FREQUENCY OF RESPONSIBLE FACTORS FOR SEVERE ACUTE MALNUTRITION (SAM) IN CHILDREN UNDER THE AGE OF FIVE YEARS.

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ABSTRACT

INTRODUCTION: One of the main causes of death for children under five is malnutrition. Severe acute malnutrition (SAM) is defined by the World Health Organization (WHO) as a very low weight for height, brought on by either the appearance of nutritional edema or obvious severe wasting. A total of 3.1 million children die each year from undernutrition, accounting for 45% of all childhood fatalities. This includes stunting, wasting, low levels of vitamin A and zinc, poor breastfeeding, and fetal growth restriction.

OBJECTIVE: To determine the frequency of responsible factors for severe acute malnutrition (SAM) in children under the age of five years.

STUDY DESIGN AND SETTING: A descriptive cross-sectional was conducted at the NSC unit, Children's Hospital SMBB Medical University Larkana, during the period July 2022 to August 2023.

SUBJECTS AND METHOD: A total of 165 patients who met the criteria for enrollment participated in the study. An informed consent from the guardian of the patient was obtained following an explanation of the study's goal and protocol. The outcome variable, i.e., risk factors for SAM under five-year-old children (no exclusive breastfeeding, occasional hand washing, incomplete vaccination status, frequent diarrhea, frequent pneumonia, high distance to the nearest health facility, and use of TAP water), was analyzed applying SPSS version 24.

RESULTS: The mean age of the children was 25.12 ± 12.68 months. Out of 267 SAM children, 152 (57%) were male and 115 (47%) were female. The most responsible risk factor was found to be

incomplete vaccination status 205 (76.6%), followed by high distance to the nearest health facility 190 (71%), occasional hand washing and use of TAP water and untimely weaning 184 (69%), frequent diarrhea 157 (59%), no exclusive breastfeeding 136 (51%), and frequent pneumonia 130 (49%).

CONCLUSION: A wide range of infant and mother risk factors for infant SAM have been found, such as incomplete immunization, a considerable distance to the closest medical facility, hygiene, the use of TAP water, untimely weaning, no exclusive breastfeeding, and infectious diseases. For this age group, a comprehensive care plan is necessary.

KEYWORDS: Chronically malnourished, risk factors, stunting

INTRODUCTION
The term malnutrition is commonly used to describe both overnutrition and undernutrition, whereas undernutrition refers to a lack of nutrition. More technically, undernutrition encompasses being underweight for one's age, too short for one's age (stunted), dangerously thin (wasted), and lacking in vitamins and minerals (micronutrient malnutrition).

According to science, undernutrition comprises being dangerously thin (wasted), underweight for one's age, stunted, and micronutrient malnourished (low vitamin and mineral intake).[1]. Malnutrition is the main cause of death among children under the age of five [2]. The World Health Organization (WHO) defines severe acute malnutrition (SAM) as an extremely low weight for height, accompanied by evident severe wasting or nutritional edema. Childhood undernutrition, which includes fetal growth restriction, stunting, wasting, vitamin A and zinc deficiencies, and poor nursing, is responsible for 3.1 million child deaths per year, accounting for 45% of total childhood mortality [3]. Acute malnutrition is a major public health issue that, in certain cases and places, has epidemic proportions. Worldwide, around 55 million under-five children suffer from acute malnutrition, with 26 million of them severely and acutely malnourished, primarily in Sub-Saharan Africa and South Asia [4].

Globally, 7.5 million under-five children are wasting, while 16.4 million are extremely malnourished [5]. SAM causes nearly one million under-five deaths each year. Survivors of acutely malnourished children are more likely to have stunting and other illnesses, problems, poor educational performance, and a low productive life [6]. Child malnutrition is a serious public health concern that exists in many underdeveloped nations where infectious illnesses are prevalent [7].

Children are the most susceptible group and are more prone to suffer from malnutrition in an emergency.

There have been few studies that address the factors that contribute to severe acute malnutrition (SAM) in children under the age of five. The most significant factor (79%) was found to be the distance to the closest health facility, followed by occasionally washing hands (70.7%), untimely weaning (69.5%), no exclusive breastfeeding (58.1%), frequent diarrhea (52.4%), frequent pneumonia (48.6%), use of TAP water (47.7%), and incomplete vaccination status (47.6%) [8, 9].

The purpose of this study was to determine the frequency of responsible factors for severe acute malnutrition (SAM) in children under the age of five years. The SAM has been widely reported and studied in developed countries, but less information is available in developing countries. Furthermore, continued research for a better long-term outcome is necessary. Thereby, strategies could be developed to secure all children from this serious complication, and prompt treatment may lessen the morbidity and mortality.

The results of my study would be a valuable contribution to the existing pool of knowledge.

ORIGINAL STUDY
OBJECTIVE:
To determine the frequency of responsible factors for severe acute malnutrition (SAM) in children under the age of five years.

OPERATIONAL DEFINITION
Severe acute malnutrition (SAM):
It was labeled as positive if a child with an acute history of weight loss had all of the following conditions:
1. <70% weight-for-height of the median
2. Presence of pedal edema on both feet
3. Mid-upper arm circumference (MUAC) of < 11 cm
Responsible factors:
No Exclusive Breast Feeding: It was labeled as positive if a baby is fed only breast milk for the first six months of his life, with no additional food o
Untimely Weaning: It was labeled as positive if the baby started giving solid food before six
Incomplete vaccination status: It was labeled as positive if the child has not received the recommended number of doses for at least one of the two
Frequent diarrhea: It was labeled as positive if the child had loose, watery motion at least two times in
Frequent Pneumonia: It was labeled as positive if a child has at least three of these symptoms twice in a month, like a cough with phlegm or pus, fever, chills, and difficulty.
High distance to nearest health facility: It was labeled as positive if the distance from home was greater.
Use of TAP water: It was labeled as positive if a child uses TAP water for drinking, washing, and cooking.
Occasionally Hand Washing: It was labeled as positive to wash hands once in a

MATERIAL AND METHODS
STUDY DESIGN: Descriptive cross-sectional
SETTING: This study was carried out in the NSC unit, Children's Hospital SMBB Medical University Larkana.
DURATION: July 2022 to August 2023
SAMPLE SIZE: By taking the prevalence of incomplete vaccination status, i.e., 47.6%, a margin of error of 6%, and a confidence interval of 95%, at least a sample of 267 was required.
SAMPLING TECHNIQUE: consecutive non-probability

INCLUSION CRITERIA:
- All children diagnosed with SAM aged 6 to 59 months admitted to Outpatient Therapeutic Care Centers (OTCC).
- Either Gender
- Guardian who gave the informed consent.

EXCLUSION CRITERIA:
- Children who were malnourished and had other related conditions that interfered with their feeding pattern of the children, such as congenital heart disease, metabolic abnormalities, renal failure, and endocrine problems, were not included in the study.

DATA COLLECTION
In the study, all those patients fulfilling the eligibility criteria were included. After outlining the purpose and methodology of the study, informed permission was taken from the patient's guardian. Data regarding age, height, weight, birth order (first child or not), and gender of the SAM children was obtained and noted on pre-designed, approved Performa. Other information about the parents of the patient, like their age, educational status, family size, monthly income, and occupation, was obtained and noted on the pre-designed, approved Performa. The outcome variables, i.e., risk factors for SAM under five-year-old children (no exclusive breastfeeding, occasionally hand washing, untimely weaning, incomplete vaccination status, frequent diarrhea, frequent pneumonia, high

distance to the nearest health facility, and use of TAP water), were labeled as positive as per the operational definition and were noted in the predesigned Performa by the researcher himself.

RESULTS

This research included children aged 6 to 59 months who had been hospitalized in Outpatient Therapeutic Care Centres (OTCCs). The mean age of the children was 25.12 ± 12.68 months, the mean weight was 15.6 ± 1.1 kg, mean length was 100.3 ± 2.1 cm, while the mothers' mean age was 27.20 ± 3.49 years, whereas the fathers' mean age was 35.12 ± 5.68 years., as shown in **tables 01.**

Out of 267 SAM children, the gender frequencies 152 (57%) were male and 115 (47%) were female have participated. In the study, 197 (73.3%) were the first children, and 70 (25.6%) were not the first children in their family. Most of the mothers and fathers had education till primary, i.e., 124 (46.4%) and 112 (49.9%), respectively, as shown in **Table 02**

In the study, 164 (61.4%) of the patients had a monthly income between 21 thousand and 50 thousand, 101 (37.8%) had $\leq$ Rs. 20,000, and only 2 (0.8%) had a monthly income.

$\geq$ Rs. 50,000, however**,** the majority of the fathers were day laborers, 29 (10.9%) were businessmen, and 9 (3.3%) were unemployed. Similarly, the majority of the mothers, 229 (85.7%), were unemployed. 247 (92.5%), followed by 16 (5.9%), were businesswomen, and 4 (1.5%) were day laborers and along this 206 (77%) of the patients had family members < 5 and 61 (33%) had family members $\geq$ 5, as shown in **Table 02.**

The most responsible risk factor was found to be incomplete vaccination status 205 (76.6%), followed by high distance to the nearest health facility 190 (71%), occasional hand washing and use of TAP water, and untimely weaning 184 (69%), frequent diarrhea 157 (59%), no exclusive breastfeeding 136 (51%), and frequent pneumonia 130 (49%), as shown in **Table 03.**

The responsible factors were further stratified concerning child age, gender, parent's age, parental education, occupational status, birth order, and family size**,** as shown in **Tables 4 & 5.**

DISCUSSION

In Sindh province, Malnutrition was recorded by NNS 2011 at 21-23% and by PDHS 2012-13 at 14%, even though the latter two surveys were conducted using community samples. Rural Tharparkar, a desert area of Sindh, has the greatest caloric poverty rate region of the province, with over two-thirds of the population food insecure.

The goal of this study was to find out the factors that contribute to SAM children's outcomes. SAM is more frequent in children aged 6–36 months. It might be related to the introduction of improperly prepared supplementary meals, resulting in repeated gastrointestinal tract infections. Previous investigations have revealed similar findings [10, 11]. Additionally, infants below six months old accounted for 6.5% of instances. Research from Cameroon by Chiabi et al. (2017) studied malnutrition in children under 6 months of age, confirming our results [10].

This is because pre-lacteals, early weaning, poor feeding methods, and bottle feeding were discovered in the research. Even though the fact that colostrum is an essential meal for newborns, 112 (56.6%) of them did not get it during our study. However, it is not related to the probability of developing SAM later in life (P > 0.05). Nevertheless, some studies have shown that depriving infants of colostrum and giving them pre-lacteals before birth increases their risk of malnutrition [12, 13].

We discovered substantial risk variables linked with SAM, including dietary risk factors, pneumonia, diarrhea, inadequate immunization status, and a long distance to the nearest health center for dehydration. A similar presentation occurred in Ethiopia. Derseh et al. [14]

These variables, coupled with comorbidities, contribute to the severity of SAM by decompensating physiological pathways and impairing the immune system. Interventions such as appropriate vaccination, sanitation, clean drinking water, and universal health coverage have the potential to improve outcomes [15]. Recurrent or persistent diarrhea causes malnutrition [16]. This is attributed to decreased appetite and malabsorption, weakened immunity, and a vicious cycle of diarrhea. These occurrences impose an economic burden on families in a developing nation [17]. The introduction of pre-lacteals, non-exclusive breastfeeding for six months, and the introduction

of supplementary meals before six months all showed a significant connection with SAM, according to this study. Previous investigations found comparable results [11, 18]. Infections such as ARI (pneumonia), sepsis, and UTI diminish SAM children's physiological reserve and increase metabolic demand to maintain temperature, labor of breathing, and cardiac output. These youngsters get hypoxic, and their appetites fall more. All of these factors contribute to decreased food and calorie intake, and many times patients require nasogastric tube feeding, resulting in malnutrition. In the current study, 32.2% of mothers and 25% of dads were illiterate. These findings do not compare to the 75% reported from Karachi [19] or the 52% reported from Sialkot. Poverty is another contributory factor to malnutrition; in the current study, the majority of parents (99.2%) earned less than Rs 5,000 per month. Poverty as a risk factor has also been identified in other research [20-22]. Large family sizes are also linked to an increased risk of SAM. In our study, big family sizes were found in 33% of the instances. Other Ethiopian and Pakistani workers have also identified large family sizes as a danger factor. [20]

Limitation:
An observational hospital-based study, may not accurately reflect the prevalence of SAM risk factors in the population. This small portion of research needs and encourages a bigger sample size and a longer duration to offer a true picture of the burden and effect of SAM. Furthermore, the non-probability sequential sampling approach was utilized, which may limit the generalizability of the results to the population.

CONCLUSION:
SAM is frequent in children aged 6-36 months. Adherence to new WHO recommendations for inpatient care has helped to reduce mortality to a manageable level. Dietary risk variables, such as the length of exclusive breastfeeding, bottle feeding, and the delayed introduction of supplemental feeding, were all strongly related to poor outcomes. Screening should be done consistently in all community healthcare facilities to discover SAM children early. Immunization and comprehensive health coverage will assist in reducing malnutrition and death rates among SAM children.

TABLE 01

Descriptive characteristics of different variables

Variable	Mean + SD
Age	25.12+12.68
Weight	15.6+1.1
Age (years) of the Mothers of Patients	27.20±3.49
Age (years) of the Fathers Patients	35.12+5.68

TABLE 02

Frequencies Of Different Demographic & Other Variables

VARIABLES		n	%
Gender	Male	152	57%
	Female	115	43%
Birth order of the Child	First Child	197	73.7%
	Not First Child	70	26.3%
Educational Status of the mother	Illiterate	86	32.2%
	Primary	124	46.4%
	Secondary	51	19%
	Intermediate	5	1.87%
	Graduate & above	1	0.37%
Educational Status of the father	Illiterate	69	25,8%
	Primary	112	41.9%

	Secondary	73	27.3%
	Intermediate	11	4.1%
	Graduate & above	02	0,74%
The monthly income of the father	< 20000	101	37.8%
	Rs: 21000-50000	164	61.4%
	>Rs: 50,000	02	0.8%
Occupation of the mother	Businessman	16	5.9
	Day Laborer	04	1.5
	Un-employment	247	92.5
Occupation of the father	Businessman	29	10.8%
	Day Laborer	229	85.7%
	Un-employment	09	3.3%
Family Size	< 5 members	206	77
	>5 members	62	33

Table 03

Risk Factors Of Sam Under Five Years Children (N=267

Risk Factors	Frequency	%
No Exclusive Breast Feeding	136	51%
Untimely Weaning	184	69%
Incomplete vaccination status	205	76.7%
Frequent Diarrhea	157	59%
Frequent Pneumonia	130	49%
High Distance to nearest health facility	190	71%
Occasionally hand wash & use of Tap water	184	69%

TABLE 04

Stratification Of Risk Factors Of Sam Under Five Years Children With Respect To Different Variables (N=267)

RISK FACTORS		No Exclusive Breast Feed		Un timely Weaning		Incomp: vaccine status		Freq: Diarrhea		Frequent pnenomia		High Dist. to nearest health facility		Occasi hand wash & use of Tap water	
Variables		yes	no	yes	No	yes	no	yes	no	yes	no	yes	no	yes	No
Age Months	6-36	81	108	110	79	141	48	108	81	90	99	117	72	124	65
	>36-59	55	23	74	04	64	14	49	29	40	38	73	05	60	18
	p-value	0.00		0.00		0.189		0.391		0.586		0.00		0.069	
Gender	Male	79	73	97	55	107	45	81	71	80	72	100	52	95	57
	Female	57	58	87	28	98	117	76	39	50	65	90	25	89	26
	p-value	0.696		0.038		0.004		0.035		0.138		0.0259		0.009	
Mother's age	≤ 30	111	98	127	82	185	24	117	92	90	119	150	59	128	81

years	>30	25	33	57	1	20	38	40	18	40	18	40	18	56	02
	p-value	0.119		0.000		0.000		0.075		0.0004		0.676		0.000	
Educational Status of Mothers	Illiterate	24	60	40	46	55	31	40	46	26	60	71	15	55	31
	Primary	78	46	111	13	117	7	80	44	55	69	64	60	80	44
	Second.	29	22	27	24	31	20	31	20	49	2	49	2	45	6
	Intermed.	04	01	5	0	2	3	5	00	5	0	5	00	5	0
	Grad. & above	01	00	1	0	0	1	1	00	1	0	1	00	1	0
	p-value	0.000		0.000		0.000		0.000		0.000		0.0000		0.007	
Occupation of the mother	Business	14	0	11	3	1	13	13	1	13	1	13	0	11	3
	D.Laborer	4	0	4	0	1	3	4	0	4	0	4	0	3	1
	Un-employm.	128	119	169	78	203	44	140	107	113	134	172	229	170	77
	p-value	0.000		0.269		0.000		0.006		0.000		0.000		0.721	
Family Size	<5memb,	107	99	127	79	191	15	143	63	121	85	179	27	161	45
	>5 memb.	29	32	57	4	14	47	14	47	9	52	11	50	23	38
	p-value	0.545		0.00	0.0	0.00		0.00		0.00		0.00		0.00	
Birth order of child	1st child	119	78	154	43	185	12	132	65	110	87	135	62	171	26
	Not 1st child	17	53	30	40	20	50	25	45	20	50	55	15	13	57
	p-value	0.000		0.000		0.000		0.000		0.000		0.111		0.000	

TABLE 05
Stratification Of Risk Factors Of Sam Under Five Years Children With Respect To Different Variables (N=267)

RISK FACTORS		No Exclusive Breast Feed		Un timely Weaning		Incomp: vaccine status		Freq: Diarrhea		Frequent pnenomia		High Dist. to nearest health facility		Occasi hand wash & use of Tap water	
Variables		yes	no	yes	no	yes	no	yes	no	yes	No	yes	no	yes	No
Educational Status of Father	Illiterate	36	33	23	46	36	33	29	40	20	49	21	48	24	45
	Primary	65	47	89	23	100	12	89	23	70	42	90	22	97	15
	Secondary	25	48	61	12	60	13	28	45	40	33	69	4	56	17
	intermediate	8	3	9	2	7	4	9	2	8	1	8	3	5	6
	Grad & above	2	0	2	0	2	00	2	0	2	00	2	0	2	0
	p-value	0.005		0.000		0.000		0.000		0.000		0.0000		0.007	

Fathers age	≤ 35	95	96	134	57	175	16	127	64	127	64	110		128	63
	>35	41	35	50	26	30	46	30	46	30	46	20		56	20
	p-value	0.545		0.486		0.000		0.000		0.000		0.000		0.288	
Occupation f the Father	Businessman	12	14	21	5	15	11	12	14	18	8	17	9	14	12
	Day Laborer	119	110	158	71	185	44	141	88	110	119	170	59	167	62
	Un-empl	5	4	5	4	5	4	4	5	2	7	3	6	3	6
	p-value	0.828		0.298		0.007		0.204		0.0031		0.02		0.007	

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