

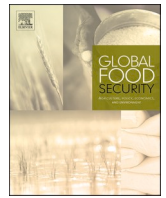


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Differences in the early impact of COVID-19 on food security and livelihoods in rural and urban areas in the Asia Pacific Region

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ABSTRACT

Lockdowns due to COVID-19 in early 2020 had health, economic, and social consequences globally. Using survey data collected as part of a rapid assessment among non-governmental organization- (NGO) supported communities in six Asia Pacific countries (n = 13,522), this study examined if the early impacts of COVID-19 on job loss or reduced income, food expenditure, food availability at households and markets, and affordability of essential items, differed between rural and urban areas. Job loss or reduced income was higher in urban areas than in rural areas in India (91.2% vs. 82.5%), Myanmar (72.0% vs. 48.6%), and Vietnam (76.5% vs. 44.9%). While there was a significant decline in food expenditure in all six countries, there were significantly larger reductions in food expenditures in urban areas versus rural areas in India (35.2% vs. 24.0%), Myanmar (30.8% vs. 8.5%), and Vietnam (31.0% vs. 2.3%). Food stocks were less available in urban areas than in rural areas in Bangladesh (18.8% vs. 37.8%), India (91.5% vs. 76.0%), and Myanmar (72.0% vs. 59.0%). Foods and essential items were largely available at markets, without significant differences between rural and urban areas, except in Vietnam. Full affordability was only 20%–30% for most items, with a trend of higher affordability of some items in urban areas than in rural areas. Recommendations to mitigate the impacts of COVID-19 include promoting urban agriculture with efficient food distribution and cash support and supporting small-holder farmers for procurement and adequate functioning of the supply chain system in the region.

1. Introduction

The spread of the novel severe acute respiratory syndrome coronavirus 2 (COVID-19) led to the global declaration of stay-at-home or lockdown mandates deployed throughout the world ([World Health Organization, 2020](https://www.who.int/news-room/feature-stories/20200417-covid-19)). Beginning in late March 2020, unprecedented lockdowns to impede the spread of the virus were instituted in many countries ([Hsiang et al., 2020](https://www.nature.com/articles/d41586-020-00000-0)). These lockdowns, however, also limited access to food markets, increased unemployment, and disturbed food chains and economic systems ([Pérez-Escamilla et al., 2020](https://www.nature.com/articles/d41586-020-00000-0)).

The International Food Policy Research Institute (IFPRI) suggests that “*even fairly short lockdown measures, combined with severe mobility disruptions and moderate food systems disruptions*” could lead to an average 7.9% decrease in gross national income per capita relative to pre-COVID-19 projections in most low- and middle-income countries ([Laborde et al., 2020](https://www.nature.com/articles/d41586-020-00000-0)). Current microeconomic models by Headey et al.

project that economic loss driven by COVID-19 may be associated with a 14.3% increase in the prevalence of moderate and severe wasting among children under-five years of age in 118 LMICs, or 6.7 million children ([Headey et al., 2020a](https://www.nature.com/articles/d41586-020-00000-0)).

The impact of this pandemic has extended around the globe, but the consequences have likely exacerbated pre-existing vulnerabilities and have affected more people in the Asia Pacific region than in other regions. Conservative estimates forecasted that COVID-19 could force at least 71 million individuals into extreme poverty, with over half of these concentrated in South Asia ([World Bank Group, 2020a](https://www.nature.com/articles/d41586-020-00000-0)). The adverse impacts of economic loss are likely to be severe in South East Asian countries, as projected in a World Bank report from October 2020 that forecasts an increase in poverty by 1.6–1.8 percentage points higher than previously projected ([World Bank Group, 2020b](https://www.nature.com/articles/d41586-020-00000-0)).

The Asia Pacific region may be particularly vulnerable to food insecurity as a result of the COVID-19 pandemic, as disruptions caused

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by lockdowns have the potential to impact the four pillars of food security: availability, access, utilization, and stability (Nguyen et al., 2021). While sharing geographic proximity, these countries represent a diverse array of pandemic responses and country demographics. However, within this region, there are individual factors that might further influence a household's vulnerability (Global Nutrition Report, 2020).

Early on in the pandemic, rapid assessments were already capturing acute food and livelihood crises. In the Narayanganj District, Bangladesh, an interrupted time series analysis with 2424 households reported that the proportion of families earning less than US\$1.90 per day increased to 47.3%, up from 0.2% just prior to the pandemic (Hamadani et al., 2020). This rapid increase in poverty is mirrored by similarly expeditious growth in food insecurity. Another study in Bangladesh conducted in April 2020 found that 90% of selected rural and urban households ($n = 212$) were experiencing some form of food insecurity (Das et al., 2020). In India, nearly 8 in 10 households reported consuming less food during the country's initial lockdown (Sinha, 2021). A recent study in Indonesia projected a significant decline in income from employment due to countrywide movement restrictions, which could potentially contribute to a 13.3% increase in national poverty (Pradesha et al., 2020). The Asian Development Bank projected a sharp decline of -1.0% in the economic growth of the Philippines due to an interplay of factors like loss of jobs, increase in debts for various enterprises, loss of wage earners in families due to illness or death, and reduction in remittances from overseas workers (Asian Development Bank, 2020). The magnitude of the pandemic's impact is becoming more apparent in some settings, but there is still a relatively poor understanding of the actual impacts on food security and nutrition at a micro-level, justifying the need to characterize those most severely impacted (Béné et al., 2021).

The emergence of newer variants of the virus across Vietnam, India, and the Philippines is compounding the economic recessions, which together with food system disruptions, will lead to a continuation of these devastating trends in the coming months and years. In 2021, India, Vietnam, and the Philippines are grappling with a second wave of the pandemic that has overwhelmed fragile health systems. The second round of lockdowns imposed by these countries to contain rising infections intensified food insecurity by restricting supply chains, limiting employment opportunities, and pushing millions of families deeper into financial distress. Meanwhile, the ongoing socio-political crises resulting in losses of domestic jobs and foreign remittances in Myanmar since February 2021 threaten to plunge an additional 1.5 to 3.4 million people into food insecurity and in need of assistance (World Food Programme, 2021). Similarly, the Philippines has reported a 6.2% food inflation rate following the impacts of typhoons in November and a second wave of COVID-19, afflicting the country's urban areas since April 2021 (Alegado and Calonzo, 2021). This has further contributed to the existing slow economic growth and food insecurity resulting from stringent lockdowns due to the pandemic in early and mid-2020 (The World Bank, 2020).

Disparities in food insecurity between urban and rural households have been documented, but the COVID-19 pandemic may exacerbate these pre-existing vulnerabilities to expand nutritional inequities. The differential in employment and income loss between urban and rural areas may suggest that in this pandemic context, urban households are especially vulnerable to food insecurity (Headey et al., 2020b), especially when considering that urban households may depend on employment for income to purchase food, while rural households can depend more on subsistence production, which may not be as negatively impacted by COVID-19 restrictions.

The World Vision Asia Pacific office administered a "Rapid Recovery Assessment" among World Vision-supported selected rural and urban communities in 14 countries throughout the Asia-Pacific region in May–June 2020 (World Vision, 2020). The assessment was a multi-sectoral rapid assessment intended for informing the Early Recovery (ER) needs of families, including identifying the vulnerable and

at-risk members in the target communities. The large-scale survey assessing >13,500 respondents' food security and livelihoods provides a unique opportunity to various impacts of COVID-19 across Asia Pacific countries and in rural and urban areas. This study examines differing early impacts of COVID-19 lockdowns on job loss and reduced income, food expenditure, and food availability, accessibility, and affordability between rural and urban households in Bangladesh, India, Indonesia, Myanmar, Philippines, and Vietnam in the Asia Pacific region during the early stages of the pandemic.

2. Methods

2.1. Data sources

The Rapid Recovery Assessment for COVID-19 was cross-sectionally conducted by World Vision country offices, in collaboration with World Vision Asia Regional Office, during May–June 2020 in 14 countries, mostly by telephone and face-to-face interviews with appropriate physical distancing measures in place in communities supported by World Vision country offices. The survey administered a household questionnaire and a child consultation questionnaire. This secondary data analysis uses the household survey data collected from six countries: Bangladesh ($n = 2671$), India ($n = 5668$), Indonesia ($n = 900$), Myanmar ($n = 429$), Philippines ($n = 423$), and Vietnam ($n = 3431$). Eight other countries were excluded from the analysis due to the small sample size [i.e. Cambodia ($n = 223$)], a different set of questionnaires [Nepal and Sri Lanka], and the inclusion of only rural households [Thailand].

2.2. Study population

The Early Recovery Assessment targeted World Vision sponsored households living in Area Program (AP) areas (communities where World Vision has conducted long-term comprehensive development programs) or households receiving any emergency support from World Vision due to economic shock derived from COVID-19. Largely, the surveyed populations belong to socio-economically poor and disadvantaged groups and were supported by World Vision before the COVID-19 pandemic. Households with children under 18 years old were eligible for the survey in all countries. Caregivers of children responded to the household survey.

2.3. Sampling methodology

A detailed methodology of data collection and sampling strategy has been described elsewhere (World Vision, 2020). Between May and June 2020, most of the countries in the region were under at least 45 days of lockdown. The sampling method varied between countries but was mostly random sampling or non-probability sampling (Supplemental Table 1). In Bangladesh, a total of 53 Area Programs (AP), out of 55 APs, from 52 upazilas of 24 districts were selected as assessment areas, following which quantitative data was collected by simple random sampling of 50 households (HH) per AP. As a result, 2671 households were assessed. In India, 111 APs, out of a total of 121, and seven special project areas were randomly selected as sampling units, and a total of 50 households were selected from each AP/project area using a non-probability convenience sampling technique. In Indonesia, a total of 29 APs of 30 were selected, and one to four primary focus areas per AP were purposively selected depending on the availability of existing data and reports. Thirty HHs were selected by convenience sampling in each AP. In total, 900 households from World Vision Indonesia responded to the survey. In Myanmar, all 31 APs from 46 districts in 13 of 14 States and Regions were assessed in the survey, were purposely sampled and in each district, 10 households were purposively sampled if the households had vulnerable children, children under-5, pregnant and lactating women, children living with disabilities, or were Vision Fund Myanmar

(VFM) clients. In the Philippines, 15 households from 28 out of 29 APs were randomly (or conveniently) selected, and a total of 423 households were assessed (World Vision, 2020). In Vietnam, the assessment was combined with a lot quality assurance sampling (LQAS) survey. In each of 35 APs, about 95 households (or 114 households in larger APs) were randomly selected and surveyed.

2.4. Available variables

The World Vision Asia Pacific Regional office designed a structured survey questionnaire with questions addressing COVID-19 related concerns, collected through an ODK platform called KoBo. The household questionnaire included the following categories (World Vision, 2020):

1) socio-demographic information: community location (rural/urban), age of the respondent, gender of respondent, survey response by household head, number of children under five years old, pregnant or lactating women, and any household member with chronic illnesses or disability; 2) livelihoods: multiple-income sources (salaried work with regular income, petty trade, owned business, agriculture, fishing, government aid/social security net), reported change in income or job status (loss of job or reduced income, resorted to secondary sources, no change), coping mechanisms, and reasons for the disruption of livelihood activities; 3) food security: the number of meals consumed by adults and children during the previous day, the reported current available food stock and food items at households, and the reported food expenditure before and during COVID-19; 4) market availability of essential items, affordability of essential items, housing, loan payments, and healthcare; 5) access to and use of clean, safe water; 6) access to health services; 7) child protection and education, and; 8) access to information and assistance.

The present study leveraged data on livelihoods and food security, including food and market availability of households, to make comparisons between rural and urban areas. The major components of food security below were evaluated based on the available data.

2.5. Food expenditure before and during COVID-19 restrictions or lockdowns

Food expenditure indicates financial and physical accessibility to foods (Béné et al., 2021). The survey respondents were asked how much (in their local currency) they spent monthly on food before and during the COVID-19 pandemic. The arithmetic change in the food expenditure before and during COVID-19 was calculated. The reduction rate in food expenditure was defined as a change in monthly food expenditure from before to during the COVID-19 pandemic.

2.6. Food availability at the household level

The survey respondents were asked if food stocks are available at their households with six possible choices: enough for one week, for two weeks, for three weeks, for one month, for more than one month, and not available. The responses of more than two weeks into one category. Also, the respondents were asked if the following food items are currently available in their household: starch, protein-rich foods, legumes, green leafy vegetables, other fruits and vegetables, energy-dense foods, and dairy products.

2.7. Food availability at local markets

A measure of the availability of food and other essential items in markets indicates a collective vulnerability in the local market system. Respondents were asked if staple food items (e.g., rice, bread, flour), fresh food items (e.g., vegetables, eggs, meat), hygiene items (e.g., soap, detergent), and essential medicines were currently available at the market, with four options of always, sometimes, not at all, and don't know. "Full availability" was defined as the item always being available

at the market. Other responses (sometimes and not at all) were categorized as "not fully available."

2.8. Affordability of essential items

Respondents were asked if they were able to meet five daily expenses (e.g., food, health care, rent, loan payment) with five possible options of fully, partially, not at all, don't know, and not applicable (only for the Philippines). "Full affordability" was defined as being fully able to bear the cost of the corresponding item, and the other responses (partially, not at all) were grouped as "not fully affordable."

2.9. Statistical analysis

Exploratory data analysis was conducted first through the calculation of proportions, means, and standard deviations for certain variables. Stacked bar graphs show the proportion of responses (fully, partially, not at all, don't know, and [not applicable if needed]) in each of four categorical variables describing affordability and accessibility. A paired student t-test was conducted within rural and urban areas separately to see if the monthly food expenditure before to during COVID-19 changed significantly. Logistic regression was conducted to assess if the change in monthly food expenditure differed between rural and urban areas. We analyzed the association between availability at households, availability at local markets, and affordability of essential items and location of residence (urban/rural areas) using univariate and multivariate logistic regression. The observations reporting "don't know" were treated as missing in the calculation of availability and affordability. Gender of the respondent, survey response by household head status, family size, and respondent's age (<25 y, 25–34 y, 35–44 y, ≤45 y) were included as confounders in the multivariable logistic regression model. β -coefficients and odds ratios with 95% confidence intervals (CI) were estimated, taking into account clustering at each area unit. All data were analyzed using Stata 16.0 (StataCorp College Station, TX).

2.10. Ethical clearance

Participation in the rapid assessment was voluntary, and informed consent was obtained by the interviewer for all participants prior to the administration of the questionnaire. Researchers followed data protection regulations, and data were anonymized before processing. This study was deemed to have an exemption of ethical review from Johns Hopkins School of Public Health.

3. Results

Most of the study households in the six countries lived in rural areas (range: 68.1%–88.2%) (Table 1). The majority of households in India (94.2%) and the Philippines (98.6%) were under lockdowns, while almost all Vietnam households (99.3%) were under a curfew. Most respondents in India (75.7%) were between 25 and 44 years, but respondents in other countries were relatively older. A total of 38.5%, 47.0%, and 32.6% of the respondents were older than 45 years in Myanmar, the Philippines, and Vietnam. Roughly half of all respondents were female in Bangladesh, India, and Vietnam, while more than 70% were females in Indonesia, Myanmar, and the Philippines. The survey response by household heads was higher in Bangladesh (61.0%), India (59.0%), and Vietnam (62.9%), compared to the other three countries where other household members completed the surveys. The lockdown status and demographic characteristics are largely comparable between rural and urban areas across countries (Supplemental Table 2).

Regarding income sources before COVID-19, daily wage labor and agriculture appeared as major income sources of the respondents. More than half of respondents were engaged in daily waged labor in Bangladesh (79.9%), India (67.5%), Myanmar (55.2%), the Philippines (52.3%), and Vietnam (54.4%) (Table 2). The proportion was higher in

Table 1
Household characteristics in six Asia Pacific countries, May–June 2020.

Characteristics	Bangladesh (n = 2671)	India (n = 5668)	Indonesia (n = 900)	Myanmar (n = 429)	Philippines (n = 423)	Vietnam (n = 3431)
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Area						
Rural	2128 (79.7)	3858 (68.1)	793 (88.1)	329 (76.7)	324 (77.1)	3027 (88.2)
Urban ^a	543 (20.3)	1810 (31.9)	107 (11.9)	100 (23.3)	97 (22.9)	404 (11.8)
Experience of lock down						
Lockdown	1590 (59.5)	5313 (94.2)	–	66 (15.4)	417 (98.6)	15 (0.44)
Curfew	1081(40.5)	132(2.3)	–	274 (63.9)	5 (1.2)	3408 (99.3)
Normal	–	197 (3.5)	–	89 (20.7)	1 (0.2)	8 (0.23)
Age (years)						
<25	N/A	600 (10.6)	49 (5.4)	12 (2.8)	8 (1.9)	125 (3.6)
25-34	N/A	2157 (38.0)	274 (30.4)	59 (13.8)	47 (11.1)	736 (21.5)
35-44	N/A	2138 (37.7)	371 (41.2)	193 (45.0)	169 (40.0)	1450 (42.3)
≥45	N/A	773 (13.6)	206 (22.9)	165 (38.5)	199 (47.0)	1120 (32.6)
Gender						
Male	1292 (48.4)	2568 (45.3)	214 (23.8)	105 (24.5)	41 (9.7)	1795 (52.4)
Female	1379 (51.6)	3099 (54.7)	686 (76.2)	324 (75.5)	382 (90.3)	1631 (47.6)
Household Head						
Yes	1629 (61.0)	3342 (59.0)	302 (33.6)	171 (39.9)	174 (41.1)	2158 (62.9)
No	1042 (39.0)	2326 (41.0)	598 (66.4)	258 (60.1)	249 (58.9)	1273 (37.1)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Family size, persons	4.8 (1.3)	5.2 (1.7)	5.2 (1.8)	5.9 (2.1)	5.9 (1.9)	4.9 (1.5)

^a Included semi-urban and slum areas.

Table 2
Household sources of income before COVID-19 in six Asia Pacific countries, May–June 2020.

Characteristics	Bangladesh (n = 2671)	India (n = 5668)	Indonesia (n = 900)	Myanmar (n = 429)	Philippines (n = 423)	Vietnam (n = 3431)
	n (%)	n (%)	n (%)	n (%)	n (%)	n (%)
Salaried work with regular income	133 (5.0)	10 (10.2)	255 (28.3)	45 (10.5)	74 (17.5)	717 (20.9)
Rural	63 (3.0)	276 (7.2)	206 (26.0)	32 (9.7)	52 (16.0)	467 (15.4)
Urban	70 (12.9)	302 (16.9)	49 (45.8)	13 (13.0)	22 (22.7)	250 (61.9)
p-value	p<0.001	p<0.001	p<0.001	p = 0.35	p = 0.13	<0.001
Petty trade/owned business	313 (11.7)	520 (9.2)	179 (19.9)	108 (25.2)	79 (28.9)	114 (3.3)
Rural	233 (11.0)	305 (7.9)	138 (17.4)	79 (24.0)	51 (15.6)	78 (2.6)
Urban	80 (14.7)	215 (12.0)	41 (38.3)	29 (29.0)	28 (28.9)	36 (8.9)
p-value	p = 0.01	p<0.001	p<0.001	p = 0.31	p = 0.003	p<0.001
Daily casual labour/migrant worker	2135 (79.9)	3945 (69.9)	243 (27.0)	237 (55.2)	221 (52.3)	1869 (54.4)
Rural	1746 (82.1)	2743 (71.2)	207 (26.1)	176 (53.5)	180 (55.2)	1696 (56.0)
Urban	389 (71.6)	1202 (67.2)	36 (33.6)	61 (61.0)	41 (42.3)	172 (42.6)
p-value	p<0.001	p = 0.002	p = 0.10	p = 0.19	p = 0.03	p<0.001
Agriculture/livestock/fishing	598 (22.4)	1522 (27.0)	472 (52.4)	190 (44.2)	127 (30.0)	2338 (68.1)
Rural	576 (27.1)	1471 (38.2)	466 (58.8)	180 (54.7)	110 (33.7)	2314 (76.5)
Urban	22 (4.1)	51 (2.9)	6 (5.6)	10 (10.0)	17 (17.5)	24 (5.9)
p-value	p = 0.001	p<0.001	p<0.001	p<0.001	p = 0.002	p<0.001
Government aid/social security net	75 (2.8)	479 (8.5)	23 (2.6)	9 (2.1)	45 (10.6)	83 (2.4)
Rural	63 (3.0)	449 (11.7)	23 (2.9)	6 (1.8)	30 (9.2)	73 (2.4)
Urban	12 (2.2)	30 (1.7)	0 (0.00)	2 (3.0)	15 (15.5)	10 (2.5)
p-value	p = 0.35	p<0.001	p = 0.07	p = 0.47	p = 0.08	p = 0.94

*p<0.05 tested by chi-squared tests to compare the responses between rural and urban areas.

rural areas than urban areas in India, Bangladesh, the Philippines, and Vietnam (all p<0.05). Agriculture was a more dominant income source in rural areas (range: 27.1% in Bangladesh to 76.5% in Vietnam) across the six countries than in urban areas (2.9% in India to 17.5% in the Philippines). Urban respondents were engaged in more diverse income sources than rural populations. The proportion of salaried work with regular income and petty trade/owned business was higher in urban respondents across all six countries.

It is notable that the majority of households in Bangladesh (89.6%), India (85.0%), Indonesia (73.8%), the Philippines (71.2%), and Myanmar (54.1%), and roughly half of households in Vietnam (48.6%) recently lost their jobs or experienced income reduction during the COVID-19 lockdown (Fig. 1 and Supplemental Table 3). The proportion of respondents who reported losing jobs or reduced income was higher in urban areas than rural areas in India (91.2% vs. 82.5%), Myanmar (72.0% vs. 48.6%), and Vietnam (76.5% vs. 44.9%) (all p < 0.001; tested by a chi-squared test), however, the differences between rural and

urban was not significant in Bangladesh, Indonesia, and the Philippines.

All surveyed rural and urban areas in these six countries showed a significant reduction in food expenditure, with the exception of an increase in food expenditure in rural Bangladesh and no significant changes in urban Indonesia and rural Vietnam (Table 3). Largely, urban areas were likely to experience a greater reduction in food expenditure than rural areas in all countries except Indonesia. In Bangladesh, the percent-change in monthly food expenditure compared to pre-pandemic time was a 10% (173 Bangladesh Taka [BDT]/1640 BDT) increase in rural areas, but a 10% reduction (220 BDT/2012 BDT) in urban areas. The reduction in food expenditure was higher in urban areas than rural areas in India (35.2%; 570 Indian rupee [INR]/1615 INR vs. 24.0%; 323 INR/1344 INR), Myanmar (30.8%; 13,180 Burmese Kyat [MMK]/42,785 MMK vs. 8.5%; 3422 MMK/40,131 MMK), and Vietnam (31.0%; 72,134 Vietnamese Dong [VND]/232,523 VND vs. 2.3%; 8530 VND/368,075 VND), while the reduction was similar in both rural and urban areas in the Philippines (32.9%; 734 Philippine Peso [PHP]/2227 PHP

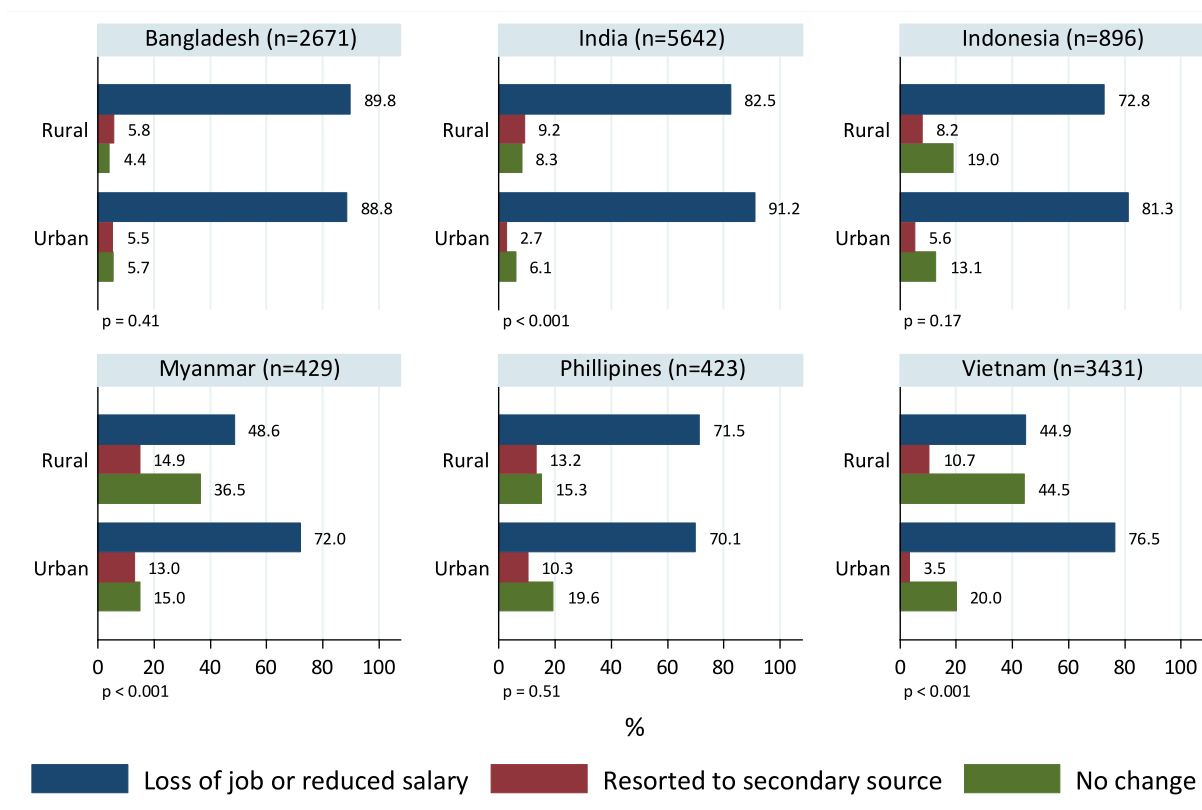


Fig. 1. Loss of job or reduced income in the four to five weeks prior to the survey in six Asia Pacific countries during COVID-19 measures, May–June 2020. In India, the response of having no work or no business (n = 3440) was included in the “loss of job or reduced salary” category.

¹ Missing data n = 26 in India

² Missing data n = 4 in Indonesia.

vs. 34.5%; 576 PHP/1669 PHP). On the contrary, the reduction in monthly food expenditure was higher in rural areas (25.3%; 90,568 Indonesian Rupiah [IDR]/357,475 IDR) than urban areas (15.7%; 68,397 IDR/434,519 IDR) in Indonesia. Compared to the rural areas, in urban areas, the monthly food expenditure during COVID-19 decreased by 391 BDK in rural areas of Bangladesh ($p = 0.02$), 241 INR in rural India ($p = 0.001$), and 10,255 MMK in Myanmar ($p < 0.001$).

Bangladesh had the highest proportion of households reporting no household food stock (66.0%) at the time of the survey (Table 4). India, Indonesia, and the Philippines had a relatively lower proportion of households without any current food stock (ranging from 13.4% to 22.0%) (Supplemental Fig. 1). Under COVID-19 measures, starchy foods were largely available in most households across the six countries (range: 73.4%–94.1%). Availability of protein-rich animal foods differed by country (Table 4). More than 70% of households in Vietnam and the Philippines had available protein-rich animal foods, but only 20.8% in India and 31.7% in Myanmar had protein-rich foods available within their household. Dairy foods, in particular, were less available in Myanmar (10.7%). The odds of available food stock at household-level were lower in urban areas than rural areas in Bangladesh (OR = 0.38, 95% CI: 0.23, 0.64), India (OR = 0.30, 95% CI: 0.18, 0.51), and Myanmar (OR = 0.53; 95% CI: 0.30, 0.96). Unlike other countries, in Indonesia, the odds of having protein-rich foods (OR = 2.92; 95% CI: 1.40, 6.06), legumes (OR = 1.74; 95% CI: 1.01, 3.02), and other fruits and vegetables (OR = 1.90, 95% CI: 1.19, 3.05) was higher in urban areas compared to rural areas. In Bangladesh, dairy products were more available in urban areas than rural areas (OR = 1.81; 95% CI: 1.11, 2.94). In the Philippines and Vietnam, the odds of green leafy vegetables being available (OR = 0.18; 95% CI: 0.07, 0.45 and OR = 0.07; 95% CI: 0.03, 0.16, respectively) were lower in urban areas compared to rural areas.

Early in the COVID-19 pandemic, the proportion of respondents

reporting full availability to basic foods (54.1%–94.4%), fresh foods (24.0%–84.7%), hygiene items (56.1%–91.8%), and medicine (51.0%–74.8%) at their local market was moderate to high across the six countries (Fig. 2 and Supplemental Table 4). Respondents in India had the lowest full (24.0%), but a large partial availability at markets (62.6%), notably with a greater partial availability of other essential items (40.6%–43.5%) than other countries. Full availability at markets was significantly higher for some of the essential items in urban areas in India, Myanmar, Philippines, and Vietnam than rural areas (Table 5), while none of the essential items significantly differed in being fully available at markets between rural and urban areas in Bangladesh and Indonesia.

Respondents reporting full affordability of food ranged from 29.8% in India to 52.8% in Indonesia. Similarly, the full affordability of health care ranged from 20.6% in Myanmar to 47.9% in Indonesia. However, the percentage range of full affordability of households' rent payments and loan repayments were only 7.1%–27.9% and 4.0%–29.1%, respectively, across the six countries (Fig. 3 and Supplemental Table 5). It is striking that the percentage of respondents who were unable to afford rent or loan repayment at all in India was relatively high at 64.3% and 62.5%, respectively. The odds of full affordability of essential items did not differ between rural and urban areas in Bangladesh, Myanmar, and the Philippines. However, the odds of full affordability of food in India were significantly lower (OR = 0.57, 95% CI: 0.39, 0.82). The odds of full affordability of rent payments were higher in urban areas in India (OR = 1.80; 95% CI: 1.12, 2.87) and Indonesia (OR = 2.60; 95% CI: 1.19, 5.67) than in rural areas (Table 6).

4. Discussion

The COVID-19 pandemic had an unprecedented global impact on the

Table 3
Changes in food expenditure in rural and urban areas of six Asia Pacific countries before and during COVID-19 lockdowns, May–June 2020^a.

Country	Rural		Difference (95%CI) (b – a)	Percent change in food expenditure relative to before pandemic (%) (b – a)/a	Urban		Difference (95%CI) (d – c)	Percent change in food expenditure relative to before pandemic (%) (d – c)/c	Difference in differences between rural and urban area β (95%CI) ^b (d – c) – (b – a)
	Before Mean (a); Median [IQR]	During Mean (b); Median [IQR]			Before Mean (c); Median [IQR]	During Mean (d); Median [IQR]			
Bangladesh (1 USD = 84.8 BDT)	1640; 1500 [1000–2000]	1814; 1550 [1000–2200]	173 (215, 132)	10.5% (+)	2012; 1800 [1400–2500]	1791; 1500 [1000–2200]	–220 (–334, –107)	10.9%	–391 (–706, –77)
p-value			p < 0.001				p < 0.001		p = 0.016
India (1 USD = 74.1 INR)	1344; 1000 [700–1500]	1020 700 [400–1250]	–323 (–349, –297)	24.0%	1615; 1500 [1000–2000]	1044; 750 [500–1200]	–570 (–608, –532)	35.2%	–241 (–378, –105)
p-value			p < 0.001				p < 0.001		p = 0.001
Indonesia (1 USD = 14489.5 IDR)	357,475; 300,000 [150,000–500,000]	267,372; 200,000 [100,000–350,000]	–90568 (–129,296, –60930)	25.3%	434,519; 350,000 [272,000–500,000]	366,123; 280,000 [140,000–400,000]	–68397 (–143,547, 6754)	15.7%	–18887 (–142,288, 104,515)
p-value			p < 0.001				p = 0.07		p = 0.72
Myanmar (1 USD = 1646.3 MK)	40,131; 35,000 [25,000–50,000]	36,709; 30,000 [30,000–49,000]	–3422 (–5551, –1293)	8.5%	42,785; 37,500 [35,000–50,000]	29,605; 28,000 [15,000–35,000]	–13180 (–17302, –9058)	30.8%	–10255 (–15328, –5183)
p-value			p = 0.002				p < 0.001		p < 0.001
Philippines (1 USD = 48.5 PHP)	1669; 1500 [1000–2000]	1092; 1000 [500–1500]	–576 (–656, –496)	34.5%	2227; 1800 [1400–2730]	1494; 1250 [750–2000]	–734 (–931, –536)	32.9%	–152 (–573, 270)
p-value			p < 0.001				p < 0.001		p = 0.47
Vietnam (1 USD = 23,000 VND)	368,075; 1200 [420–500,000]	357,333; 1000 [1000–500,000]	–8530 (–42925, 25,685)	2.3%	232,523; 1200 [700–2700]	160,389; 1043 [650–3000]	–72134 (–140,700, –35690)	31.0%	–66330 (–223,690, 91,030)
p-value			p = 0.63				p = 0.04		p = 0.40

^a BDT, Bangladesh Taka; INR, Indian Rupee; IDR, Indonesian Rupiah; MK, Myanmar Kyat; PHP, Philippine Peso; VND, Vietnamese Dong. Currency data provided by Morningstar for Currency and Coinbase for Cryptocurrency, June 18, 2021.

^b All β -coefficient (95%CI) were adjusted for the gender of respondent, the household head status of the respondent, family size, and age and accounted for community clustering.

Table 4
Availability to food items at households in six Asia Pacific countries during COVID-19 measures, May–June 2020.

Characteristics	Bangladesh (n = 2671)	India (N = 5642) ^a	Indonesia (n = 892) ^b	Myanmar (n = 429) ^c	Philippines (n = 423)	Vietnam (n = 3431)
Availability of food stock, n (%)						
No stock	1764 (66.0)	755 (13.4)	134 (15.0)	133 (31.0)	93 (22.0)	1343 (39.1)
Yes, for one week	630 (23.6)	1726 (30.6)	290 (32.5)	108 (25.2)	195 (46.1)	785 (22.9)
Yes, for two weeks or more	277 (10.4)	3161 (35.3)	468 (52.5)	188 (43.8)	135 (31.9)	1303 (38.0)
Rural (Ref)	1.00	1.00	1.00	1.00	1.00	1.00
Urban [OR(95%CI)]	0.38 (0.23, 0.64) ^d	0.30 (0.18, 0.51)	0.78 (0.42, 1.47)	0.53 (0.30, 0.96)	0.73 (0.27, 1.96)	0.57 (0.27, 1.21)
Current available food item						
Starch, n (%)						
Rural (Ref)	1.00	1.00	1.00	1.00	1.00	1.00
Urban [OR(95%CI)]	0.96 (0.57, 1.63)	0.59 (0.34, 0.99)	1.66 (0.58, 4.75)	0.62 (0.16, 2.43)	5.25 (1.19, 23.2)	0.45 (0.18, 1.15)
Protein rich animal, n (%)						
Rural (Ref)	1.00	1.00	1.00	1.00	1.00	1.00
Urban [OR(95%CI)]	0.97 (0.70, 1.34)	0.91 (0.60, 1.37)	2.92 (1.40, 6.06)	1.03 (0.52, 2.06)	0.74 (0.39, 1.39)	0.63 (0.28, 1.46)
Pulses and legumes, n (%)						
Rural (Ref)	1.00	1.00	1.00	1.00	1.00	1.00
Urban [OR(95%CI)]	0.92 (0.52, 1.62)	0.86 (0.58, 1.28)	1.74 (1.01, 3.02)	0.95 (0.49, 1.85)	0.57 (0.31, 1.06)	0.75 (0.36, 1.59)
Green leafy vegetables, n (%)						
Rural (Ref)	1.00	1.00	1.00	1.00	1.00	1.00
Urban [OR(95%CI)]	0.91 (0.52, 1.61)	0.68 (0.43, 1.06)	1.41 (0.80, 2.48)	0.64 (0.35, 1.17)	0.18 (0.07, 0.45)	0.07 (0.03, 0.16)
Other fruits and vegetables, n (%)						
Rural (Ref)	1.00	1.00	1.00	1.00	1.00	1.00
Urban [OR(95%CI)]	1.32 (0.82, 2.11)	0.79 (0.56, 1.11)	1.90 (1.20, 3.03)	0.46 (0.21, 1.04)	0.79 (0.33, 1.92)	0.33 (0.15, 0.72)
Energy dense foods, n (%)						
Rural (Ref)	1.00	1.00	1.00	1.00	1.00	1.00
Urban [OR(95%CI)]	1.33 (0.77, 2.29)	0.89 (0.57, 1.41)	2.38 (0.97, 5.85)	0.35 (0.17, 0.72)	1.30 (0.59, 2.89)	1.14 (0.51, 2.56)
Milk products, n (%)						
Rural (Ref)	1.00	1.00	1.00	1.00	1.00	1.00
Urban [OR(95%CI)]	1.81 (1.11, 2.94)	0.94 (0.62, 1.42)	1.86 (0.81, 4.26)	0.96 (0.34, 2.68)	1.45 (0.74, 2.86)	2.22 (0.98, 5.04)

^a Missing data n = 26 in India.

^b Missing data n = 8 in Indonesia.

^c Availability of 100% or 75% was categorized as “available” in Myanmar.

^d All ORs (95%CI) were adjusted for the gender of respondent, the household head status of the respondent, family size, and age and accounted for community clustering.

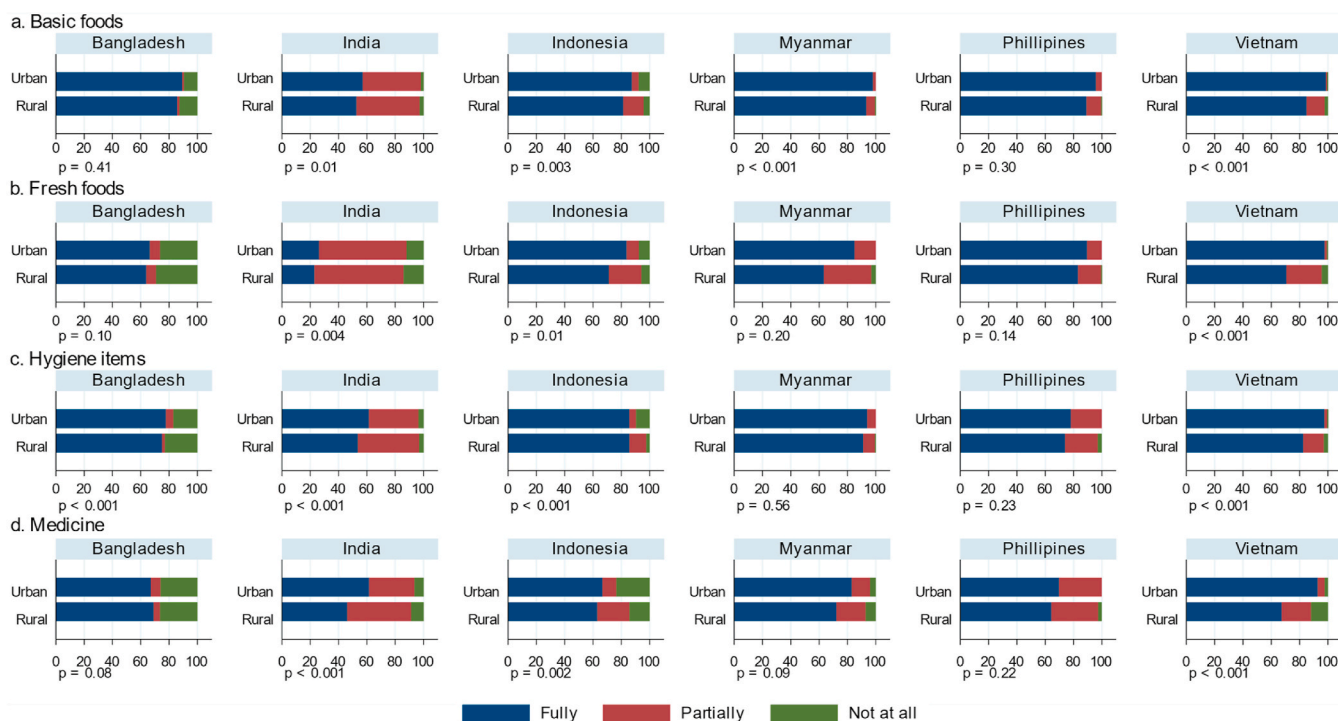


Fig. 2. Market availability of essential items in rural and urban areas in six Asia Pacific countries during COVID-19 lockdowns, May–June 2020. The number of observations in rural areas, n = 2128 in Bangladesh, n = 3858 in India, n = 793 in Indonesia, n = 329 in Myanmar, n = 326 in the Philippines, and n = 3027 in Vietnam; In urban areas, n = 543 in Bangladesh, n = 1810 in India, n = 107 in Indonesia, n = 100 in Myanmar, n = 97 in the Philippines, and n = 404 in Vietnam. Each stack bar indicates the sum of mean percentage of items.

Table 5

Adjusted Odds Ratio (95%CI) of availability of essential items at markets and affordability of essential items during COVID-19 measures in urban areas, compared to rural areas in six Asia Pacific countries, May–June 2020.

Essential items		Bangladesh (n = 2671)	India (n = 5642) ^a	Indonesia (n = 892) ^b	Myanmar (n = 429)	Philippines (n = 423)	Vietnam (n = 3431)
		OR (95%CI) ^c	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Fresh food items	Ref: Rural	1.00	1.00	1.00	1.00	1.00	1.00
	Urban	1.13 (0.63, 2.00)	1.18 (0.80, 1.75)	2.14 (0.55, 8.34)	3.44 (1.57, 7.54)	1.78 (0.79, 3.99)	16.7 (6.88, 40.6)
Basic food items	Ref: Rural	1.00	1.00	1.00	1.00	1.00	1.00
	Urban	1.36 (0.56, 3.28)	1.18 (0.85, 1.64)	1.57 (0.38, 6.53)	3.19 (0.56, 18.13)	2.82 (1.01, 7.83)	10.6 (3.64, 31.1)
Hygiene items	Ref: Rural	1.00	1.00	1.00	1.00	1.00	1.00
	Urban	1.16 (0.59, 2.29)	1.41 (1.00, 1.98)	0.96 (0.29, 3.21)	1.35 (0.40, 4.60)	1.25 (0.48, 3.26)	7.24 (4.10, 12.8)
Essentials medicines	Ref: Rural	1.00	1.00	1.00	1.00	1.00	1.00
	Urban	0.92 (0.53, 1.59)	1.92 (1.39, 2.64)	1.06 (0.42, 2.72)	1.86 (0.96, 3.60)	1.29 (0.68, 2.45)	5.92 (2.12, 16.6)

^a Missing data n = 26 in India.

^b Missing data n = 8 in Indonesia.

^c All ORs (95%CI) were adjusted for the gender of respondent, the household head status of the respondent, family size, and age and accounted for community clustering.

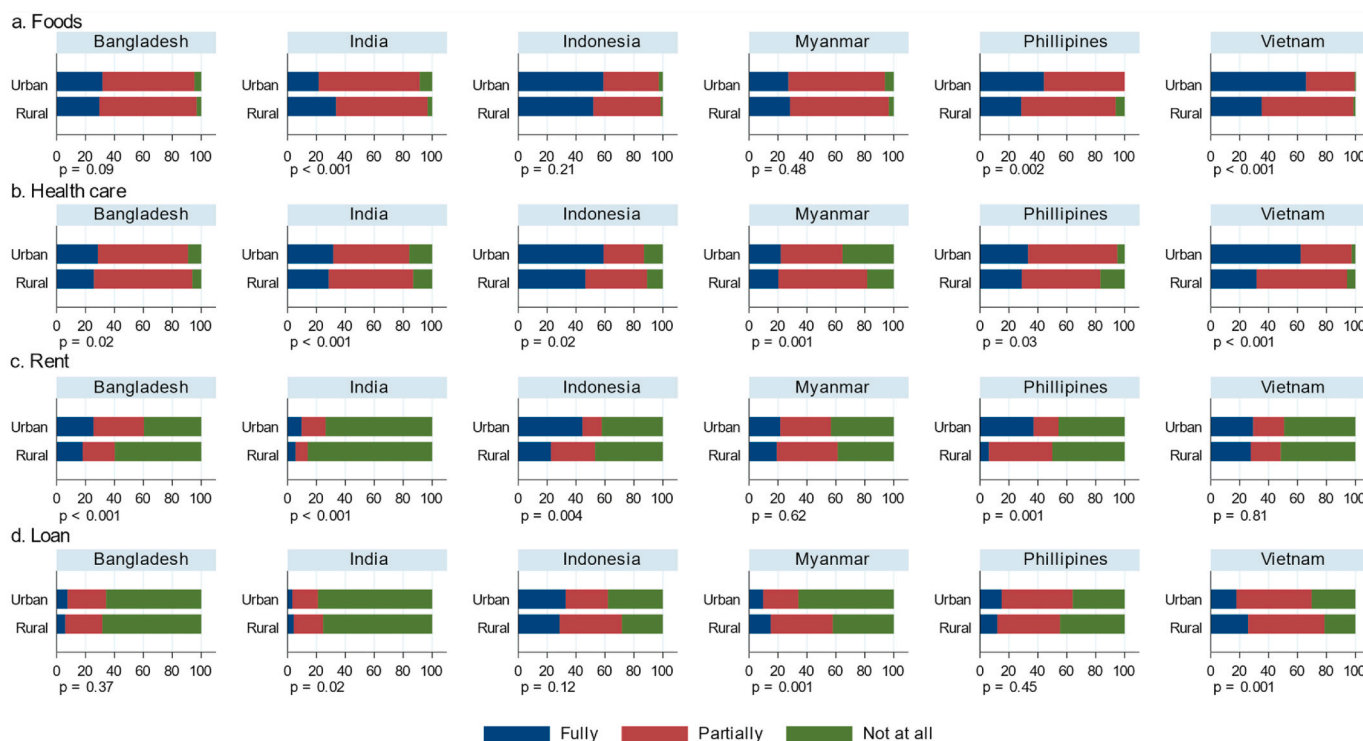


Fig. 3. Affordability of essential items in rural and urban areas in six Asia Pacific countries during COVID-19 lockdowns, May–June 2020. The number of observations in rural areas, n = 2128 in Bangladesh, n = 3858 in India, n = 793 in Indonesia, n = 329 in Myanmar, n = 326 in the Philippines, and n = 3027 in Vietnam; In urban areas, n = 543 in Bangladesh, n = 1810 in India, n = 107 in Indonesia, n = 100 in Myanmar, n = 97 in the Philippines, and n = 404 in Vietnam. Each stack bar indicates the sum of mean percentage of items.

world economy. The present study leverages cross-sectional survey data from a Rapid Recovery Assessment collected among economically disadvantaged households during the early months of COVID-19 (May–June 2020) across six Asia Pacific countries. A high proportion of households had already lost their job or experienced reduced income since the beginning of the COVID-19, and as a result, they had reduced household food expenditure. These trends were reported to be higher in urban areas in a few countries. There was substantial variation between countries regarding whether a lack of food stock was more prominent in urban areas than rural areas. The market availability of essential items, including foods, was moderate to high across countries, without significant difference between urban and rural areas for most items except for Vietnam, where the trend showed urban areas with greater availability to all items. Poor affordability of essential expenses was particularly pronounced for loan repayments and rent payments, compared to food.

4.1. Income losses

Most surveyed countries were economically affected through loss of jobs or reduced salaries and food expenditure during the lockdowns, more so in urban areas than rural areas (Table 2). Similarly, a cross-sectional survey conducted in Myanmar reported a decline in median income by 34.6%, with higher losses in households with skilled/unskilled labor followed by farming households (Headey et al., 2020c). In another study in Myanmar, 75% of households in rural settings reported a loss of employment and income, in contrast to 84% of urban households (Researchers of the International Food Policy Research Institute (IFPRI) and Michigan State University, 2020).

The discrepancy between urban and rural areas in the proportion of income loss and reduced income might be related to their differing income source profile. A higher proportion of the urban population earns

Table 6

Adjusted Odds Ratio (95%CI) of affordability of essential items during COVID-19 measures in urban areas, compared to rural areas in six Asia Pacific countries, May–June 2020.

Essential items		Bangladesh (n = 2671)	India (n = 5642) ^a	Indonesia (n = 892) ^b	Myanmar (n = 429)	Philippines (n = 423)	Vietnam (n = 3431)
		OR (95%CI) ^c	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)	OR (95%CI)
Food	Ref: Rural	1.00	1.00	1.00	1.00	1.00	1.00
	Urban	1.11 (0.56, 2.21)	0.57 (0.39, 0.82)	1.21 (0.70, 2.09)	0.88 (0.52, 1.48)	2.04 (0.84, 4.96)	3.43 (1.86, 6.33)
Rent	Ref: Rural	1.00	1.00	1.00	1.00	1.00	1.00
	Urban	1.55 (0.65, 3.74)	1.80 (1.12, 2.87)	2.60 (1.19, 5.67)	1.11 (0.62, 2.00)	– ^d	1.07 (0.65, 1.79)
Health care/ medicine	Ref: Rural	1.00	1.00	1.00	1.00	1.00	1.00
	Urban	1.14 (0.64, 2.03)	1.21 (0.87, 1.67)	1.54 (0.95, 2.49)	1.19 (0.53, 2.70)	1.24 (0.48, 3.22)	3.41 (1.91, 6.09)
Loan payment	Ref: Rural	1.00	1.00	1.00	1.00	1.00	1.00
	Urban	1.29 (0.66, 2.54)	0.80 (0.44, 1.47)	1.15 (0.56, 2.36)	0.60 (0.29, 1.23)	1.30 (0.43, 3.90) ^e	0.60 (0.41, 0.88)

^a Missing data n = 26 in India.

^b Missing data n = 8 in Indonesia.

^c All ORs (95%CI) were adjusted for the gender of respondent, the household head status of the respondent, family size, and age and accounted for community clustering.

^d Regression analysis was excluded due to available n = 83.

^e n = 211.

income through salaried employment or small trades, while there is a high proportion of agriculturists, especially small-holder farmers, in rural areas. A rapid response survey conducted by the Bangladesh Rural & Advancement Committee (BRAC) reported higher reductions in income (75%) compared to baseline or pre-pandemic times among urban respondents, compared to a 62% reduction in income in rural respondents from February to April 2020 (PPRC-BIGD, 2020). In the study, 1% of urban respondents were engaged in agriculture as their main source of income compared to 16% of rural participants. However, in our study in Bangladesh, the income loss was reported by 89.6% of respondents, and this percentage was comparable between rural and urban households, despite a higher engagement in agricultural practices (27.1% vs. 4.1%) and daily labor (82.1% vs. 71.6%) in rural areas than urban areas.

In our study, India reported a higher rate of loss of jobs and reduced income in urban households compared to rural households (91.2% vs. 82.5%) during lockdowns. National job losses in India were recorded at 122 million in the month of April 2020 (Vyas, 2020). Lockdown following the surge in COVID-19 cases in India triggered a rapid loss of employment in the informal sector, especially among daily wage workers, which could potentially account for the difference observed between rural and urban households. This reduction in the earning capacity of daily wage workers is further aggravated by their inability to access cash transfers and remittances because they lack bank accounts.

4.2. Changes in food expenditure

A high rate of reduced income or job loss would lead to reduced household food expenditures. More urban households reported reduced food expenditure across India and Myanmar, which could be a consequence of more pronounced loss of jobs and reduced incomes in urban areas versus rural areas. The present study findings add to evidence showing that typical urban households who subsist on daily income to buy food products are more economically vulnerable to reduced income or loss of jobs than rural households (Headey et al., 2020a). Financial and physical accessibility was the most disrupted dimension of food security during the early stages of COVID-19, especially in urban areas in LMICs (Béné et al., 2021). Changes in food expenditure reflect both reduced access to the market and reduced purchasing power in households (Béné et al., 2021).

All countries, but rural Bangladesh, reported reduced food expenditure during the early COVID-19 period. The significant surge in food expenditure observed in rural households in Bangladesh might be related to a rapid change in food price in the first week of April compared to March 2020 (Food and Agriculture Organization of the United Nations, 2020). Other research using a nationally representative

sample in Bangladesh (n = 5,471) observed that average food expenditure decreased by 22% in rural households and by 28% in urban households and was further reduced in the lower-income groups (PPRC-BIGD, 2020).

In addition to income loss as a contributing factor to decreasing food expenditure, changes in food prices may impact the household's capacity to purchase food items for consumption. In Myanmar, crop traders and food vendors experienced regional variations with higher prices than generally reported from the West and North zone, and food items like chicken and pork showed a substantial increase in prices, while prices of oilseed and pulses significantly decreased (Goeb et al. 2020; Minten et al., 2020). Similarly, compared to 2019, retail food prices of different commodities across 11 cities in India increased following the lockdown, especially in non-cereals versus cereals (TCI Tata-Cornell Institute, 2020).

4.3. Food availability at households

Higher food stock availability in rural households can be explained by a higher proportion of the population engaging in agriculture and livestock rearing in rural areas across the six countries. In our study, 62.2% of households in rural and 81.2% in urban Bangladesh reported having no food stock (Supplemental Fig. 1). Findings from a similar study conducted in Rupganj Upazila during the lockdown observed that 69.4% of surveyed households experienced food insecurity (Hamadani et al., 2020); and 37% and 21% of urban and rural participants, respectively, had only 1–2 days of food stock (Rashid et al., 2020). During the lockdown, the supply chain of agricultural products, especially perishable food items, bore the brunt of issues such as poor access to marketing channels, inadequate transportation, lack of storage facilities, handling, and processing, which heightened the non-availability of food items in urban areas (Padhee and Pingali, 2020). A study amongst 448 farmers in a few India States reported that vegetable consumption reduced in 30% of the households, but significantly increased in another 15% (Harris et al., 2020). A study in Myanmar noted that rural farming households have a lower likelihood of being impacted by income loss or food supply issues, compared to skilled and unskilled households in urban areas (Headey et al., 2020b). In Bangladesh, business for informal street vendors who usually go door to door selling products came to a grinding halt following the implementation of lockdown measures, which resulted not only in the loss of income for business owners but also limited access to food for urban residents (Ruszczuk et al., 2020).

Our findings showed that starchy foods were available to most households across the six countries, while protein-rich animal and dairy foods were in short supply for most households in some countries. The

supply side of labor-intensive food products, including meat processing, fruits, and dairy product, is likely to be more affected than other food groups by the restrictions in Asian countries (Kim et al., 2020). The current repeated COVID-19 lockdowns in the Asia Pacific region would likely exacerbate the reduction in dietary diversity at the population level through reduced availability of animal source-based and micronutrient-rich foods in poor food supply chains.

4.4. Availability at local markets

During the early lockdowns, essential items, including basic foods and fresh foods, were available at markets in these countries. This indicates that the market system was not severely degraded by lockdowns. However, findings from our study suggest that India and Bangladesh were more affected than other countries. The survey was undertaken between May and June 2020, closely following a relatively short period of pandemic lockdowns, allowing this paper to evaluate the disruption of food markets. At least, by the time of this survey, the local market systems “resisted” the shocks Béné et al. mentions (Béné et al., 2021), without additional evidence of severe market food shortages in the short-term.

Although physical access to markets was not assessed in this survey, it was reported that even under lockdowns restricting movements, physical access to local markets or neighborhood kiosks for basic food items was not hindered in Bangladesh, Indonesia, and Myanmar (World Vision, 2020). At the time of the Rapid Assessment by World Vision, the study sites of India had been under stringent lockdown conditions, including limited times to access markets and public transportation restrictions, since March 24, 2020 (World Vision, 2020).

We observed that the proportion of respondents reporting full availability of essential items at markets across all countries did not differ substantially between rural and urban areas, except in Vietnam, even though our data suggests that urban households are more susceptible to further economic vulnerabilities than rural areas. Our results also suggest that even under lockdowns conditions that restrict movement, supply of essential foods to local markets was likely maintained, noting that urban markets procure more diverse supplies than rural markets.

Similar to the findings of high partial availability of essential items in India, a cross-sectional survey conducted in an urban city of Western India also reported that 50% of the respondents noted a decrease in market availability of vegetables, meat, and poultry and had limited daily access to grocery stores due to strict containment measures (Sukhwani et al., 2020).

Using the Food Insecurity Experience Scale (FIES), Headey et al. (2020a) show that in Myanmar, access to healthy food was reported to be most affected. Likewise, in India, 62% of the farm households interviewed reported disruptions to their diets. While around 80% of these households reported an ability to protect their consumption of staple foods, the largest declines in consumption were in fruit and animal-source foods other than dairy, in around half the households (Harris et al., 2020).

4.5. Affordability of essential items

The overall results suggest that affordability for essential items was worse than the level of availability in these countries. The reported affordability for food or health care was higher than that of rent or loan payment across six countries. The results suggest that an immediate lack of cash puts more economic pressure on repaying loans and making rent payments than purchasing foods.

4.6. Strengths and limitations

This study leveraged data with a large sample size from six Asia Pacific countries that used similar survey questionnaires, enabling a

comparison of the early impact of COVID-19 on food security and livelihoods among vulnerable populations across countries. There were several limitations of the study. First, the structure of the survey sampling frames varied by country, and the regional aggregated data were not weighted to the survey population. Secondly, another limitation is to use of non-probabilistic sampling, as most of the data collection occurred in areas supported by long-term development or COVID-19 relief support agencies. This selective choice of survey participants does not guarantee the generalizability of results to the general population. The study population belonged to lower socio-economic groups in the countries where they reside and was receiving support from World Vision. Therefore, the results cannot be extrapolated to the entire country population. Third, this is a cross-sectional survey, and there are no baseline household data prior to the COVID-19 outbreak. Thus, differences in availability, affordability, and accessibility measures between rural and urban areas would not solely result from changes in their livelihoods due to the COVID-19 lockdown, but instead could be mixed with existing economic gaps between the two areas before COVID-19, coupled with weakened livelihoods due to loss of income and reduced food expenditure from COVID-19 restrictions. Also, purchasing schedules at the market would not be consistent between rural and urban areas. Continued monitoring and longitudinal surveys are recommended to track changes in livelihoods and food security among vulnerable households. Fourth, since the interviews were conducted during an emergency, the data collection approaches were mixed via telephone or face-to-face household interviews, and there were varying lockdown policies in the six countries. Fifth, the percent reduction in food expenditure from before to during the COVID-19 pandemic cannot be used as a perfect proxy for change in food affordability or accessibility as food item prices have also changed. Lastly, the type of information collected in the survey included perception-based and self-reported responses when recalling an economic status before COVID-19, which may not exclude the possibility of recall bias. Regardless of these limitations, the present study provides important early insight into ever-evolving situations due to the COVID-19 lockdowns in vulnerable populations across six low and middle-income countries in the Asia Pacific region and captured a large number of respondents whose perspectives help to understand the impact of COVID-19 on their families and communities.

4.7. Recommendation for program and policy

To mitigate the impact of successive lockdowns and mobility restrictions imposed by COVID-19 in the Asia Pacific region, our findings suggest governments and aid organizations should be actively involved in securing supply chains for producers, advocating for fair labor, investing in resources, and providing monetary support directed towards households affected by the lockdown measures and weakened economic activities. Providing dry rations and fortified foods to especially vulnerable groups in the short term, enhancing food production in the medium term through supplying inputs, and strengthening critical commercial food supply chains in the long-term should be implemented.

To maximize the resilience of local food systems, strategies should target different aspects of livelihoods in urban and rural areas. To build more resilient food systems in urban areas in the post-COVID-19 era, previous literature discussed the possibility of home gardening and urban agriculture to strengthen local food production (Lal, 2020; Yoshida and Yagi, 2021; Ancog et al. 2020). Also, efficient food distribution systems through public distribution schemes (PDS) should be established to ensure regular food availability to vulnerable groups (Roy, 2020; Lal, 2020). Compared to mega-cities such as Dhaka, there is a greater opportunity for smaller cities close to rural areas to practice urban agriculture (Ruszczuk et al., 2020). Since transportation services were suspended, local food producers from rural areas may find it easier to sell their products to nearby small towns instead of large cities.

In rural areas, smallholder farmers need to receive support from the

governments, as they consist of a large part of the population and are a critical component of food systems in Asian countries (Fan et al., 2021). As a mid-term strategy, local governments can build robust partnerships with state governments and other domestic or international civil societies to strengthen local and community-level capacity. For countries like India, Bangladesh, and Vietnam, where an agrarian economy dominates, governments should direct resources to smallholder farmers to support the procurement and sale of perishable agricultural produce (Pasricha, 2020). Such support ensures the adequate functioning of local food markets and supply chain systems. Furthermore, national data can be utilized by local policymakers to identify pockets of undernutrition and target vulnerable areas by reinforcing subsidized food distribution systems.

In addition, social security nets and social protection, if adequately implemented in countries across the Asia Pacific region, have the potential to alleviate the immediate impacts of income losses in vulnerable households, as well as help workers rehabilitate as economies recover (World Bank 2020). In India, the National Rural Employment Guarantee Scheme (MNERGA) and subsidized food distribution systems have ensured employment and social stability in rural areas. Similar policies for social protection and guaranteed employment are lacking in urban areas (Vasudevan et al., 2020). Public distribution system (PDS) coverage also increased significantly during the pandemic for both food-secure and food-insecure households (Nguyen et al., 2021). The government of the Philippines launched financial assistance in the form of cash aid, amounting to PHP 205 billion for low-income households (International Monetary Fund, 2020). The government of Vietnam announced a deferment of land rental fees by five months, along with a reduction of land rent and house rent effective April 7th, 2020 (Tran et al., 2020). Since informal workers constitute a substantial proportion of the population at risk of the negative impacts of COVID-19, it is crucial to ensure that social insurance and cash support in the face of unemployment are extended to informal workers migrating from urban to rural areas in countries (IPC-IG and UNICEF ROSA, 2020).

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Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.gfs.2021.100580>.

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