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A qualitative exploration of reasons for improvement in nutritional status of children under-three during the pandemic in an informal settlement in Mumbai

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Abstract

Objective: To study the reasons for improvements in nutrition among children under three years of age in an informal settlement in Mumbai, India, during the COVID-19 pandemic.

Design: In-depth telephonic interviews were conducted and data were analysed using thematic framework analysis.

Setting: An informal settlement in Mumbai, Maharashtra, India.

Participants: The participants of this qualitative study included mothers with children less than three years of age. Mothers were selected based on the following nutritional status of the children: 1) improvement in their nutrition status from being wasted to no longer being wasted; 2) remaining well-nourished or not wasted; and 3) continuing to be wasted, between two time periods (before and during the pandemic).

Results: Various behavioural and systemic aspects contributed to improvements in the nutrition status of under-three children in a slum settlement in Mumbai during the COVID-19 pandemic. Appropriate feeding practices such as the timely introduction of complementary foods, low consumption of junk food, availability of nutritionally diverse food, migration to the village, a positive home environment, support from family and a low frequency of child illness were some of the contributing reasons for the improvement in nutrition status.

Conclusions: This study highlights the need for a multi-dimensional approach to improve child health and to strengthen nutrition programs to cope with future emergencies. Learning from what worked well for mothers among positive deviance cases needs to be sustained and scaled to enable more holistic interventions for child nutrition.

Keywords: wasting, Mumbai, positive deviance, child malnutrition, slums, COVID-19 pandemic, India, qualitative analysis

Introduction

COVID-19 (coronavirus disease 2019), a contagious viral disease, emerged in China in late 2019 and spread worldwide. The pandemic forced many governments to impose strict lockdown protocols on their citizens, posing a serious threat to nutrition, health and children's overall growth due to disruptions in education and health care, including school feeding programs, vaccination and child health programs [1,2]. A major risk factor among children due to the pandemic was increased malnutrition rates, also known to increase vulnerability to infections [3,4].

The adverse impacts on child nutrition due to the pandemic were a cause for concern in low- and middle-income countries, where the pandemic caused severe pressure on the existing health systems. Several studies have found a decline in Maternal and Child Health (MCH) services in India during the pandemic, as well as an increase in stillbirths and non-institutional deliveries, a decrease in antenatal and postnatal care visits, a decrease in immunisation rates, an increase in the risk of maternal and child mortality and an increase in malnutrition [5-9]. Household food insecurity emerged as a serious concern during the pandemic [10] and in India, it was compounded by the partial disruption of government-led nutrition services [11, 12].

In India, the pandemic posed a grave risk of rising child malnutrition [13], as reflected in the periodic multi-round survey conducted throughout India, the National Family Health Survey (NFHS). The fifth round of the survey or NFHS-5 conducted in 2019–21 showed that 19.3 percent of children under five years of age (U5) in India are wasted (low weight-for-height), 35.5 percent are stunted (low height-for-age) and 32.1 percent are underweight (low weight-for-age), with no significant improvement as compared to the NFHS-4 conducted in 2015–16. Anaemia prevalence increased from 58.6 percent (in NFHS-4) to 67.1 percent among U5 children [14].

Increases in food insecurity and pressure on health services threatened to adversely affect vulnerable communities disproportionately impacted by the pandemic and lockdowns. In Mumbai, 42 percent of residents live in informal settlements or slums, with one of the highest population densities in the world [15]. These are characterised by inadequate housing and basic services, contributing to poor health and nutrition [16]. This was aggravated during the pandemic as slum residents faced a loss of livelihoods, the spread of infections, poor sanitation and hygiene, food insecurity and disruption of regular health services [17-19].

Despite this grim situation, a few studies suggested improvements in MCH and nutrition indicators during the pandemic. This included a reduced risk of adverse birth outcomes, improved parent-child interactions and parental feeding practices, healthier food habits and increased home-cooked food [20-22]. In Mumbai, government data related to the Integrated Child Development Services (ICDS) scheme, a national child health and nutrition community-based program that caters to vulnerable populations, reported an overall fall in the proportion of underweight children U5 from 17.29 percent in December 2019 to 12.26 percent in July 2021 [23].

The possibility of improvement in the nutritional status of some children amidst the literature on adverse impacts during the pandemic triggered the need to explore child health and nutrition practices in vulnerable urban communities in Mumbai. Based on this, the study intends to investigate possible nutritional improvements and the reasons for them among children under three in informal settlements of Mumbai, India, during the COVID-19 pandemic.

Methods

Study Setting

The study was conducted in a slum settlement in Indira Nagar, Mankhurd, Mumbai. A Mumbai-based non-governmental organisation (NGO) working on reproductive, maternal, adolescent and child health initiatives for over 20 years to improve urban communities and build government capacity implements its integrated health and nutrition program in this area. The slum settlement of Indira Nagar, Mankhurd, is part of Mumbai's M-East ward (one of 24 municipal administrative divisions), which recorded the lowest Human Development Index scores in 2009 [24] and houses some of the densest slum settlements in the city. During the pandemic, these settlements were particularly vulnerable due to the loss of jobs and poor access to health care and basic services [19,25,26].

Framework

The study uses exploratory qualitative research methods to understand behaviours and practices related to child nutrition during the pandemic. A comparison of annual surveys conducted in January 2020 and January 2021 as part of monitoring and evaluation of the program intervention [27,28] found malnutrition rates among under-two children decreasing: wasting from 16 percent to 9

percent, stunting from 30 percent to 28 percent and underweight from 29 percent to 23 percent. These results motivated the exploration of pandemic-associated practices potentially leading to improvements in child nutrition.

The study employs a positive deviance approach to closely examine the factors promoting nutritional improvements in under-three children during the pandemic. The aim is to study reasons for improvements or positive outcomes in otherwise adverse conditions. This approach identifies factors that can be used to improve health interventions and provides a context-specific understanding of positive achievements [29-31].

Sampling

Respondents for the study included women with children under three years of age, purposively sampled as per their child's nutrition status based on annual evaluation surveys conducted by an NGO in the area. Mothers were selected based on the following nutritional status of the children: 1) improvement in their nutritional status from being wasted to no longer being wasted; 2) remaining well-nourished or not wasted; and 3) continuing to be wasted, between two time periods (before and during the pandemic). The first two cases considered positive deviance are henceforth referred to as "thriving children." Wasting was calculated as per the World Health Organisation Child Growth Standards' definition of wasting, i.e., the low weight-for-height of the children (Z scores of -2 and -3) [32].

Data collection

Data were collected between June and September 2021 through in-depth telephonic interviews. Due to movement restrictions in Mumbai, telephonic interviews were conducted rather than face-to-face interviews. Long-standing relationship of the NGO which the authors are part of, with the community helped facilitate telephonic data collection.

Interviews were conducted by the authors, NS, AJ and RS and lasted for about 30 to 45 minutes. No compensation was given to the participants for the interview. The key points of focus in the qualitative guide are summarised in Table 1. Qualitative data were collected until saturation was achieved and no new themes emerged. Twenty-five in-depth telephonic interviews were conducted with mothers of children under the age of three, consisting of eight cases of children

who graduated from being wasted to thriving, six cases of children who remained thriving and eleven cases of children who remained wasted.

Table 1: Key points explored in the qualitative interview guide

- Demographic details of children and their families
- Mothers' awareness and views on their child's health
- Child feeding practices during the pandemic
- Food, nutritional and other support received from the government and NGOs during the pandemic
- Home environment and support of husband and family members in child rearing
- Migration status during the pandemic including details regarding changes in feeding practices and home environment due to migration
- Overall child health, including hygiene, episodes of illness, immunisation, etc.

Analysis

All interviewers were well-trained in qualitative data collection and analysis methods. They were also familiar with the study setting and context. The interviews were conducted in Hindi and were recorded, translated and transcribed into English. Preliminary ideas that emerged from the transcripts were discussed in a group. We held weekly debriefs as a team to discuss emerging ideas and lines of thinking in a group, and iteratively build on the themes that emerged. "Framework analysis" [33,34] was used to compare the cases across themes using a codebook derived from the guide. We constructed a matrix with cases (interviews with participants) as rows, and the various themes as columns. These columns were not fixed but modified as the data emerged. The qualitative software NVivo (version 10) was used for sorting, coding and extracting themes.

Results

Demographic Profile

The demographic details of the children and parents/family can be found in Table 2.

Table 2: Demographic status of children and their families

Demographic Details		n	%
Profile of children (N=25)			
Age	15-24 months	18	72
	25-36 months	7	28
Sex	Female	16	64
	Male	9	36
Nutritional status	Children who improved their nutrition status from being wasted to no longer being wasted (thriving)	8	32
	Children who remained well-nourished or not wasted (thriving)	6	24
	Children who continued to be wasted	11	44
Parental characteristics (N=25)			
Mothers (respondents)			
Age (years)	20 to 24	9	36
	25 to 29	10	40
	30 and above	6	24
Education	No education (illiterate)	9	36
	Up to secondary (grades 1 to 10)	10	40
	Higher secondary and above (grade 11 and above)	6	24
Employment status	Currently not employed	25	100
	Currently employed	0	0
	Experienced loss of wages/ job loss during lockdown	1	4
Fathers			
Education	No education (illiterate)	4	16

	Upto secondary (grades 1 to 10)	18	72
	Higher secondary and above (grade 11 and above)	3	12
Employment status	Currently not employed	0	0
	Currently employed	25	100
	Experienced loss of wages/job loss during lockdown	24	96
Family characteristics			
Type of family	Joint	9	36
	Nuclear	16	64
Migration	Families temporarily migrated to native villages during the lockdown	16	64
	Family continued to stay in Mumbai	9	36

Reasons for improvements in child nutrition during the pandemic

The extracted themes are categorised into primary reasons relating to feeding practices and food security and secondary reasons relating to household environment and overall health of the child. Within these, reasons that led to a possible improvement of nutritional indicators among the thriving cases were identified and contrasted with those who continued to remain wasted in the context of the pandemic. We use behavioural and systemic causes, as characterised by other authors, to explain the possible reasons for nutritional improvements in our cases [31,35]. Behavioural aspects are linked to mothers' behaviour and habit patterns and practices for child nutrition, such as feeding practices. Systemic or structural aspects include the influence of the political economy, health systems and social norms in society. Systemic aspects could influence or have a bearing on behavioural aspects. Table 3 summarizes the characteristics of each of the themes identified through their categorisation as behavioural or systemic causes for child nutrition, distinguishing and contributing factors to thriving cases and overall pandemic related influences. Distinguishing factors refer to those reasons where there was a clear distinction between the thriving and wasted categories. In contributing factors, clear distinctions were not evident between thriving and wasted categories, but these could have contributed positively to child nutritional

status. Pandemic related influences highlight how specific behaviours and systemic changes related to the pandemic had an impact on the reasons affecting child nutrition.

Table 3: Summary of Reasons Influencing Child Nutrition During the Pandemic

Themes	Feeding Practices and Food Security			Household Environment and Overall Health of the Child			
Reasons	Breastfeeding and Complementary Feeding	Food Insecurity and Availability of Government Food Provisions	Junk food Consumption	Migration to the Village	Emotional Environment and Family Support in the Household	Hygiene and COVID Appropriate Behaviour	Child's Illness
Systemic/Behavioural Causes							
Distinguishing/ Contributing Factor for thriving cases							
Pandemic Related Specificities	Food insecurity and migration due to pandemic influenced feeding practices	Nutritionally diverse food provisions from government and non-govt. sources during lockdowns	Related to habit and convenience than availability in the pandemic	Migration due to pandemic-induced lockdowns	Loss of jobs, fear of pandemic/lockd own, all members confined in the home	Importance due to pandemic related guidelines	Fear due to pandemic led to extra caution

Behavioural Causes
Systemic Causes
Both
Distinguishing factor for thriving cases
Contributing factor for thriving cases

Feeding Practices and Food Security

Breastfeeding and Complementary Feeding

We found that appropriate feeding practices were crucial in improving children's nutrition status. The feeding practice adopted was based on several individual or behavioural aspects, such as the mother's awareness of timely weaning and introduction of nutritious food, the mother not producing milk anymore, the child not willing to eat solids and systemic causes such as food insecurity and food provisions by the government.

Among the mothers with thriving children, the majority were aware of and found to follow certain appropriate child-feeding practices, such as exclusive breastfeeding for the first six months and the timely introduction of nutrition-rich complementary foods such as pulses, cereals, vegetables, fruits

and non-vegetarian foods.

> "Whatever I cook, they (*children*) eat; *dal (lentils)*, rice, vegetables, *rawa (semolina), sabudana* (*sago*), egg, etc. She eats instant noodles in the morning, but I give only sometimes as it is not good for health." (Mother of a 20-month-old thriving girl)

Contrary evidence was found in the category of mothers whose children remained wasted. Most mothers in this category continued to only breastfeed their children for up to or beyond two years. Minimal complementary foods such as pulses, cereal or just fruits were started very late, often after more than one year.

> "He is dependent only on my milk the entire day. He drinks when I breastfeed him and afterwards plays for two to four hours. He only asks for my milk, not for food." (Mother of a 29-month-old wasted boy)

The followance of appropriate feeding practices was a distinguishing factor between thriving and wasted categories of children.

Food Insecurity and Availability of Government Food Provisions

The pandemic and ensuing national lockdown led to financial constraints due to the loss of jobs, posing a grave threat to food security and adversely impacting child nutrition.

> "There was no job during *corona (COVID-19)*. We borrowed money from here and there for *ration*." (Mother of a 24-month-old wasted girl)

As reported by most mothers, food provisions by the government (locally referred to as *ration*) through the Public Distribution System (PDS), a national food security system to provide subsidised food provisions, and ICDS acted as a major cushion, preventing food insecurity. Here, reasons specific to the pandemic situation- nutritionally diverse food provisions by government sources and additional support received from NGOs, helped evade a situation of food insecurity.

> "*Anganwadi (community-based courtyard preschools run by ICDS)* teachers used to call us over the phone, then we used to go and get the *ration*. They provided various items like *masoor* (*lentils*), *moong* (*lentils*), *chana (chickpea)*, rice, wheat and once we got

sugar and oil also. It helped us to decrease our expenses." (Mother of a 22-month-old thriving girl)

"During the lockdown, I received *ration* from NGOs twice, and from the *Anganwadi* (*community-based courtyard preschools run by ICDS)* I used to get *ration* every month, so there was some support." (Mother of a 36-month-old thriving girl)

Most respondents from all categories received food provisions. Therefore food provisions were not a distinguishing factor between thriving and wasted categories. However, they acted as a contributing factor to child nutrition. Cases of those who did not receive food provisions and faced food insecurity, showed an adverse impact on child nutrition. For example, few mothers continued breastfeeding instead of starting nutritious complementary foods. Few mothers reported reducing the diversity of food, such as by avoiding expensive fruits and mixing milk with water. Few mothers also compromised their own food intake to ensure their child's nutrition.

"Yes, we faced financial problems, but we never compromised on our children's food even if we eat less." (Mother of a 24-month-old thriving boy)

These can be seen as behavioural aspects attempting to navigate systemic limitations. Evidence from those who did not receive adequate food provisions highlights the importance of government-led food provisions as a major systemic reason that provided support for mothers in fighting food insecurity during the pandemic.

Junk Food Consumption

The consumption of junk food, high in calories, sugar, sodium and fat, including processed, packaged and ready-to-eat foods, was common among under-three children in the sample studied. While the availability of junk food possibly fell for a limited period during the lockdown due to the closure of shops and street vendors, this was reported only by a couple of mothers.

There was a clear differentiation in the kind and frequency of junk food consumed between wasted and thriving children. Most mothers in the thriving category were aware of junk food being unhealthy or had been advised by a doctor, an ICDS worker or NGO frontline workers not to give junk food to their children. They either reported that they did not have a habit of giving junk food

such as chips, instant noodles and flavoured drinks to their children or that junk food consumption had been reduced or was minimal. Moreover, no cases of junk food consumption as a replacement for meals were reported in the thriving category.

> "No, she does not eat *(junk food)*. If I give her, she will eat, but only one or two bites." (Mother of a 23-month-old thriving girl)

Conversely, most mothers whose children remained undernourished reported daily consumption of chips, chocolates, packaged snacks, biscuits and flavoured drinks. Ready-to-eat noodles or pasta were not considered unhealthy and were fed as a replacement for meals. In cases where children did not have nutritious meals, junk food acted as a complementary feed along with milk.

> "I know that she does not eat other things, so I give her instant noodles four to five times a week. She eats that. Cooking instant noodles does not take much time. If she eats this, then she does not eat anything else." (Mother of a 24-month-old wasted girl)

Other reasons for the high consumption of junk food among this group included the influence of older siblings who shared their junk food packets with their younger siblings. High junk food consumption was also allowed by some parents as a marker of freedom for children and good parenting. No clear link was found between financial constraints, the availability of food provisions, and junk food consumption. The extent of junk food consumption was thus a distinguishing factor between those who were thriving and wasted.

Household Environment and Overall Health of the Child

Migration to the Village

The exodus of migrant workers and their families due to the national lockdown in India brought to light the concerns regarding the city's informal service economies and lack of adequate housing. While this was a time of adversity for migrants, mothers of under-three children who migrated to villages reported an improvement in their child's overall health and nutrition.

Migration to the village, specific to the pandemic-induced lockdown, highlights various behavioural differences in childcare and nutrition in the village vis-à-vis informal settlements in the city. It connects to systemic aspects that compel migrants to live in precarious conditions in the city,

having an adverse impact on child health and nutrition.

Among the mothers interviewed for this study, there was a clear differentiation between the categories: children whose families had migrated to the village were thriving. In contrast, children whose families continued to stay in Mumbai remained wasted. The difference in categories can be explained by environmental factors, feeding patterns, and family support in the village, which were lacking in Mumbai's densely populated slum settlements.

Many mothers mentioned better availability of nutritious food for their children in the village, including home-cooked meals, fresh fruits and vegetables, fresh cow's milk and *ghee* (clarified butter). Especially for women who reported starting complementary food in the village, there was a visible improvement in their child's nutrition and food intake.

> "Yes, now (*in the village*) she eats everything: *dal (lentils)*, rice, vegetables. After coming to the village, she is absolutely fine; she is healthy now." (Mother of a 15-month-old thriving girl)

Mothers mentioned how the village environment contributed to their children's health because children had open spaces to play, interact with and learn from other children and eat with other children. One of the mothers starkly mentioned the importance of this community environment- fresh air, water and open spaces- compared to their living conditions in the city.

> "In the village, she used to play with kids. Here (in *Mumbai*), she only lives in the house." (Mother of a 24-month-old thriving girl)

Another factor for improvement in children whose families migrated to the village is the lesser availability of junk food and the higher cost of such processed foods.

Migration to the village, where the extended families of the children resided, also meant better support for the mother in housework and childcare. Mothers with thriving children reported that in the village, they had less work, more support from other family members for feeding and playing with the child, and suggestions from elders on childcare that contributed to improved health. A few mothers also observed that their children had fewer episodes of illness while in the village.

> "In the village, my sister-in-law and my mother used to massage her. I did not know

how to massage. My relatives shouted at me since her head was a little big and her legs were also crooked. Then they did regular massages with olive oil, she started crawling, and now she has also started walking." (Mother of an 18-month-old thriving girl)

For most mothers in the thriving category, migration to the village offered the opportunity for a better environment, more nutritious food and family support, which helped improve the child's nutritional status. In comparison, most of those who stayed back in the city did not enjoy these advantages and continued to remain wasted, highlighting migration as a distinguishing factor between thriving and wasted categories.

Emotional Environment and Family Support in the Household

The emotional climate of the household has a significant impact on a child's growth and overall well-being.

Cases of loss of job, chronic illness, mental strain, domestic violence and frequent pregnancies, found across categories, impacted overall household environment. Mothers from all categories reported being engaged in housework and childrearing as their primary responsibility. Mothers who did not receive any support from their husbands during the lockdown reported to have been tired, frustrated, irritated and burdened. Many mothers in the category where children remained wasted complained about not having time to feed or pay attention to their children, adversely impacting the child's nutrition and overall health. Children continued to be wasted in most nuclear families where the husband did not contribute to household or childcare work.

"No, I did not have any support (*from the husband*). I get irritated at times, but what can I do?" (Mother of a 24-month-old wasted girl)

At the same time, for a few mothers, living in a joint family meant additional family commitments and responsibilities, due to which they did not get sufficient time for their children, adversely impacting their nutrition and health.

On the other hand, a positive and supportive home environment contributed to child growth. Children of mothers who received support in joint families- in the city, with the natal family, or in

the village- reported improved nutrition status. When the husband shared household and childcare work, like cooking, feeding, bathing and playing with the child when they were home during the lockdown, it was a positive factor for the child's nutrition and overall well-being.

> "Yes, he (the *father*) also took care of them when he was home during the lockdown. He spoon-fed the children and bathed them." (Mother of a 22-month-old thriving girl)

Support from the husband, family and household environment acted as a contributing factor, but was not a distinguishing cause between the thriving and wasted categories.

Hygiene and COVID Appropriate Behaviour (CAB)

Cleanliness and hygiene in the child's physical environment contributed positively to their health by preventing infections. In the specific context of the pandemic, much attention was given to improving sanitation and hygiene practices in these families residing in urban informal settlements.

Most mothers from all categories reported following some or all of the CAB, such as wearing face masks, frequent sanitising, cleaning hands and legs after coming from outside, changing and washing clothes more frequently, washing vegetables and fruits thoroughly before consumption, using boiled water, limiting going outside and limiting eating outside food. These behaviours were directed at preventing illnesses due to the fear of accessing healthcare during the lockdown and contracting COVID-19.

> "I did not let children go outside at all. If they went out, they used to wear masks, and after coming home, I used to tell them to wash their hands and legs carefully. I did not let them eat outside things." (Mother of a 20-month-old thriving girl)

While adherence to CAB contributed to better child health, no distinction related to CAB was found between the thriving and wasted categories.

Child's illness

The frequency and severity of illnesses reported among children were influenced by migration to the village, the home environment and feeding practices. During the pandemic, children from the

thriving category had either not fallen ill or had fallen ill only once. Most mothers in this category had reported migration to the village, confirming the positive impact of a better environment, the availability of fresh food and family support in the village on child health. They also followed appropriate feeding practices, such as providing timely and nutritious complementary food.

> "She eats *dal (lentils)*, rice, egg, fruits. I don't give her outside food. She fell ill only once in the past year; she had a cough and cold." (Mother of a 23-month-old thriving girl)

In contrast, most mothers with wasted children were frequently ill. They reported not having migrated to the village and adopting poor feeding practices. Many mothers in this category reported that their children did not eat when they fell ill, pointing to the cyclical nature of undernutrition, where a child's illness is both a cause and effect of poor nutritional status.

Some mothers of wasted children blamed their child's illness on their vulnerability as a result of living in informal settlements.

> "The house used to get flooded frequently. So he often fell ill. And also, we had no space outside for him to play." (Mother of a 29-month-old wasted boy)

Thus, for those who stayed in the city and could not migrate during the pandemic, living in congested houses with minimal ventilation, poor drainage systems, and poor access to clean and safe toilet facilities made living conditions for the children difficult, contributing to frequent illnesses and undernourishment. Child illness is also a distinguishing factor between thriving and wasted children in our study.

Discussion

In this study, we have tried to shed light on the factors that led to improvements in the nutritional status of children under the age of three living in vulnerable communities in Mumbai. We identified reasons that could have influenced child nutrition positively during the pandemic. It is known that mothers' awareness of appropriate feeding practices, such as the introduction of timely and appropriate complementary feeding and limiting junk food consumption, has a positive impact on the child's nutritional status [22,36,37,38]. These are also positively influenced by generating awareness

through the health system and the initiatives of NGOs. Many mothers reported how information from the government and NGO frontline workers increased their awareness towards feeding practices and junk food consumption, highlighting the need to strengthen such community-level awareness programs.

More importantly, we found that behavioural aspects were mainly influenced by systemic causes specific to the hardships faced during the pandemic in India. It was, therefore, essential to address systemic gaps to improve child nutrition and health.

First, the migration from Mumbai to native towns and villages due to the pandemic-induced lockdowns highlighted a change in feeding practices, a better environment and family support that contributed to improved nutrition and health in children. Such migration is indicative of poor city planning in Mumbai, which compels a majority of its population to live in informal and inadequate housing settlements, forcing them to move out of the city due to loss of livelihood and financial hardship during the lockdowns. Housing in high-density settlements, crammed rooms without proper sunlight and ventilation, a lack of basic facilities like water and cleanliness, a absence of open spaces and the easy availability of cheaper junk food led to a poor environment during the growth years of children in slums. Migration to the village, although temporary, provided a better living environment and fresh and nutritious food, which contributed to better nutritional outcomes during the pandemic. While villages faced their challenges, the cases of those who migrated to the village and improved their nutritional status, as opposed to those who did not and remained malnourished, highlight the role of housing and environment in child nutrition. This makes valuable connections between child health indicators and city planning systems, stressing the need for improving housing and basic services within informal settlements in Mumbai.

A second systemic aspect directly related to government policy is food provisioning, which is reported as a major support for families facing financial hardship and job loss during the pandemic. Even in non-crisis times, government provision of food is considered a major support for families to ensure adequate meals for their children. During the lockdown, families reported receiving much more diverse food provisions from the government and non-government sources, contributing to nutritionally diverse meals for children and the family. This is a significant learning opportunity for the post-pandemic situation, highlighting the need for diversification in the food provisions through the government's PDS and other food security programs.

Other aspects studied included hygiene behaviours and family support, which, although not determining or distinguishing reasons for thriving cases, were essential contributing factors. For instance, support from husbands in childcare and housework positively impacted children's health. While husbands' participation in household duties was limited to the lockdown period, it highlighted the need for a structural shift in the gendered division of labour in which at least childcare work is shared between parents. Such growth-promoting practices need to be sustained even in normal times.

Since the study was conducted during the pandemic, several factors that contributed to improving child nutrition, such as migration, help from husbands in childcare, the provision of nutritionally diverse food and extra care for cleanliness and hygiene, were specific to the pandemic. However, these offer crucial insights into the policy directions that need to be taken by governments, going forward post pandemic. The study highlights the need for improving living conditions in urban informal settlements such as improving basic service provisions and access to open spaces for women and children as measures directly related to improving child health and nutrition. Universal provision of nutritionally diverse food through the PDS needs to be ensured for sustaining nutrition of the child and the family. The ICDS community centres need to be strengthened to act as avenues for disseminating health information including reduction in consumption of junk food, timely introduction of complementary food etc. For crisis situations specifically, the study highlights the need for financial and food security support from the government along with community level support systems including NGOs to ensure that child health and nutrition is not adversely affected. Through this the study highlights how not one aspect but multiple intervening aspects play a role in improving child nutrition and health, pointing to the need for programs and policies in nutrition to adopt a multi-sectoral and multi-dimensional approach in their interventions.

The use of qualitative research methods was the strength of this study, providing in-depth interpretative knowledge of the experiences of mothers and practices followed during the pandemic for their child's health and nutrition. One major limitation of the study identified arises from using telephonic interviews for data collection. Telephonic interviews faced connectivity issues, the inability to observe respondents in their environment and the exclusion from the sample of those who did not own a phone. Our findings were based on self-reported data due to which there is a possibility of a social desirability bias in the responses, for example all mothers

reported following CAB. Another limitation is that the cases thriving before the pandemic were not used because the study's focus was on mapping positive deviance. Further research is required to determine whether the improvements seen during the data collection phase have been sustained. Other inter-relational factors, such as the impact of domestic violence and a broken home environment on the child's nutrition and the impact of the mother's mental health on the child's health and nutrition, should be explored in future research.

In conclusion, this study highlights the need for a multi-dimensional approach to improve child health and to strengthen nutrition programs to cope with future emergencies. Learning from what worked well for mothers among positive deviance cases needs to be sustained and scaled to enable more holistic interventions for child nutrition.

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