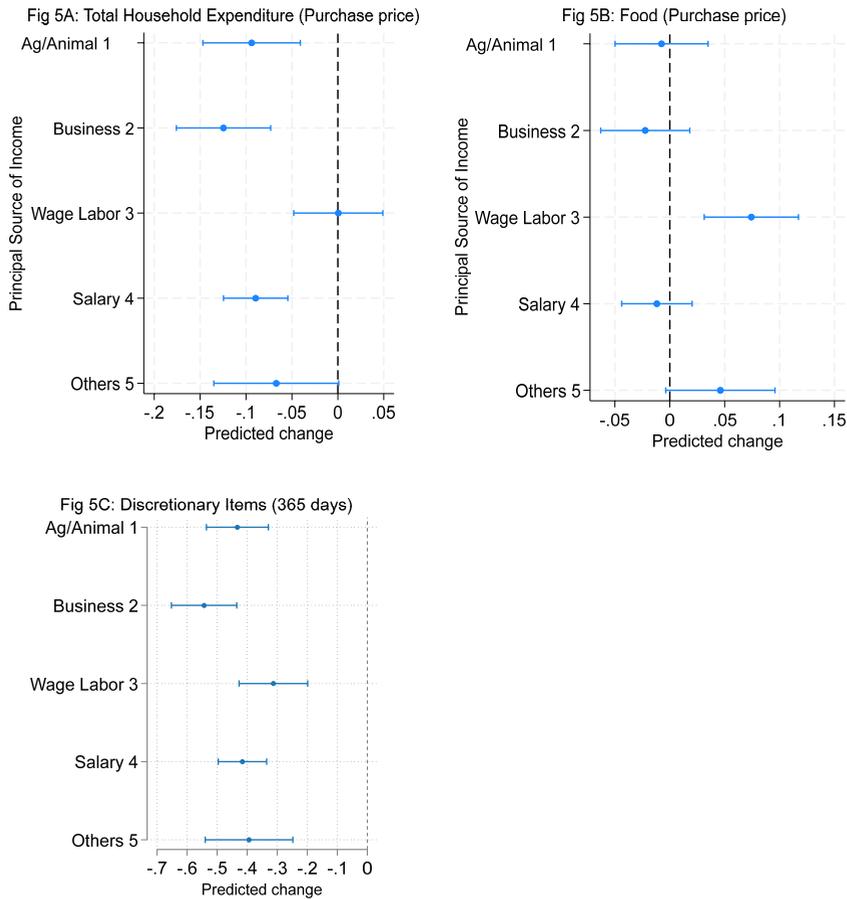
Table 3: Predicted change in per capita expenditure by type of ration card

Variable	Per capita expenditure (purchase price) (1)	Per capita expenditure (market price) (1A)	Per capita food expenses (purchase price) (2)	Per capita food expenses (market price) (2A)	Non-food expenses (30 days) (3)	Discretionary expenses (365 days) (4)
No card	-0.132 (0.000)	-0.125 (0.000)	-0.045 (0.023)	-0.028 (0.142)	-0.049 (0.043)	-0.448 (0.000)
BPL	-0.053 (0.041)	-0.048 (0.057)	0.046 (0.038)	0.051 (0.013)	-0.055 (0.059)	-0.480 (0.000)
APL	-0.062 (0.000)	-0.055 (0.001)	0.021 (0.127)	0.033 (0.014)	-0.059 (0.002)	-0.404 (0.000)
Observations	8,536	8,536	8,536	8,536	8,536	8,536

Note: Predicted change reflects marginal effects based on estimates provided in Table 2. P-values are reported in parentheses in the second rows. APL = above poverty line, BPL = below poverty line.

In contrast to food expenditure, the drop in discretionary expenses is large across all groups. This likely reflects a trade-off between food and non-food purchases. Households chose to curtail spending on non-food essential items, as they had to buy staple food items on the market.

Figure 5: Predicted change in real per capita household expenditure



Note: Predicted change reflects marginal effect based on estimates provided in Table 2. All figures are adjusted for 2019 prices. The standard error bars represent 95% confidence intervals.

Studies have shown that those working in the informal sector were most affected by the pandemic, especially during the initial lockdown period in 2020 (Choudhuri, Pramanik, and Desai 2023). While daily laborers experienced an immediate loss of work, small business owners also faced closure and loss of investments. How did these occupational groups cope with sustaining their household expenditure a year into the pandemic? Using estimates based on Table 2, Figure 5 shows changes in real per capita

expenditure across broad occupational groups, indicating widespread economic insecurity. Real per capita expenditure (using the purchase price) decreased for all households except those whose primary source of income was daily wage labor. For wage laborers, income loss captured most of the pandemic impact, but for other households there seems to be a deeper impact on their livelihoods due to business closure or fear of unemployment. Even for daily wage laborers, the effect is positive but small (coefficient of 0.01). However, as overall expenditure declined, households continued to prioritize food consumption expenditure, showing an insignificant decrease (Figure 5B). By contrast, most of the decline was in discretionary items (Figure 5C). There was a slight increase in food consumption expenditure for daily wage laborers.

7.3 Subsidized grains associated with greater dietary diversity

Overall, the results in the previous section show stability in food expenditure when the government ramped up the distribution of rice and wheat at highly subsidized prices. Since these are staples of the north Indian diet, it led to expenditure savings on essential food items. How did households react to this unexpected windfall, which acted as an implicit income transfer? The answer to this question has important implications for discussing subsidies in cash vs. in kind. Here, we address two questions linked to hypothesis H3: (1) Did the reduction in necessary expenditure on cereals lead to funds being diverted outside of food expenditure? (2) If it did not (as we have already documented in the prior section), where were these savings invested?

To examine potential shifts in the food basket, we divide food expenditure into three categories: (1) Expenditure on cereals (rice, wheat, bread, millet, etc.), (2) Expenditure on cereal complements such as lentils and vegetables, and (3) Expenditure on cereal substitutes such as milk, meat, fruit, and nuts.

Appendix Figure A1 plots the Engel curve for all households using a locally weighted regression of the budget share of the commodity group on the log of real per capita expenditure (which can be considered a proxy for permanent income).

Figure A1–A shows a higher share of food staples post-pandemic for each level of total per capita expenditure in real terms. This closely follows Engel’s law, which predicts that a fall in income translates to an increase in the share of necessities such as food. While the budget share of food expenditure increased, this is not necessarily true for all components in the food basket. We notice a non-linear Engel curve for cereal substitutes (Figure A1–D). It has also been shown in past studies that while the food Engel curve may be close to being linear in the log of income, this may not hold for all commodities in the food basket (Banks, Blundell, and Lewbel 1997).

As subsidized wheat and rice became available, expenditure on cereals declined. However, this reduction in cereal expenditure did not lead to households using the savings for other discretionary items, as we have already shown in Table 3 (hypothesis H2). In Table 4, we show that access to cheaper cereals was associated with changes in dietary composition, increasing the budget share of expenditure on cereal complements such as lentils and vegetables, particularly for poorer households at the lower levels of asset quintile. These savings were also invested in cereal substitutes at the middle and upper asset quintile levels to enhance dietary diversity. Carbohydrate-rich Indian diets have been associated with a variety of metabolic diseases. On the surface, the distribution of practically free rice and wheat should increase carbohydrate consumption, cereals being staples of the Indian diet. However, our results suggest that savings in cereal expenditure led first to increased spending on lentils and vegetables eaten with cereals, and once these needs were satisfied, increased consumption of milk, fruit, nuts, and other diverse food groups for higher income households. Thus, the additional PDS subsidy acted as an implicit income transfer that translated into a slight improvement in dietary diversity.

Table 4: Predicted change in budget share by asset quintile group

VARIABLE	Food (market price)	Food (purchase price)	Cereals /Grains	Cereal Complements	Cereal Substitutes
	(1)	(1A)	(2)	(3)	(4)
Q1	2.021 (0.005)	1.889 (0.008)	-2.006 (0.000)	3.093 (0.000)	-0.307 (0.537)
Q2	3.113 (0.000)	2.694 (0.000)	-0.825 (0.000)	2.710 (0.000)	-0.271 (0.589)
Q3	4.661 (0.000)	4.201 (0.000)	-0.456 (0.000)	2.670 (0.000)	0.678 (0.083)
Q4	5.395 (0.000)	5.042 (0.000)	-0.274 (0.034)	2.389 (0.000)	1.603 (0.000)
Q5	3.290 (0.000)	3.025 (0.000)	0.016 (0.911)	1.387 (0.000)	0.748 (0.133)
Observations	8,532	8,532	8,532	8,532	8,532

Note: Predicted change reflects marginal effects. See Table A-1 for coefficient estimates of all covariates used in the household fixed effects regression model. P-values are reported in parentheses in the second row, respectively. Q1–Q5 represent the asset quintile groups.

The marginal effects estimated from Equation (2), presented in Table 4 (see Table 3A in the Appendix for the full regression results), show that the budget share of food expenditure increased progressively for all asset quintile groups. In the food basket the expenditure share of cereal consumption went down for all asset quintile groups, except for those in the top 5th quintile (p-value of 0.831). On the other hand, the budget share of cereal complements rose for all asset groups, reflecting the broad shift in food consumption patterns, in conformity with hypothesis H3. During a period of crisis, welfare gains through additional subsidies in kind in the form of cereals such as grains

seem to be associated with increases in cereal complements, irrespective of household wealth status. Interestingly, the budget share of cereal substitutes is negative for the first two asset quintiles but with high p-values of 0.537 and 0.589, suggesting a wide confidence interval.

8. Robustness checks

The re-contact rate for the 2021 survey was 81.67%: 93% in rural areas and 70% in urban areas. Attrition was lower for households with agricultural land, with an 89% re-contact rate versus 77.5% for those without. The recontact rate was also higher among poorer households (88%) than among those in the top asset quintile (61%). To examine whether our results are driven by attrition bias, we calculate the propensity score of responses using multivariate logistic regression, conditioned on household characteristics, and use it to calculate the inverse probability weights (IPW) of respondents. IPW allows higher weighting for households with a lower probability of response than for those with a higher probability.

Results from the logistic regression used to obtain the propensity score are presented in Table A-1 in the Appendix. As covariates predicting the response rate for the 2021 household survey, we use the household rank in asset quintile, the highest level of household education, social and religious group (Forward/general caste Hindus, other backward caste, scheduled caste, scheduled tribes, and other religions, such as Muslims, Christians, Jain, Buddhists, etc.), state of residence, region (urban or rural), presence of BPL ration card, ownership of agricultural land, and number of household members. Subsequently, we re-estimate Equation (1) using the inverse probability weights regression adjustment method (IPWRA), with the inverse probability weights constructed from the logistic regression predicting the response rate (see Table A-2 in the Appendix). For the outcome equation we use the same set of covariates as presented in Table 2. The coefficient estimates (odds ratio) for the outcome equation are presented in Table A-3 in the Appendix. Using these coefficient estimates, we calculate the marginal effects (see Table A-4), capturing the predicted change in per capita expenditure in the presence or absence of BPL or APL ration cards.

The results from Table A-3 and the marginal effects presented in Table A-4 show that the coefficient estimates are robust compared to those from Tables 2 and 3, both in terms of magnitude and the direction of change. We observe a marginally higher drop in per capita food expense for those without any ration card – the coefficient estimates are lower by 1.3 percentage points when compared with Table 2. Further, unlike in Table 3 where the p-value was 0.142 for food expenditure recalculated at the market price, the effect is now statistically significant at the 1% level (Table 5, column 2A), with a p-value

of 0.030. For those with BPL or APL cards, the coefficient for food expenditure is positive but lower by 0.4 to 0.5 percentage points in magnitude, indicating largely robust coefficient estimates, and that the results are not driven by attrition of households in the second wave.

9. Discussion

The COVID-19 pandemic and subsequent lockdown and unlocking phases adversely affected the livelihood of a wide spectrum of households, resulting in both an immediate income drop and a higher level of uncertainty. A contemporaneous study suggests a sharp decline in food intake (Drèze and Somanchi 2021) with possible implications for the health and nutrition of the poor. However, the medium-term impact of examining food security before and immediately following the pandemic suggests only modest impacts.

The data show that, on average, per capita real household expenditure dropped considerably, although less than the fall in per capita real income. Despite the fall, households could smooth their food consumption in response to the livelihood shock, keeping their food consumption stable while reducing other expenses. This is similar to Gupta, Malani, and Woda (2021), who have shown that expenditure fell less than income, with households partially able to smooth their expenditure.

The results also show that the decline in per capita expenditure was mainly driven by a reduction in expenditure on discretionary purchases (e.g., purchase of consumer durables), rather than on food and fuel. While the results do not show the prevalence of widespread starvation, the Delhi NCR is a privileged region, and the results should be treated with caution.

As pointed out in the previous section, these results were supported by the government extending the additional grain subsidy. This is particularly evident in poorer households, where we observe an increase in dietary diversity through the consumption of cereal complements such as vegetables, pulses, etc. This could have resulted from freed-up cash that households would otherwise spend on the consumption of grains. We also observe an increase in expenditure on cereal substitutes, but the effect is only substantial for higher-income households. The subsidy, which acted as an implicit income transfer, may have allowed non-poor households to diversify their food baskets even further.

These results have interesting implications for future disasters and relief planning as well as the debate on in-kind vs. cash transfers. First, they are consistent with results from other countries in that moderate drops in income do not result in starvation because households prioritize food intake. However, as overall per capita household expenditure drops, there is a reduction in discretionary items. Since we have combined a variety of

expenditures under the discretionary heading, including educational expenditure, in future research it is important to further disaggregate these to understand the welfare implications.

Second, our results highlight the importance of existing food distribution channels to provide immediate food relief during a period of crisis when logistical difficulties and associated price increases may make it difficult to obtain staple food items. This is an issue that has received very little attention in the debate on cash vs. food transfers (Alderman, Gentilini, and Yemstov 2017; Currie and Gahvari 2008). Proponents of cash transfers often focus on the logistical costs involved in food transfers as well as the paternalism inherent in ensuring that individuals get food and do not engage in wasteful spending. However, the importance of an institutional framework available to support safety nets has received little attention. The Indian government was able to tap into existing distribution channels to immediately provide food items due to pre-existing distribution networks via fair-price shops. In the absence of an existing distribution network, cash transfers would have been the only option available to the government. With rising food prices and transportation difficulties, food availability on the market through mechanisms such as the PDS may need to be increased to meet basic food needs. We see some hints of this in our data. Households that did not have access to subsidized food due to the absence of ration cards spent more money on cereal purchases than households that were able to access subsidized grains, leaving them with less money to spend on lentils and vegetables.

Some exclusions also became evident during the pandemic. About 21% of our sample were left out of the existing distribution channels. This exclusion could have been the result of those suffering from health issues during the pandemic not being able to access rations because mobility restrictions prevented them from travelling to PDS shops. Also, many were poor migrants from rural areas who had not established a residence and obtained a ration card. The latter reinforces the case for better targeting of PDS grains and expanding the food safety net. It also reinforces the importance of effective implementation of the One Nation One Ration Card (ONORC) scheme, launched in 2022, allowing for the portability of ration cards across states under the National Food Security Act (NFSA) to provide ease of access to food subsidies and food security. Around 10% of households with BPL cards did not consume subsidized foodgrains from the PDS ration shops in 2021. This could be for a variety of reasons linked to supply chain constraints. Using results from a survey carried out in 2020 across 18 states, Gelb et al. (2022) find evidence that while 94% of ration card holders received the additional subsidy, logistic difficulties such as non-delivery of grain rations or dealers denying service were the main reason why some reported non-receipt. Further, 42% of APL households did not consume subsidized grains from PDS shops in 2021, which could

reflect access to better alternatives for wealthier households rather than indicating exclusion.

We show that in-kind provision of staple food items did not prompt households to shift expenditure on food to meet other needs, at least in the short run. In this case, it was associated with greater expenditure on diverse food items, improving dietary diversity.

If there is a silver lining to the economic crisis accompanying the COVID-19 health emergency, it lies in a recognition that the world needs to be better prepared for emergencies, whether they occur due to epidemics, floods, or drought. The results presented in this paper highlight the importance of emergency preparedness measures that anticipate and supplement actions that households take in response to crises.

10. Acknowledgement

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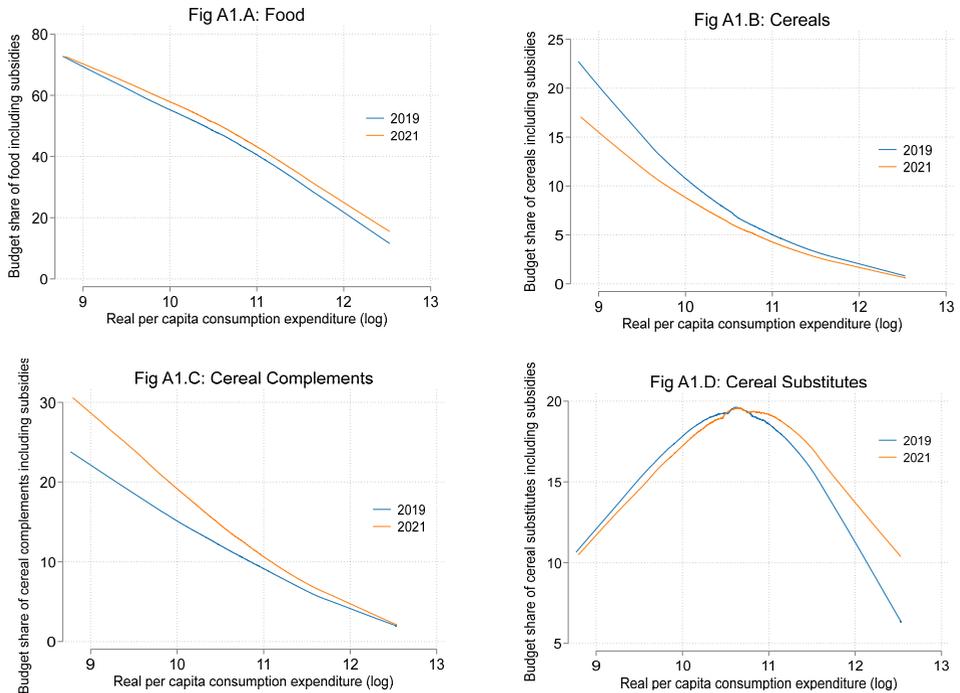
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Appendix

Figure A-1: Budget share of per capita expenditure in real terms (2019 vs. 2021)



Source: Authors' computation based on matched panel data from the baseline survey and end-line survey.

Note: Engel curves are estimated using locally weighted regression of non-zero budget share of the respective commodity on the log of per capita real consumption expenditure. All 2021 figures have been adjusted for 2019 prices, using the monthly consumer price index, by state and sector (urban vs. rural). Per capita, real consumption is winsorized at the 99th percentile.

Table A-1: Change in budget share between 2019 and 2021

VARIABLE	Food (market price) (1)	Food (purchase price) (1)	Cereals /Grains (2)	Cereal complements (3)	Cereal substitutes (4)
Year (0/1)	1.90 (0.020)	1.69 (0.035)	-2.13 (0.000)	2.96 (0.000)	-0.18 (0.744)
Number of household members	0.06 (0.755)	0.11 (0.583)	0.16 (0.000)	-0.07 (0.340)	-0.02 (0.897)
Home production	2.53 (0.001)	2.93 (0.000)	-0.34 (0.065)	-1.09 (0.000)	4.30 (0.000)
Cereal subsidy (in IHS)	0.41 (0.000)	-0.03 (0.759)	0.11 (0.000)	0.17 (0.000)	0.09 (0.182)
Ration card categories * year	yes	yes	yes	yes	yes
Assets quintile * year	yes	yes	yes	yes	yes
Constant	41.34 (0.000)	40.99 (0.000)	5.47 (0.000)	11.01 (0.000)	16.02 (0.000)
Observations	8,532	8,532	8,532	8,532	8,532
R-squared	0.053	0.039	0.078	0.152	0.025

Note: All consumption and income figures are in real terms, adjusted for 2019 prices. P-values are reported in parentheses in the second and third rows, respectively. All models were estimated using household fixed effects.

Table A-2: Logistic regression predicting response rate between surveys

VARIABLE	Response rate
<i>Household Asset quintile</i>	
<i>Ref. category: 1st quintile (Poorest)</i>	
2nd quintile	1.01 (0.967)
3rd quintile (Middle)	1.00 (0.976)
4th quintile	0.84 (0.220)
5th quintile (Richest)	0.54 (0.000)
<i>Highest level of education in the household</i>	
<i>(Reference: up to primary (<6 years))</i>	
Middle (6–9 years)	0.96 (0.831)
Secondary (10–11 years)	0.92 (0.665)
Higher Secondary (12–13 years)	1.19 (0.342)
Graduates & above (14 years+)	0.73 (0.076)
<i>Social and religious groups</i>	
<i>(Reference: Forward/ general caste)</i>	
Scheduled castes/ scheduled tribes / other backward castes	0.93 (0.565)
Muslim, Christian, Jain, Buddhist	1.76 (0.000)
Urban (1) vs. Rural (0)	0.34 (0.000)
<i>Ration Card</i>	
<i>(Reference: No card)</i>	
BPL	0.48 (0.000)
APL	1.37 (0.035)
Any agricultural land (1/0)	1.26 (0.037)
Number of household members	1.13 (0.000)
State dummies	Yes
Constant	5.83 (0.000)
Observations	5,252

Note: P-values are reported in parentheses. Coefficients represent odds-ratio.

Table A-3: Change in real per capita expenditure (in log) between 2019 and 2021 (weighted)

VARIABLE	Per capita expenditure (purchase price) (1)	Per capita expenditure (market price) (1A)	Per capita food expenditure (purchase price) (2)	Per capita food expenditure (market price) (2A)	Non-food expenses (30 days) (3)	Discretionary expenses (365 days) (4)
Year dummy (2021: 1/0)	-0.08 (0.003)	-0.08 (0.005)	0.00 (0.790)	0.01 (0.517)	0.07 (0.039)	-0.42 (0.000)
Per capita income (in log)	0.07 (0.000)	0.07 (0.000)	0.06 (0.000)	0.06 (0.000)	0.05 (0.000)	0.13 (0.000)
Number of household members	-0.08 (0.000)	-0.08 (0.000)	-0.07 (0.000)	-0.08 (0.000)	-0.08 (0.000)	-0.04 (0.011)
Home production of food/milk (1/0)	0.09 (0.001)	0.08 (0.001)	0.14 (0.000)	0.13 (0.000)	0.01 (0.700)	0.00 (0.956)
Year dummy (2021: 1/0)	Yes	Yes	Yes	Yes	yes	yes
Income Source (5 categories) *year	Yes	Yes	Yes	Yes	yes	yes
Ration Card (3 categories) *year	10.44 (0.000)	10.47 (0.000)	9.56 (0.000)	9.62 (0.000)	9.28 (0.000)	8.08 (0.000)
Constant						
Observations	8,532	8,532	8,532	8,532	8,532	8,532
R-squared	0.087	0.085	0.103	0.106	0.050	0.103
Number of households	4,266	4,266	4,266	4,266	4,266	4,266

Note: Standard errors are clustered at the PSU level. Coefficient estimates are based on IPWRA estimates, correcting for attrition bias. P-values are reported in parentheses in the second rows. All consumption and income figures are in real terms, adjusted for 2019 prices. Results reflect estimates from household fixed effects regression using the IPWRA method, with inverse probability weights to correct for attrition bias.

Table A-4: Predicted change in per capita expenditure by type of ration card (IPW weighted)

VARIABLE	Per capita expenditure (purchase price) (1)	Per capita expenditure (market price) (1A)	Per capita food expenses (purchase price) (2)	Per capita food expenses (market price) (2A)	Non-food expenses (30 days) (3)	Discretionary expenses (365 days) (4)
No card	-0.146 (0.000)	-0.139 (0.000)	-0.058 (0.020)	-0.042 (0.030)	-0.057 (0.022)	-0.462 (0.000)
BPL	-0.056 (0.029)	-0.051 (0.041)	0.042 (0.022)	0.048 (0.018)	0.051 (0.078)	-0.480 (0.000)
APL	-0.065 (0.000)	-0.059 (0.000)	0.015 (0.014)	0.027 (0.041)	0.055 (0.002)	-0.404 (0.000)
Observations	8,532	8,532	8,532	8,532	8,532	8,532

Note: Predicted change reflects marginal effects based on IPWRA estimates provided in Table A-3, correcting for attrition bias. P-values are reported in parentheses in the second row, respectively. APL = above poverty line, BPL = below poverty line.

Table A-5: Predicted change in budget share by asset quintile group (IPW weighted)

VARIABLE	Food (market price) (1)	Food (purchase price) (1A)	Cereals /Grains (2)	Cereal Complements (3)	Cereal Substitutes (4)
Q1	2.07 (0.004)	1.93 (0.006)	-1.92 (0.000)	3.17 (0.000)	-0.43 (0.373)
Q2	2.95 (0.000)	2.51 (0.000)	-0.74 (0.000)	2.69 (0.000)	-0.43 (0.383)
Q3	4.44 (0.000)	3.99 (0.000)	-0.42 (0.001)	2.65 (0.000)	0.53 (0.169)
Q4	5.00 (0.000)	4.65 (0.000)	-0.20 (0.074)	2.32 (0.000)	1.33 (0.001)
Q5	3.18 (0.000)	2.92 (0.000)	0.09 (0.532)	1.38 (0.000)	0.75 (0.110)
Observations	8,532	8,532	8,532	8,532	8,532

Note: Predicted change in budget share reflects marginal effects, based on IPWRA estimates, correcting for attrition bias. P-values are reported in parentheses in the second rows. Q1–Q5 represent the asset quintile groups.