



A crisis within a crisis: Role of COVID-19 pandemic in poor compliance of Community-based Management of Severe Acute Malnutrition among children younger than five years in Pakistan

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Research article

A crisis within a crisis: Role of COVID-19 pandemic in poor compliance of Community-based Management of Severe Acute Malnutrition among children younger than five years in Pakistan

¹ Department of Public Health, University of the Punjab, Lahore, Pakistan

² Department of Food Science and Human Nutrition, University of Veterinary and Animal Sciences, Lahore, Pakistan

³ Bakhtawar Amin Medical and Dental College, Multan, Punjab, Pakistan

* Email: ruhmarshahzad@gmail.com

Munnaza Batool¹, Javeria Hassan¹, Ruhma Shahzad^{1*}, Sanaulah Iqbal², Muhammad Salman Butt¹, Shahroz Haider³

ABSTRACT

Introduction

In order to attain Sustainable Development Goal 2 (SDG-II) of eradicating malnutrition among children by 2030, Pakistan has initiated a Community-based Management of Severely Acute Malnutrition (CMAM) program. This program has been established at the public level to detect and treat uncomplicated Severely Acute Malnourished (SAM) children at an early stage. However, during the outbreak of COVID-19, very poor compliance with the CMAM program was observed. Consequently, the nutritional quality of children's diets has deteriorated, with malnutrition rates expected to rise. Therefore, this study has been set up to evaluate the effect of the COVID-19 lockdown on the health of SAM children and compliance with the CMAM program.

Methodology

This study used a multicenter cross-sectional design in District Dera Ghazi Khan's rural areas located in the Southern Province of Punjab. Data were collected from the parents/guardians of SAM children through the researcher-administrated questionnaire. The sample size was 196, and data were analyzed through SPSS version 25.

Results

The majority of the children enrolled were males (52.5%), had fathers aged between 41 and 50 years (52.0%), mothers aged between 21 and 30 years (52.5%), had illiterate fathers (40.1%), illiterate mothers (73.8%) and had a monthly household income of PKR <15,000 (91.1%). All of the respondents mentioned that COVID-19 affected them in one way or the other (100.0%), with a majority of them did not visit the hospital during COVID-19 for their SAM child (52.5%) as they were afraid of COVID-19 (63.2%) and/or they lacked access to transport for visiting a hospital (93.4%). Bivariate analysis revealed that the father's age ($P = 0.02$) and income ($P = 0.00$) is associated with the perceived effect

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of COVID-19 on income. In contrast, only the gender of the child ($P = 0.00$) is related to the visit to the hospital, and the gender of the child ($P = 0.01$) and mother's literacy ($P = 0.00$) is associated with the choice of treatment from any other setup, including Hakeem and Peer.

Conclusion

This study concludes that health emergencies like the COVID-19 pandemic pose a significant barrier to access to healthcare services and subject a more vulnerable state to already vulnerable groups like SAM children. To lessen their vulnerability, initiatives like mobile health care services should be introduced, especially for socially disadvantaged communities, localities, and groups on regular basis and for future emergencies.

1. INTRODUCTION

To achieve Sustainable Development Goal 2 (SDG-II) of eradicating malnutrition among children by 2030, the Government of Pakistan is taking various steps. One of the initiatives taken at the public level in Pakistan to achieve SDG-II is the introduction of a program of Community-based Management of Severely Acute Malnutrition (CMAM) for early detection and treatment of uncomplicated Severely Acute Malnourished (SAM) children. WHO defines uncomplicated SAM children as those children having "mid-upper arm circumference (MUAC) < 115 mm or weight-for-height z-score < -3 " or grade 1-2 bilateral edemas, who are otherwise clinically well, alert, and have a good appetite. Under this program, the home-based treatment approach has been started with Ready-to-Use Therapeutic Food (RUTF), which is a combination of all necessary micro and macro-nutrients [1]. It is an energy-dense and high-caloric food [2] recommended by WHO for the treatment of uncomplicated SAM children [3].

Wasting acute malnutrition causes children to become extremely frail and thin. It is a life-threatening form of malnutrition that causes stunted growth and learning among children and increases the risk of death. According to the estimates of UNICEF, more than 45 million children have wasted prior to the outbreak of COVID-19 in 2019; however, without any immediate action, this number was estimated to increase to 54 million by the end of the year resulting in such amounts of global waste that have not been witnessed in this millennium [4].

Before COVID-19, the world was already behind schedule in achieving the SDG-II of eradicating undernutrition among children by 2030 [5]. However, the COVID-19 pandemic has added more to the global nutritional difficulties, particularly in low- and middle-income countries (LMICs) like Pakistan. Likewise, during the outbreak of COVID-19, very poor compliance with the CMAM program was observed. Consequently, the nutritional requirements of malnutrition children were not fulfilled and their condition deteriorated, with malnutrition rates expected to rise.

Considering the poor compliance and the possible threat COVID-19 has posed on it, this paper has been set up to evaluate the effect of the COVID-19 lockdown on the health of SAM children and compliance with the CMAM program. This study also assesses other factors contributing to poor compliance with the program.

2. METHODOLOGY

2.1 Study Area

This study was conducted in the rural region of District Dera Ghazi Khan (DGK), located in the Southern region of the Province of Punjab, Pakistan. This district was selected as it is underprivileged, with high illiteracy rates, poverty, and malnutrition among children [1].

2.2 Study Design

This study used a multicenter cross-sectional design. Parents/guardians of SAM children of 6 to 59 months of age were enrolled in the Out-Patient Therapeutic Feeding Program within the primary healthcare settings of the District DGK, Punjab, Pakistan, before the COVID-19 lockdown. Lockdown was imposed on 22nd March 2020 in Pakistan, therefore, children enrolled in the program before the stated date was included in this study. This study was conducted from June 2020 to June 2021. This paper is a part of a broader study and has been extracted from a dissertation titled, "Nutritional Intervention for the Treatment of Uncomplicated Severe Acute Malnutrition: South Punjab Pakistan".

2.3 Inclusion and Exclusion Criteria

Children younger than 5 years (06–59 months) were enrolled in the CMAM program for the treatment

of uncomplicated SAM children using RUTF for their management. Only the children who were enrolled in the program before the COVID-19 lockdown imposed in March 2020 were selected, while those enrolled after the COVID-19 lockdown were excluded from the study.

2.4 Data Collection Tool

Data for this study were collected from the parents/guardians of SAM children through the researcher-administrated questionnaire. The questionnaire had three sections. The first section focuses on the socio-demographic profile of the child and their parents and asks questions regarding the gender of the child, mother's age, mother's literacy, father's age, father's literacy, and monthly household income. The second section emphasizes the effect of COVID-19 on the parents/guardians of SAM children, their income, and their health. All three questions in this section are measured with closed-ended questions having "Yes" or "No" options. The last section of the questionnaire asks questions related to visiting a hospital or any other health facility, receiving treatment, and RUTF and the reasons for non-compliance to the CMAM program.

2.5 Sampling Technique and Sample Size

A sample of 196 respondents was calculated using Cochran's formula ($n = z^2 \times pq / e^2$) with a 7% margin of error (e) and 95% confidence interval (CI). However, data were collected from 202 respondents to allow for missing categories.

2.6 Statistical Analysis

Data were entered and analyzed using SPSS version 25. Descriptive analysis is presented as percentages and frequencies, while for inferential statistics, the Chi-square association test at a 95% CI was applied. Significant associations at 95% CI in Chi-square are further analyzed using Binary regression analysis and presented as odds ratio (OR) and adjusted odds ratio (AOR).

2.7 Ethical Considerations

Before data collection, the researcher communicated the study's objective to the respondents and took their written consent. The ethics of the study has been approved by the Institutional Ethical Review Board Committee (Ref: # D/193/DFEMS).

3. RESULTS

3.1 Characteristics of Respondents

The majority of the children enrolled were males (52.5%), had fathers aged between 41 and 50 years (52.0%), mothers aged between 21 and 30 years (52.5%), had illiterate fathers (40.1%), illiterate mothers (73.8%), and monthly household income of PKR <15,000 (91.1%) (Table 1).

Table 1. Characteristics of respondents.

Characteristics	f	%
Gender of the child (n = 202)		
Female	96	47.5
Male	106	52.5
Father's age (n = 202)		
21-30	0	0.0
31-40	81	40.1
41-50	105	52.0
51- above	16	7.9
Mother's age (n = 202)		
21-30	106	52.5
31-40	96	47.5
41-50	0	0.0

51 and above	0	0.0
Father's education (n = 202)		
Illiterate (no formal education)	81	40.1
Primary (1-5 years of education)	69	34.2
Secondary (6-10 years of education)	27	13.4
Higher (11 and above years of education)	25	12.4
Mother's education (n = 202)		
Illiterate	149	73.8
Primary	37	18.3
Secondary	12	5.9
Higher	4	2.0
Income (n = 202)		
Less than PKR 15,000	184	91.1
Above PKR 15,000	18	8.9

3.2 Effect of COVID-19

All respondents mentioned that COVID-19 affected them in one way or the other (100.0%). The majority of the respondents reported that they were worried about the effect of COVID-19 on their SAM child (99.0%), while only a few (1.0%) mentioned that they were not concerned about the impact of COVID-19 on the health of their children. These two questions were excluded from bivariate and multivariate analyses because the frequency was less than 5% in the "No" category for both questions. Lastly, 6.9% of respondents mentioned that they were not worried about the effect of COVID-19 on their income, while the majority revealed that they were concerned (93.1%) (Table 2).

Table 2. Effect of COVID-19.

Did COVID-19 affect you? (n = 202)	f	%
Yes	202	100.0
No	0	0.0
Were you worried about the COVID-19 effect on your SAM child's health? (n = 202)		
Yes	200	99.0
No	2	1.0
Were you worried about COVID-19 effect on your income? (n = 202)		
Yes	188	93.1
No	14	6.9

3.3 Visit Healthcare Facility

Analysis revealed that the majority of the respondents did not visit the hospital during the COVID-19 pandemic for their SAM child (52.5%) (Table 3) and reported the fear of COVID-19 (63.2%) and the lack of transport as the reasons for not visiting the hospital (93.4%) (Figure 1). However, of those who saw the hospital (47.5%), the majority of them neither got a checkup (64.6%) nor received RUTF (96.9%). In addition to this, the majority of the respondents also reported visiting an alternative healthcare facility including Hakeem (Herbal Medicine Practitioner) for herbal medicines (99.5%) and/or Peer (Religious/Spiritual Guide) for religious therapy using amulets and exorcise (53.9%) for treating the malnourishment of their SAM children (Table 3).

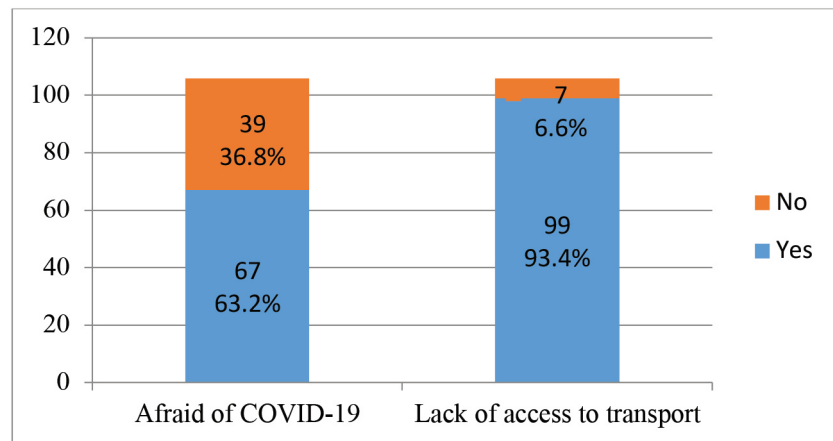


Figure 1. Reasons for not visiting the hospital.

Table 3. Visit to healthcare facility.

Did you visit the hospital during the COVID-19 lockdown for your SAM child? (n=202)	f	%
Yes	96	47.5
No	106	52.5
If yes, did your child get a checkup? (n = 96)		
Yes	34	35.4
No	62	64.6
If yes, were you given RUTF? (n = 96)		
Yes	3	3.1
No	93	96.9
Did you receive treatment from any other setup for your child with SAM? (n = 202)		
Yes	191	94.6
No	11	5.4
If yes, from Hakeem (n = 191)		
Yes	190	99.5
No	1	0.5
If yes, peer/shrines (n = 191)		
Yes	103	53.9
No	88	46.1

3.4 Factors Associated with the Effect of COVID-19 on Income, Visit to Hospital, and Treatment from any Other Setup

Bivariate analysis revealed that the father's age ($P = 0.02$) and income ($P = 0.00$) is associated with the perceived effect of COVID-19 on income. In contrast, the gender of the child ($P = 0.58$), mother's age ($P = 0.17$), father's literacy ($P = 1.00$), and mother's literacy ($P = 0.76$) are not associated with the perceived effect of COVID-19 on income. On the other hand, only the gender of the child ($P = 0.00$) is related to the visit to the hospital, while other factors are not associated with it. Lastly, the gender of the child ($P = 0.01$) and the mother's literacy ($P = 0.00$) are related to the choice of treatment from any other setup, including Hakeem and Peer (Table 4).

Table 4. Factors associated with the perceived effect of COVID-19 on income, visit to the hospital, and treatment from any other setup.

Factors	Perceived effect of COVID-19 on income		P-value	Visit to hospital		P-value	Treatment from any other setup		P-value
	Yes	No		Yes	No		Yes	No	
Gender									
Female	88 (46.8)	8 (57.1)	0.58	34 (35.4)	62 (58.5)	0.00**	95 (49.7)	1 (9.1)	0.01*
Male	100 (53.2)	06 (42.9)		62 (64.6)	44 (41.5)		96 (50.3)	10 (90.9)	
Father's age									
31–40	80 (42.6)	1 (7.1)	0.02*	43 (44.8)	38 (35.8)	0.43	76 (39.8)	5 (45.5)	0.61
41–50	93 (49.5)	12 (85.7)		46 (47.9)	59 (55.7)		99 (51.8)	6 (54.5)	
51–above	15 (8.0)	1 (7.1%)		7 (7.3)	9 (8.5)		16 (8.4)	0 (0.0)	
Mother's age									
21–30	96 (51.1)	10 (71.4)	0.17	48 (50.0)	58(54.7)	0.57	100 (52.4)	6 (54.5)	1.00
31–40	92 (48.9)	4 (28.6)		48 (50.0)	48 (45.3)		91 (47.6)	5 (45.5)	
Income									
Less than PKR 15,000	175 (93.1)	9 (64.3)	0.00**	89 (92.7)	95 (89.6)	0.47	174 (91.1)	10 (90.9)	1.00
Above PKR 15,000	13 (6.9)	5 (35.7)		7 (7.3)	11 (10.4)		17 (8.9)	1 (9.1)	
Father's education									
Illiterate	75 (39.9)	6 (42.9)	1.00	36 (37.5)	45 (42.5)	0.56	78 (40.8)	3 (27.3)	0.53
Literate	113 (60.1)	8 (57.1)		60 (62.5)	61 (57.5)		113(59.2)	8 (72.7)	
Mother's education									
Illiterate	139 (73.9)	10 (71.4)	0.76	69 (71.9)	80 (75.5)	0.33	146 (76.4)	3 (27.3)	0.00**
Literate	49 (26.1)	4 (28.6)		27 (28.1)	26 (24.5)		45 (23.6)	8 (72.7)	

P-value calculated through Chi-square test.

*Significant at 95% CI.

** Significant at 99% CI.

Further analysis revealed that fathers of age 41 to 50 years are 10.32 folds more likely (OR = 10.32; 95% CI = 1.31–81.13) than fathers of age 31 to 40 years, while respondents having a monthly household income of PKR >15,000 are 7.47 times more likely (OR = 7.47; 95% CI = 2.18-25.58) than those having monthly family income of PKR ≤15,000 to be worried about the effect of COVID-19 on their income. AOR also revealed a father's age of 41 to 50 years (AOR = 10.07; 95% CI = 1.25–81.12) as the strongest predictor of the perceived effect of COVID-19 on income. On the other hand, the gender of the child is the only predictor of visiting a hospital, with parents of a male child 2.57 folds more liable (OR = 2.57; 95% CI = 1.45–4.54) to take their SAM child to the hospital for a checkup than those having a female child. Conversely, parents of the female child are 9.89 folds more liable (OR = 9.89; 95% CI= 1.24–78.82) than those having a male child to visit any other setup for treatment of their SAM child, including a Hakeem and/or Peer (**Table 5**).

Table 5. OR and AOR.

Variable	Factors	OR (95% CI)	P-value	AOR (95% CI)	P-value	
Perceived effect of COVID-19 on income	Father's age	31–40	(1)			
		41–50	0.09 (0.01–0.76)	0.02*	0.09(0.01–0.79)	0.03*
		51 or above	0.18 (0.01–3.16)	0.24	0.27 (0.01–5.10)	0.38
	Income	PKR ≤15,000	7.47(2.18–25.58)	0.00**	7.60 (2.05–28.20)	0.00**
		PKR >15,000	(1)			
Visit to hospital	Gender	Female	(1)			
		Male	2.57 (1.45–4.54)	0.00**	-	-
Treatment from any other setup	Gender	Male	(1)			
		Female	9.89 (1.24–78.82)	0.03*	9.31(1.14–75.94)	0.03*
	Mother's education	Illiterate	8.65 (2.20–33.99)	0.00**	8.23 (2.04–33.11)	0.00**
		Literate	(1)			

*Significant at 95% CI.

** Significant at 99% CI.

4. DISCUSSION

The COVID-19 pandemic has caused food, health system, and economic disruptions [6] and has threatened to exacerbate maternal and child malnutrition in LMICs as well [7]. Pakistan, being an LMIC, was already moving at a slow pace toward 2025 global nutrition targets for maternal and child healthcare and nutrition; however, the COVID-19 pandemic and the economic downturn caused by it have further slowed it down. Considering the impact of COVID-19 on global nutrition targets, this study evaluates the effect of the COVID-19 lockdown on the health of SAM children and the compliance of the CMAM program.

Evidence shows that children are generally vulnerable to wider consequences of any social disruption; however, the increased food insecurity caused by COVID-19, specifically in LMICs, has pushed them into further malnutrition risk [8]. In echo to this, the results of this study also highlight that parents of almost all SAM children reported their concerns regarding the effect of COVID-19 on their child's health (99.0%). In addition to the direct impact of the pandemic, it has also indirectly impacted the children's health by reducing their compliance with the CMAM program as less than half (47.5%) of the parents took their SAM children to the hospital during COVID-19 lockdown, out of which the majority of the children (64.6%) did not get checkups while only a few (3.1%) received RUTF. Previous studies found that as much as 70% of the population of Pakistan relies on different complementary and alternative (CAM) medical practices [9]; however, our study shows a relatively higher percentage of its usage as almost all parents highlighted the usage of one or more CAM medical practice for treating the malnourishment of their child including herbal medicines from Hakeems (99.5%) and amulets and exorcise from Peers (53.9%).

Moreover, the parents of all SAM children reported that they were affected in one way or the other by COVID-19. With economic disruption as one of the significant consequences of COVID-19 [10], most parents also reported their concerns regarding the impact of COVID-19 on their income (93.1%). Similarly, the analysis also showed that the father's age and income are significantly associated with the perceived effect of COVID-19 on income. However, in contrast, the gender of the child, the mother's age, the father's education, and the mother's literacy is not associated with the effect of COVID-19 on income. On the other hand, the gender of the child and the mother's literacy is linked to the choice of treatment from any CAM setup, including CAM practices. Whereas, only the gender of the child is associated with the visit to the hospital, while other factors are not associated with it.

The COVID-19 pandemic has caused a situation of stress, panic, and fear among the general population [11] - [13] as well as among healthcare professionals [14]-[15], and these feelings of stress and fear have restricted access to healthcare services. The findings of this study highlight that the fear

of COVID-19 and the lack of access to transport are two main reasons causing hindrances in compliance with the CMAM program. Similarly, past studies have also reported the fear of COVID-19 as one of the reasons causing a substantial reduction in the number of visits to family pediatrician clinics and delayed access to healthcare [12].

Conclusively, the impact of the COVID-19 pandemic has been devastating in fulfilling the nutritional needs of children. The nutritional status of the children plays a significant part in enhancing their developmental potential [16]-[17], with inadequate healthy grades contributing to an adverse impact on cell maturation and delayed developmental processes [18, 19]. Past studies have indicated that RUTF with effective CMAM is one of the most effective techniques for achieving adequate nutritional status and enhancing developmental processes among children under five years of age [20]. The COVID-19 pandemic has not only affected the supply chain for essential nutrition services [21], but rather, it has also drastically increased the feeding costs, the rates of household poverty, and the proportions of food insecurity [7], with more than 6.5 million children under the age of 5 years at threat of wasting [22]. CMAM-based RUTF can address and eliminate malnutrition among children; however, its poor compliance due to COVID-19 has raised additional concerns by adding to the vulnerability of already vulnerable children. Therefore, there is a high need to address the barriers to service access and service utilization in the healthcare delivery system.

5. CONCLUSION

This study highlights different barriers to healthcare delivery access and concludes that health emergencies like the COVID-19 pandemic pose a significant barrier to accessing healthcare services. Such health emergencies increase the vulnerability of already vulnerable groups like SAM children by posing a constraint in access and utilization of healthcare services. Therefore, public health experts, nutritionists, and academicians should work together to improve healthcare service delivery. Initiatives focusing on improving healthcare delivery access as well as utilization, like mobile healthcare services, should be introduced on a regular basis, especially for socially disadvantaged and vulnerable communities, localities, and groups, to lessen their vulnerable state.

6. CONFLICT OF INTEREST

All authors declare no conflict of interest.

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