

Information Sources and Technologies used for Awareness about severe acute Malnutrition (SAM) among Children: A Survey of Caregivers

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Abstract

Severe acute malnutrition (SAM) remains a major public health issue in Pakistan significantly increasing morbidity and mortality among children under five years age. Although the conventional causes, such as food insecurity, poverty, and lack of access to healthcare services are well established, information and technology variables may also play significant role in the causation and prevention of SAM. This paper explores the effects of information factors such as digital health interventions, mobile health applications and health information access on the incidence and management of SAM in children. Quantitative research approach is used for the current study. A structured questionnaire was developed to collect data. The findings show that the low rate of digital literacy, poor internet access in rural areas, and absence of IT integration in primary care systems complicate the process of early diagnosis and treatment of SAM. This study comes to the conclusion that IT can be a double-edged sword: while smart use of technology has transformative potential in tackling SAM, a lack of digital infrastructure could sustain health inequities. Reducing the prevalence of child malnutrition in Pakistan may require strengthening information and technology frameworks used in healthcare delivery, especially in underprivileged areas.

Keywords: Severe Acute Malnutrition (SAM), Information and Communication Technology (ICT), Child Health, Nutrition Surveillance, eHealth Interventions, Pakistan, Digital Health Systems

Background of the Study

Severe Acute Malnutrition (SAM) refers to the condition in which children have extremely low weight for their height, usually resulting from inadequate food intake, infections, and various other socio-economic factors. One of the main causes of death for children under five is malnutrition. Both forms of over-nutrition and under-nutrition are commonly referred to as "malnutrition," with the term "under-nutrition" denoting just a nutritional deficiency. According to scientific definitions, malnutrition includes being dangerously thin (wasted), underweight for one's age, stunted, and lacking in vitamins and minerals (micronutrient malnutrition).

In Pakistan, severe acute malnutrition, or SAM, is still a major public health concern, especially for children under five. According to the 2018 National Nutrition Survey, 8% of children under five have SAM, up from 5.8% in 2011. Maternal under-nutrition, poor feeding practices for infants and young children, food insecurity, and limited access to healthcare services are all contributing factors. Ineffective management and prevention of SAM are made more difficult by a lack of technological solutions and inadequate information dissemination. A weight-for-height/length ratio below -3 standard deviations from the WHO Child Growth Standards median or the presence of nutritional edema are two indicators of SAM, which is a major public health concern in Pakistan that affects millions of children under the age of five (WHO, 2020). According to Pakistan Demographic and Health Survey (PDHS) 2021-23, in rural parts of Sindh, 63% of children were stunted (amongst which 40% were severely stunted), 48% were underweight and 14% are wasted. With this state of affairs, it becomes critical to do a fresh stock taking of the current situation, and subsequently suggest practical and impact interventions to the program managers and the decision makers in the provincial health department.

In developing countries like Pakistan, where malnutrition is still a major problem, SAM has a substantial negative influence on child survival and health. There are two main ways that SAM presents itself: wasting, which is a sign of a nutritional deficit, and kwashiorkor, which is linked to edema. The health and development of children are greatly impacted by SAM, a serious public health concern, especially in low- and middle-income nations like Pakistan. The extremely low weight-for-height ratio that characterizes SAM suggests a serious nutritional intake deficit, which may raise morbidity and mortality rates in children under five. This paper hypothesizes that the SAM outcomes can be positively impacted not only by the increase in food security and access to healthcare but also by the role played by the social dynamics, technological progress, and the spread of information about nutrition in contributing to the improvement or worsening of malnutrition among children. Determinants of SAM are multi-dimensional and this study seeks to examine the informational

determinants of SAM in Pakistani children.

The main objective of this study was to understand and catalogue all the determinants and their association with SAM among children in the district Kasur, which stands out in terms of SAM statistics. Having developed this understanding, it is envisaged that more focused and selected study of information seeking will help in reducing this alarming rate of SAM in the area. Therefore, these findings will help the program managers, research community and the policy makers for deciding on the future roadmap to confront severe acute malnutrition (SAM) in the province, and especially in the district Kasur. Policymakers, healthcare professionals, and international organizations will be able to develop more effective treatments by using this study's understanding of the possibilities and difficulties of information in addressing SAM. The ultimate objective is to draw attention to the ways in which information might act as a catalyst for long-lasting advancements in pediatric healthcare and nutrition, hence assisting in the decrease of SAM in Pakistan.

Research Questions

1. What is the knowledge of mothers about the detection, treatment, and prevention of SAM in Pakistan?
2. What sources of knowledge have been used for getting information about SAM in Pakistan?
3. Is there any impact of better information on SAM?
1. What devices are being used for getting information about SAM?

Literature review

Pakistan is among the top 10 countries based on the highest number of cases of severe acute malnutrition (SAM), with millions of children under five year old impacted annually (UNICEF, 2023).

The traditional therapies have been dominated by public health campaigns, medical therapy and food supplements. A potentially groundbreaking approach to the malnutrition battle, however, has emerged over recent years: the integration of information and communication technologies (ICTs) into the systems of the public health. The benefits of digital health interventions for early malnutrition diagnosis, monitoring, and treatment have been emphasized by a number of international research. Examples of mobile health (mHealth) platforms, which have shown potential in increasing the knowledge of caregivers and assisting them in obtaining nutritional services, include mobile applications, teleconsultation, and SMS reminders (Lee et al., 2020; WHO, 2021).

Front line medical workers can utilize the technologies to submit SAM cases to be treated immediately and track child growth indicators in real-time. The field of digital health is a developing one in Pakistan. E-Health and mHealth services have been piloted by the Punjab Information Technology Board and by projects of organizations

such as Sehat Kahani particularly in remote and less-privileged regions. Nevertheless, as a result of the absence of digital infrastructure, low literacy rates, slow internet connections, and the absence of training of healthcare workers, the use of these tools remains asymmetrical (Qamar et al., 2022).

A study by Khan et al. (2021) conducted in rural Sindh revealed that coverage of mobile phones is high, but there is very low usage of health-related apps by caregivers. In order to properly monitor child nutrition, health professionals do not have access to trustworthy databases or electronic health records, according to a different study by (Ahmed & Javed, 2020).

Also, due to the fragmentation of health information systems, the lack of connection between real-time data collection and practical intervention occurs (World Health Organization, 2019). Caregivers and, more specifically, women, who are the main caregivers and do not necessarily have easy access to mobile devices or internet connectivity, are also affected by gender dynamics and cultural norms when it comes to using technology (UNICEF, 2021). These sociocultural barriers have to be resolved in order to make ICT-based nutritional treatments a success (Global Nutrition Report, 2020). In spite of the emerging knowledge about IT and overall population health in Pakistan, research gaps in explicitly linking IT determinants with the outcomes of severe acute malnutrition (SAM) remain (Khan et al., 2022).

Mobile phones can enhance the access to timely interventions and educational material, particularly in rural and remote regions (GSMA, 2019). Other low-resource environments have also investigated digital health interventions such as telemedicine and remote malnutrition treatment monitoring systems, with potential to enhance access to healthcare services and SAM (Bhutta et al., 2020). The effectiveness of school-based programs, community health workers, and media campaigns in improving diet awareness. The influence of mass media and health campaigns on communication of nutrition information to the population has been examined in different settings (Khan et al., 2022). Yet, such campaigns are more effective in Pakistan where access to the health literacy can be restricted, so further investigation is needed (Pakistan Demographic and Health Survey, 2018). The issues with dissemination and access to information continue to be problems, yet the government initiatives, such as the National Nutrition Program or the activities of international organizations (UNICEF, WHO), have been used to combat SAM (Ministry Of National Health Services Pakistan, 2021).

The Pakistani health systems have begun to adopt mobile apps as a tool to enable them to collect data and make decisions in real-time. The Aga Khan Development Network established the Central Asia Stunting Initiative (CASI) that provided local health workers with mobile devices that evaluated and tracked child growth, categorized nutritional condition, and referred at-risk children. Particularly in remote areas of the North, the instruments have contributed to the timely

identification of malnutrition and the timely delivery of intervention (AKDN, 2023). Identify SAM needs an understanding of demographic and socioeconomic factors, such as mother education, family income, and access to medical care. There was a higher likelihood of stunted, wasted, or underweight children in lower-income families and children whose mothers had lower levels of education, as a study based on the Pakistan Demographic and Health Survey (Siddiqa et al., 2023). These findings underscore the importance of ensuring that interventions are customized based on the socioeconomic class.

The issues to the effective implementation of nutritional interventions have been identified through process reviews. A study conducted on food supplementation programs in rural Pakistan found that caregivers had quite a bit of knowledge on supplements, yet they often shared these supplements with other members of the household, and did not get the monthly full supply. Moreover, caregivers were not frequent and connect supplements with the prevention of stunting, which points to the necessity of an enhanced level of community engagement and counseling (Zaidi et al., 2020).

Research Methodology

A quantitative research design is used by conducting survey through structured questionnaire. The cross-sectional survey assesses the role of information in dealing with SAM outcomes of children.

The population for the study consists of mothers and caregivers of children with SAM. Union councils, villages and families in district Kasur were chosen using a cluster sampling strategy, which is in line with procedures used in Pakistani studies. SAM patients (MUAC <115 mm or WHZ <-3 SD) and matched controls in the 6–59 month age range were systematically sampled from each site. Children aged 6 to 59 months who meet WHO criteria for SAM (MUAC <115 mm or WHZ < 3 SD) and their primary caregivers were eligible participants. Children with chronic health problems that are not related to malnutrition are left out. Verbal consent of older children and written informed consent of the caregivers were obtained in accordance with the ethical standards.

Home visits were used to collect quantitative data. Surveys about demographics and information seeking habits were given to caregivers. Data from anthropometry will be collected twice and averaged. To guarantee consistency, first author briefed the respondents in case of any ambiguity. Descriptive statistics was used to analyze data. Frequencies and percentages were used to explain data.

The appropriate institutional review boards in Pakistan grant ethical approval. Consent and data confidentiality processes for the current study is consistent with national norms. Regular supervisory checks, training, and removal of duplicate entries ensured the quality of the data. Content validity is maintained via pilot testing.

Results

1. Demographic details of respondents

The respondents' relationship with the primary carer is displayed in the table. Most of the 110 respondents were mothers and only few children affected by SAM have caregivers other than mothers.

Of the 110 participants, 76 responses (69.1%) are mothers who are between the ages of 20 and 29. This suggests that the majority of the sample is young adults, which is a typical pattern given that this age group for raising children. The 30-39 age group is the second biggest group with 26 responders (23.6%). It means that a large proportion of carers are at the mature parenting phase, and they may be more stable and experienced childcare providers. The sample consists of young or early-age moms, as shown by the reduced number of carers (7 respondents, or 6.4) who are below 20. Conversely, there is only a single respondent (0.9) in 40 years and above category.

The educational attainment of mother among the 110 respondents is displayed in the table 1. The results indicate that 57 participants (51.8%) having no formal education. This finding means that the proportion of mothers in the research sample with minimal formal education is relatively high and can potentially affect their health, nutrition, and childcare practices and awareness. Moreover, 17 respondents (15.5%) have completed their elementary school, and 17 respondents (15.5) have completed their secondary school education.

Table 1: Relationship of respondents with child

Relationship of respondents with child	Frequency	Percentage
Mother	103	93.6
Grandmother	02	01.8
Other	05	04.5
Age of mother/caregiver		
Below 20	07	6.40
20-29	76	69.1
30-39	26	23.6
40 and above	01	0.90
Education level of mother		
No formal education	57	51.80
Primary	17	15.50
Secondary	17	15.50
Higher	19	17.30
Total	110	100%

2. Sources of information about Severe Acute Malnutrition (SAM)

Only one respondent (0.9%) learnt about SAM from TV or radio, while 23 respondents (20.9%) identified other means, and 10 respondents (9.1%) got information from the internet.

These results suggest that community-based methods are the best ways to inform carers about SAM, particularly in low-resource or rural areas. Although internet and mainstream media sources raise knowledge of health issues, they seem to have little effect on this demographic. The findings are consistent with research showing that skilled community health workers reduce child morbidity and death by improving carer knowledge, early detection, and management of malnutrition.

In order to guarantee that carers are knowledgeable about the hazards, prevention, and management of SAM, the results generally highlight the significance of bolstering community health initiatives, increasing coverage, and combining various communication methods.

Table 2: Source of information about SAM

Source of Information about SAM	Frequency	Percentage
Community Health Worker	76	69.10
Internet	10	09.10
Others	23	20.90
TV/ Radio	01	0.90
Total	110	100.0

3. Knowledge and belief about SAM

The respondents' knowledge about SAM is shown in the table 2. Of the 110 participants, 96 respondents (87.3%) said they had heard of SAM, whereas 14 respondents (12.7%) said they had not. This suggests that respondents in the study population have a high degree of awareness regarding SAM. Awareness is vital as it affects early detection, prompt health-seeking behavior, and proper care for impacted children. The 12.7 percentage of those who are not aware of SAM implies that there is a knowledge gap which may cause delays in treatment and higher chances of complications among children. These findings correlate with studies which show that outreach efforts, community health education and engagement with respondents significantly increase malnutrition knowledge and treatment. The prevention, early diagnosis and effective treatment of malnutrition particularly in a low-resource setting are reliant on the establishment of sufficient awareness of SAM.

Among the 110 responders, 107 (97.3) believed that SAM was treatable, and 3 (2.7) were not confident. This implies that the awareness of the potential of recovering out of SAM through the use of proper nutritional and medicinal treatments is very high among the respondents. Favorable perceptions towards the treatability of SAM are necessary since they encourage the respondents to consult medical services immediately, adhere to treatment regimens, and participate in community-based management programs. Since SAM is associated with a high risk of morbidity and mortality among children below five years of age, timely intervention is particularly important.

Table 3: Knowledge of SAM

Have you heard about Severe Acute Malnutrition	Frequency	Percentage
Yes	96	87.3
No	14	12.7
Do you believe SAM is treatable?		
Yes	107	97.3
Not sure	03	02.7
Total	110	100.0

4. Do you believe malnutrition can be prevented through better information and hygiene?

The beliefs of the respondents about preventing malnutrition through better information and hygiene are displayed in the table 3. Of the 110 responders, 105 (95.5%) think that good diet and hygiene practices can prevent malnutrition. Three respondents (2.7%) were unsure, while just two respondents (1.8%) disagreed.

This suggests that respondents have a high degree of awareness and a positive outlook regarding the need of proper feeding and hygiene in preventing malnutrition. In order to prevent both acute and chronic malnutrition, these attitudes are crucial for encouraging good parenting techniques, introducing supplementary foods on time, and getting relevant information. In order to improve child health outcomes and reduce malnutrition, caregiver's knowledge and practices are crucial.

Table 4: Do you believe malnutrition can be prevented through better information and hygiene?

Do you believe malnutrition can be prevented through better information and hygiene?	Frequency	Percentage
Yes	105	95.5
No	02	1.8
Not sure	03	2.7
Total	110	100.0

5. Device used for accessing information about SAM

The majority of respondents do not utilize any device to access health information via ICT, according to the table 5. Dominant majority of respondents (70.9%, n=78) said they did not use any gadget, indicating little use of digital technology to get health-related information. Mobile phones are the most widely utilized device for obtaining information, according to 26.4% (n=29) of respondents who do use devices. On the other hand, only 2.7% (n=3) of the participants reported using a computer, indicating relatively little computer use. Overall, the results indicate that respondents have very little access to ICT equipment, and when they do, cell phones are the main way they obtain information.

Table 5: What type of device do you use for accessing health information via ICT?

Device	Frequency	Percentage
Mobile	29	26.40
Computer	03	02.70
None	78	70.90
Total	110	100.0

6. Frequency of SAM related information via ICT

Most respondents never or never obtain health-related information via ICT, according to the data. There is extremely little digital communication on health and nutrition among the families, as seen by the high percentage of 68.2% (n=75) who said they never receive health-related information via ICT. The low amount of ICT-based health information transmission is further highlighted by the fact that 19.1% (n=21) said they seldom receive such information. The proportion of respondents who said they received health information more regularly was quite low. Only 5.5% (n=6) said they get information every day, 2.7% (n=3) said they get it every week, and 4.5% (n=5) said they get it every month.

Overall, these results imply that there is very little access to health-related information via ICT, and most respondents do not frequently receive digital health communication, which may have an impact on awareness and knowledge regarding nutrition and child health

Table 6: Frequency of health-related information via ICT

How often do you receive health-related information via ICT	Frequency	Percentage
Daily	06	05.50
Weekly	03	02.70
Monthly	05	04.50
Rarely	21	19.10
Never	75	68.20
Total	110	100.0

6. Findings

The findings indicate that the majority of participants were mothers (93.6%), with very few female grandparent (1.8%) and other caregivers (4.5%), supporting the central role of mothers in child care and nutrition practices (UNICEF, 2021). Most Care provider were aged 20-29 years (69.1%), followed by 30-39 years (23.6%), while only a small percentage were below 20 (6.4%) or above 40 (0.9%). In case of education, more than half of the mothers had no formal education (51.8%) whereas the remaining had primary (15.5%), secondary (15.5%), and higher education (17.3%). This indicates that low maternal education remains a prominent factor that may influence child health awareness and nutrition-related decision –making (World Health Organization, 2020).

Regarding awareness and information sources about SAM, a large percentage of participants (87.3%) had heard about SAM, and most believed it could be prevented through better information and hygiene (95.5%) and treating effectively (97.3%). Community health workers were recognized as the primary source of information (69.1%) whereas very few participants relied on TV/ radio (0.9%) or the internet (9.1%). Furthermore, Access to digital devices was limited, with only (26.4%) owning mobile phones and (70.9%) reporting no access to any device.

Similarly, most participants reported rarely (19.1%) or never (68.2%) receiving health-related information via ICT. These findings highlight a significant digital divide and suggest that while awareness of SAM exists, but access to ICT-based health information is limited, particularly in low- resource settings (Global Nutrition Report, 2022; World Bank, 2021).

Conclusion

An analysis of information and technology issues that affect the severe acute malnutrition (SAM) in Pakistani children underscores the level of importance that technology, expertise of specific caregivers, and availability of health information play in shaping the child nutrition effectiveness. The studies indicate that technological tools, poor digital literacy, and the lack of access to reliable health and nutrition data are common among caregivers. Some of the technological interventions that can be used to improve treatment adherence, early detection, and follow-up care include digital monitoring systems, electronic health records, and mobile health applications. Better information and use of technology enhance the accuracy of monitoring, access to services, and treatment outcomes, particularly in remote and underserved regions, combined with community-based programs such as Community Management of Acute Malnutrition and supported by competent frontline health workers. Access to nutrition and health-related information is one of the factors that affect caregiver's behavior. Caregivers with information about complementary feeding, balanced foods, nursing techniques, and sanitation tend to use preventive measures that reduce the risk of SAM. On the other hand, effective prevention and prompt intervention are still hampered by a lack of knowledge and awareness. Combining technical and information aspects is the best way to reduce SAM. The digital tools, social engagement and behavior change communication all collaborate to enhance the monitoring systems, preventive measures and the treatment effectiveness. It is possible that the frequency and severity of SAM can be significantly decreased through the reinforcement of these combined interventions, which would improve the health and survival outcome of children in this country.

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