Type of the Paper (Research article)

Evaluation of Preventive Nutritional Services for Under-Five Children in Fayoum Primary Health Care Facilities

Naglaa A. El-Sherbiny[1], Yousra Z. Hamida[1], Mohamed Masoud[1]*

[1] Public Health & Community Medicine Department, Faculty of Medicine, Fayoum University, Fayoum 63511, Egypt.

Received: 11 January, 2024 Reviewed: 12 February, 2025
Accepted: 11 May, 2025 Published online: 20 September 2025

*Correspondence: Mohamed Masoud, mms07@fayoum.edu.eg, Tel: (002) 01003772854.

Abstract:

Introduction: In Egypt, malnutrition among under-five children remains an important issue.

Aim of the study: To evaluate the preventive nutritional services provided for under-five children in PHC facilities in Fayoum Governorate.

Subjects and Methods: This health services research was conducted throughout 2019 using Donabedian framework to assess the structure, process, and outcome dimensions of the services. We employed a facility-based assessment that entailed a situation analysis of Fayoum PHC facilities and a quantitative survey to assess the mothers' satisfaction with preventive nutritional services.

Results: For service evaluation in PHC facilities, our results revealed that appropriate recording and record-keeping were available. Additionally, scales for weight and height measurements were available. Weight and height were measured and recorded. In some PHCs, weight and height were not plotted on the growth chart. Regarding the assessment of mothers' satisfaction, the median (IQR) for the total satisfaction score was 69 (65-74). Mothers' age, residence, marital status, education, and occupation were found to be significant predictors according to the multiple linear regression model.

Conclusions: Appropriate recording was available in the studied PHC facilities, which can be utilized for implementing a nationwide surveillance system for undernutrition among under-five children. Improving the provision of nutrition services at the PHC level requires strengthening supervision and increasing the number of nurses responsible for nutritional assessment. It's also critical to provide the appropriate equipment and training to enhance the delivery of nutrition services at the PHC level.

Keywords: Growth monitoring; Breastfeeding; Primary health care; Mothers' satisfaction.

1. Introduction

Under-nutrition refers to both protein-energy malnutrition (PEM) and micronutrient deficiency. PEM in under-five children is clinically categorized as marasmus, kwashiorkor, and the mixed condition (marasmic-kwashiorkor) [1]. According to the World Health Organization (WHO) criteria, stunting, underweight, and wasting are defined as Z-scores less than −2 standard deviations of the median standard of height for age, weight for age, and weight for height, respectively. Stunting reveals chronic exposures to nutritional deficiency, while wasting reflects acute nutritional deficiency. In addition, underweight reflects both acute and chronic nutritional deficiency exposures. Furthermore, there are two forms of acute malnutrition in children 6–59 months of age; A moderate acute malnutrition (MAM), which is defined as weight-for-height $\geq$ -3.0 z and $<$ -2.0 z scores, of the median (WHO) standards or mid-upper arm circumference (MUAC) $\geq$ 11.5 cm and $<$ 12.5 cm with no edema and a severe acute malnutrition (SAM), which is defined as weight-for-height below -3.0 z scores, and/or (MUAC) less than 11.5 cm, and/or the presence of bilateral pitting edema [2,3].

In 2016, there were an estimated 155 million stunted children under the age of 5 years worldwide, while 52 million were wasted, of whom 17 million were classified to be severely wasted [4]. Malnutrition contributes to half of the under-five children's mortality in many developing countries [3], causing about 3.1 million child deaths annually in low- and middle-income countries [1].

In Egypt, despite the considerable number of nutrition interventions implemented in recent years to address this issue in the country, malnutrition remains a major health problem, with 5.5% of under-five children being underweight and 21.4% being stunted [5].

Therefore, this study aimed to assess the structure and process dimensions of the preventive nutritional care services for under-five children in primary health care facilities (PHCs) in Fayoum Governorate, including: the recording process of data, anthropometric measurements activities, and breastfeeding promotion activities. The second objective of this study was to evaluate the outcome dimension of these services by assessing the mothers'

satisfaction with nutritional services for under-five children.

2. Subjects & Methods

2.1.*Study design and setting*

This health services research was conducted during the period from January 2019 to December 2019 using Donabedian structure–process–outcome framework. The service's structure and process dimensions were evaluated using a facility-based assessment approach that involved a situational analysis, case-study design of Fayoum PHC facilities. Also, a quantitative approach was employed to assess the outcome dimension. The mothers' satisfaction with preventative nutritional interventions was measured using a cross-sectional design in this quantitative method (**Figure 1**). A similar approach was conducted by Billah et al. (2017) [6].

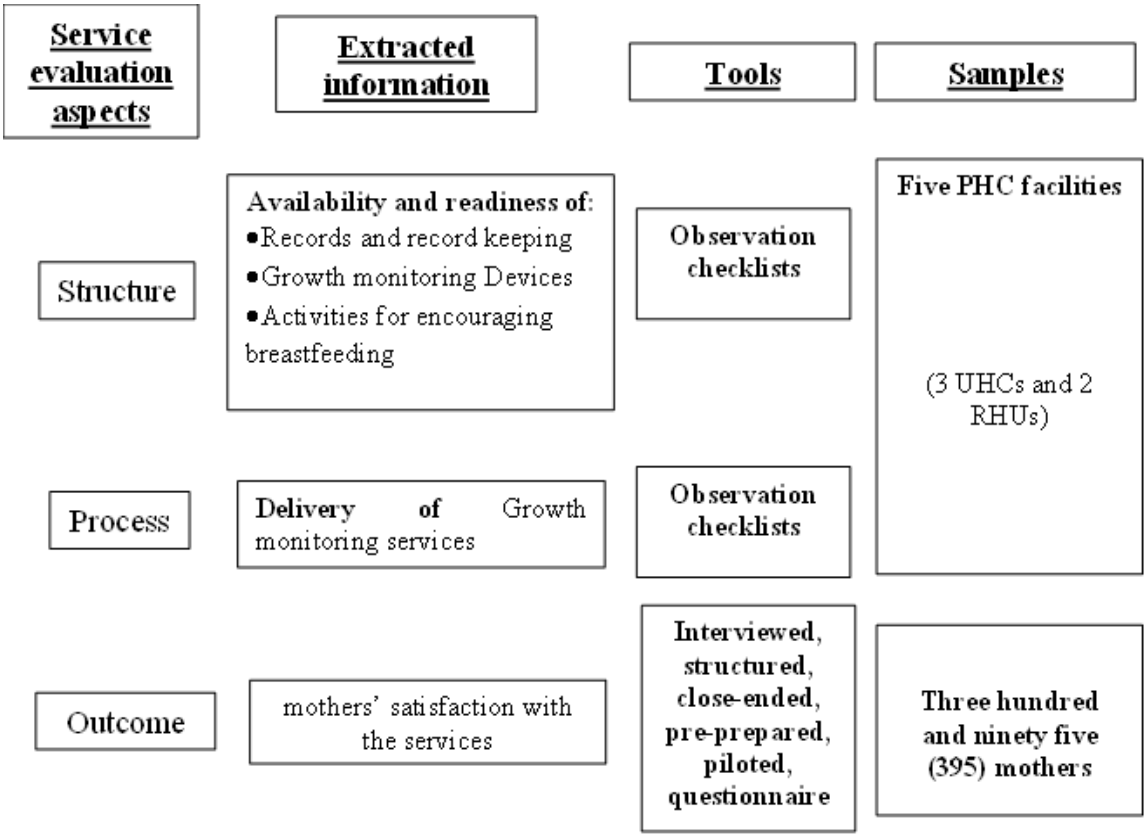

Figure 1: Donabedian framework showing the extracted information, study samples and different data collection tools.

Fayoum Governorate, located about 100km southwest of Cairo, is mostly surrounded by desert. The governorate is divided into six administrative districts and is largely agrarian, with a total population of 3,666,000 as estimated in 1/1/2018 with about 2,818,000 living in rural areas, while 848,000 live in urban areas [7].

2.2.*Study Sample*

PHC facilities

Five PHC facilities, including 3 urban health centers (UHCs) and 2 rural health units (RHUs), were randomly selected. The selected PHC facilities were observed to assess records and recording process, PHC readiness, nutrition assessment session and breastfeeding activities.

Inclusion of a sample of mothers

The sample size of 384 was determined using Epi Info 7.2.2.6, assuming an expected level of satisfaction of 50%, with a confidence interval of 95% and margin of error of 5%. Finally, 10% was added to the calculated sample size to reach 422 to overcome the problem of missing data. Four hundred and nine mothers filled out the questionnaire in this study. However, 395 mothers were included in the statistical analysis, and 14 participants were excluded due to missing values in the variables related to the number of family members, number of children, and income. One hundred and ninety-seven (N=197) of the mothers attended the observed UHCs while the remaining mothers (N=198) attended the RHUs.

2.3. *Data collection*

Data were collected through two categories of tools:

1. Observation checklists: Observation checklists were prepared according to the literature review and were reviewed with stakeholders at the PHC level and directorate level for assessing the following:
   - Process of recording growth monitoring
   - Readiness of the PHC facilities and availability of growth monitoring devices
   - Nutritional assessment session
   - Breastfeeding activities
2. Interviewer-administered, structured, closed-ended questionnaire for assessment of mother satisfaction regarding preventive nutrition services

The initial questionnaire draft was designed based on the literature review and modifications that were performed to a validated standardized questionnaire about

patient satisfaction, namely the short form patient satisfaction questionnaire (PSQ-18) (8). Then the questionnaire was piloted on 30 mothers to assess its acceptability and reliability. For the assessment of its internal consistency, Cronbach's alpha was used with α=0.89. Finally, the final version of the questionnaire contained two parts; the first part consisted of the socio-demographic characteristics of the mothers. The second part included twenty-one questions to assess mothers' satisfaction with the nutritional services. This part includes (7 questions) for PHC readiness and (14 questions) for service delivery. After that, the questionnaires were pre-coded for data entry. Each statement of satisfaction was measured on a five-point Likert scale, where strongly satisfied was scored (5), satisfied was scored (4), neutral was scored (3), dissatisfied was scored (2) and strongly dissatisfied was scored (1). The maximum total satisfaction score was 105. The maximum score for satisfaction regarding readiness of the PHC and service delivery was 35 and 70, respectively.

2.4.*Statistical Methods*

For the quantitative approach, the collected data were analyzed using IBM SPSS version 22 (Armonk, NY: IBM Corp.). For quantitative variables, the mean, standard deviation (SD) or median and interquartile range (IQR) were calculated. Mann-Whitney U test or Kruskal-Wallis test was used, when appropriate, to test the differences between several categorical study variables as regards mother satisfaction scores. Correlation between the mothers' satisfaction score and other quantitative variables was performed using Spearman correlation. Multiple Forward step-wise linear regression was performed to show the significant predictors influencing the total satisfaction score of the mothers. For categorical variables, the numbers and percentages were calculated. Statistical significance was adopted at $P< 0.05$.

In addition, strengths and weaknesses identified through the observational situation analysis at the five PHC facilities were summarized.

3. Results

The results of this work were presented in two parts:

Part I: Observation of the selected PHC facilities in Fayoum (the facility-based assessment):

Five PHC facilities, including 3 UHCs and 2 RHUs, were observed to assess records and recording process, PHC readiness, breastfeeding activities, and nutrition assessment sessions.

3.1.*Recording process*

Record keeping in a special registry was available in all observed PHC facilities. Records were in a good state, and writing was clear. Recording was performed by the nurse during the nutritional assessment session. Data was not collected on a monthly basis to be notified at the district level.

3.2.*PHC readiness*

Out of the observed PHC facilities, only one UHC had a special room for nutritional assessment of children under five. However, at the rest of the PHCs, the vaccination room was used for nutritional assessment. In one UHC and one RHU, the room had enough space for entry and exit. Regarding ventilation, the observation revealed that 4 PHC facilities, all observed UHCs (3 UHCs) and one RHU, had adequate ventilation (natural or artificial). All observed PHC facilities had adequate illumination. All PHC facilities had a hand-washing facility. Regarding growth monitoring (GM) devices, all observed places had scales for weight measurement. The height measurement scale was identified in the 3 observed UHCs only. Tapes for measurements of head circumference (HC) were not available in the studied PHC facilities.

3.3.*Activities for encouraging Breastfeeding*

No activated guidelines for breastfeeding activities were found in any PHC facility. In three PHCs (one UHC and 2 RHUs), health staff reported that they received training about breastfeeding. Although all the observed facilities had health education (HE) materials about breastfeeding, HE and training of mothers were conducted in only one UHC and one RHU.

3.4. *Nutritional assessment session:*

Preparation of the work

In all observed PHCs, these points were reported:

- There was only one nurse for anthropometric measurement and recording.
- Target children were not defined before the session.
- The nurses did not wash their hands or wear gloves before the beginning of the work.

Implementation

- Nurses had identified the age of children by asking their mothers in all PHCs.
- Weight and height were measured by nurses in all PHCs. On the other hand, head circumference was not measured in any PHC.
- In all PHCs, the measured weight and height were recorded in the children's health cards and in the facility registry. Plotting the weight and height in the growth chart was reported in two UHCs only.
- No PHC facility identified or referred children with growth delay.
- None of the PHCs assessed defaulters at the end of the sessions.

The main identified strengths and weaknesses in the observational situation analysis conducted at the five PHC facilities were summarized in **Figure 2.**

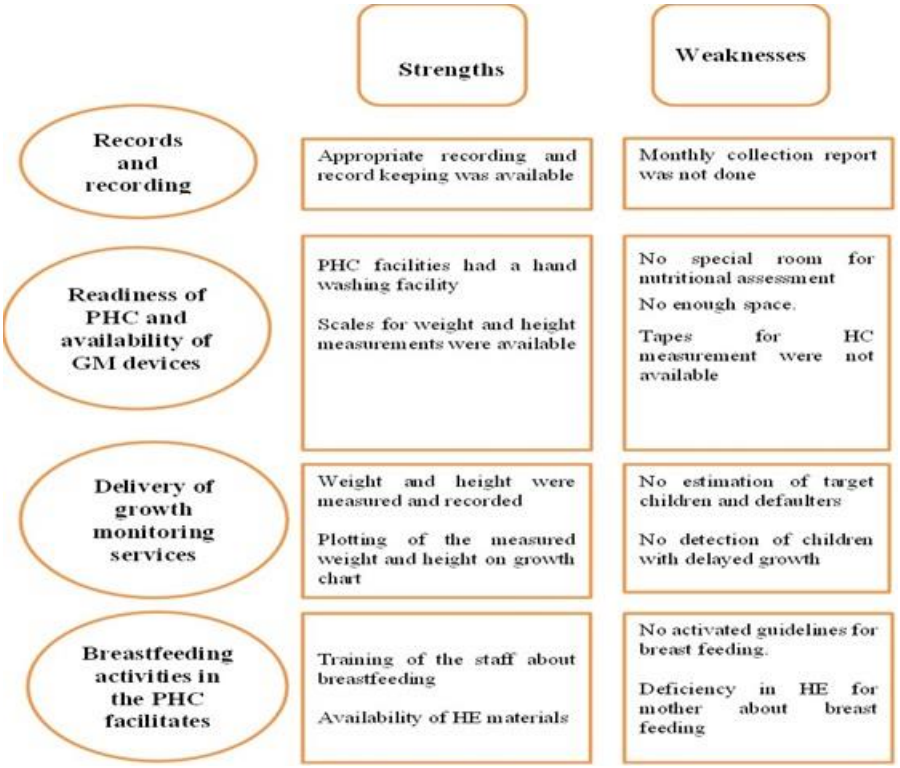

Figure 2: Strengths and weaknesses according to the observational situation analysis conducted at the PCHs as regards preventive nutritional services for the under-five children.

Part II: Results concerned with mothers' satisfaction (the quantitative approach):

Basic characteristics of mothers

Three hundred and ninety-five (N=395) mothers were included in the analysis. Their age ranged from 18 to 40 years old, with the mean ± SD of (27.1±5.7) years. According to residence, about half of the females, 50.1% (N=198), inhabited rural areas, and the other half, 49.9 % (N=197), were from urban areas. The median (IQR) income was (1000, 800-1400) pounds. The median (IQR) family and children numbers were (5.0, 4-6) and (2, 1-3), respectively. The majority of study participants were married, 91.9% (N=363). As regards mother education, most mothers, 61.3% (N=242), received below intermediate education, and the other 38.7% (N=153) had intermediate and above education. According to the mother's occupation, the majority, 81.8% (N=323), were housewives while 18.2% (N=72) were working women. Most mothers, 71.4% (N=282), had attended the PHC facility for a follow-up visit, while 28.6% (N=113) had attended for the first time.

Mothers' satisfaction

Mothers felt satisfied with a percentage over 60 in all items regarding accessibility and readiness of the PHC, except for the time of waiting (**Table 1**).

Table 1: Mothers' satisfaction with the accessibility and readiness of the PHC facility.

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
The PHC place is accessible	56 (14.2%)	240 (60.8%)	2 (0.5%)	92 (23.3%)	5 (1.3%)
The PHC is clean	35 (8.9%)	331 (83.8%)	5 (1.3%)	24 (6.1%)	0 (0%)
How many chairs do you have to sit on	25 (6.3%)	235 (59.5%)	9 (2.3%)	121 (30.6%)	5 (1.3%)
Lighting and ventilation in the waiting area are good.	24 (6.1%)	272 (68.9%)	20 (5.1%)	75 (19%)	4 (1%)
The PHC contain everything necessary to provide full nutritional care	7 (1.8%)	268 (67.8%)	33 (8.4%)	80 (20.3%)	7 (1.8%)
The waiting time is long	27 (6.8%)	185 (46.8%)	13 (3.3%)	154 (39%)	16 (4.1%)
Entry for the assessment should be according to the role	10 (2.5%)	240 (60.8%)	18 (4.6%)	106 (26.8%)	21 (5.3%)

Mothers felt satisfied with a percentage over 50 in the items related to service delivery, except for seven questions; Do you have any doubts about the nurse's ability to perform the service provided? Did the nurse measure, write, and record the circumference of your child's head in the child's notebook, correct? Did the nurse properly raise health awareness? Did she advise you about the benefits of breastfeeding and the harm of industrial feeding? Did she refer you to the doctor to periodically check the child in the clinic? Did you find it difficult to know the next follow-up visit? Are you dissatisfied with some things in the healthcare provided to you in the unit? (**Table 2**).

Table 2: Mothers' satisfaction with the service delivery at the PHC facility.

	Strongly agree	**Agree**	**Neutral**	**Disagree**	**Strongly disagree**
Does the nurse deal well with you?	12 (3%)	323 (81.8%)	2 (0.5%)	58 (14.7%)	0 (0%)
If you asked, the nurse replies?	19 (4.8%)	338 (85.6%)	6 (1.5%)	28 (7.1%)	4 (1%)
Did the nurse stay with you for a lot of time?	6 (1.5%)	230 (58.2%)	31 (7.8%)	115 (29.1%)	13 (3.3%)
Do you have any doubts about the nurse's ability to perform the service provided?	9 (2.3%)	152 (38.5%)	66 (16.7%)	162 (41%)	6 (1.5%)
Did the nurse register your child's name in her registry?	18(4.6%)	356 (90.1%)	2 (0.5%)	19 (4.8%)	0 (0%)
Did the nurse correctly measure the	10 (2.5%)	265 (67.1%)	8 (2.0%)	105 (26.6%)	7 (1.8%)

weight, write and record the child on the curve?					
Did the nurse take the length of the child, write it and record it in the direction of the child's booklet, right?	9 (2.3%)	159 (40.3%)	6 (1.5%)	210 (53.2%)	11 (2.8%)
Did the nurse measure, write, and record the circumference of your child's head in the child's notebook, correct?	0 (0%)	0 (0%)	191 (48.4%)	138 (34.9%)	66 (16.7%)
Did the nurse properly raise health awareness?	14 (3.5%)	177 (44.8%)	21 (5.3%)	160 (40.5%)	23 (5.8%)
Did the nurse ask you about breastfeeding the baby?	16 (4.1%)	284 (71.9%)	11 (2.8%)	84 (21.3%)	0 (0%)
Did she advise you about the benefits of breastfeeding and the harm of industrial feeding?	1 (0.3%)	135 (34.2%)	16 (4.1%)	219 (55.4%)	24 (6.1%)
Did she refer you to the doctor to periodically check the child in the clinic?	1 (0.3%)	98 (24.8%)	27 (6.8%)	247 (62.5%)	22 (5.6%)
Did you find it difficult to know the next follow-up visit?	7 (1.8%)	142 (35.9%)	15 (3.8%)	218 (55.2%)	13 (3.3%)
Are you dissatisfied with some things in the healthcare provided to you in the unit?	28 (7.1%)	132 (33.4%)	2 (0.5%)	226 (57.2%)	7 (1.8%)

The median (IQR) satisfaction score regarding readiness of the PHC was 25 (23-26), representing 71.4 % of the maximum expected score. The median satisfaction score about service delivery was 45 (41-49), representing 64.3 % of the maximum expected score. Studied mothers had a median (IQR) total satisfaction score of 69 (65-74), representing 65.7 % of the maximum expected score.

Relation between satisfaction scores and mothers' characteristics

Mothers' age showed a statistically significant negative correlation with the total satisfaction score (r=-0.195, p<0.001) and satisfaction scores related to service delivery (r=-0.194, p<0.001).

Median total score was statistically significantly higher in mothers in urban areas compared to those in rural areas (71 vs. 68; p<0.001). Also, there was a statistically significant difference between mothers who inhabited urban areas (46) and those from rural areas (43) as regards satisfaction score about service delivery, p<0.001. Married mothers had a higher median total score when compared to divorced or widowed (70 vs. 65; p<0.001).

Also, they had the highest score regarding readiness of the PHC (25 vs. 22, p=0.018) and service delivery (45 vs. 43, p<0.001) (**Table 3**).

Table 3: Differences in satisfaction score according to mothers' characteristics.

		Readiness of the PHC		**Service delivery**		**Total**	
		Median	**IQR**	**Median**	**IQR**	**Median**	**IQR**
Residence	Rural	25	23-26	43	40-47	68	64-72
	Urban	25	23-26	46	43-49	71	67-75
	***P*-value**	0.774		**<0.001***		**<0.001***	
Marital status	Divorced + Widowed	22	19.5-26	43	37.5-47	65	58-70
	Married	25	23-26	45	41-49	70	66-74
	P-value	**<0.001***		**0.018***		**<0.001***	
Education	Below Intermediate	25	23-26	44.5	40-49	69	64-74
	Intermediate + University	24	23-27	45	43-48	69	66-74
	P-value	0.330		0.254		0.139	
Occupation	Working	25	23-26	45	41-49	69	65-74
	Housewife	25	23-27	44	41-47.5	69	65-73
	P-value	0.185		0.246		0.500	
Visit	First visit	25	22-26	45	41-48	69	65-74
	Follow-up visit	25	23-26	45	41-49	70	65-74
	P-value	0.857		0.515		0.501	

Significant at p<0.050

Multiple forward step-wise linear regression was performed to show the significant predictors that may influence the total satisfaction score. Mothers' age, residence, marital status, education, and occupation were found to be significant predictors, P<0.050 (**Table 4**).

Table 4: Multiple forward step-wise linear regression showing the significant predictors influencing the total satisfaction score.

	B	**t**	***P*-value**
(Constant)	58.808	22.261	**<0.001***

Mothers' age (in years)	-0.259	-4.862	**<0.001***
Residence (urban)	3.515	5.704	**<0.001***
Marital status (married)	7.158	6.171	**<0.001***
Mothers' education (Above intermediate)	2.045	3.319	**<0.001***
Mothers' occupation (Working mothers)	1.998	2.412	**0.016***

Significant** **at** ***p<0.050

4. Discussion

Over 100 million children <5 years of age all over the world were estimated to be stunted in 2016, while about 50 million were wasted, nearly half of them were severely wasted [4]. Malnutrition is responsible for half of the mortality of under-five children in many developing countries [3], as it causes around 3.0 million deaths annually in low- and middle-income countries among this age group [1]. Prevention of malnutrition among under-five children includes several measures such as providing an efficient health education to mothers about breastfeeding and proper weaning, nutritional assessment and proper management [9]. In Egypt, instead of the implementation of several interventions in recent years to deal with malnutrition in the country, it still represents a public health problem, as about 6% of under-five children are underweight and 21% are stunted, according to the last demography and health survey, 2014 [5].

This study may be the first study to assess preventive nutritional services provided for under-five children in PHC facilities in Fayoum. In this study, we employed the Donabedian framework to evaluate these services from the perspectives of structure, process, and outcome. An additional strength of this study is its utilization of different methodologies (direct observation and interviews with a structured, well-prepared questionnaire). On the other hand, there were some limitations. Firstly, the number of observed facilities may not be large enough to generalize the results properly; however, the selected PHCs comprised both urban and rural places. Also, the investigator’s observation of service delivery may annoy the service providers,

leading them to change their behavior for the better.

According to the results of the current research, record keeping in a special registry for nutritional assessment was available in all observed PHC facilities. This is a major implication of the study, as these data can be used for regular estimation of the nutritional status in this vulnerable age group. However, to initiate this practice, monthly reports should be gathered and submitted to the higher level. Also, the present research revealed the availability of the equipment for weight and height measurements at the PHC level. On the other hand, while the WHO recommends measuring HC for assessing malnutrition [2], none of the PHC facilities involved in this study performed so. Our results agreed with Billah et al. (2017), who reported a great lack in the essential equipment comprising measurement scales and growth monitoring cards, which may lead to inappropriate assessment of nutritional status [6]. Also, in a study conducted in Bangladesh, Kouam et al. (2014) reported that MUAC tapes were not available in all observed facilities [3].

The majority of the personnel at the observed facilities stated that they received training about breastfeeding, which was not comparable to the findings of Billah et al. (2017), who indicated a low coverage in the basic nutrition training among service providers [6]. Although all the observed facilities had HE materials about breastfeeding, HE and training of mothers were conducted in only one UHC and one RHU. Raising awareness among mothers about breastfeeding is an important issue in preventing malnutrition among this age group.

During the nutritional assessment sessions, our research revealed that weight and height was measured and recorded. Plotting of the measured weight and length/height on growth charts for age was not observed in some PHC facilities. In a study conducted in Mexico, Pena et al. (2009) identified that there was a reduction in some services, such as the comparison of weight and height measurements of the child with the reference [10]. From practical point of view, the current study made two crucial points that may alter the appropriate screening and management of under nutrition; the first one is the failure to

identify the children with delayed growth and refer them for proper management and the second point is the lack of estimation of the defaulters from nutritional assessment session. These weaknesses may be due to the work overload, which highlights the importance of increasing the number of nurses who are responsible for nutritional assessment in the PHC facilities.

As regards mothers' satisfaction, this research found that mothers had a level of satisfaction above average. Awadallah et al. (2009) carried out a study in Minia governorate in Egypt to assess women's satisfaction regarding MCH services. They considered that the majority of the clients were satisfied with the services [11]. Moreover, in a study carried out in Indonesia, Nazari et al. (2015) found that mothers who were satisfied with the provided services had the intention to attend to monitor the nutritional status of their children [12].

The present study disclosed that mothers felt satisfied with a percentage over 60 in all items regarding accessibility and readiness of the PHC, except for the time of waiting. These results were similar to the results of Awadallah et al. (2009), who showed that the main reason for female dissatisfaction was the long waiting time [11]. Similarly, a study conducted in Bangladesh revealed that the waiting time was the major reason for mothers' dissatisfaction [13]. As regards satisfaction with service delivery, the current study indicated that mothers felt dissatisfied with the nurses' ability to raise their health awareness and counsel them on the advantages of breastfeeding over artificial feeding. These results were consistent with our findings obtained from the observation of PHC facilities regarding the inadequate breastfeeding education provided to mothers. Alongside the absence of an effective policy to encourage breastfeeding at the PHCs, these findings implicate the importance of the proper implementation of breastfeeding interventions in our PHC facilities. Mohseni et al. (2019), in a study conducted to criticize the nutritional policy in Iran, revealed that precise formulation and implementation of breastfeeding programs should take priority [14]. Future research should be conducted to investigate the barriers to the use of such interventions,

which could promote breastfeeding in our setting.

Furthermore, our study indicated that mothers' satisfaction scores were higher in mothers in urban areas compared to those in rural areas. This may denote that service delivery and readiness of the PHC facilities were relatively better in urban areas than rural areas. Likewise, married mothers had higher satisfaction scores than others. Married women may show more satisfaction than others due to their adaptation to the provided services. Tocchioni et al., (2018) reported that previous experiences may control clients' expectations, which sequentially have a lower influence on the perception of services quality [15].

5. Conclusion

Appropriate recording and record keeping were available in the studied PHC facilities, which is a major strength as these data can be used for the implementation of a nationwide surveillance system for undernutrition among the under-five children. Missed opportunities to identify undernourished children and a shortage in providing preventive health education messages could be overcome through strengthening the supervisory visits to correct the bad practices of the nurses. Also, our findings implicate the importance of increasing the number of nurses who are responsible for nutritional assessment to reduce the work overload. It's also critical to provide the appropriate equipment and training to enhance the delivery of nutrition services at the PHC level.

Acknowledgement: The authors would like to thank all the participants in the study.

Ethical approval and consent to participate: This study was conducted following the Institutional Research Ethics and the Declaration of Helsinki. Approval of the ethics committee at Fayoum Faculty of Medicine was obtained.

Funding: This research is not funded.

Conflicts of Interest: All authors declare no conflict of interest.

AI declaration: Non-declared.

References

1. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, DeOnis M: Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet. 2013;

382:427±51. Doi: 10.1016/S0140-6736(13)60937-X.

2. WHO: Assessment of differences in linear growth among populations in the WHO Multicenter Growth Reference Study. Acta Paediatr, 2006; 450(1):56–65.
3. Kouam, C.E., Delisle, H., Ebbing, H.J. et al. Perspectives for integration into the local health system of community-based management of acute malnutrition in children under 5 years: a qualitative study in Bangladesh. Nutr J; 2014, 13: 22. doi: 10.1186/1475-2891-13-22
4. Bhutta, Z., Berkley, J., Bandsma, R. et al. Severe childhood malnutrition. Nat Rev Dis Primers 2017; 3: 17067. doi: 10.1038/nrdp.2017.67.
5. EDHS Egypt demography and health survey (2014): Ministry of health and population, Cairo; available online on; http://dhsprogram.com/pubs/pdf/PR54/PR54.pdf
6. Billah SM., Saha KK., Khan ANS., Chowdhury AH., Garnett SP., and Arifeen SE. (2017) Quality of nutrition services in primary health care facilities: Implications for integrating nutrition into the health system in Bangladesh. PLoS ONE. 2017 12(5): e0178121. doi: 10.1371/journal.pone.0178121
7. CAPMAS. Central Agency for Public Mobilization and Statistics. Egypt in figure (2018), available online on https://www.sis.gov.eg/UP/Egypt%)20in%)20Figures%)202018/egypt-in-numbers2018.pdf
8. PSQ-18: Patient Satisfaction Questionnaire-18, short form, from RAND health care available online on https://www.rand.org/health-care/surveys_tools/psq.html
9. WHO: Fact sheet, detail, Malnutrition, 2020, available online on https://www.who.int/news-room/fact-sheets/detail/malnutrition. Access, 11 July 2020
10. Peña YF., de la Gala SEVR., and Cerda-Flores RM. Maternal satisfaction with maternal-infant nursing care in Campeche, Mexico. Revista Latino-Americana de Enfermagem, 17(5), 645-650. Doi: 10.1590/S0104-11692009000500008
11. Awadalla H.I., Kamel E.G., and Mahfouz EM: Evaluation of maternal and child health services in El-Minia City, Egypt. J Public Health 2009; 17, 321–329. doi: 10.1007/s10389-009-0255-8
12. Nazri C., Yamazaki C., Kameo S., Herawati D., Sekarwana N., Raksanagara A., et al. Factors influencing mother's participation in Posyandu for improving nutritional status of children under-five in Aceh Utara district, Aceh province, Indonesia. BMC public health, 2016; 16, 69. doi: 10.1186/s12889-016-2732-7.
13. Mendoza Aldana J, Piechulek H, al-Sabir A. Client satisfaction and quality of health care in rural Bangladesh. Bull World Health Organ. 2001;79(6):512-7.
14. Mohseni M., Aryankhesal A., and Kalantari N. Prevention of malnutrition among children under 5 years old in Iran: A policy analysis. PloS one, 2019, 1; 4(3), e0213136. doi: 10.1371/journal.pone.0213136.
15. Tocchioni V., Seghieri C., De Santis G., and Nuti S. Socio-demographic determinants of women's satisfaction with prenatal and delivery care services in Italy. International journal for quality in health care: journal of the International Society for Quality in Health Care, 2018; 30(8), 594–601. doi: 10.1093/intqhc/mzy078.