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Investigating the nutritional and mental health status in the suburbs of Northeast Iran: a register-based study

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Abstract

Background In urban areas, particularly among informal settlements, malnutrition and mental health disorders are recognized as key indicators of social inequality. Child malnutrition encompasses a wide range of developmental disorders. Mental disorders are also considered one of the main causes of the global burden of disease. This study aimed to investigate the nutritional status in children, mental health, and exposure to domestic violence among mothers living in the marginalized areas of Mashhad, northeast Iran.

Methods This cross-sectional study analyzed data from 325863 individuals (children and mothers) living in the marginalized areas of Mashhad, registered in the Sina Electronic Health Record SINA-EHR system between 2016 and 2018. National reference standard values for underweight (weight-for-age), stunting (height-for-age), wasting, overweight, and obesity (weight-for-height) were used to define nutritional status. Binary and multinomial logistic regression models were applied to explore the associated factors with nutritional and mental health status. Data analysis was performed using SPSS software version 26.

Results A total, 51.2% were boys and 48.8% were girls. Children with abnormal TSH were 20% more likely to be Stunting. Girls were 14% more likely to be underweight than boys (AOR = 1.14; 95% CI: 1.07–1.23). Maternal education and employment played a protective role in children's nutritional indicators. Regarding mental health and domestic violence indicators, smoking was associated with an increased likelihood of developing mental health problems (AOR = 3.58; 95% CI: 3.26–3.93). No statistically significant association was found between alcohol consumption and domestic violence; mothers with low scores on the mental health assessment were more likely to experience domestic violence, and a significant association was observed in this regard.

Conclusions Malnutrition and mental health problems remain significant challenges among children and mothers in marginalized areas. Strengthening maternal support, early identification, and integrated health interventions are crucial to reduce these disparities.

Keywords Malnutrition, Mental health, Domestic violence, Child, Mothers, Suburban population, Iran

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Introduction

Nutrition is a multifaceted phenomenon shaped by sociocultural, economic, medical, and dietary factors [1]. Each of these determinants independently influences human development throughout the lifespan [2]. When nutritional needs are unmet, both physical and mental health can be irreversibly impaired, resulting in various forms of malnutrition [3, 4]. Malnutrition encompasses stunting, wasting, underweight, micronutrient deficiencies, overweight, and obesity [5, 6]. In 2020, an estimated 149 million children under five years of age were stunted and 45 million were wasted. Meanwhile, overweight and obesity—representing another dimension of malnutrition—have become the second leading cause of death worldwide, accounting for approximately 300,000 deaths annually [7–10].

In national surveys of micronutrient status, 9.3% of girls and 7.8% of boys aged 15–23 months, and 11% of girls and 7.7% of boys aged 6 years were under weight. The prevalence of nutritional stunting in the 15–23-month age group was 15.1% among girls and 14.5% among boys, while in the 6-year age group, it reached 9.6% and 13.5%, respectively [11, 12]. These conditions not only elevate child morbidity and mortality but also impose substantial economic burdens due to decreased productivity and increased healthcare costs [13]. For instance, stunting alone results in an estimated annual global economic loss of US\$548 billion, followed by low birth weight with US\$344 billion. When overlapping factors such as poor breastfeeding are considered, preventable malnutrition costs the world at least US\$761 billion annually, equivalent to about US\$2.1 billion per day [14, 15].

To assess nutritional status, a variety of anthropometric tools and indices are employed, including growth charts, the Gomez classification (weight-for-age), and the McLaren index (weight-for-height) [16]. Anthropometric data are typically expressed as percentiles—indicating the percentage of the reference median—or as z-scores, representing standard deviations from the median. Key anthropometric indicators of nutritional status include wasting, underweight, and stunting [17].

Beyond its biological consequences, malnutrition is closely associated with mental health disorders. Socioeconomic deprivation and psychosocial stressors are recognized as major contributors to both nutritional deficiencies and mental disorders [18]. Mental and addictive disorders affect more than one billion people worldwide and account for 7% of the global burden of disease measured in disability-adjusted life years (DALYs) and 19% of total DALYs lost to disability. Depression, in particular, is among the leading causes of DALYs for both sexes [19, 20].

At the national level, three epidemiological studies have estimated the prevalence of mental disorders to be

21%, 17.1%, and 23.6%, respectively [21]. Furthermore, domestic violence is a serious public health concern; a national study reported an overall prevalence of 81.1% among couples and 84.5% among parents and children. Psychological violence was the most prevalent and severe form, affecting 75.5% of couples [22]. The risk factors for mental disorders can be broadly categorized into socioeconomic and anthropometric factors. Socioeconomic factors include gender, income, education level, unemployment, divorce, bereavement, and substance use, while anthropometric factors are related to body image and eating behaviors [23]. The interaction between these determinants varies significantly across regions and population groups [24]. In Iran, rapid urbanization and widening socioeconomic inequalities have intensified disparities in health outcomes [25].

Marginalized communities—particularly those in informal settlements—face numerous challenges, including poor housing, unemployment, poverty, limited education, and restricted access to healthcare services [26]. Mashhad, Iran's second-largest metropolis, hosts one of the country's largest marginalized populations, particularly in its northeastern districts. These neighborhoods experience rapid population growth, diverse migration patterns, and high poverty levels, making residents especially vulnerable to nutritional deficiencies and mental health issues. Accordingly, the present study aimed to investigate the nutritional status, mental health, and exposure to domestic violence among children and mothers living in the marginalized areas of Mashhad. By focusing on this high-risk population, the study seeks to identify prevailing health patterns and inform evidence-based strategies for prevention and intervention.

Methods

Study design and setting

This cross-sectional analytical study was conducted at Mashhad University of Medical Sciences (MUMS), northeastern Iran, using secondary data extracted from the Sina Electronic Health Record System (SinaEHR). The study protocol was approved by the Ethics Committee of MUMS.

Study population

The study population consisted of mothers and their children under five years of age residing in the marginalized urban outskirts of Mashhad who had visited MUMS-affiliated comprehensive health service centers between 2018 and 2024. Populations living in central metropolitan or urban areas were excluded from the final analysis.

Inclusion and exclusion criteria

Inclusion criteria were as follows: [1] complete electronic health records available in the SinaEHR system,

and [2] availability of required demographic and clinical variables. Records with missing data on main study variables—such as child anthropometric indices or maternal mental health and domestic violence scores—were excluded.

Data quality and records management

The SinaEHR system is part of the National Health Information Infrastructure, supervised by the Iranian Ministry of Health and Medical Education. Data are entered by trained health staff at comprehensive health service centers using standardized electronic forms with built-in validation checks (e.g., range limits for anthropometric values). Data quality is ensured through regular supervisory audits, cross-validation, and random inspections conducted by MUMS monitoring teams. Health staff receive periodic training and certification to maintain data reliability [27].

Variables and operational definitions

Data were retrieved in two main areas:

1. Demographic variables: gender, place of residence (this variable reflects the official MUMS coding of marginal neighborhoods that may have different national census codes) including: metropolitan, rural, suburban, and city center, maternal education variable (illiterate, primary, secondary, university education) and maternal occupation were recorded in predefined categories (housewife, student, employee, farmer/worker, unemployed, self-employed). Health center: refers to comprehensive health service centers affiliated with Mashhad University of Medical Sciences (coded 1 to 5) that provide primary care and social services to the population covered by them.
2. Clinical variables: Anthropometric indices for children under five (weight-for-age, height-for-age, and weight-for-height) were converted to z-scores based on World Health Organization reference standards. Thresholds were defined as follows: • Weight-for-age < -2 SD: underweight • Height-for-age < -2 SD: stunting • Weight-for-height < -2 SD: wasting • +1 to +3 SD: overweight • +3 SD: obesity Maternal body mass index (BMI) was calculated from routinely measured weight and height. In the SINA EHR system, thyroid function screening follows the national guidelines of the Iranian Ministry of Health. For neonates, normal TSH is defined as a serum TSH level of less than 5 mIU/L.

The HITS short questionnaire was designed by Sherin et al. (family physicians in the United States) with the aim

of rapid screening for domestic violence. The questionnaire has 4 questions that focus on verbal and physical violence. Each question has 5 answer options, the minimum score for each question is 1 and the maximum score is 5, and the total score range is between 4 and 20. A score above 10 is considered positive and confirms the presence of violence. The reliability (i.e., internal consistency) and concurrent validity of the HITS instrument have been evaluated with a group of female patients who have visited their family physician, and the questionnaire has a high level of internal consistency, concurrent validity, and content and construct validity. Cronbach's alpha was 0.87 [28]. The Kessler Psychological Assessment Questionnaire has six questions, which are: restlessness and restlessness, depression and sadness, hopelessness, worthlessness, hard work, and anxiety. The questionnaire is scored on a five-point scale from never (0) to always. The scale has a total score obtained by summing the item scores and indicates overall distress. The minimum and maximum scores are 0 and 24. Individuals who score 12 or more are considered positive. Cronbach's alpha was also 0.93 [29]. Alcohol consumption: This variable is derived from self-reported data collected during routine health visits, where individuals are asked about any history of alcohol consumption. Due to the legal and cultural context in Iran, reporting is limited. Therefore, alcohol consumption is categorized as "reported consumption" versus "unreported consumption." We address this issue in the Discussion section. The variable of smoking status is recorded as current or former smokers based on standardized questions in the National Health Registry.

Statistical analysis

For dichotomous outcomes (maternal mental health, domestic violence, short stature and underweight coded as normal/abnormal), binary logistic regression models were used. For child nutritional outcomes (weight-for-height score), multinomial logistic regression was used because the dependent variable included more than two categories (underweight, normal, overweight and obese). Finally, adjustment was made for demographic and socioeconomic predictor variables. Incomplete or missing data were removed listwise and no imputation techniques were applied. To address potential multiple collinearities, we re-evaluated all predictor variables using the variance inflation factor (VIF) and no collinearity was observed. In order to examine the adjusted association of the main influential variable with the outcome under study, considering and controlling for the effect of confounding variables, variables with p values less than 0.25 were included in the model and the adjusted odds ratio (AOR) with 95% confidence intervals (CI) were reported. Statistical analyses were performed using SPSS version 26 software.

Results

Data from 325,863 active health records from health service centers in rural areas were extracted and analyzed. Of these, 51.2% ($n = 166,776$) were male and 48.8% ($n = 159,087$) were female. Regarding the educational status of the mothers, 2.9% were illiterate, 14.4% had primary education, 54.9% had a diploma, and 27.8% had a university education. In terms of employment status, 66.9% of the mothers were housewives and only 3.4% were employed in the government sector (employees). In terms of geographical distribution, 32.2% of the study population was covered by Comprehensive Health Service Center No. 1, 18.3% by Center No. 2, 31.1% by Center No. 3, and 18.4% by Center No. 5 (Tables 1, 2, 3, 4 and 5). Based on height-for-age index (Table 6), 2.02% of children were short-statured, of which 46.34% were boys and 53.66% were girls. The prevalence of underweight based on weight-for-age index was reported to be 2.33% (48.98% boys and 51.02% girls) (Table 7). Also, based on weight-for-height index, 3.8% of children were in the thin group (47.85% boys and 52.15% girls), 12.6% in the overweight group (45.26% boys and 54.74% girls), and 0.7% in the obese group (37.78% boys and 62.22% girls) (Table 8).

Statistical analysis showed a significant difference between girls and boys in terms of short stature ($p < 0.001$). Children who were breastfed and formula-fed were 47% more likely to be short (AOR = 1.47; 95% CI: 1.27–1.69) and children with abnormal TSH levels were 20% more likely to be short. Also, maternal university education had a 15% protective effect against short stature (AOR = 0.85; 95% CI: 0.72–1.00) (Table 6). Children who were formula-fed were 62% more likely to be underweight than children who were breastfed (AOR = 1.62; 95% CI: 1.12–1.33). Higher maternal education (diploma and university) showed a protective effect against short stature. Girls were significantly more likely to be underweight than boys (AOR = 1.14; 95% CI: 1.07–1.23). Also, white-collar occupation and university education had a protective effect against weight-for-height disorder, and a significant association was observed between maternal pre-pregnancy body mass index (BMI) and all three nutritional indicators (Table 7). In the area of mental health, 3.9% of individuals required psychological assessment more. Of this group, 80.4% had secondary education and 71.5% were housewives. Comprehensive Health Service Center No. 3 had the highest share (37.7%) of cases identified as requiring mental health assessment. Center No. 3 was significantly associated with lower mental health assessment scores (AOR = 1.60; 95% CI: 1.51–1.69). Statistical analysis indicated that smoking was associated with an increased likelihood of mental disorders (AOR = 3.58; 95% CI: 3.26–3.93), while employment as an employee was identified as a protective factor (Table 9). Of those identified as exposed to domestic

violence (0.1%), 80.3% had secondary education, 19.6% had university education, and 71.9% were housewives. No statistically significant association was found between alcohol consumption and domestic violence, however (Table 10), there was a statistically significant association between smoking and mental health score ($p < 0.001$).

Discussion

The present study examined the prevalence and determinants of malnutrition (underweight, stunting, wasting, overweight, and obesity) among children under five, as well as factors associated with maternal mental health and domestic violence in marginalized areas of Mashhad. The findings confirmed that malnutrition remains a major public health concern in these communities and is strongly influenced by socioeconomic and family-related factors. The average age of participating mothers was 31.7 years (SD = 5.96). Low maternal education, smoking, substance use, maternal age, BMI, and employment status emerged as key factors associated with both mental health and child nutritional outcomes. The prevalence of stunting, underweight, wasting, overweight, and obesity was 2.03%, 2.33%, 3.84%, 12.6%, and 0.7%, respectively. These rates are lower than those reported in the study by Mousavi et al., which may be explained by several factors. First, improvements in maternal and child health programs and nutritional interventions in recent years may have reduced the prevalence of malnutrition. Second, regional differences in socioeconomic conditions, dietary habits, and healthcare access between Mashhad and other provinces may contribute to variability. Third, methodological differences, including the use of secondary health record data versus primary surveys, could also explain the observed discrepancies. Moreover, local interventions implemented in Mashhad's marginalized neighborhoods, such as enhanced maternal-child health services, may have mitigated undernutrition compared with earlier findings. In the aforementioned study, the prevalence of wasting was reported as 19.2%, overweight was reported as 8.4%, and obesity was reported as 7.4% in preschool children, and no significant relationship was observed between gender and nutritional status [15]. However, in the current study, a significant relationship was observed between gender and nutritional indicators (weight-for-height and weight-for-age). Also, in Fars Province (2017–2018), the prevalence of stunting was reported as only 2% (a cross-sectional study on 606 children under five years of age), which is also consistent with this study. Abnormal levels of thyroid-stimulating hormone (TSH) may contribute to growth failure through several biological mechanisms. Thyroid hormones play a critical role in regulating metabolism, bone growth, and skeletal maturation in early childhood. Elevated TSH levels—often indicative of subclinical or

Table 1 Distribution of maternal mental health status based on demographic and clinical factors

Variable		Frequency (Percentage)		P-Value*
		Psychological Assessment (Normal)	Psychological Assessment (Abnormal)	
Gender	Male	139,366 (48.77)	5865 (49.25)	0.306
	Female	146,399 (51.23)	6044 (50.75)	
Place Of Residence	Metropolis	121,826(42.63)	3,862(32.43)	< 0.001
	Rural	43,784(15.32)	1,505(12.64)	
	Suburb	118,423(41.44)	6,497(54.56)	
	Uner_1_milon	1,732(0.61)	45(0.37)	
Education Of Mother	Illiterate	7,952(2.92)	494(4.41)	< 0.001
	Primary School	38,735(14.22)	2,091(18.67)	
	Diploma	149,274(54.80)	6,425(57.38)	
	Academic Education	76,442(28.06)	2,188(19.54)	
Job Of Mother	Housewife	180,144(66.78)	7,915(71.58)	< 0.001
	Student	15,806(5.86)	543(4.91)	
	Unemployed	1,723(0.64)	64(0.58)	
	Employee	9,464(3.51)	153(1.38)	
	Manual Worker/Farmer	820(0.30)	51(0.46)	
	Self-Employment	61,820(22.82)	2,332(21.09)	
Mode Of Delivery	Vaginal Delivery	143,427(50.19)	5,730(48.11)	< 0.001
	Cesarean Delivery	142,323(49.81)	6,179(51.89)	
BMI Of Mother	Wasting	11,509(5.86)	692(6.26)	< 0.001
	Normal	86,503(44.07)	4,692(42.37)	
	Overweight	65,453(33.34)	3,660(33.13)	
	Obesity	32,832(16.73)	2,005(18.15)	
PKU New Born	Normal	284,799(99.97)	11,870(99.99)	0.209
	Abnormal	79(0.03)	1(0.01)	
TSH New Born	Normal	267,872(94.03)	11,148(93.89)	0.540
	Abnormal	17,008(5.97)	725(6.11)	
Alcohol Use	No	285,623(99.95)	11,886(99.81)	< 0.001
	Yes	142(0.05)	23(0.19)	
Smoking	No	282,304(98.79)	11,134(93.49)	< 0.001
	Yes	3,461(1.21)	775(6.51)	
Narcotic	No	285,484(99.90)	11,838(99.40)	< 0.001
	Yes	281(0.10)	71(0.60)	
Health Center	Center 1	92,889(32.51)	2,880(24.18)	< 0.001
	Center 2	52,090(18.23)	2,294(19.26)	
	Center 3	88,204(30.86)	4,496(37.75)	
	Center 5	52,582(18.40)	2,239(18.81)	
Weight For Height	Wasting	10,728(3.83)	470(4.02)	0.290
	Normal	231,984(82.80)	9,727(83.15)	
	Overweight	35,377(12.63)	1,420(12.14)	
	Obesity	2,087(0.74)	81(0.69)	
Height For Age	Normal	279,999(97.98)	11,646(97.79)	0.148
	Stunting	5,766(2.02)	263(2.21)	
Weight For Age	Normal	279,133(97.68)	11,600(97.41)	0.052
	Underweight	6,632(2.32)	97.41(2.59)	
Feeding Type	Exclusive Breast Feeding	267,983(94.87)	11,211(95.06)	0.425
	Exclusive Formula Feeding	11,596(4.1)	457(3.87)	
	Combination Feeding	2,897(1.03)	126(1.07)	

overt hypothyroidism—can reduce circulating thyroxine (T4) and triiodothyronine (T3), leading to decreased protein synthesis, disruption of growth plates, and delayed bone formation. These processes collectively result in

slower linear growth and short stature. In this study, low birth weight, family size, maternal education, and paternal occupation were identified as significant risk factors. These findings confirm that family socioeconomic status

Table 2 Distribution of maternal domestic violence status among moter based on demographic and clinical factors

Variable		Frequency (Percentage)		P-Value*
		Domestic Violence (Normal)	Domestic Violence (Abnormal)	
Gender	Male	145,001 (48.77)	230 (48.83)	0.985
	Female	152,202 (51.23)	241 (51.17)	
Place Of Residence	Metropolis	125,552(42.24)	136(28.87)	< 0.001
	Rural	45,204 (15.21)	85(18.05)	
	Suburb	124,671(41.95)	249(52.87)	
	Uner_1_milon	1,776(0.60)	1(0.21)	
Education Of Mother	Illiterate	7,952(2.97)	24(5.76)	< 0.001
	Primary School	40,749(14.39)	77(18.47)	
	Diploma	155,465(54.90)	234(56.12)	
	Academic Education	78,548(27.74)	82(19.65)	
Job Of Mother	Housewife	187,762(66.96)	297(71.91)	0.004
	Student	16,335(5.83)	14(3.39)	
	Unemployed	1,783(0.64)	4(0.97)	
	Employee	9,611(3.43)	6(1.45)	
	Manual Worker/Farmer	867(0.31)	4(0.97)	
	Self-Employment	64,064(22.83)	88(21.31)	
Mode Of Delivery	Vaginal Delivery	148,935(50.11)	222(47.13)	0.196
	Cesarean Delivery	148,253(49.89)	249(52.87)	
BMI Of Mother	Wasting	12,171(5.88)	30(7.16)	0.682
	Normal	91,009(43.98)	186(44.39)	
	Overweight	68,976(33.33)	137(32.70)	
	Obesity	34,771(16.81)	66(15.75)	
PKU New Born	Normal	296,203(99.97)	466(100.00)	0.723
	Abnormal	80(0.03)	0(0.0)	
TSH New Born	Normal	278,575(94.02)	445(95.49)	0.181
	Abnormal	17,712(5.98)	21(4.51)	
Alcohol Use	No	297,039(99.94)	470(99.79)	0.148
	Yes	164(0.06)	1(0.21)	
Smoking	No	293,027(98.59)	411(87.26)	< 0.001
	Yes	4,176(1.41)	60(12.74)	
Narcotic	No	296,855(99.88)	467(99.15)	< 0.001
	Yes	348(0.12)	4(0.85)	
Health Center	Center 1	95,665(32.19)	104(22.08)	< 0.001
	Center 2	54,278(18.26)	106(22.51)	
	Center 3	92,523(31.13)	177(37.58)	
	Center 5	54,737(18.42)	84(17.83)	
Weight For Height	Wasting	11,173(3.83)	25(5.45)	0.329
	Normal	241,334(82.82)	377(82.14)	
	Overweight	36,743(12.61)	54(11.76)	
	Obesity	2,165(0.74)	3(0.65)	
Height For Age	Normal	291,185(97.98)	460(97.66)	0.633
	Stunting	6,018(2.02)	11(2.34)	
Weight For Age	Normal	290,278(97.67)	455(96.60)	0.125
	Underweight	6,925(2.33)	16(3.40)	
Feeding Type	Exclusive Breast Feeding	278,754(94.88)	440(94.83)	0.830
	Exclusive Formula Feeding	12,035(4.10)	18(3.88)	
	Combination Feeding	3,017(1.03)	6(1.29)	

Table 3 Distribution of height for age score in children based on demographic and clinical factors

Variable		Frequency (Percentage)		P-Value*
		Height For age (Normal)	Height For age (Stunting)	
Gender	Male	142,437 (48.64)	2,794 (46.34)	< 0.001
	Female	149,208 (51.36)	3,235 (53.66)	
Place Of Residence	Metropolis	123,786(42.45)	1,902(31.55)	< 0.001
	Rural	44,017(15.09)	1,272(21.10)	
	Suburb	122,096(41.86)	2,824(46.84)	
	Uner_1_milon	1,746 (0.60)	51(0.51)	
Education Of Mother	Illiterate	8178(2.94)	268(4.72)	< 0.001
	Primary school	39,674 (14.28)	1152(20.28)	
	Diploma	152,716(54.95)	2983(52.51)	
	Academic Education	77,352(27.83)	1278(22.50)	
Job Of Mother	Housewife	184,130(66.90)	3929(70.05)	< 0.001
	Student	16,056(5.83)	293(5.22)	
	Unemployed	1740(0.63)	47(0.84)	
	Employee	9494(3.45)	126(2.25)	
	Manual Worker/Farmer	853(0.31)	18(0.32)	
	Self-Employment	62,956(22.87)	1196(21.32)	
Mode Of Delivery	Vaginal Delivery	145,969(50.05)	3,188 (52.89)	< 0.001
	Cesarean Delivery	145,662(49.95)	2,840(47.11)	
BMI Of Mother	Wasting	11,799(5.82)	402(8.96)	< 0.001
	Normal	89,189(43.97)	2006(44.70)	
	Overweight	67,721(33.38)	1392(31.02)	
	Obesity	34,149(16.83)	688(15.33)	
PKU New Born	Normal	290,674(99.97)	5995(99.93)	0.058
	Abnormal	76(0.03)	4(0.07)	
TSH New Born	Normal	273,430(94.04)	5,590(93.18)	0.005
	Abnormal	17,324(5.96)	409(6.82)	
Alcohol Use	No	291,484(99.94)	6,025(99.93)	0.71
	Yes	161(0.06)	4(0.07)	
Smoking	No	287,495 (98.58)	5,943(98.57)	0.98
	Yes	4,150(1.42)	86(1.43)	
Narcotic	No	291,301(99.88)	6,021(99.87)	0.74
	Yes	344(0.12)	8(0.13)	
Health Center	Center 1	94,164(32.29)	1,605(26.62)	< 0.001
	Center 2	53,098(18.23)	1,286(21.33)	
	Center 3	90,871(31.16)	1,829(30.34)	
	Center 5	53,512(18.35)	1,309(21.71)	
Weight For Height	Wasting	10,557(3.69)	641(10.80)	< 0.001
	Normal	237,107(82.92)	4604(77.63)	
	Overweight	36,209(12.66)	588(9.91)	
	Obesity	2071(0.72)	97(1.63)	
Domestic Violence	Normal	291,185 (99.84)	6,018 (99.82)	0.63
	Abnormal	460 (0.16)	11(0.18)	
Weight For Age	Normal	287,247(98.49)	3,486(57.82)	< 0.001
	Underweight	4,398(1.51)	2,543(42.18)	
Feeding Type	Exclusive Breast Feeding	273,647(94.90)	5,547(93.53)	< 0.001
	Exclusive Formula Feeding	11,767(4.08)	286(4.82)	
	Combination Feeding	2,925(1.01)	98(1.65)	
Mental Health Status	Normal	279,999(96.01)	5,766(95.64)	0.148
	Abnormal	11,646(3.99)	263(4.36)	

Table 4 Distribution of weight for age score in children based on demographic and clinical factors

Variable		Frequency (Percentage)		P-Value*
		Weight For Age (Normal)	Weight For Age (Underweight)	
Gender	Male	141,831 (48.78)	3400 (48.98)	0.74
	Female	148,902 (51.22)	3541 (51.02)	
Place Of Residence	Metropolis	123,496(42.48)	2192(31.58)	< 0.001
	Rural	43,879(15.09)	1410(20.31)	
	Suburb	121,626(41.83)	3294(47.46)	
	Uner_1_milon	1732 (0.60)	45(0.65)	
Education Of Mother	Illiterate	8181(2.95)	265(4.02)	< 0.001
	Primary school	39,563 (14.28)	1263(19.17)	
	Diploma	152,098(54.91)	3601(54.64)	
	Academic Education	77,169(27.86)	1461(22.17)	
Job Of Mother	Housewife	183,506(66.90)	4553(69.78)	< 0.001
	Student	15,984(5.83)	365(5.59)	
	Unemployed	1732(0.63)	55(0.84)	
	Employee	9466(3.45)	151(2.31)	
	Manual Worker/Farmer	850(0.31)	21(0.32)	
	Self-Employment	62,722(22.88)	1380(21.15)	
Mode Of Delivery	Vaginal Delivery	145,677(50.11)	3480 (50.14)	0.95
	Cesarean Delivery	145,042(49.89)	3460(4.86)	
BMI Of Mother	Wasting	11,573(5.73)	628(12.05)	< 0.001
	Normal	88,776(43.92)	2419(46.41)	
	Overweight	67,600(33.44)	1513(29.03)	
	Obesity	34,185(16.91)	652(12.51)	
PKU New Born	Normal	289,762(99.97)	6907(99.91)	0.002
	Abnormal	74(0.03)	6(0.09)	
TSH New Born	Normal	272,573(94.04)	6447(93.26)	0.007
	Abnormal	17,267(5.96)	466(6.74)	
Alcohol Use	No	290,573(99.94)	6,936(99.93)	0.55
	Yes	160(0.06)	5(0.07)	
Smoking	No	286,599 (98.58)	6839(98.58)	0.74
	Yes	4131(1.42)	102(1.47)	
Narcotic	No	290,390(99.88)	6932(99.87)	0.77
	Yes	343(0.12)	9(0.13)	
Health Center	Center 1	93,869(32.29)	1900(27.37)	< 0.001
	Center 2	53,148(18.28)	1236(17.81)	
	Center 3	90,434(31.11)	2266(32.65)	
	Center 5	53,282(18.33)	15.39(22.17)	
Weight For Height	Wasting	7547(2.65)	3651(52.65)	< 0.001
	Normal	238,465(83.69)	3246(46.81)	
	Overweight	36,761(12.90)	36(0.52)	
	Obesity	2166(0.76)	2(0.03)	
Domestic Violence	Normal	290,278 (99.84)	6925 (99.77)	0.12
	Abnormal	455 (0.16)	16(0.23)	
Height For Age	Normal	287,247(98.80)	4398(63.36)	< 0.001
	Stunting	3486(1.20)	2453(36.64)	
Feeding Type	Exclusive Breast Feeding	272,817(94.91)	6377(93.44)	< 0.001
	Exclusive Formula Feeding	11,697(4.07)	356(5.22)	
	Combination Feeding	2931(1.02)	92(1.35)	
Mental Health Status	Normal	279,133(96.01)	6632(95.55)	0.052
	Abnormal	11,600(3.99)	309(4.45)	

Table 5. Distribution of weight for height score in children based on demographic and clinical factors

Variable		Frequency (Percentage)				P-Value*
		Weight For Height (Wasting)	Weight for Height (Normal)	Weight For Height (Overweight)	Weight For Height (Obesity)	
Gender	Man	5358(47.85)	119644(49.50)	16654(45.26)	819(37.78)	<0.001
	Female	5840(52.15)	122067(50.50)	20143(54.74)	1349(62.22)	
Place Of Residence	Metropolis	3767(33.64)	99924(41.34)	17945(48.77)	1261(58.16)	<0.001
	Rural	2038(18.20)	38058(15.75)	4277(11.62)	211(9.73)	
	Suburb	5302(47.35)	102249(42.30)	14406(39.15)	687(31.69)	
	Uner_1_milon	91(0.81)	1480(0.61)	169(0.46)	9(0.42)	
Education Of Mother	Illiterate	332(3.10)	6968(3.02)	963(2.76)	27(1.31)	<0.001
	Primary School	1845(17.22)	33763(14.64)	4302(12.34)	210(10.17)	
	Diploma	6150(57.37)	127177(55.14)	18473(52.98)	1107(53.63)	
	Academic Education	2392(22.31)	62752(27.21)	11131(31.92)	720(34.88)	
Job Of Mother	Housewife	7459(70.27)	153722(67.29)	22165(64.24)	1330(67.01)	<0.001
	Student	630(5.93)	13292(5.82)	2021(5.86)	122(5.97)	
	Unemployed	72(0.68)	1455(0.64)	222(0.64)	9(0.44)	
	Employee	222(2.09)	7606(3.33)	1493(4.33)	110(5.38)	
	Manual Worker/Farmer	35(0.33)	712(0.31)	107(0.31)	3(0.15)	
	Self-Employment	2197(20.70)	51653(22.61)	8495(24.62)	469(22.96)	
Mode of Delivery	Vaginal Delivery	5219(46.61)	118851(49.17)	20630(56.07)	1326(61.16)	<0.001
	Cesarean Delivery	5978(53.39)	122847(50.83)	16166(43.93)	842(38.84)	
BMI Of Mother	Wasting	909(10.78)	10426(6.11)	712(3.04)	26(2.01)	<0.001
	Normal	4165(49.38)	76641(44.92)	8602(36.96)	374(28.95)	
	Overweight	2403(28.49)	56318(33.01)	8670(36.96)	461(35.68)	
	Obesity	958(11.36)	27245(15.97)	5475(23.34)	431(33.36)	
PKU New Born	Normal	11140(99.96)	240930(99.97)	36700(99.99)	2162(99.95)	0.151
	Abnormal	5(0.04)	68(0.03)	4(0.01)	1(0.05)	
TSH New Born	Normal	10477(94.01)	226514(93.99)	34580(94.21)	2048(94.68)	0.215
	Abnormal	668(5.99)	14486(6.01)	2125(5.79)	115(5.32)	
Alcohol Use	No	11196(99.98)	241576(99.94)	36769(99.92)	2168(100)	0.082
	Yes	2(0.02)	135(0.06)	28(0.08)	0(0.00)	
Smoking	No	11051(98.69)	238246(98.57)	36281(98.60)	2140(98.71)	0.673
	Yes	147(1.31)	3465(1.43)	516(1.40)	28(1.29)	
Narcotic	No	11184(99.87)	241436(99.89)	36742(99.85)	2162(99.72)	0.048
	Yes	14(0.13)	275(0.11)	55(0.15)	6(0.28)	
Health Center	Center 1	3159(28.21)	77515(32.07)	12385(33.66)	817(37.68)	<0.001
	Center 2	1774(15.84)	44420(18.638)	6857(18.63)	335(15.45)	
	Center 3	4020(35.90)	74449(30.80)	11606(31.54)	718(33.12)	
	Center 5	2245(20.05)	45327(18.75)	5949(16.17)	298(13.75)	
Weight For Age	Normal	7547(67.40)	238465(98.66)	36761(99.90)	2166(99.91)	<0.001
	Under weight	3651(32.60)	3246(1.34)	36(0.10)	2(0.09)	
Domestic Violence	Normal	11173(99.78)	241334(99.84)	36743(99.85)	2165(99.86)	0.329
	Abnormal	25(0.22)	377(0.16)	54(0.15)	3(0.14)	
Height For Age	Normal	10557(94.28)	237107(98.10)	36209(98.40)	2071(95.53)	<0.001
	Stunting	641(5.72)	4604(1.90)	588(1.60)	97(4.47)	
Feeding Type	Exclusive Breast Feeding	10475(94.99)	227595(95.22)	33867(93.04)	1948(60.69)	<0.001
	Exclusive Formula Feeding	452(4.10)	9142(3.82)	1998(5.49)	168(7.82)	
	Combination Feeding	100(0.91)	2275(0.95)	536(1.47)	32(1.49)	
Mental Health Status	Normal	10728(95.80)	231984(95.98)	35377(96.14)	2087(96.26)	0.290
	Abnormal	470(4.20)	9727(4.02)	1420(3.86)	81(3.74)	

Table 6 Factors associated with height for age score in children using multinomial logistic regression model

Variable		Crude Odds Ratio			Adjusted Odds Ratio		
		OR	CI	P-value	OR	CI	P-value
Gender	Male	Reference					
	Female	0.99	(0.94–1.04)	0.74	-	-	-
Smoking	No	Reference					
	Yes	1.03	(1.26–0.84)	0.741	-	-	-
Alcohol	No	Reference					
	Yes	1.30	(0.53–3.18)	< 0.001	0.85	(0.27–2.65)	0.78
Narcotic	No	Reference					
	Yes	1.09	(0.56–2.13)	0.78	-	-	-
Mode Of Delivery	Vaginal Delivery	Reference					
	Cesarean Delivery	0.99	(0.95–1.04)	0.95	-	-	-
Mothers Age	-	1.00	(1.06–1.23)	0.07	1.01	(1.011–1.019)	< 0.001
Feeding Type	Exclusive Breast Feeding	Reference					
	Exclusive Formula Feeding	1.30	(1.16–1.45)	< 0.001	1.47	(1.27–1.69)	< 0.001
	Combination Feeding	1.34	(1.08–1.65)	< 0.001	1.10	(0.77–1.58)	0.56
TSH New Born	Normal	Reference					
	Abnormal	1.14	(1.03–1.25)	< 0.001	1.20	(1.07–1.35)	< 0.001
BMI Of Mother	Wasting	Reference					
	Normal	0.50	(0.45–0.54)	< 0.001	0.50	(0.46–0.55)	< 0.001
	Overweight	0.41	(0.37–0.45)	< 0.001	0.41	(0.37–0.45)	< 0.001
	Obesity	0.35	(0.31–0.39)	< 0.001	0.33	(0.29–0.37)	< 0.001
PKU New Born	Normal	Reference					
	Abnormal	3.40	(1.47–7.81)	< 0.001	2.59	(0.80–8.37)	0.11
Education Of Mothers	Illiterate	Reference					
	Primary school	0.98	(0.86–1.12)	0.83	1.06	(0.91–1.23)	0.41
	Diploma	0.73	(0.64–0.82)	< 0.001	0.92	(0.79–1.06)	0.28
	Academic education	0.58	(0.51–0.66)	< 0.001	0.85	(0.72–1.00.72.00)	0.05
Job Of Mother	Housewife	Reference					
	Student	0.92	(0.82–1.02)	0.13	0.89	(0.78–1.02)	0.09
	Unemployed	1.27	(0.97–1.67)	0.07	1.26	(0.93–1.69)	0.12
	Employee	0.64	(0.54–0.75)	< 0.001	0.74	(0.58–0.95)	0.02
	Manual Worker/Farmer	0.99	(0.64–1.53)	0.98	0.91	(0.57–1.44)	0.70
	Self-Employment	0.88	(0.83–0.94)	< 0.001	0.97	(0.90–1.05)	0.51
Health Center	Center 1	Reference					
	Center 2	1.14	(1.06–1.23)	< 0.001	0.98	(0.90–1.07)	0.75
	Center 3	1.23	(1.16–1.31)	< 0.001	10.25	(1.16–1.35)	< 0.001
	Center 5	1.42	(1.33–1.52)	< 0.001	1.24	(1.13–1.35)	< 0.001
Place Residence	Metropolis	Reference					
	Rural	1.81	(1.69–1.93)	< 0.001	1.56	(1.43–1.70)	< 0.001
	Suburb	1.52	(1.44–1.61)	< 0.001	1.32	(1.22–1.43)	< 0.001
	Uner_1_milon	1.46	(1.08–1.97)	0.01	1.42	(1.01–1.98)	0.04
Domestic Violence	Normal	Reference					
	Abnormal	1.47	(0.89–2.42)	0.128	1.34	(0.77–2.35)	0.29
Mental Health Status	Normal	Reference					
	Abnormal	1.12	(0.99–1.25)	< 0.001	1.01	(0.89–1.19)	0.80

can play a significant role in the occurrence of developmental disorders [30]. In the present study, there was a significant association between stunting, underweight, male gender, maternal age and BMI, and formula feeding, and high maternal education had a protective role in the occurrence of stunting and underweight.

Consistent with international evidence from Mumbai, our study found that male gender, low maternal education, maternal age, and low birth weight were significant predictors of undernutrition [31]. Employment also showed a protective effect: mothers working as clerks had children with lower odds of underweight, overweight, and obesity. Significant differences were observed

Table 7 Factors associated with weight for age score in children using multinomial logistic regression model

Variable		Crude Odds Ratio			Adjusted Odds Ratio		
		OR	CI	P-value	OR	CI	P-value
Gender	Male	Reference					
	Female	1.10	(1.05–1.60)	< 0.001	1.14	(1.07–1.23)	< 0.001
Smoking	No	Reference					
	Yes	1.00	(0.80–1.24)	0.98	-	-	-
Alcohol	No	Reference					
	Yes	1.20	(0.44–3.24)	0.71	-	-	-
Narcotic	No	Reference					
	Yes	1.12	(0.55–2.26)	0.74	-	-	-
Mode Of Delivery	Vaginal Delivery	Reference					
	Cesarean Delivery	0.89	(0.84–0.93)	< 0.001	0.79	(0.74–0.85)	< 0.001
Mothers Age	-	1.00	(0.99–1.00.99.00)	0.54	-	-	-
Feeding Type	Exclusive Breast Feeding	Reference					
	Exclusive Formula Feeding	1.19	(1.06–1.35)	0.003	1.17	(0.97–1.40)	0.08
	Combination Feeding	1.65	(1.34–2.02)	< 0.001	1.62	(1.12–2.33)	0.01
TSH New Born	Normal	Reference					
	Abnormal	1.15	(1.04–1.27)	< 0.001	1.15	(1.00–1.32.00.32)	0.04
BMI Of Mother	Wasting	Reference					
	Normal	0.66	(0.59–0.73)	< 0.001	0.84	(0.74–0.96)	0.01
	Overweight	0.60	(0.53–0.67)	< 0.001	0.78	(0.68–0.90)	< 0.001
	Obesity	0.59	(0.52–0.66)	< 0.001	0.75	(0.64–0.87)	< 0.001
PKU New Born	Normal	Reference					
	Abnormal	2.55	(0.93–6.97)	0.06	0.50	(0.52–4.89)	0.55
Education OF Mother	Illiterate	Reference					
	Primary School	0.88	(0.77–1.01)	0.07	0.94	(0.79–1.12)	0.53
	Diploma	0.59	(0.52–0.67)	< 0.001	0.72	(0.61–0.86)	< 0.001
	Academic education	0.50	(0.44–0.57)	< 0.001	0.70	(0.58–0.84)	< 0.001
Job Of Mother	Housewife	Reference					
	Student	0.85	(0.75–0.96)	0.01	0.88	(0.75–1.03)	0.12
	Unemployed	1.26	(0.94–1.69)	0.11	1.05	(0.72–1.54)	0.76
	Employee	0.62	(0.52–0.74)	< 0.001	0.87	(0.66–1.16)	0.36
	Manual Worker/Farmer	0.98	(0.61–1.57)	0.96	0.62	(0.33–1.17)	0.14
	Self-Employment	0.89	(0.83–0.95)	< 0.001	0.97	(0.89–1.07)	0.61
Health Center	Center 1	Reference					
	Center 2	1.42	(1.31–1.53)	< 0.001	1.24	(1.12–1.37)	< 0.001
	Center 3	1.18	(1.10–1.26)	0.<0.001	1.07	(0.97–1.18)	0.12
	Center 5	1.43	(1.33–1.54)	< 0.001	1.24	(1.11–1.37)	< 0.001
Place Residence	Metropolis	Reference					
	Rural	1.88	(1.75–2.02)	< 0.001	1.38	(1.24–1.53)	< 0.001
	Suburb	1.50	(1.41–1.59)	< 0.001	1.14	(1.04–1.25)	< 0.001
	Uner_1_milon	1.15	(0.80–1.65)	0.42	1.24	(0.58–1.41)	0.67
Weight For Height	Wasting	Reference					
	Normal	0.31	(0.29–0.34)	< 0.001	6.95	(6.10–7.93)	< 0.001
	Overweight	0.26	(0.23–0.29)	< 0.001	9.50	(7.99–11.29)	< 0.001
	Obesity	0.77	(0.61–0.95)	0.02	31.49	(23.50–42.50)	< 0.001
Weight For Age	Normal	Reference					
	Under weight	47.64	(44.90–50.54.90.54)	< 0.001	10.42	(9.62–11.19)	< 0.001
Domestic Violence	Normal	Reference					
	Abnormal	1.15	(0.63–1.20)	0.63	0.96	(0.82–1.12)	0.63
Mental Health Status	Normal	Reference					
	Abnormal	1.09	(1.04–1.27)	0.14	0.96	(0.82–1.12)	0.63

Table 8 Factors associated with weight for height score in children using multinomial logistic regression model

Variable		Crude Odds Ratio			Adjusted Odds Ratio		
		OR	CI	P-value	OR	CI	P-value
Gender	Male	Reference					
	Female	0.96	(0.92–0.99)	0.03	0.076	(0.12–0.02)	< 0.001
Smoking	No	Reference					
	Yes	1.08	(0.92–1.28)	0.31	-	-	-
Alcohol	No	Reference					
	Yes	3.25	(0.80–13.1)	0.09	2.10	(0.02–4.18)	0.04
Narcotic	No	Reference					
	Yes	0.95	(0.56–1.63)	0.87	-	-	-
Type Of Delivery	Natural Birth	Reference					
	Cesarean Section	0.86	(0.83–0.91)	< 0.001	0.01	(0.06–0.03)	0.5
Mothers Age	-	0.99	(0.99–1.00.99.00)	0.49	-	-	-
Feeding Type	Exclusive Breast Feeding						
	Exclusive Formula Feeding	0.99	(0.90–1.09)	0.91	-	-	-
	Combination Feeding	1.13	(0.92–1.38)	0.23	-	-	-
TSH New Born	Normal	Reference					
	Abnormal	0.99	(0.92–1.07)	0.94	-	-	-
BMI Of Mother	Wasting	Reference					
	Normal	1.67	(1.55–1.80)	< 0.001	0.31	(0.22–0.39)	< 0.001
	Overweight	2.21	(2.04–2.39)	< 0.001	0.52	(0.43–0.62)	< 0.001
	Obesity	2.81	(2.56–3.09)	< 0.001	0.73	(0.62–0.84)	< 0.001
PKU New Born	Normal	Reference					
	Abnormal	0.58	(0.23–1.43)	0.54	-	-	-
Education Of Mother	Illiterate	Reference					
	Primary school	0.86	(0.76–0.97)	0.01	0.21	(0.36–0.06)	< 0.001
	diploma	0.99	(0.88–1.11)	0.93	0.19	(0.33–0.05)	< 0.001
	Academic education	1.30	(1.15–1.46)	< 0.001	0.08	(0.24–0.06)	0.26
Job Of Mother	Housewife	Reference					
	Student	1.03	(0.94–1.12.12)	0.46	0.08	(0.16–0.19)	0.09
	Unemployed	0.98	(0.77–1.24)	0.90	0.006	(0.29–0.27)	0.96
	Employee	1.74	(1.52–1.99)	< 0.001	0.23	(0.02–0.43)	0.02
	Manual worker/farmer	0.98	(0.70–1.38)	0.94	0.13	(0.29–0.56)	0.53
	Self-employment	1.16	(1.10–1.21)	< 0.001	0.04	(0.18–0.11)	0.15
Health Center	Center 1	Reference					
	Center 2	1.01	(0.95–1.07)	0.66	0.21	(0.14–0.29)	< 0.001
	Center 3	0.75	(0.71–0.78)	< 0.001	0.26	(0.32–0.19)	< 0.001
	Center 5	0.79	(0.75–0.84)	< 0.001	0.04	(0.02–0.12)	0.20
Place Residence	Metropolis	Reference					
	Rural	0.66	(0.62–0.69)	< 0.001	0.11	(0.19–0.32)	< 0.001
	Suburb	0.69	(0.63–0.67)	< 0.001	0.20	(0.26–0.14)	< 0.001
	Uner_1_milon	0.57	(0.46–0.71)	< 0.001	0.62	(0.88–0.36)	< 0.001
Height For Age	Normal	Reference					
	Stunting	0.31	(0.29–0.34)	< 0.001	1.91	(1.78–2.04)	< 0.001
Weight For Age	Normal	Reference					
	Under weight	0.24	(0.023–0.025)	< 0.001	4.18	(4.26–4.10)	< 0.001
Domestic Violence	Normal	Reference					
	Abnormal	0.69	(0.46–1.03)	0.07	0.19	(0.70–0.31)	0.45
Mental Health Status	Normal	Reference					
	Abnormal	0.95	(0.86–1.04)	0.29	-	-	-

Table 9 Factors associated with maternal health status using multinomial logistic regression model

Variable		Crude Odds Ratio			Adjusted Odds Ratio		
		OR ¹	CI ²	P-value	OR	CI	P-value
Gender	Male	Reference					
	Female	0.98	(0.94–1.01)	0.306	-	-	-
Smoking	No	Reference					
	Yes	5.67	(5.24–6.15)	< 0.001	3.58	(3.26–3.93)	< 0.001
Alcohol Use	No	Reference					
	Yes	3.89	(2.50–6.04)	< 0.001	0.93	(0.55–1.56)	0.798
Narcotic	No	Reference					
	Yes	6.09	(4.69–7.91)	< 0.001	2.31	(1.69–3.16)	< 0.001
Mode Of Delivery	Vaginal Delivery	Reference					
	Cesarean Delivery	1.08	(1.04–1.12)	< 0.001	0.98	(0.98–1.03)	0.623
Mother's Age	-	1.00	(0.99–1.00.99.00)	0.126	1.00	(1.00–1.01.00.01)	< 0.001
Feeding Type	Exclusive Breast Feeding	Reference					
	Exclusive Formula Feeding	0.94	(0.85–1.03)	0.22	1.11	(0.99–1.24)	0.052
	Combination Feeding	1.03	(0.86–1.24)	0.67	1.50	(1.21–1.86)	< 0.001
TSH New Born	Normal	Reference					
	Abnormal	1.02	(0.94–1.10)	0.540	-	-	-
BMI Of Mother	Wasting	Reference					
	Normal	0.90	(0.83–0.97)	0.014	0.88	(0.80–0.96)	0.004
	Overweight	0.93	(0.85–1.01)	0.089	0.88	(0.80–0.96.80.96)	0.006
	Obesity	1.01	(0.92–1.11)	0.73	0.93	(0.84–1.02)	0.148
PKU New Born	Normal	Reference					
	Abnormal	0.30	(0.04–2.18)	0.23	-	-	-
Education Of Mother	Illiterate	Reference					
	Primary School	0.86	(0.78–0.96)	0.006	-	-	-
	Diploma	0.69	(0.63–0.76)	< 0.001	-	-	-
	Academic Education	0.46	(0.41–0.50)	< 0.001	-	-	-
Job Of Mother	Housewife	Reference					
	Student	0.78	(0.71–0.85)	< 0.001	0.81	(0.73–0.89)	< 0.001
	Unemployed	0.85	(0.65–1.08)	0.189	0.79	(0.61–1.03)	0.095
	Employee	0.36	(0.31–0.43)	< 0.001	0.60	(0.51–0.72)	< 0.001
	Manual Worker/Farmer	1.41	(1.06–1.87)	0.016	1.35	(1.00–1.82.00.82)	0.046
	Self-Employment	0.85	(0.81–0.89)	< 0.001	0.99	(0.94–1.04)	0.77
Health Center	Center 1	Reference					
	Center 2	1.42	(1.34–1.50)	< 0.001	0.99	(0.93–1.06)	0.97
	Center 3	1.64	(1.56–1.72)	< 0.001	1.60	(1.51–1.69)	< 0.001
	Center 5	1.37	(1.29–1.45)	< 0.001	0.97	(0.91–1.04)	0.44
Place Residence	Metropolis	Reference					
	Rural	1.08	(1.02–1.15)	0.009	0.57	(0.53–0.62)	< 0.001
	Suburb	1.73	(1.66–1.80)	< 0.001	1.11	(1.06–1.17)	< 0.001
	Uner_1_milon	0.81	(0.60–1.10)	0.190	0.64	(0.47–0.88)	< 0.001
Weight For Height	Wasting	Reference					
	Normal	0.95	(0.87–1.05)	0.36	1.05	(0.94–1.18)	0.34
	Overweight	0.91	(0.82–1.01)	0.10	1.10	(0.97–1.25)	0.12
	Obesity	0.88	(0.69–1.12)	0.32	1.20	(0.92–1.56)	0.17
Height For Age	Normal	Reference					
	Stunting	1.09	(0.96–1.24)	0.148	0.97	(0.83–1.13)	0.737
Weight For Age	Normal	Reference					
	Under Weight	1.12	(0.99–1.25)	0.052	1.06	(0.91–1.23)	0.40

1- Odds Ratio

2- Confidence interval

Table 10 Factors associated with maternal domestic violence using multinomial logistic regression model

Variable		Crude Odds Ratio			Adjusted Odds Ratio		
		OR	CI	P-value	OR	CI	P-value
Gender	Male	Reference					
	Female	0.99	(0.89–1.19)	0.98	-	-	-
Smoking	No	Reference					
	Yes	10.24	(7.79–13.45)	< 0.001	3.20	(2.23–4.59)	< 0.001
Alcohol	No	Reference					
	Yes	3.85	(0.53–27.5)	0.17	0.97	(2.23–7.44)	0.98
Narcotic	No	Reference					
	Yes	7.30	(2.71–19.65)	< 0.001	1.55	(0.47–5.11)	0.46
Mode Of Delivery	Vaginal Delivery	Reference					
	Cesarean Delivery	1.26	(0.94–1.35)	0.19	1.01	(0.81–1.24)	0.92
Mother's Age	-	1.00	(0.99–1.01)	0.55	-	-	-
Feeding Type	Exclusive Breast Feeding	Reference					
	Exclusive Formula Feeding	0.94	(0.59–1.51)	0.82	-	-	-
	Combination Feeding	1.25	(0.56–2.82)	0.57	-	-	-
TSH New Born	Normal	Reference					
	Abnormal	0.74	(0.47–1.15)	0.18	0.69	(0.41–1.16)	0.16
BMI Of Mother	Wasting	Reference					
	Normal	0.82	(0.56–1.21)	0.34	0.98	(0.63–1.53)	0.96
	Overweight	0.80	(0.54–1.19)	0.28	0.96	(0.61–1.52)	0.89
	Obesity	0.77	(0.49–1.18)	0.23	0.89	(0.54–1.46)	0.65
PKU New Born	Normal	Reference					
	Abnormal	1	-	-	-	-	-
Education Of Mothers	Illiterate	Reference					
	Primary School	0.66	(0.41–1.04)	0.07	0.61	(0.37–1.00.37.00)	0.05
	Diploma	0.52	(0.34–0.80)	< 0.001	0.65	(0.41–1.02)	0.06
	Academic Education	0.36	(0.23–0.57)	< 0.001	0.67	(0.40–1.11)	0.12
Job Of Mother	Housewife	Reference					
	Student	0.54	(0.31–0.92)	0.02	0.48	(0.25–0.91)	0.02
	Unemployed	1.14	(0.52–3.80)	0.48	1.60	(0.59–4.33)	0.35
	Employee	0.39	(0.17–0.88)	0.02	0.80	(0.32–2.00.32.00)	0.64
	Manual Worker/Farmer	2.91	(1.08–7.84)	0.03	1.97	(0.62–6.26)	0.24
	Self-Employment	0.86	(0.68–1.10)	0.24	1.07	(0.82–1.40)	0.57
Health Center	Center 1	Reference					
	Center 2	1.79	(1.37–2.35)	< 0.001	1.31	(0.95–1.81)	0.09
	Center 3	1.75	(1.38–2.24)	< 0.001	1.60	(1.21–2.13)	< 0.001
	Center 5	1.41	(0.05–1.38)	0.01	1.07	(0.75–1.52)	0.68
Place Residence	Metropolis	Reference					
	Rural	0.69	(0.46–1.04)	0.08	1.23	(0.89–1.69)	0.20
	Suburb	0.65	(0.40–1.05)	0.08	1.10	(0.85–1.43)	0.44
	Uner_1_milon	0.61	(0.18–2.05)	0.43	0.51	(0.70–3.72)	0.51
Weight For Height	Wasting	Reference					
	Normal	0.69	(0.46–1.04)	0.08	0.89	(0.52–1.50)	0.66
	Overweight	0.65	(0.40–1.05)	0.08	0.90	(0.49–1.65)	0.75
	Obesity	0.61	(0.18–2.05)	0.43	1.14	(0.32–4.00.32.00)	0.83
Height For Age	Normal	Reference					
	Stunting	1.15	(0.63–2.10)	0.63	-	-	-
Weight For Age	Normal	Reference					
	Under Weight	1.47	(0.89–2.42)	0.12	1.37	(0.75–2.52)	0.29
Mental Health Status	Normal	Reference					
	Abnormal	18.47	(15.3–22.09.3.09)	< 0.001	10.68	(8.59–13.29)	< 0.001

between catchment areas of health centers (particularly Centers 2, 3, and 5), indicating the importance of neighborhood-level socioeconomic context. Similar to findings from Ardabil, parental education and occupation were strong determinants of child nutrition [32], emphasizing the role of cultural and geographical variations in shaping malnutrition patterns. However, it is important to note that the cross-sectional design limits our ability to determine causal pathways. For instance, while smoking may contribute to poor mental health or increase the risk of domestic violence, the reverse could also be true. Longitudinal studies are therefore required to clarify these temporal and causal relationships. Higher rates of domestic violence were observed among women attending Comprehensive Health Service Center 3, possibly reflecting contextual socioeconomic vulnerabilities in that area. Regarding generalizability, the findings are limited to mothers and children in the marginalized areas of Mashhad and may not represent other urban centers or rural populations in Iran.

Low maternal education, smoking, substance use, maternal age, and overweight status were all significantly associated with lower mental health scores. These findings align with previous national research, such as Dolatian et al., who reported a high prevalence of domestic violence—especially emotional abuse (84.4%)—among Iranian women [33], and Noheja et al., who found significant associations between demographic factors (age, education, employment, and residence) and domestic violence [34]. A 2023 national survey of 24,584 Iranians aged ≥ 15 reported a domestic violence prevalence of 11.4%, significantly associated with female gender, younger age, lower education, unemployment, and suspected mental disorders [35]. Similarly, a meta-analysis of 31 studies involving 15,514 participants estimated domestic violence prevalence in Iran at 66%, with marked regional variations [36]. A 2006 cross-sectional study in Tehran reported a 35.7% prevalence of domestic violence among married women, with victims 3.5 times more likely to suffer from psychiatric disorders such as depression and anxiety than the general population [37]. Other studies have also linked domestic violence to depression, anxiety, and poor mental health outcomes among women [38].

Global evidence further confirms that intimate partner violence remains widespread, particularly in low- and middle-income countries, where socioeconomic disparities exacerbate its prevalence [39, 40]. From a policy perspective, these findings underscore the need for integrated interventions that address both nutritional and psychosocial determinants of health. Strengthening maternal education, integrating domestic violence and mental health screening into routine primary care, and expanding community-based counseling and support

programs are essential steps. In addition, social protection policies targeting poverty, unemployment, and housing insecurity in marginalized areas can indirectly improve child nutrition and maternal well-being. Overall, this study contributes to a deeper understanding of the interconnected nature of malnutrition, mental health, and domestic violence in disadvantaged urban settings. Addressing these challenges requires coordinated action among policymakers, healthcare providers, and community organizations to design evidence-based, multisectoral interventions that simultaneously target biological, behavioral, and social determinants of health. Finally, it should be noted that alcohol consumption data in Iran are subject to underreporting due to cultural and legal restrictions. Consequently, the lack of a significant association between alcohol use and domestic violence in this study likely reflects data limitations rather than a true absence of relationship.

Conclusion

This study demonstrated that malnutrition and maternal mental health challenges remain important public health concerns among mothers and children living in the marginalized areas of Mashhad. The prevalence of underweight, stunting, and wasting was lower than reported in some previous studies, which may reflect regional differences, methodological variation, or the impact of recent health interventions. Low maternal education, maternal body mass index, and residential setting emerged as key determinants of child nutritional status, while poor mental health and exposure to domestic violence were strongly associated with socioeconomic and behavioral risk factors such as smoking. Although migrants are part of the marginalized population in Mashhad, our study was not designed to specifically investigate migration-related health disparities; therefore, the findings should be interpreted in the broader context of urban marginalization.

From a policy perspective, strengthening maternal education, expanding access to routine screening for domestic violence and mental health problems, and integrating nutritional support into primary health care are critical steps. Multi-sectoral approaches, including collaboration with governmental and non-governmental organizations to provide free counseling services and improve socioeconomic conditions, could help reduce these disparities. Future research should replicate this work in other urban centers and rural areas of Iran, using longitudinal designs to clarify causal pathways and better inform evidence-based interventions.

Limitations

This study has several limitations. First, despite the large overall sample size, certain subgroups—such as mothers who reported alcohol or drug use—were small in number, which may reduce the reliability and precision of the estimates. Second, the cross-sectional design precludes causal inference; longitudinal studies are needed to clarify temporal and causal pathways. Third, the findings are limited to mothers and children living in suburban neighborhoods of Mashhad and may not be generalizable to rural populations or other urban areas in Iran. Finally, the system only records general demographic characteristics (such as age, sex, place of residence, education), anthropometric and nutritional indicators, etc., and does not record information about ethnicity, quality of marital or family relationships, or specific occupational exposures and work shifts.

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Authors' contributions

Methodology: E.M.F. and M.S. Formal analysis: S.E. and M.S. Investigation: S.E. and M.A. and E.M.F. Writing original draft: S.E. and N.KH and M.D. Supervision: M.D. Project administration: M.D. All authors reviewed the manuscript, revised it critically for important intellectual content and approved the final manuscript draft.

Data availability

The datasets used and/or analyzed during the present study are available from the corresponding author on reasonable request.

Declarations

Ethics approval and consent to participate

The study protocol has been approved by the Institutional Review Board (IRB) of the Mashhad University of Medical Sciences (MUMS), Mashhad, Iran (IR.MUMS.FHMPM.REC.1402.207). The data used in this study were anonymized before its use. According to the Human Research Review & Ethics Committee, there was no need for informed consent, because the present research is a type of secondary and register-based data analysis. All methods in our study were performed in accordance with the relevant guidelines and regulations and have been performed in accordance with the Declaration of Helsinki.

Consent for publication

Not applicable.

Competing interests

The authors declare no competing interests.

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