

Assessment of IMCI Management of Undernutrition and Anemia in an Urban MCH Center; Assiut City

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Abstract

Introduction: Since Integrated Management of Childhood Illnesses (IMCI) program was implemented as a part of child health services in Egyptian Ministry of Health, it has a well evident impact on reduction of childhood mortality. However, the details of IMCI management process have not been assessed. **Objective:** This study aimed to assess the IMCI management of undernutrition and anemia as well as knowledge and satisfaction of children care givers on provided services. **Method:** A cross sectional study was conducted in an urban maternal and child health center in Assiut city. An exit interview with the caregivers of 242 children who reported child undernutrition or anemia was administered. **Results:** The results revealed that, the most common child illnesses were as follow; anemia 84%, and anemia with upper respiratory tract infection 12%. Most of child's caregivers reported good performance of physicians regarding providing the diagnosis, prescribing the treatment and the way of giving it. However, child caregivers complained that the physicians missed the provision of a follow up schedule, type of feeding during illness and signs and symptoms indicated for immediate return to MCH center. Most of child caregivers had good knowledge about undernutrition and anemia. More than 90% of child caregivers were satisfied with the provided IMCI services. **Conclusions and recommendation:** The majority of child caregivers were satisfied with provided IMCI services. Health care providers should inform the child caregivers about the schedule of follow up, type of feeding during illness and signs and symptoms indicated for immediate return to MCH center.

Keywords: *IMCI, Assessment, undernutrition and anemia, children care givers, Assiut city.*

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Introduction

Each year, about 11 million children die before reaching their fifth birthday. In response to this challenge, WHO and UNICEF in the early 1990s developed Integrated Management of Childhood Illness (IMCI), an approach designed to decrease child morbidity and deaths in under-developed countries. This strategy focuses on the major causes of deaths in children through improving case management skills of health workers, strengthening the health system, and

addressing family and community practices.¹

The WHO/ UNICCF clinical guidelines for IMCI applied a standardized approach using simple and effective methods, this approach applied evidence-based assessment and treatment of sick child, concurrent with use of effective and low-cost medicine and simple equipment.^{2,3}

The core of the IMCI strategy is integrated case management of the most common childhood problems;

pneumonia, diarrhea, measles and malaria.⁴ The clinical guidelines include methods for assessing signs that indicate severe disease; assessing a child's nutrition, immunization, and feeding; teaching parents how to care for a child at home; counselling parents to solve feeding problems; and advising parents about when to return to a health facility.⁵ Childhood undernutrition is an important indicator of the health of a population.⁶ It is estimated that 56% of childhood deaths worldwide are attributable to the potentiating effects of undernutrition, with 83% of these arising from the mild-to-moderate form rather than the severe form.⁷

Childhood undernutrition can have long-term physical and cognitive repercussions. The literature indicates that both fetal and childhood undernutrition have a marked effect on adult anthropometric outcomes.⁸ Furthermore, malnourished children display a reduced immune response compared with their well-nourished counterparts. This increases susceptibility to and mortality from communicable diseases⁹ conversely, such communicable diseases can also precipitate childhood undernutrition.¹⁰ WHO reported anemia as the world's second leading cause of disability and one of the most serious global public health problems. Anemia affects over half of pre-school children in developing countries and at least 30-40% in industrialized countries.¹¹ It impairs cognitive and psychomotor development and the general health of children.¹²

Since IMCI introduction in Egypt in 1996, IMCI was adopted as a primary child health care program. IMCI coverage rose from 3% of primary health care facilities in 2000 to 98% in 2012; 95% of trained staff received a follow-up after training visit.¹³

Retrospective analysis, based on data from vital registration, assessed the impact of IMCI implementation between

2000 and 2006 on child mortality in 213 Egyptian districts. The analysis detected that IMCI implementation was associated with a doubling in the annual rate of under-five mortality reduction.¹⁴ World Health Organization considered Egypt as a successful model in IMCI implementation at national scale in a country with large population.¹³

To deliver high quality and affordable health services is considered difficult challenge. Health services researches are concerned with studying different aspects for health care services including; utilization, costs, quality, accessibility, delivery process, organization, financing, and outcomes. Health services researches has a value to inform providers themselves, consumers, governmental and non-governmental making decisions about health-related issues.¹⁵

The present study considered the earliest study assessing the process of IMCI management of undernutrition and anemia. Other aims of this study are assessing caregivers' knowledge about undernutrition and anemia, their satisfaction on provided services, and exploring the associated factors of undernutrition and anemia among children in urban maternal child center.

Method:

Setting: The study was carried out in an urban maternal and child health center in eastern area in Assiut city, Assiut Governorate; Upper Egypt. The selection of the center based on its application of IMCI management of children illness.

Study design: Descriptive cross-sectional study design was applied.

Study population: Total coverage of children aged from 6 to 59 months and their caregivers who attend MCH center (n=242) reported their children complaint of anemia or undernutrition and agreed to participate in the study. Data were collected by the researchers themselves by direct exit interviewing

within 2-3 children caregivers per day on average in 6 months duration from February to July 2017. Response rate was 97%, cause of children caregivers' refusal to participate in the study was no enough time. The data collection instrument was composed of 3 parts: The first part was interviewed administered questionnaire. The approximate time spent during the filling of the questionnaire was around 20-30 minutes from each child caregiver. The questionnaire included: (1) Socio-demographic characteristics such as child age, gender, residence and parent's education and occupation. (2) Process of IMCI assessment in management of undernutrition and anemia such as whether the physicians mentioned the diagnosis, prescribe treatment and explain to child care giver how to give treatment. Also, the process of IMCI assessment included whether the physician informs the care giver when to return for follow up and signs

and symptoms to return immediately. (3) Knowledge of children caregivers about anemia and undernutrition regarding causes, symptoms and complications. (4) Knowledge of children care givers about feeding pattern during illness and signs or symptoms indicated for immediate return to maternal and child health center. (5) Child caregiver satisfaction on the provided health services.

The second part was assessing the weight and height of studied children. Measurements were obtained from record performed by nurses responsible for IMCI program in the center. Nutritional status was classified based on the following indices: weight-for-age z-score (WAZ), height- or length-for-age z-score (HAZ), and weight-for-height or length z-score (WHZ) in accordance with the criteria proposed by WHO ⁽¹⁶⁾ using the software WHO Anthro (version 3.2.2, January 2011) ⁽¹⁷⁾.

	Weight-for-age (Z score)	Height-for-age (Z score)	Weight-for-height (Z score)
< -3 SD	Severely underweight	Severely stunted	Severely wasted
< -2 SD	Underweight	Stunted	Wasted
-2 SD: 2 SD	Normal	Normal	Normal
≥ 2 SD	Above normal	Above normal	Overweight

The third part was assessing children hemoglobin concentration to diagnose severity of anemia. Anemia and the cut-offs for its severity were considered as: non-anemia ≥ 11 mg/dl, mild anemia 10-10.9 mg/dl, moderate anemia 7- 9.99 mg/dl and severe anemia if less than 7 mg/dl. ^{19,18}

Pilot study was carried out before starting data collection on 10 children caregivers who were excluded from the study. The pilot study aimed to test the clarity of the tool and estimate the time needed for filling it.

Ethical consideration:

Before the start of the study, the administrative approval to conduct the study was obtained from the Directorate of Health. The Ethical Committee, Faculty of Nursing in Assiut University

approved the study. All ethical considerations were ensured including children caregivers consent after explanation of study objectives, participants' confidentiality and security of data.

Statistical analysis:

Data entry and analysis was conducted using SPSS program (version 20). ^{20,19} Data analysis included descriptive statistics; frequencies, percentages, the mean and standard deviation. Comparison between groups was done using chi-square, Fisher's Exact tests and Exact tests for qualitative variables. For quantitative variables, Mann-Whitney U test was used to compare mean between two independent groups.

Results:

Table (1) shows that the mean of age of studied children was 17.7 ± 9.5 months and vast majority of children (87.6%) were less than 2 years. Females constituted more than half of children (52.1%). The majority of studied population (93.4%) resides in urban area. About sixty percent of children parents had university education or above. Regarding fathers' occupation, professional workers represented 44.6% and employees 22.3%. Nearly 59% of mothers were housewives.

Table (2) reveals that about 90% of children had their first visit to MCH center. The physician mentioned the diagnosis of child illness for 82.6% of children care givers. The most common child illnesses as reported by child caregivers were as follow; anemia 84%, and anemia with upper respiratory tract infection 12%. The physician prescribed treatment for 93.4% of children. Iron syrup was prescribed for 90.3% of children. The physician demonstrated the way of drug administration for 93.8% of studied sample. The physician or nurse mentioned for nearly 55% of caregivers when return to MCH for follow up visit. Among them, the physician or nurse told 7.5% of child caregivers to return after 14 days while majority of them (91.0%) were informed to return after three months. More than two thirds of studied sample (62.0%) was not counseled about type of child feeding during illness. The majority of studied sample (86.8%) weren't informed about signs or symptoms indicated for immediate return to MCH center.

Figure (1) shows that the severity of anemia among studied children attended MCH based on assessed hemoglobin levels; more than half of children (54.5%) were mild anemic while 45.5% of them were moderate anemic. No case was detected with severe anemia ($HB < 7$ mg/dl)

Table (1): Socio-demographic characteristics of the interviewed caregivers and their children in urban MCH, Assiut 2017

Item	Total No. (242)	%
Age of the child (months)		
< 2 years	212	87.6
≥ 2 years up to 5 years	30	12.4
Mean \pm SD	17.7	
(Range)	± 9.5 (6-57)	
Gender:		
Male	116	47.9
Female	126	52.1
Residence:		
Rural	16	6.6
Urban	226	93.4
Father education:		
Illiterate / read & write	14	5.8
Primary / preparatory	14	5.8
Secondary	70	29.0
University graduate/ postgraduate	144	59.4
Father occupation:		
Don't work	2	0.8
unskilled worker	18	7.4
skilled worker	32	13.2
Employee	54	22.3
Professional	108	44.6
Business worker	24	9.9
Died	4	1.7
Mother education:		
Illiterate	10	4.1
Primary / preparatory	12	5.0
Secondary	70	28.9
University graduate/ postgraduate	150	62.0
Mother occupation:		
Housewife	142	58.7
Employee	40	16.5
Professional	60	24.8

Figure (2) illustrated that the proportions of wasted, underweight and stunted children were 5%, 4.1 % and 12.4% respectively. The analysis showed no children were reported to have weight for age, height for age and weight for height less than 3 SD.

Table (3) reveals child caregiver knowledge about undernutrition and anemia. More than half of studied sample (57.9%) was aware about undernutrition. About 57 % of them reported the correct

Table (2): Assessment of IMCI process by children care givers in urban MCH, Assiut, 2017

Variable	No. (242)	%
Type of visit:		
First	216	89.3
Follow up	26	10.7
Physician mention diagnosis for child caregivers:	200	82.6
Child diagnosis reported by child caregivers:	(N=200)	
Anemia	168	84.0
Anemia & low weight	2	1
Anemia & rickets	4	2
Anemia & upper respiratory tract infection	24	12
Parasitic infestation	2	1
The physician prescribed a treatment for the child:	226	93.4
Type of the treatment:	(N=226)	
Iron	204	90.3
iron, antibiotic & antipyretic	20	8.8
Iron & Parasitic treatment	2	0.9
The physician described the way of giving treatment	212	93.8
The physician / nurse mention when to return for follow: up	134	55.4
If yes duration:	(N=134)	
after 14 days	10	7.5
after 2 months	2	1.5
after 3 months	122	91.0
Physician/ nurse mention type of feeding during illness:	92	38.0
The physician/ nurse mention signs or symptoms indicated for immediate return to MCH center:	32	13.2

Table (3): Knowledge about undernutrition and anemia among child caregivers in urban MCH, Assiut, 2017

Variables	No. (242)	%
Knowledge of caregiver about definition of undernutrition	140	57.9
Correct Symptoms of undernutrition	80	57.1
Reported correct symptoms: *		
Low weight	46	57.5
Anorexia	26	32.5
Delayed teething	6	7.5
Decrease activity	26	32.5
Correct Causes of undernutrition	72	51.4
Reported correct causes: *		
Unhealthy diet	64	88.9
Parasitic infestation	2	2.8
Mothers negligence	8	11.1
Correct Complication of undernutrition	92	65.7
Reported correct complication: *		
Decrease immunity	35	38.0
Delay growth	40	43.5
Low effort	24	26.1
Knowledge of caregiver about definition of anemia	208	86.0
Correct Symptoms of anemia	138	66.3
Reported correct symptoms: *		
Pallor	46	33.3
Low immunity/ repeated infection	56	40.6
Affect intelligence	10	7.2
Decrease activity	37	26.8
Dark color under eye	26	18.8
Correct Causes of anemia	94	45.2
Reported correct causes:		
Low iron in diet	89	94.7
Parasitic infestation	5	5.3

Table (4): Knowledge regarding child feeding pattern during illness and danger signs among child caregivers in urban MCH, Assiut 2017.

Variables	No. 242	% 100
Child caregiver knowledge about breast feeding during illness:		
Continue feeding	188	77.7
Stop feeding	40	16.5
Don't know	14	5.8
Amount of feeding during illness:		
The same	34	14.0
Increased	52	21.5
Decreased	144	59.5
Don't know	12	5.0
Amount of fluids given during illness:		
The same	20	8.3
Increased	202	83.5
Decreased	16	6.6
Don't know	4	1.7
The child caregiver Know about signs or symptoms indicated for immediate return to MCH center?	154	63.6
Child caregiver knowledge about signs or symptoms indicated for immediate return to MCH center: *		
Fever	116	75.3
Progress of illness	30	19.5
Vomiting	16	10.4
Diarrhea	12	7.8
Unable to drink or feed	10	6.5

symptoms of undernutrition. The most frequent reported symptom of undernutrition (57.5%) was low weight. The proportion of children care givers identified correct causes of undernutrition was 51.4%. The main cause of undernutrition reported by nearly 90 % of child caregivers was unhealthy diet. More than two thirds of studied population (65.7%) was aware about complication of undernutrition. The most common complications of undernutrition reported were delayed growth (43.5%), decrease immunity (38%).

The table also revealed that 86.0% of care givers knew about anemia. Regarding symptoms of anemia; more than two thirds of them (66.3%) mentioned correct answers. Most frequent mentioned symptoms of anemia in order were Low immunity with repeated infection and pallor. Nearly 45% of child caregivers identified the correct causes of anemia and low iron in diet was the commonest reported causes (94.7%)

Table (5): Satisfaction of child caregivers on provided IMCI service in urban MCH, Assiut 2017

Variables	No. 242	%
Satisfaction:		
Very satisfied	124	51.2
Satisfied	104	43.0
Dissatisfied	14	5.8
Causes of satisfaction:*	No. = (228)	
Waiting time	44	19.3
Dealing of health team worker	162	71.1
Quality of child examination	68	29.8
Manner of physician communication	56	24.6
Prescribed treatment	24	10.5
Causes of dissatisfaction:	No. = (14)	
Waiting time	2	14.3
Way of communication with physician	10	71.4
Prescribed treatment	2	14.3

Table (4) depicts the knowledge of children care givers about child feeding during illness; more than three quarters (77.7%) of child caregivers reported that

breast feeding should be continued. About 60% of child caregivers mentioned that the amount of feeding during illness should be decreased while 83.5% recommended increasing amount of fluids during illness. Nearly 64% of caregivers knew signs or symptoms indicated for immediate return to MCH

center. The most frequent reported symptoms indicated for immediate return to MCH center were fever (75.3%), progress of illness (19.5%) and vomiting (10.4%).

Table (5) revealed that the majority of children caregivers (94%) were very

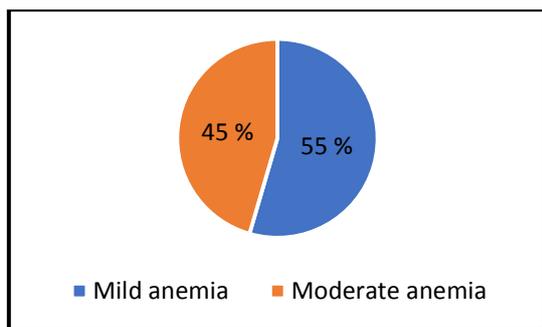
Table (6): Relationship between socio-demographic, knowledge score, severity of anemia and undernutrition among children in urban MCH, Assiut 2017

Variables	Wasting		P value	Underweight		P value	Stunting		P value
	Present No. (12)	Absent No. (230)		Present No. (10)	Absent No. (232)		Present No. (30)	Absent No. (212)	
Child age Mean±SD^a	14.5± 3.06	17.85±9.69	0.518	20.60±14.11	17.56±9.27	0.853	22.467±11.6	17.01±8.9	0.001
Gender									
Male	4 (33.3)	112 (48.7)	0.229	10 (100.0)	106 (45.7)	0.001 [®]	18(60.0)	98(46.2)	0.185
Female	8 (66.7)	118 (51.3)		0(0.0)	126 (54.3)		12(40.0)	114(53.8)	
Residence									
Rural	0 (0.0)	16(7.0)	0.344	0 (0.0)	16 (6.9)	1.000 [®]	0(0.0)	16(7.5)	0.232 [®]
Urban	12 (100.0)	214(93.0)		10 (100.0)	216 (93.1)		30(100.0)	196(92.5)	
Father education									
Illiterate / read & write	0 (0.0)	14(6.1)	0.309^α	0(0.0)	14(6.0)	0.209^α	0(0.0)	14(6.6)	0.122^α
Primary / preparatory	2 (16.7)	12 (5.2)		2(20.0)	12(5.2)		4(13.3)	10(4.7)	
Secondary/upper intermediate	4 (33.3)	66 28.7)		2(20.0)	68(29.3)		10 (33.3)	60(28.3)	
University education or more	6 (50.0)	138 (60.0)		6(60.0)	138(59.5)		16(53.3)	128(60.4)	
Mother education									
Illiterate / read & write	2 (16.7)	8 (3.5)	0.106^α	2(20.0)	8(3.4)	0.015^α	2(6.7)	8(3.8)	0.615^α
Primary / preparatory	0 (0.0)	12 (5.2)		0(0.0)	12(5.2)		2(6.7)	10(4.7)	
Secondary/upper intermediate	2 (16.7)	68 (29.6)		0(0.0)	70(30.2)		6(20.0)	64(30.2)	
University education or more	8 (66.7)	142 (61.7)		8(80.0)	142(61.2)		20(66.7)	130(61.3)	
Father occupation									
Don't work unskilled/ Skilled worker	2 (16.7)	0 (0.0)	0.000 ^α	2(20.0)	0(0.0)	0.000 ^α	2(6.7)	0(0.0)	0.004 ^α
Employee	2 (16.7)	48 (20.9)		0(0.0)	50(21.6)		6(20.0)	44(20.8)	
Professional / Business worker	6 (50.0)	48 (20.9)		4(40.0)	50(21.6)		8(26.7)	46(21.7)	
Died	2 (16.7)	130 (56.5)		4(40.0)	128(55.2)		14(46.7)	118(55.7)	
	0 (0.0)	4 (1.7)		0(0.0)	4(1.7)		0(0.0)	4(1.9)	
Mother occupation									
House wife	6(50.0)	136(59.1)	0.265 ^α	2(20.0)	140(60.3)	0.029 ^α	18(60.0)	124(58.5)	0.874
Employee	4(33.3)	36(15.7)		4(40.0)	36(15.5)		4(13.3)	36(17.0)	
Professional	2(16.7)	58(25.2)		4(40.0)	56(24.1)		8(26.7)	52(24.5)	
Knowledge* Mean±SD^a	4.67±1.78	4.12±2.17	0.392	4.7500±1.16	4.1261±2.17	0.224	4.79 ±1.81	4.06±2.19	0.094
Severity of anemia									
Mild	6 (50.0)	126 (54.8)	0.378	6(60.0)	126(54.3)	0.359	16(53.3)	116(54.7)	0.079
Moderate	6 (50.0)	104 (45.2)		4(40.0)	106(45.7)		14(46.7)	96(45.3)	

Chi-square test [®]Fisher's Exact test ^α Exact test ^α Mann-Whitney U test *Parents only who were included (n =230)

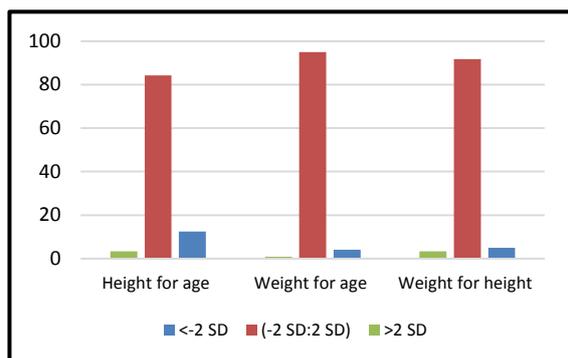
satisfied/satisfied about provided services. The most common reported causes of satisfaction were dealing of health team worker (71.1%) and quality

of child examination (29.8%). As shown in Table (6), child age was not significantly associated with wasting or underweight conditions while the stunted



No case was detected with severe anemia ($HB < 7$ mg/dl)

Figure (1): Distribution of severity of anemia among studied children in urban MCH, Assiut 2017



No children were reported to have either weight for age, height for age or weight for height less than 3 SD.

Figure (2) Distribution of nutritional indices among studied children in urban MCH, Assiut 2017

children have significantly higher mean of age (22.467 ± 11.63) compared to non-stunted ones (17.01 ± 8.98) (P value = 0.001). Gender was significantly related to underweight as males had significantly higher proportion compared to females ($P=0.001$). Significant higher proportion of underweight children was detected in children whose mothers had university education or above (80%) and in working mothers (80%). father' occupation was significantly associated with wasting, underweight and stunting (P value < 0.05).

Discussion:

IMCI follow simple techniques that save lives of children, it provides better management of sick children at low cost to municipalities. Compared to previous vertical disease specific programs, it addresses integrated management of most killer childhood diseases undernutrition and anemia.²⁰

To ensure the continuous efficiency of health programs, assessment for their operating process is necessary. Assessment of IMCI was conducted either in small scale as assessment of specific item in the program e.g. health care providers counseling for children caregivers in a cross-sectional study using quantitative and qualitative methods In Uganda²¹, or large scale as national assessment of all component of IMCI program using different tools as analysis of routine statistics, surveys on health care providers and children caregivers sought health care, and

stakeholders over 10 years duration in the Republic of Moldova.²² The current study assessed the IMCI management process for undernutrition and anemia through exist interview with children care givers.

Undernutrition is highly prevalent among children in low and middle-income countries. However, wide variations exist in the overall prevalence of underweight, stunting, and wasting among children across countries.²³⁻²⁶ Results of Egyptian Demographic Health Survey, 2014 (EDHS) showed that among children under 5 years, Overall, nearly 27% of children suffered from variable degree of anemia. Also, 21%, 8.4% and 5.5% of children had stunting, wasting and underweight respectively. It showed that undernutrition was higher in urban Upper Egypt where prevalence of stunting was about 30%, wasting was 9% and underweight was 8.1%.²⁷

In the present study, the proportions of stunting, wasting and underweight were

12.4%, 5% and 4.1%, respectively. However, the proportions of undernutrition indicators in present study cannot be generalized as these results are limited to similar studied population whose children caregivers sought care and complained from low weight or anemic presentation.

Based on hemoglobin assessment, all cases in the current study suffered from either mild or moderate anemia. Similar finding was observed in EDHS, 2014 results.²⁷

In the current study, the majority of children caregivers reported that physician prescribed a treatment for their children and informed them with the correct way of giving treatment. This was in line with IMCI basic guidelines that stated prescription of treatment and provision caregivers with practical treatment instructions e.g. how to give oral drugs at home.²⁸

A basic component of IMCI management process is counseling the care givers about how to feed and give fluids during illness.²⁸ Provision of accurate and timely information help to decrease burden of children undernutrition.²⁹ In the present study, although all children were anemic with detected proportion of undernourished children, about two thirds of children caregivers reported that the physician or nurse did not inform them about child feeding and nutrition at home. While better practice of health providers in IMCI program was observed In Uganda. Where, using direct observation revealed that 76% of health providers gave feeding advices.²¹

Regarding informing caregivers on time of follow up visit, IMCI stated that if pallor was detected, follow-up visit should be after 14 days and if low weight for age was noticed, the follow-up advised to be after 30 days.³⁰ In this study, nearly 55% of children caregivers were informed when to return for follow up visit, among those who were informed to return, only 7.5% of them were asked

to return after 14 days, and 92.5% were advised to return for follow up visit after two or three months that exceed the appropriate date of follow up.

Informing children caregivers about reasons necessitate immediate return to unit is a basic component of IMCI. In the present study, the majority (87%) reported that the physician did not mention this item for them. While in Uganda, good performance of health care providers was observed in this item (78%).²¹

Regarding caregivers' satisfaction on provided IMCI services in management of undernutrition and anemia, dealing of health care team and quality of child examination were the most frequent reported aspects of satisfaction in the present study. These results agreed with those of national IMCI assessment in Moldova showed that the most common mentioned reasons were communication of physicians and child management services.²²

In the present study, most of caregivers (63.6%) knew about signs or symptoms indicated for immediate return to MCH center. The mentioned symptoms were fever (75.3%), progress of illness (19.5%), persistent vomiting (10.4%) and the child inability to drink or feed (6.5%). However, Moldavian children caregivers had better knowledge than current study. Where, about 88.5 % of them were able to list at least two danger signs indicated for immediate return. The most often known signs were fever over 38 C (90.5%), child vomits everything (48.9%), worsening condition (46.3%) and child is unable to drink or eat (44.7%).²²

Regarding mother's knowledge on undernutrition in this study, about 58% acknowledged prior knowledge of undernutrition and 51% of them reported correct causes of undernutrition such as unhealthy diet, mother negligence and parasitic infestation. This finding was not in line with WHO that reported that poor

hygienic condition, poverty and unsafe water can lead to undernutrition in children³¹ and study conducted by Cumber and his colleagues showed that 73% of the mothers were aware of undernutrition and the reported causes of undernutrition by these mothers were poor hygienic condition in preparing the child's food, poverty, unsafe water diseases and infections.³²

Regarding caregivers' knowledge about anemia, 86% of them were aware about its definition. Low immunity, repeated infection and pallor were the common correct symptoms of anemia reported by the caregivers. The majority of caregivers reported low iron in diet as the main cause of anemia. These results disagree with a study conducted in Tanzania revealed that more than half of mothers (55%) have heard about anemia. The most frequent symptoms of anemia reported by the mothers in Tanzania were pallor of conjunctiva and reduced physical activity and the main causes of anemia were frequent illness, and refusal to eat.³³

Breastfeeding reduces infant mortality due to common childhood illnesses such as diarrhea or pneumonia and helps for a quicker recovery during illness.³⁴ More than three quarters of children caregivers in the present study correctly answered that the breast feeding should be continued during illness. Similar finding was detected in Indian study evaluated knowledge of mothers on breast feeding, where 82% of studied sample mentioned that breast feeding should be continued during illness.³⁵

Stunting was significantly associated with higher child's age in the present study. This is consistent with other studies carried out in Ethiopia³⁶, Ghana³⁷ and India³⁸. This could be attributed to decreasing immune protective effects of breast milk in older children with mixed, or even absence of breastfeeding, coupled with increasing exposure to contaminated supplementary foods,

resulting in the increase probability of infectious diseases along with growing need for nutrients, compared to younger children who might be protected by the mother's immune system at birth.³⁹

Stunting in the present study was significantly associated with professional fathers in contrast with other studies which showed its association with irregular employment status of father.^{26,40,41} Mother education has protective role against child undernutrition.⁴² However, the present study showed that underweight was significantly associated with highly educated mothers and working mothers. This might be explained by that employed mothers had limited time to give care to their children compared to unemployed mothers.⁴³

The present study showed that male children were more likely to be underweight than female counterparts. This is consistent with other studies.^{44,45} However, it contradicts other studies.^{46,47} This could be explained by boys are more affected by environmental stress than girls. Thus, boys are more likely to exhibit chronic undernutrition effect.⁴⁸

Conclusion:

Most of child caregivers were satisfied with provided IMCI services. Children caregivers reported good performance of physicians regarding telling the diagnosis, prescribing the treatment. Also, they had good knowledge about undernutrition and anemia.

Recommendations:

To ensure providing efficient IMCI services, health care providers should give emphasis to child caregivers about when to return for follow up, type of feeding during illness and signs and symptoms indicated for immediate return to MCH center.

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