

Association between maternal mental health and child nutritional status in rural Sindh: a cross-sectional study using an e-health clinical model

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ABSTRACT

Objective To assess the association between maternal common mental disorders (CMD), as measured by the Self-Reporting Questionnaire-20 (SRQ-20), and child nutritional outcomes wasting, stunting and underweight in rural Sindh, Pakistan, using an e-health clinical model.

Design A cross-sectional observational study was conducted to explore the relationship between maternal mental health and child nutritional status. Data were collected through nurse-facilitated consultations at e-health clinics, with maternal CMD assessed via the WHO-validated SRQ-20 tool and child nutritional status measured using standardised anthropometric indicators (weight-for-height Z-score, height-for-age Z-score, weight-for-age Z-score) based on WHO growth standards. Multivariate logistic regression was applied to determine adjusted associations.

Setting Six nurse-assisted e-health clinics operating under the Sehat Kahani telemedicine platform across rural regions of Sindh.

Participants A total of 455 mother–child dyads with children aged 6–59 months who visited clinics between April and June 2025. Eligible mothers had resided in the local area for 6 months and were not undergoing treatment for any mental health disorder.

Results Stunting affected 62% of children, underweight 46.8% and wasting 43.3%. Maternal CMD was prevalent in 76.9% of participants (SRQ-20 score ≥ 7). Multivariate logistic regression revealed that children of mothers with CMD were about twice as likely to be stunted (adjusted odds ratio (AOR)=2.006, $p=0.006$) and nearly 1.6 times more likely to be underweight (AOR=1.688, $p=0.05$), though CMD showed no link with wasting. Maternal education was protective against stunting (AOR=0.458, $p=0.012$), while paternal unemployment was linked to increased odds of stunting and underweight. No significant associations were found with environmental factors, water source and toilet facilities.

Conclusion Maternal CMD, educational attainment and paternal employment status are key predictors of child nutritional status in rural, low-resource contexts. These findings underscore the need for integrated maternal mental health and child nutrition interventions within digital healthcare delivery models.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Maternal common mental disorders have been linked to inadequate child growth and nutrition worldwide; however, evidence from Pakistan, particularly in rural and low-resource regions, is scarce. The majority of previous studies investigated maternal depression and child malnutrition independently, neglecting their combined effects.

WHAT THIS STUDY ADDS

⇒ This study demonstrates that maternal common mental disorders are significantly associated with increased likelihood of child stunting and underweight in rural Sindh. It emphasises maternal education and paternal employment as critical modifying factors affecting child nutritional outcomes within a digital health service delivery model.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ Integrating maternal mental health assessments into community nutrition and digital health initiatives can improve early detection and assistance for vulnerable families. These findings offer information to assist policymakers in formulating comprehensive treatments that tackle both psychological and nutritional factors affecting child health in resource-limited environments.

INTRODUCTION

Globally, 970 million individuals suffer from diverse mental problems, with anxiety and depression being the most common.¹ The overlapping of symptoms such as depression, anxiety, exhaustion and somatic problems results in the categorisation of mental diseases as common mental disorders (CMD).² CMDs are notably widespread among women, particularly in low- and middle-income countries (LMICs).³ The prevalence of CMDs has been documented as 22.8% in India,⁴ 46.2% in Bangladesh⁵ and 35.7% in Pakistan as

mentioned in The National Psychiatric Morbidity Survey of Pakistan (2022).⁶

A complex interaction of biological, social and environmental factors leaves women in (LMICs) more vulnerable to CMD than men.^{7 8} Concerning women's mental health, social factors are crucial in their onset and progression.⁹ Women's mental health problems may be exacerbated by cultural norms that impose strict conventional duties on individuals, reducing their autonomy and social standing.^{10 11}

Diminished maternal mental health, including prenatal and postpartum depression, significantly increases the risk of delayed growth in infants and young children compared with those whose mothers are not depressed.^{12 13} Medical complications, suicide and premature death are more common in people with untreated CMD.¹⁴ Affected people may experience a spectrum of emotions, from moderate to severe, and the symptoms can last anywhere from a few months to a few years. It hinders everyday functioning and creates significant emotional discomfort.¹⁵ Different characteristics were shown to be significantly associated with common mental diseases in LMICs, though. According to several of these researchers, women in LMICs are more likely to experience mental health issues as a result of factors such as gender bias, poor prenatal care, undesired pregnancies, limited social responsibilities and low socioeconomic status.^{16 17}

Maternal depression has been associated with compromised child growth, a vital measure of general health and nutritional quality.^{18 19} Insufficient growth during early childhood can result in enduring repercussions, such as impaired physical development, diminished cognitive capacities, decreased economic production and heightened vulnerability to diseases.²⁰ The initial 2 years of life, commonly termed the 'window of opportunity', represent a phase of accelerated physical and cognitive growth, during which approximately 80% of brain development occurs. Children in (LMICs) frequently encounter substantial obstacles, including poverty, restricted access to healthcare and undernutrition, which can hinder their complete developmental potential, rendering them more susceptible to illness and premature mortality.^{21 22} The child is particularly susceptible to the impacts of their caregiver's mental condition since they are completely dependent on them for their social and nutritional needs in these environments when the primary caregiver is the only provider.²³

Social inequality is intricately associated with risk factors for numerous prevalent mental disorders. Rural inhabitants encounter restricted access to professional mental health services owing to manpower deficiencies and geographical obstacles.²⁴ The disparity in mental health awareness between urban and rural populations hinders rural communities from identifying symptoms and pursuing assistance.²⁵ Moreover, significant stigma and insufficient privacy in rural areas encourage individuals to hide their diseases, obstructing accurate diagnosis and treatment.²⁶

The mental health of mothers is a crucial factor influencing infant nutritional status, since CMDs in mothers are significantly linked to poor feeding practices and an increased risk of child wasting.²⁷ Mental health difficulties affect a mother's capacity to deliver consistent care, impacting the child's growth and development, in Pakistan where malnutrition is a very big public health challenge. Nationally, about 40% of children under 5 have stunting, 17.7% are afflicted with wasting and approximately 28.9% are classified as underweight. The conditions in Sindh are particularly dire, with stunting prevalence at 45.5%, wasting at 23.3% and underweight at 41.3%, as reported by the National Nutrition Survey 2018.²⁸ These statistics highlight the imperative of prioritising mother mental health within holistic child nutrition initiatives.

Despite there being global evidence connecting maternal mental health to child nutrition, there is a dearth of research in Pakistan, particularly in rural and low-resource contexts, that has explored this relationship. Previous research frequently examines maternal depression and child malnutrition in isolation, neglecting their synergistic effects. This study examines the association between (CMD), evaluated through the Self-Reporting Questionnaire-20 (SRQ-20) and child nutritional outcomes, specifically stunting, wasting and underweight, in children under 5 years old attending e-health clinics in rural Sindh, Pakistan.

METHODOLOGY

Study design and setting

The study used an observational cross-sectional design to evaluate maternal and child health outcomes in rural Sindh, Pakistan. Data were gathered from six nurse-assisted e-health centres situated in Moro, Jijanagar, Nasarpur, Lucky Farm, Al-Shifa Clinic (Hyderabad) and Tandohyder. Mothers and their children engaged in digital consultations with certified general practitioners and specialists, while trained nurses did in-person anthropometric measures of the children. These clinics function inside the Sehat Kahani digital healthcare infrastructure, which enables audio and video consultations for patients in underserved and distant areas. The platform consists of 63 e-health clinics, retail and corporate apps and e-pharmacy services. Proficient bilingual nurses fluent in Urdu and prominent regional languages (Sindhi, Punjabi, Balochi and Pashto) to guarantee effective communication and participant comfort executed all interviews and data collection. The Urdu-validated SRQ-20 was employed to evaluate maternal mental health.²⁹ Nurses facilitated the initial setup during consultations before withdrawing to uphold patient confidentiality. The Sehat Kahani head office in Karachi centrally supervised data coordination, aggregation and quality assurance to ensure methodological consistency and reliability.

Inclusion and exclusion criteria

The study encompassed mother-child pairs, with children aged 6 months to under 5 years, who attended

Sehat Kahani's e-health clinics between 1 April 2025 and 1 June 2025. Mothers were enrolled after granting informed consent. Participants were mandated to have lived in the local district for a minimum of 6 months to guarantee contextual representativeness. Exclusion criteria comprised children born preterm (under 28 weeks of gestation) or with specific healthcare needs, pregnant women and mothers presently undergoing pharmacological or psychological treatment for mental health disorders.

Sample size

The sample size was calculated using a single population proportion formula $n = Z^2(p)(1-p)/d^2$, incorporating a 95% confidence level ($Z=1.96$), a $d=5\%$ margin of error and an estimated stunting prevalence of $p=45.5\%$ derived from the National Nutrition Survey.²⁸ This resulted in a necessary sample size of 381, which was modified for a 20% non-response rate, culminating in a final target of $n=457$ participants moreover a convenience sampling technique was employed in this study.

Patient consent

Patients using the Sehat Kahani e-health platform grant informed consent, which expressly recognises the potential utilisation of anonymised data for commercial objectives and publications that advocate the telemedicine model for healthcare accessibility. This transparent approach protects patient privacy while enabling the study to enhance telemedicine in healthcare delivery.

Patient and public involvement

None.

Data collection tool

The nutritional status of children was evaluated via standard anthropometric measures, comprising height-for-age Z-score (HAZ), weight-for-age Z-score (WAZ), weight-for-height Z-score (WHZ) and mid-upper arm circumference (MUAC). Mothers' mental health was assessed using the SRQ-20 to identify CMD, while socio-demographic data were gathered to investigate correlations with child nutritional outcomes. A cut-off score of ≥ 7 on the SRQ-20 was employed to signify elevated risk of CMD.²⁷

Anthropometric assessment

Anthropometric measurements were acquired in accordance with established WHO protocols. Recumbent length was assessed for children under 2 years and standing height for older children using a UNICEF height/length board (precision ± 0.1 cm), while weight was documented with a digital electronic scale (precision ± 0.1 kg). The MUAC was assessed on the left arm at the midpoint between the acromion and olecranon processes using a standard MUAC tape. Data were systematically assessed for completeness and plausibility using WHO Anthro software, with flagged values being verified or excluded as necessary. In accordance with the exclusion criteria, cases

with specific healthcare requirements were excluded from the study sample.

Statistical analysis

The principal outcome variables were child nutritional indicators (wasting, stunting and underweight), categorised per WHO growth guidelines and the WHO Anthro software was used to obtain the scores. The principal independent variable was maternal CMD status (high vs low SRQ-20 score), with additional explanatory variables encompassing demographic, socioeconomic and healthcare access indicators, including parental education, paternal occupation, delivery location and type, prenatal care and household sanitation conditions. Data analysis was performed with the Statistical Package for Social Sciences V.24.0. Subsequently, the participants were categorised appropriately and underwent preliminary assumption verification prior to data analysis. Descriptive statistics were produced using frequencies and percentages. χ^2 tests were employed to analyse bivariate correlations. All variables with a p value ≤ 0.20 were included in multivariate logistic regression analysis.³⁰ Outcomes were presented as ORs accompanied by 95% CIs, with statistical significance established at $p < 0.05$.

RESULTS

The demographic and clinical data provide substantial insights into the health status and living situations of the examined paediatric population data of a total of 455 mother and children dyads made part to the final sample. Stunting was the most prevalent form of malnutrition among the nutrition indicators, affecting 62% of children, followed by wasting at 43.3% and underweight at 46.8%, underscoring chronic nutritional inadequacies. A minor male predominance was observed in the sample (55.8% male compared with 44.2% female). A significant percentage of children exhibited a recent history of diarrhoeal sickness (59.8%) and fever (60.9%), indicating exposure to infectious risk factors. A significant majority of families had access to safe water sources (80.2%) and enclosed toilet facilities (94.7%); however, a considerable minority lacked these sanitation amenities. Clinical visits were predominantly focused in a limited number of clinics, with Moro Clinic accounting for 23.3%, Jijanagar 19.3% and Nasarpur for 18.9% of the total share. Follow-up patients constituted 33.8% of the sample, exhibiting diverse levels of involvement in telehealth services. The educational attainment of mothers and spouses was inadequate, with 36.5% of mothers and 22.9% of spouses lacking any formal schooling. The predominant languages spoken were Pashto (53.4%) and Sindhi (32.1%). The majority of mothers were homemakers (90.3%), while fathers were primarily small business owners (64.8%). The majority of families resided in joint households (74.3%), with the average household size exceeding four individuals (93.2%). Of the children born, 58% were delivered in

hospitals, while 42% were born at home, with 34.3% receiving assistance from traditional or unskilled birth attendants. Antenatal care coverage was heterogeneous, with 58% indicating one to three prenatal visits. Ultimately, 92.5% of births occurred at full term (37 weeks or more), whereas a small percentage indicated preterm deliveries occurring between 28 and 36 weeks. These findings highlight a brief overview of socioeconomic, cultural and healthcare factors affecting mother and child health outcomes in the research group [table 1](#) and [table 2](#).

[Figure 1](#) illustrates that the prevalence of wasting, stunting and underweight among children of mothers with elevated CMD (SRQ $\geq$ 7) scores was significantly greater than that of children whose mothers had low CMD scores (<7), children of mothers with CMD appear more susceptible, with a gradual rise in undernutrition across categories compared with those with lower CMD levels.

The χ^2 analysis in online supplemental table 1 revealed multiple parameters substantially correlated with child nutritional outcomes. The maternal CMD status exhibited a significant association with wasting ($p=0.034$), stunting ($p=0.001$) and underweight ($p=0.003$), highlighting its pivotal role in child malnutrition. All the variables with p values $\leq$ 0.20 were included in the multivariate analysis to assess their adjusted effects with nutritional status.

In the multivariate logistic regression analysis [table 3](#), maternal CMD (common mental disorder) scores were identified as a significant predictor of adverse nutritional outcomes in offspring. Children of mothers exhibiting elevated CMD scores (SRQ $\geq$ 7) demonstrated markedly increased chances of stunting ($p=0.006$, AOR=2.006, 95% CI 1.226 to 3.282) and underweight ($p=0.05$, AOR=1.688, 95% CI 0.998 to 2.857), although the association of these outcomes with wasting was not statistically significant.

Newly registered patients had a higher likelihood of stunting ($p=0.001$, AOR=2.235) and being underweight ($p<0.001$, AOR=3.064) in comparison to follow-up patients. Children without a fever history in the preceding 2 weeks exhibited markedly reduced risks of wasting ($p=0.007$, AOR=0.557) and underweight ($p<0.001$, AOR=0.421). A higher birth weight showed a positive correlation with stunting ($p=0.038$, AOR=9.860). Hospital delivery was associated with elevated risks of wasting ($p=0.016$, AOR=1.699).

Children whose mothers attended four or more antenatal visits exhibited reduced chances of stunting ($p=0.008$, AOR=2.871), but secondary maternal education served as a protective factor against stunting ($p=0.012$, AOR=0.458). Paternal work as a small business owner correlated with increased odds of stunting ($p=0.013$) and underweight ($p=0.001$), while unemployment exhibited a significant association with stunting ($p=0.039$). Environmental factors, including water supply and the kind of toilet facility, were not substantially correlated with nutritional results.

Table 1 Socio-demographic characteristics of participants visiting Sehat Kahani e-health centres for consultations

Variables	Frequency n	Percentage %
Socio-demographics		
Clinical name		
Moro Clinic	106	23.3
Al-Shifa Clinic Hyderabad	52	11.4
Tandohyder	42	9.2
Jijanagar	88	19.3
Lucky Farm	81	17.8
Nasarpur	86	18.9
Patient registration type		
Follow-up patient	154	33.8
New patient	301	66.2
If you are a follow-up patient, how often have you used e-health services at the Sehat Kahani Clinic?		
One time	42	9.2
Two times	81	17.8
Three times	30	6.6
More than three times	1	0.2
Mothers' education		
No education	166	36.5
Primary education (1–5)	134	29.5
Secondary education (7–12)	155	34.1
Spouse education		
No education	104	22.9
Primary education (1–5)	111	24.4
Secondary education (7–12)	231	50.8
Tertiary education	9	2
Language spoken		
Urdu	48	10.5
English	4	0.9
Sindhi	146	32.1
Punjabi	8	1.8
Balochi	5	1.1
Pashto	243	53.4
Afghani	1	0.2
Mother occupation		
Govt employee	18	4
Small business owners	26	5.7
Housewife	411	90.3
Spouse occupation		
Govt employee	113	24.8
Small business owners	295	64.8
Unemployed	47	10.3
What is your current life situation		
Nuclear family	117	25.7

Continued

Table 1 Continued

Variables	Frequency n	Percentage %
Joint family	338	74.3
What is the number of members in your family		
Less than four members	31	6.8
More than four members	424	93.2
What type of water source does your household use		
Protected	365	80.2
Unprotected	90	19.8
What type of toilet facilities do the people in your household use		
Close door toilet	431	94.7
Open door toilet	24	5.3

DISCUSSION

The study indicated that maternal CMD represents a significant health challenge linked to child undernutrition, with approximately 76.9% of the females attending the clinic during the research period exhibiting scores of ≥ 7 , a notably high proportion. In comparison to other studies conducted in the same domain, the findings indicate 46.2% in Bangladesh,²⁷ 31.2% in Vietnam and 39.4% in Ethiopia.³¹ Maternal CMDs are prevalent in developing nations, yet their incidence varies by country. A systematic review of studies by Stewart *et al* demonstrated a strong correlation between maternal depressive symptoms, evaluated using instruments such as the WHO SRQ-20, and infant undernutrition, especially evident in low socioeconomic communities where women face increased adversities and possess diminished levels of empowerment.³² Evidence from sub-Saharan Africa further supports our findings. A cross-sectional study involving 204 mothers of children with severe acute malnutrition at eight outpatient clinics in Jigawa, North-Western Nigeria, employed the WHO SRQ-20 and identified a high prevalence of maternal CMD, which had a significant association with child undernutrition.³³

This study identified increased maternal CMD (SRQ ≥ 7) as a significant predictor for adverse nutritional outcomes in children under 5 years of age. Elevated CMD scores were associated with increased odds of stunting (AOR=2.006, 95% CI 1.226 to 3.282, $p=0.006$) and a marginal association with underweight status (AOR=1.688, 95% CI 0.998 to 2.857, $p=0.05$). No substantial association was identified with wasting in the present study. These findings align with existing literature, indicating that maternal CMDs are associated with poor child growth. A study conducted in Bangladesh reported stronger associations with wasting (eg, AOR=2.25, 95% CI 1.15 to 4.43).²⁷ The variation in wasting outcomes may reflect contextual differences in malnutrition drivers, emphasising the need for integrated maternal mental

Table 2 Child anthropometric status and reproductive history of mothers attending Sehat Kahani e-health clinics in rural Sindh

Variables	Frequency n	Percentage %
Child parameters		
Wasting identifier WHZ		
Normal	258	56.7
Wasting	197	43.3
Stunting identifier HAZ		
Normal	173	38
Stunting	282	62
Underweight identifier WAZ		
Normal	242	53.2
Underweight	213	46.8
Child gender		
Male	254	55.8
Female	201	44.2
What was the baby's weight at the time of birth		
It was less than that of average children	60	13.2
It was like that of an average child	374	82.2
It was more than that of average children	21	4.6
Child history of diarrhoeal disease within 2 weeks		
Yes	272	59.8
No	183	40.2
Child's history of fever within 2 weeks		
Yes	277	60.9
No	178	39.1
Reproductive history		
Where was the child born		
At home	191	42
In hospital	264	58
Type of delivery		
Normal delivery	389	85.5
C-section delivery	66	14.5
Assistance in child delivery		
Healthcare professional	280	61.5
Traditional birth attendant	162	35.6
Unskilled healthcare personnel/quack	13	2.9
Number of prenatal visits		
None	118	25.9
One to three	264	58
Four or more	73	16
If your baby was born before 37 weeks, in which week was the baby born		

Continued

Table 2 Continued

Reproductive history		
37 weeks of normal term	421	92.5
28 weeks	2	0.4
B/w 28–32 weeks	13	2.9
B/w 32–37 weeks	19	4.2

HAZ, height-for-age Z-score; WAZ, weight-for-age Z-score; WHZ, weight-for-height Z-score.

health and child nutrition interventions in developing nations.

Parental education has long been recognised as a critical determinant of child nutritional status, with maternal education in particular demonstrating a sustained positive influence on child growth and development.³⁴ Consistent with this body of evidence, the present study found that secondary-level maternal education was significantly associated with reduced odds of stunting in children (AOR=0.458, $p=0.012$), suggesting a protective effect. This reinforces the role of maternal education in improving child health outcomes and promoting informed caregiving and health-seeking behaviours.

Similarly, prior studies have shown that children of fathers engaged in full-time employment face a substantially lower risk of malnutrition compared with those with unemployed fathers (OR=0.56, 95% CI 0.38 to 0.83).³⁵ However, findings from the current study indicate a more complex association between paternal occupation and child nutritional outcomes. Specifically, paternal involvement in small business ownership was significantly associated with increased odds of both stunting ($p=0.013$) and underweight ($p=0.001$), while paternal unemployment was also linked to higher odds of stunting ($p=0.039$).

These findings suggest that the stability, income reliability and time demands associated with different forms of employment may have important implications for household resource allocation and caregiving capacity, thereby influencing child nutritional status. This study's findings underscore the intricate and interconnected determinants of child undernutrition, with maternal mental health, parental education and socioeconomic conditions influenced by paternal employment identified as pivotal factors. In resource-limited environments, where structural vulnerabilities are significant, tackling child malnutrition requires more than mere nutritional assistance. An integrated, multisectoral response is necessary to concurrently support maternal psychological well-being, advance women's education and strengthen household economic resilience. Prioritising these dimensions is crucial for alleviating undernutrition and promoting sustained enhancements in child health, development and equity.

CONCLUSION

This study highlights the complex connections of factors contributing to child undernutrition in low-resource environments, with maternal mental health identified as a pivotal influence on growth outcomes. The elevated incidence of maternal CMD and their substantial correlation with heightened risks of stunting and underweight highlight the necessity of prioritising maternal psychological health in child health initiatives. Moreover, maternal education and paternal employment status significantly influence child nutritional outcomes, highlighting the overall effects of parental capability, empowerment and household socioeconomic conditions. These findings confirm that addressing undernutrition requires more

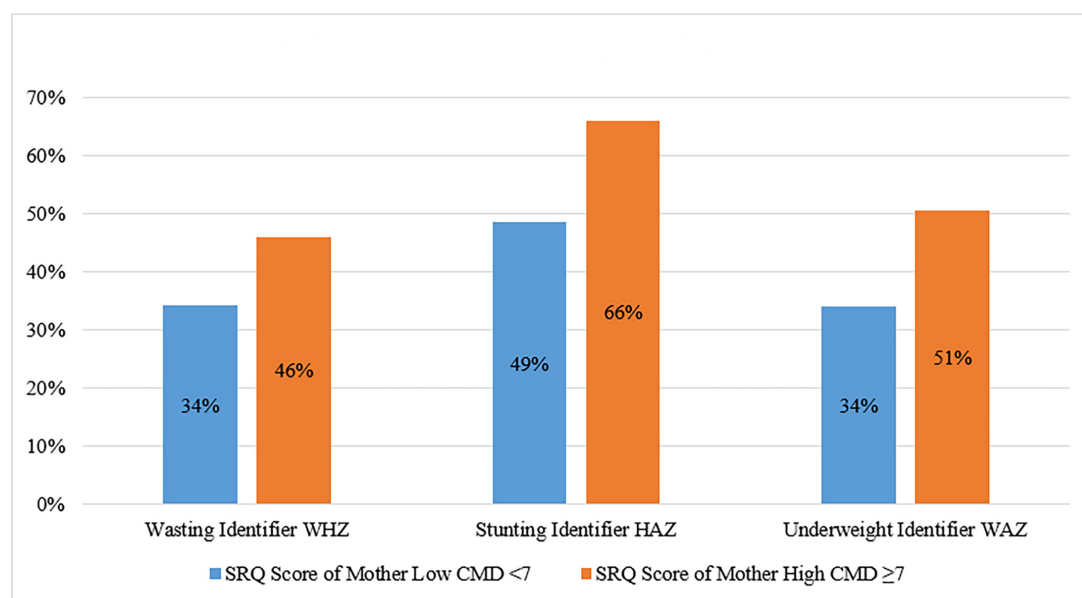


Figure 1 Child nutritional outcomes by maternal CMD (SRQ) score. CMD, common mental disorders; HAZ, height-for-age Z-score; SRQ, Self-Reporting Questionnaire; WAZ, weight-for-age Z-score; WHZ, weight-for-height Z-score.

Table 3 Multivariate logistic regression analysis showing factors associated with malnutrition among children visiting Sehat Kahani e-health centres for consultations

Variables in the equation	Wasting identifier WHZ			Stunting identifier HAZ			Underweight identifier WAZ		
	95% CI			95% CI			95% CI		
	Sig.	AOR	Upper	Sig.	AOR	Upper	Sig.	AOR	Upper
CMD score status									
Low CMD<7	Ref			Ref			Ref		
High CMD≥7	0.251	1.337	0.814	2.198	0.006	2.006	0.05	1.688	0.998
Patient registration status									2.857
Follow-up patient	Ref			Ref			Ref		
New patient	0.307	1.277	0.799	2.041	0.001	2.235	0.000	3.064	1.823
Weight of newborn at time of birth									5.152
It was less than that of average children	Ref			Ref			Ref		
It was like that of an average child	0.229	0.663	0.339	1.295	0.765	0.899	0.460	0.767	0.380
It was more than that of average children	0.815	1.143	0.372	3.513	0.038	9.860	0.129	2.746	0.745
Child's history of fever within 2 weeks									10.115
Yes	Ref			Ref			Ref		
No	0.007	0.557	0.365	0.850	0.058	0.656	0.000	0.421	0.266
Where was child delivered									0.667
At home	Ref			–			Ref		
In hospital	0.016	1.699	1.103	2.616			0.111	1.576	0.900
Type of delivery									2.758
Normal delivery	Ref			–			Ref		
C-section delivery	0.082	1.728	0.934	3.198			0.131	1.687	0.856
Assistance in delivery of the child									3.326
Healthcare professional	Ref			Ref			Ref		
Traditional birth attendant	–			0.148	0.718	0.458	0.580	0.845	0.465
Unskilled healthcare personnel				0.022	0.231	0.066	0.639	0.731	0.197
Number of prenatal visits									2.711
None	Ref			Ref			Ref		
One to three	0.525	0.830	0.468	1.474	0.262	1.415	0.506	0.814	0.444
Four or more	0.051	1.984	0.998	3.945	0.008	2.871	0.115	1.788	0.869
Mothers' education									3.681

Continued

Table 3 Continued

Variables in the equation	Wasting identifier WHZ			Stunting identifier HAZ			Underweight identifier WAZ		
	95% CI			95% CI			95% CI		
	Sig.	AOR	Upper	Sig.	AOR	Upper	Sig.	AOR	Upper
No education	Ref			Ref			–		
Primary education (1–5)	0.291	1.321	2.214	0.631	1.153	0.646			2.055
Secondary education (7–12)	0.111	1.534	2.598	0.012	0.458	0.248			0.844
Spouse education									
No education	Ref			Ref			Ref		
Primary education (1–5)	–			0.084	0.553	0.282	0.037	0.505	0.265
Secondary education (7–12)				0.971	0.987	0.479	0.052	0.525	0.274
Tertiary education				0.713	0.731	0.138	0.608	1.566	0.282
Mother occupation									8.700
Government employee	Ref			Ref			Ref		
Small business owners	–			–			0.260	0.431	0.099
Housewife							0.968	0.977	0.315
Spouse occupation									3.031
Government employee	Ref			Ref			Ref		
Small business owners	0.056	1.601	2.592	0.013	1.877	1.142	0.001	2.554	1.486
Unemployed	0.084	0.478	0.207	0.039	2.588	1.050	0.973	1.014	0.444
Number of members in your family									2.316
Less than four members	Ref			Ref			Ref		
More than four members	–			–			0.791	1.126	0.469
Type of water source									2.702
Protected	Ref			Ref			Ref		
Unprotected	0.356	1.307	0.741	0.505	0.801	0.416	0.262	0.703	0.381
Type of toilet facility									1.300
Close door toilet	Ref			Ref			Ref		
Open door toilet	–			0.565	1.385	0.457	–		4.195

Dependent variables were for analysis 'stunting', 'wasting' and 'underweight' were coded as 1, and 'normal' nutritional status as 0. CMD, common mental disorders; HAZ, height-for-age Z-score; WAZ, weight-for-age Z-score; WHZ, weight-for-height Z-score.

than just nutritional interventions. Holistic, cohesive strategies that enhance maternal mental health, advance female education and bolster household economic stability are crucial for attaining sustainable enhancements in child health and development.

Limitations

- ▶ The cross-sectional design of this study provides merely a snapshot of the issue, with exposure (eg, maternal CMD) and outcome (eg, child nutritional status) evaluated at a singular moment in time. This constrains the capacity to ascertain temporal or causal relationships among variables.
- ▶ Self-reported data on CMD, antenatal care and child illness may introduce recall and reporting bias.
- ▶ The limited sample sizes in some subgroups may have influenced the stability of regression estimates and widened CIs, which should be interpreted with caution.
- ▶ The SRQ-20, although a validated screening instrument, is not diagnostic and may be affected by cultural perceptions and subjective interpretations, potentially leading to misclassification of maternal mental health status.

Strengths

- ▶ The research employed a solid and geographically varied sample from several e-health clinics, using validated instruments like the WHO SRQ-20 and standardised anthropometric measures (WHZ, HAZ, WAZ) to ensure data reliability, methodological rigour and contextual significance in underserved populations.
- ▶ The study provides a multidimensional analysis of child undernutrition by integrating mental health, educational attainment and socioeconomic variables, facilitating a comprehensive understanding of intersecting risk factors beyond mere dietary intake.
- ▶ This research addresses a significant evidence gap by investigating the relationship between maternal CMD and child nutrition within the framework of a digital health service, providing insights pertinent to scalable and integrated interventions in resource-limited environments.

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