Effect of Mothers' Nutrition- Related Knowledge, Attitude and Practices on Nutritional Status of their Preschool Children

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Abstract

Background: Proper nutrition is crucial for maintaining good health and provide the basis for proper growth and development of children. Thus, **the aim** of this study was to assess the effect of mothers' nutrition-related knowledge, Attitude and practice on nutritional status of their preschool children. **Subjects and methods: Design**: A descriptive research design was utilized. **Setting**: The study was conducted at four nursery schools randomly selected from East and West educational administrations of Zagazig City by using a multi-stage cluster sampling. **Subjects:** A sample of 320 preschool children and their mothers were recruited for the study**. Tools for data collection**: Tool I: A structured questionnaire consisted of two parts: Socio-demographic data and Children's Eating Habits. Tool II: Nutrition-related Knowledge, Attitude and Practices of the mothers. Tool III: Anthropometric Measurements of the children. **Results**: The study results revealed that 68.4 % of the studied children had unhealthy eating habits. Also, 58.8 % the studied children had healthy weight and only 1.3 % and 1.9 % of them had severe stunting and severe wasting, respectively. As well, 61.2 % of the mothers had satisfactory nutrition-related knowledge and 71.3 % of them had positive nutrition-related attitude. Whereas, 68.7 % of the mothers had good nutrition-related practices. **Conclusion**: The nutritional awareness of the mothers was relatively moderate and more than half of the studied preschool children maintained healthy weight with a significant majority of the children demonstrated no signs of stunting or wasting. **Recommendations:** Developing and implementing comprehensive nutrition education programs targeting both mothers and children.

Key Words: Attitude, Knowledge, Mothers, Nutritional status, Practice and Preschool children**.**

Introduction

Preschool children, typically aged between 2 and 5 years, undergo substantial physical and cognitive growth. During this phase, their nutritional needs are high, as they require essential nutrients to support growth, brain development, and immune function. Proper nutrition is essential for the development of healthy bones, muscles, and organs, as well as for the establishment of cognitive abilities, such as attention, memory, and learning **(1).**

Preschool children have unique dietary requirements compared to older children and adults. They need adequate amounts of energy, protein, carbohydrates, healthy fats, vitamins, and minerals to fuel their growth and activities. However, their small stomach capacity limits the amount of food they can consume at one time. Therefore, it is crucial to offer nutrient-dense foods that provide the necessary nutrients in a smaller volume, ensuring that their nutritional needs are met **(2).**

The nutritional status of preschool children is critical for their growth and development **(3).** Nutritional status is defined as the balance of nutrients consumed and expended in the growth, reproduction, and maintenance of health processes. It is a major determinant in the nurturing and development of children **(4)**

Despite the recognized importance of nutrition in early childhood, studies indicate that many preschool children do not meet the

recommended dietary guidelines. Factors such as picky eating, food preferences, and limited exposure to a variety of foods contribute to inadequate nutrient intake [5].

Malnutrition is a violation of a child's right to survival and development and its consequences often remain invisible, until it's too late [6]. Consequently, nutritional assessment in children is needed to determine their nutritional status and problems in their food regimes to treat such problems in order to prevent them from becoming larger and threatening to children's health [7]

Mothers are the first caregiver of children to achieve optimal growth and prevent nutritional problems. The alteration in the children's nutrition is influenced by maternal nutrition-related knowledge, practices, and attitudes [8]. Therefore, the nutritional awareness of mothers of preschool-age children is crucial for fostering healthy eating habits. When mothers are knowledgeable about nutrition, they can make informed decisions regarding their child's diet, create a supportive environment for healthy eating, and introduce a variety of nutritious foods [9].

Nutritional awareness can be defined as a person's self-perception of the necessity of eating well-balanced meals, and it was categorized as high, moderate, or low [10].

Sufficient nutritional knowledge of the mothers will help them to implement a good nutrition practices; hence, their children will be healthy and free from malnutrition diseases [8]. As well as, mothers can affect children's dietary practices in many areas as availability and accessibility of the foods; meal content and environment; adult food modeling; and food socialization practices [11]. Moreover, mothers' attitudes of serving foods may influence children's attitudes concerning likes and dislikes as children are usually eating from what mothers provide as children' vegetable selection was affected by mothers' vegetable serving [12].

The nurse's important role is to help mothers to care for the nutrition of their children by providing adequate care, formal and informal health education, and supportive resources. Also, nurses assist mothers in providing information about feeding regarding positive structure, age-appropriate support, and healthful food and beverage choices [13].

Significance of the study

In Egypt, the most populous country in the Arabic region, preschool children represent approximately 11.3 % of the population, and 29.6% of them enrolled pre-primary education [14]. Today's children are tomorrow's citizens who should be healthy and their nutritional status is of great significance. Malnutrition is a major public health problem that affects millions of children worldwide often leading to long lasting impairment [15]. Malnutrition, represented in the high prevalence of stunting, increasing rates of underweight, and simultaneously increasing rates of obesity, is a huge burden on Egypt's economy. It affects about one-third of the Egyptian children under-five years, which has a hazardous impact on their physical and intellectual development [15].

Recently, the Egyptian government began a campaign to screen for stunting, obesity, and anemia among preschool and school children as an extention of "100 Million Healthy Lives" Initiative, in line with the newly adopted Sustainable Development Goals and Egypt's vision 2030 [16]. Nutritional status of children is strongly linked with maternal nutritional knowledge. Practices of mothers are influenced by knowledge, awareness, and skill levels that affected the nutritional outcomes of children and might help more effective interventions against malnutrition. It is

important to assess and evaluate maternal nutritional knowledge, practices, and attitude to maintain child growth and health [14].

Aim of the study:

The aim of this study was to assess the effect of mothers' nutrition-related knowledge, Attitude and practice on nutritional status of their preschool children.

Research Question:
1. What are the categories of nutritional status of preschool children?
2. What are the nutrition-related knowledge, practices, and attitude of mothers?
3. Is there a relation between nutritional status of preschool children and their mothers' nutrition-related knowledge, practices, and attitude?

Subjects and methods:
Research design:

A descriptive research design was utilized for conducting this study.

Study setting:

The study was conducted at four nursery schools randomly selected from the East and West educational administrations of Zagazig city. These nursery schools were Gaid-Youssef nursery, Norte dame nursery, Ali-Zaki nursery and Nasiriyah nursery.

Study subjects:

The study included 320 preschool children and their mothers attending the above-mentioned setting during the study time. The subjects were selected according to the following inclusion criteria:
- Age from 4 to less than 6 years.
- Enrolled in the nursery schools in the study setting.
- Those mothers who accept and permit their children to participate in the study.

Sample size calculation:

The sample size was calculated by software Epi-info package, assuming a prevalence of moderate picky eating behavior among preschoolers is about 71.0% [17], with 80% power of test and at a 95% level of confidence. The sample size was 320 preschool children and their mothers.

Sampling technique

A random multistage cluster sampling technique was used in the recruitment of this study subjects as follows:

Stage 1: At this stage, the researcher selected two educational administrations of the Zagazig city; these were namely the East and West administrations.

Stage 2:

The researcher list all nursery school at East and West educational administrations of Zagazig City (34 and 40 nursery schools, respectively).

Stage 3:

This stage involved random selection of Nursery schools: Four Nursery schools (Gaid-Youssef nursery, Norte dame nursery) at East Zagazig Educational Administration, (Ali-Zaki nursery and Nasiriyah nursery) at West Zagazig Educational Administration.

Stage 4:

This stage involved selection of the classes as clusters from schools according to the required sample size. This was done through random sampling of the classes. All children in the selected classes were included in the sample. These were as follows:
- Gaid-Youssef nursery (80 children)
- Norte dame nursery (75 children)
- Ali-Zaki nursery   (65 children)
- Nasiriyah nursery   (100 children)

This division was based on the ratio calculated from the numbers of children in each nursery school as obtained from the General Department of Information and Computer (GDIC) affiliated to the Education Department at El-Sharkia Governorate.

Tools of data collection

Three tools will be used to carry out the present study as follows;

Tool I: A structured questionnaire was developed by the researcher after reviewing related literature that consisted of two parts:

Part one: This part will include
- **Socio-demographic characteristics of the mothers:** This will include data as age, educational level, residence, working status, marital status, family income, etc.
- **Demographic data of the children:** This will involve questions about age, gender, birth weight, history of child's food allergy, etc.
- **Scoring of social class:** The total score is 48 and the social class is classified to high ≥ 70 % [33.6 – 48], medium 40- < 70% [19.2 - < 33.6] – low < 40% [< 19.2] [18].

Part two: Children's Eating Habits: This will include questions for mothers eliciting information about their child's eating habits as number of meals per day, consumption of snacks, supplement use, watching television during eating, etc.

Tool II: **Nutrition-related Knowledge, Attitude, and Practices (KAP) questionnaire**

This tool will be developed by the researcher guided by KAP Model Nutrition Questionnaire Module 2 (young children from 6-23 months) and Module 3 (feeding school-age children) published by FAO [19]. These modules will be modified by the researcher to be suitable for preschool children. Also, feeding practices of mothers related to children's eating habits and behaviors adapted by **Yabanci et al. [20].**

Knowledge scoring: For the knowledge items, a correct response was scored 1 and the incorrect or don't know scored zero. For each area of knowledge, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score and means, and standard deviations were computed. The total score was 42, and knowledge was considered satisfactory if the percent score was (>25.2) 60% or more and unsatisfactory if less than (< 25.2) 60%.

Practice scoring: For the practice items, a correct response was scored 1 and the incorrect zero. For each area of practice, the scores of the items were summed-up and the total divided by the number of the items, giving a mean score for the part. These scores were converted into a percent score and means and standard deviations were computed. The total score was twelve. The total grades were summed to yield seventeen grades was considered good if the percent score was (>7.2) 60% or more and unsatisfactory if less than (< 7.2) 60%.

Attitude Scoring: The responses "strongly agree", "agree", "to some extent", "disagree" and "strongly disagree" were respectively scored 5, 4, 3, 2, and one. The scoring was reversed for negative statements, the items including negative attitude sentences (2and 3) were reversely coded. The scores of the items were summed-up and the total divided by the number of the items, giving a mean score. These scores were converted into a percent score, means and standard deviations were computed, and the mean is considered cutoff point. The total score was 30, and the attitude was considered positive if the score was 16 or more and negative if less than 16.

Tool III: **Anthropometric measurement tool**

This tool included the anthropometric measurement of the child which is used to record weight-for-age, height-for-age, and weight-for-height (WFH) will be measured following the z-score benchmark of the

World Health Organization. Electronic scale machine will be used to measure the children's weight. Height will be measured for children by utilizing the measuring tape. Additionally, Body mass index (BMI) will be calculated. It is used to assess the nutritional status of the children in terms of stunting, wasting, underweight, normal, overweight and obesity. Anthropometric software provided by the WHO was used for conversion of data into anthropometric indices according to both, standards and WHO references [21] [22].

Scoring: The BMI was then categorized according to percentile charts. Body mass index-for-age categories and corresponding percentiles were:

- Less than the fifth percentile for underweight.
- 5th percentile to the 85th percentile for a healthy weight.
- 85th to less than the 95th percentile for overweight people.
- Equal to or more than the 95th percentile for obesity.

BMI z-scores were generated using online calculator based on WHO guide where percentile conversion from Z-Score was done by table look-up in the standard Normal Table.

- Percentiles provided for Z Scores between -3.09 and 3.09. Values beyond these extremes return percentiles of 0.1 and 99.9 respectively.
- Moderate malnutrition was defined as moderate stunting or wasting.
- Severe malnutrition was defined as severe stunting or severe wasting, or edematous malnutrition.

Content validity& Reliability:

The tool was revised by a panel of three experts in the fields of community health nursing, community medicine in Zagazig University who conducted face and content validity of all items of the study tool. There were no recommended modifications. The reliability of the tool was tested through measuring its internal consistency by calculating Cronbach alpha coefficient. Their reliability proved to be satisfactory as shown by the values of Cronbach alpha coefficient in the following table:

Tool	Cronbach alpha	Items
Knowledge	.650	42
Practice	.921	12
Attitude	.419	5

Pilot study:

A pilot study was carried out on a sample of 32 children and mothers, representing about 10 % of the total studied sample. The pilot study was aimed to test clarity of the instructions, the format of the questionnaire, comprehension of the items, and to estimate the exact time required for filling the questionnaire sheet. The necessary modifications were done based on the analysis of the pilot study to develop the final format. The participants involved in the pilot study were excluded from the main study sample.

Fieldwork

Once permission was granted to proceed with the study, the researcher met with the directors of the selected nursery schools, explained to them the study aim and procedures, as well as the data collection forms. They were asked to seek the permission of the mothers of the children in the selected classes to participate in the study. Once mothers' consents were secured, the researcher set up a schedule for collecting data with the help of the director of each nursery school. After that, the researcher interviewed each mother individually and explained to them the purpose and nature of the study and the data collection forms and confirmed the secrecy of information obtained. The time spent for filling out the forms ranged from 20-

25 minutes including the anthropometric measurements of the child. The researcher visited the nursery schools from the time it opens in early morning until it close in the afternoon (the opening and closing time varied from nursery school to another). Data collection were conducted from the beginning of October 2021 to the end April 2022.

Administrative and ethical considerations:

Official permissions were obtained from the Education Directorate at Zagazig based on letters from the Faculty of Nursing explaining the aim and procedures of the study. The Director General referred the researcher to the directors of the selected schools with approval letters. Then the researcher met with each of them and explained the aim of the study and the nature of tool used for data collection. The researcher gave the director of each school and the social worker a copy of the tool and the formal letters.

The study proposal was approved by the Research Ethics Committee (REC) and the Postgraduate Committee of the Faculty of Nursing at Zagazig University. Then, the agreement of participants was taken from mothers of the preschool children after full explanation of the aim of the study. Participants was given the opportunity to refuse participation and they was notified that they could withdraw at any time of the data collection interviews; also, they were assured that the information would be confidential and used for the research purpose only. The researcher assured maintaining anonymity and confidentiality of the subject's data.

Statistical analysis:

Data entry and statistical analysis were done using SPSS 22.0 statistical software package. Data were presented using descriptive statistics in the form of frequencies and percentages for qualitative variables and means and standard deviations and medians for quantitative variables. The Cronbach alpha coefficient was calculated to assess the reliability of the developed tools through their internal consistency. Qualitative categorical variables were compared using a chi-square test (X^2). Whenever the expected values in one or more of the cells in a 2x2 tables was less than 5, Fisher exact test was used instead. Quantitative continuous data were compared using the nonparametric Mann- Whitney test. The Spearman rank correlation was used for assessment of the interrelationships among quantitative variables and ranked ones. In order to identify the independent predictors of the knowledge, attitude, practice, nutritional status and picky eaters scores multiple linear regression analysis was used after testing for normality, and homoscedasticity, and analysis of variance for the full regression models were done. Statistical significance was considered at p-value <0.05.

Results:

Table 1 reveals that the studied children' age ranged between 4 and 6 years, with mean 5.47±.48 years and 61.3 % of them were females. As displayed, 55.6 % of the studied children had one sibling. Regarding birth order, 40.6 % of the children had last birth order rank. As displayed, mothers' age ranged between 24 and 47 years, with a mean of 32.73 ±4.15 years and 58.7 % were house wives. For 98.7 % of the families, the monthly income was just enough for daily needs. Whereas, 94.4 % of the families had high social class.

Figure 1 demonstrates that 68.4 % of the studied children had unhealthy eating habits.

According to **Table 2,** 58.8 % the studied children had healthy weight.

Whereas, 12.8 % of the children were underweight and 18.8 % of them were obese.

Table 3 displays that 91.9 % the studied children had no stunting and 90.9 % of them had no wasting. Whereas, 1.3 % of the children had severe stunting and 1.9 % of them had severe wasting.

As displayed in **Figure 2,** 61.2 % of the mothers had satisfactory nutrition-related knowledge and 38.8 % of them had unsatisfactory knowledge.

Figure 3 demonstrated that 68.7 % of the mothers had good nutrition-related practices and 31.3 % of them had poor practices.

Figure 4 illustrates that 71.3 % of the preschool children' mothers had positive nutrition-related attitude and 28.7 % of them had negative attitude.

Table 4 indicates statistically significant weak positive correlation between mothers' knowledge and their attitude (r=.161) and negative correlation with children's BMI (r=-.132) and stunting (r=-.142). Meanwhile, the mothers' attitude had a statistically positive correlation with children's BMI (r=0.137) and wasting (r=-.112).

Table 5 indicates that the multivariate analysis identified that mothers' occupation was the only statistically significant positive predictor of their knowledge score. The model explains 91% of mother's knowledge score as shown by the value of r-square.

Table 6 indicates that mothers' knowledge score was the only statistically significant positive predictor of their attitude score. The model explains that 26% of mothers' attitude score as shown by the value of r-square.

Table 7 indicates that the multivariate analysis identified that mothers' knowledge score statistically significant negative predictors of their practice score. Conversely, attitude score and mothers occupation were negative ones. The model explains 13 % of mothers' practice score as shown by the value of r-square.

According to **table 8**, the multivariate analysis identified that children' wasting Z score was the only positive predictor of their BMI percentile scores. Conversely, children' gender and stunting Z score were the negative predictors. The model explains that 78% of BMI score as shown by the value of r-square.

Discussion:

The present study reflected that more than one third of the studied children were not eating their breakfast at home, and the main cause among more than one quarter of them is to take it with their friends in the nursery. This might be due to that the children wake up late and there is not enough time to eat their breakfast besides that they may do not have an appetite for food early in the morning. As well, majority of the studied children ate basic meal with family daily. These findings might be attributed to the family awareness of the importance of getting-together during the lunch as main meal for the family as social interactions during the meals are important events in a child's life and the development of his or her eating patterns. Similarly, a study conducted by **Taylor et al.** [23] demonstrated that the highest proportion of the studied children had their breakfast at nursery and their lunch at home with family**.**

In addition, the current study findings indicated that more than three fifths of the studied children ate while watching television and almost more than two-fifth them ate during playing with mobile phone. This study results might be attributed to that

mothers use T.V cartoons or mobile to motivate their children to eat regardless the negative consequences of this unhealthy habit. Consistently, **Chao** [24] reported that the more than half of the preschool children ate their meals while watching TV. Likewise, **Robinson et al.** [25] found that children who watch television during two or more meals per day consume fewer servings of healthy food and more red/processed meat and junk food than children from families in which television was never on during mealtimes or only for one meal per day.

As well, the findings of the current study revealed that more than half of the studied children ate food cooked out of home and most of them did not ate a lot of meals. This worrying finding might be due to that all the studied children preferred snacks and out of home snacks are usually fast foods and artificially sweetened beverages. Consistently, **Brown et al.** [26] revealed that most of the preschool children ate snacks out of door. However, this finding is in disagreement with the study conducted in Central Vietnam by **Yen et al.** [27] who found that most of children ate cooked food at home.

The current study found that most of the studied children masticated food well and more than half of them were pressured to eat. This result was in accordance with **Brown et al.** [26] who stated that most of the studied children masticated food well. Similarly, **Wolstenholme et al.** [28] mentioned that more than have of children were pressured to eat. Pressure to eat was associated with higher food avoidance traits and lower consumption of core foods [29].

The present study highlighted that more than two thirds of the studied children had unhealthy eating habits, while nearly one third of them had healthy eating habits. This finding might be attributed to the highest proportion of the studied children ate their food in front of TV, ate snacks and light meals out of door to as well as parents may employ improper techniques that impede the formation of healthy eating habits. This result was in agreement with the result of a study conducted by **Hayati and Amran** [30] who found that the largest proportion of the studied children had unhealthy eating habits.

Considering the nutritional status of the preschoolers in the study sample, the current study indicated that more than half of the studied children had healthy weight. Whereas, more than one tenth of them were underweight and nearly one fifth of them were obese. As well, the present study revealed that the great majority of the preschool children had no wasting or stunting. This finding might be attributed to that great majority of parents are highly educated and belonged to high social class and had two or less children so they are more oriented towards preventive action, know more about health problems, have better financial ability to provide sufficiently diverse food according to each family member's needs and also can seek health care services, and tend to pay more attention to their children.

In the same stream, the prior Egyptian study of **Abd El-latife et al.** [31] revealed that the nutritional status of more than half of the children was appropriate. In the same vein, a study conducted by **Angraini et al.** [32] in Indonesia, mentioned that 73.8% of the children had normal weight and 13.1% of them was underweight. Additionally, the study of **Siregar and Angkat** [33] reported that more than half of children had normal nutritional status, while less than half of them were undernourished.

Also, in agreement with the forgoing study findings, the previous Egyptian study of **Ali and Ahmed** [34] found that 6.6% were under weight, 19.5% had sever stunting and 3.7% had sever wasting. As well, a study conducted in Iran by **Payandeh et al.** [35] found that the rate of wasting was 4.4 % of children. Also, a study conducted by **Yen et al.** [27] in Central Vietnam, revealed that the prevalence of stunting and wasting were 11.6% and 2.2%, respectively. Moreover, a study carried out by **Flores et al.** [36] in Mexico, found that 11.9 % of preschool children presented stunting and less than five percent had severe stunting.

As regard nutrition-related knowledge, attitude and practices of the mothers, the current study showed that about three fifth of mothers had satisfactory nutrition-related knowledge. This might be attributed to that the highest percentage of the studied mothers had high level of education because education greatly influences a person's ability to understand and receive nutrition information. In the same context, a study conducted by **Adai and Hussein** [37] demonstrated that overall knowledge of mothers about pre-school children nutrition was good among nearly three quarters of them, while minority had poor knowledge. Correspondingly, the Iranian studies of **Momeni et al.** [38] found that most of the mothers had high level of nutrition-related knowledge and **Faeq Abdulzahra et al.** [39] reported that more than half of mothers scored moderate knowledge, followed by more than two fifth of them scored good knowledge.

However, the study result contradicted with a study carried out by **Chasanah et al.** [40] who found that more than two thirds of mothers had poor knowledge on their preschool children's nutrition.

Pertaining to nutrition-related attitude, the current study result revealed that that more than two thirds of the mothers had positive attitude. This finding might be explained by that the good knowledge and high level of education of mothers reflected positively on their attitude as mothers with more nutritional knowledge use more rational judgment about the nutritional value of these foods.

This result was supported by **Setia et al.** [41] whose study mentioned that more than two thirds of mothers had good nutritional attitude regarding their children before the educational intervention. Correspondingly, result of a study done by **Onyeke et al.** [42] revealed that most of mothers had favorable nutrition attitude of their young children. However, in contrast to this, a study by **Ormanci et al.** [43] reported that attitudes towards various aspects of their children' diet were not sufficient to establish of healthy eating. This contradiction may be related to level of education, knowledge and socioeconomic differences between the study subjects.

According to total nutrition-related practice among mothers of preschool children, the present study results displayed that more than two thirds of the mothers had good practices. This might be explained by that mothers had relatively good nutrition-related knowledge and the more the nutritional knowledge, the more type and amount of food chosen for consumption is considered, as well mothers' nutritional choices are based on the nutritional value of the food. This result was in consistent with a study conducted by **Qiu et al.** [44] who found that most of mothers had good feeding practice. Similarly, a study conducted in India by **Seun and Oyewole** [45] found that more than half of the mothers had good child

feeding practices. However, a study carried out by **Elsahoryi et al.** [46] affirmed that more than half of mothers had moderate nutrition related practices.

Considering the relation between nutritional status of the preschool children and their mothers' awareness, the result of the current study demonstrated that there were statistically significant associations between mothers' nutrition-related knowledge and their educational level and occupation. Moreover, the multivariate analysis confirmed that mothers' occupation was the only statistically significant positive predictor of their knowledge score. These indicating that mothers who are working and have high level of education, are more likely to have higher level of nutrition related knowledge. This result agreed with the studies of **Aljohani and Aljohani** [47] **and Faeq Abdulzahra et al.** [39] that demonstrated an association between educational level and nutrition related knowledge score of the mothers. In addition, the previous studies reported a significant relation between mothers' nutritional knowledge and their occupational status [48] [40].

In the opposite line of the forgoing study results, a study conducted in Nigeria by **Raji et al.** [49] revealed no relationship between the mothers' work and their total knowledge regarding nutrition of their children. Also, **Ghimire and Pandey** [50] found that the job status of the mother affected negatively on the knowledge levels of the mother due to the sociocultural beliefs

Regarding relation between mothers' nutrition related knowledge and their children nutritional status, the current study reflected that there was a statistically significant association between mothers' nutrition-related knowledge and BMI category of their preschool children. Possible explanation of such relation might be that mother's level of

nutritional knowledge affect child's energy intake following the recommended adequacy rate. Consistently, a study by **Adai et al.** [37] stated that there was a high significant relationship between overall knowledge of mothers and nutritional status according to BMI categories of their preschool children.

In the same context, **Yabancı et al.** [20] found that majority of the mothers who have good nutritional knowledge level their children have normal body weight according BMI categories. Similarly, the previous studies have shown that there was high significant association between mother's feeding knowledge and nutritional status of their children [51] [52] [53]. In disagreement with this result, the study of **Komala et al.** [54] in Indonesia showed no significant relation between the level of maternal nutritional knowledge and the nutritional status of height\age and BMI\ age of their children.

The present study clarified that there was statistically significant positive correlation between mothers' knowledge and their attitude and negative correlation with children's BMI and stunting. This indicated that improving knowledge of mothers improves their attitudes and behaviors. This is supported by **Marías and Glasauer** [55] demonstrated that knowledge and attitudes influence children's eating habits. Therefore, high level of nutrition knowledge consequently translated to a good attitude which will reveal the good health status of the children. In addition, **Setia et al.** [41] reported that there was significant positive correlation between mothers' nutrition related knowledge and attitude. As well, there was negative correlation with the child BMI and stunting.

The current study indicated that there was no statistically significant relation between mothers'

nutrition-related attitude and their characteristics. Conversely, this result was contradicted with **Elsahoryi et al.** [46] who found that there were significant relations between mothers' attitude and their demographic characteristics as mothers' age, education level, and socioeconomic status. Also, **Onyeke et al.** [42] clarified that there was a significant relation between level mothers' attitude and their occupation.

Also, the present study identified that there was a statistically significant association between mothers' nutrition-related attitude and BMI category of their preschool children. This finding might be explained by that attitudes of mothers will look to provide or prepare daily food in sufficient quantities for children's nutritional needs. In congruence, a study carried out by **Ormanci et al.** [43] demonstrated that the preschool children nutritional status was associated with nutrition-related attitude of their mothers.

On the same way, the study of **Sari and Murti** [56] found that there was significant relation between the mother's attitudes towards improving nutrition and the nutritional status of children under five years. In addition, the current study found a statistically negative correlation between mothers' attitude and children's BMI and wasting. This was similar to previous studies conducted by **Simanjuntak et al.** [57] and **Sari and Murti** [56] which reported that there was negative significant correlation between mothers' nutrition related attitude and the child BMI and wasting.

Also, the multivariate analysis illustrated that mothers' knowledge score was the only significant positive predictor of their attitude score. This result was in accordance with **Sukandar et al.** [51] and **Aljohani and Aljohani** [47] who

revealed that parent's knowledge can be one of the main factors in improving their nutritional related attitude.

The present study findings illustrated that there were no statistically significant relations between mothers' nutrition-related practices and their characteristics. Similarly, a study done by **Kutbi** [58] reported that there was no significant relation between the studied mothers' level of practice regarding children nutrition and their demographic characteristics. On the other hand, **Momeni et al.** [38] found a significant relation between mothers' practice and their level of education and job.

Also, the multivariate analysis of present study showed that mothers' knowledge score was statistically significant positive predictor of their practice score. Conversely, attitude score and mothers occupation were negative ones. Similarly, **Prasetya and Khomsan** [48] demonstrated that nutritional related knowledge and attitude of mothers had significant impact on their practice. In the same stream, the study of **Bauer et al.** [59] reported that parents' employment boosts the food habit of children; however, mothers' full-time employment creates a less healthful food environment at home and concluded that parental occupation has also significant effect across nutritional practices.

The current study findings clarified that children' BMI had statistically significant positive correlation with their age and negative correlation with gender and pressure to eat. Such result mean that older children have higher scores of BMI and female children and those who pressured to eat have lower scores of BMI. In the same vein, **Brown and Perrin** [60] mentioned that there was significant positive correlation between children age and their body weight. Also, **Le**

Heuzey and Turberg-Romain [61] reported that there was significant negative correlation between the children BMI and pressure to eat and **Encinger and Raikes** [62] showed that highly controlling practices have been negatively associated with children's ability to regulate intake in response to energy content of foods.

The present study results demonstrated that children' wasting Z score was the only positive predictor of their BMI percentile scores. Conversely, children' gender and stunting Z score were the negative predictors. In this concern, a study conducted by **Fitriana et al.** [63] affirmed that the children BMI was affected positively by wasting. Likewise, a study done by **Brown et al.** [26] reported that there was a significant impact of the children gender and stunting on their BMI scores.

Additionally, the present study revealed that stunting had negative correlation with child's age and good mastication of food and positive correlation with weight at birth. As well, wasting had negative correlation with pressure the child to eat. These findings indicated that younger children and children with poor food mastication and low birth weight are more likely to have stunting. Moreover, children who are not pressured to eat seem to have wasting. Similarly, **Russell et al.** [29] found that there was negative correlation between pressure to eat and wasting. Likewise, a study of **Uwaezuoke et al. (2016)** reported that there was correlation between the children stunting and their birth weight and age.

The study results bring about the conclusion that more than half of the studied preschool children maintained healthy weight with great majority of them had no signs of stunting or wasting. As well, more than half of the mothers had satisfactory nutrition-related knowledge, more than two third of them displayed good nutrition-related practices and less than three quarters of the preschool children's mothers showed a positive nutrition-related attitude. In addition, there were statistically significant associations between children's nutritional status and their mothers' nutritional awareness.

Recommendations:
On the basis of the current study findings, the following recommendations are suggested:
- Develop and implement comprehensive nutrition education programs targeting both mothers and children.

- Providing accessible and reliable information for mothers' of preschool children about age-appropriate foods, portion sizes, and the importance of diverse nutrients can further support children's health.

- Conduct further longitudinal studies to track at-risk malnourished children for developing more tailored nutrition interventions that support their growth and development.

Conclusion:

Table (1): Demographic characteristics of the studied children and their mothers (n=320)

Demographic characteristics	Frequency	Percent
Age:		
4 - < 5	**54**	**16.9**
5 - < 6	**266**	**83.1**
Mean ± SD	**5.47 ±.48**	
Rang	**(4-6)**	
Gender:		
Male	**124**	**38.7**
Female	**196**	**61.3**
No. of siblings:		
No brother	**37**	**11.6**
One	**178**	**55.6**
Two	**78**	**24.4**
Three and more	**27**	**8.4**
Rank of child between his siblings:		
Single	**37**	**11.6**
The first	**113**	**35.3**
The middle	**40**	**12.5**
The last	**130**	**40.6**
Mother age:		
24-35	**244**	**76.3**
36-47	**76**	**23.7**
Mean ± SD	**32.73 ±4.15**	
Rang	**(24-47)**	
Mother job:		
House wives	**188**	**58.7**
Working	**132**	**41.3**
Marital status:		
Married	**308**	**96.3**
Divorced	**12**	**3.7**
Residence		
Rural	**34**	**10.6**
Urban	**286**	**89.4**
Family type:		
Nuclear	**213**	**66.6**
Extended	**107**	**33.4**
Family income :		
Not enough	**4**	**1.3**
Enough for daily needs	**316**	**98.7**
Social class:		
Medium	**18**	**5.6**
High	**302**	**94.4**

Fig. (1): Rating for child eating habits

Table (2): BMI / Weight category among children (n=320)

BMI/ Weight category	Frequency	Percent
Under weight	41	12.8
Healthy weight	188	58.8
Overweight	31	9.7
Obesity	60	18.8

Table (3): Stunting and Wasting among children (n=320)

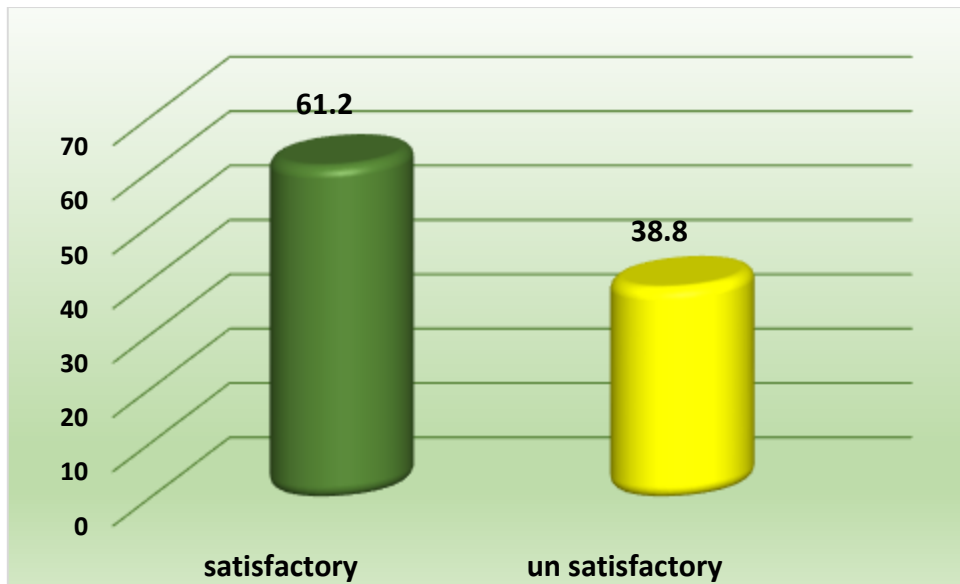| Stunting and wasting	Frequency	Percent
Stunting :		
No stunting	294	91.9
Moderate	22	6.9
Severe	4	1.3
Wasting :		
No wasting	291	90.9
Moderate	23	7.2
Severe	6	1.9

Figure (2): **Total nutrition-related Knowledge among preschool children' mothers (n=320)**
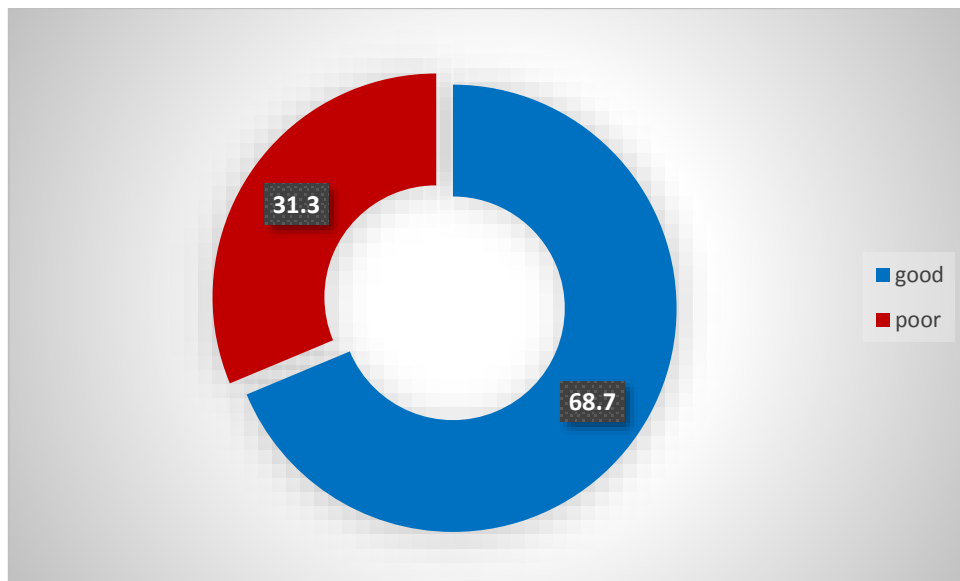

Figure (3): Total nutrition-related practice among preschool children' mothers (n=320)
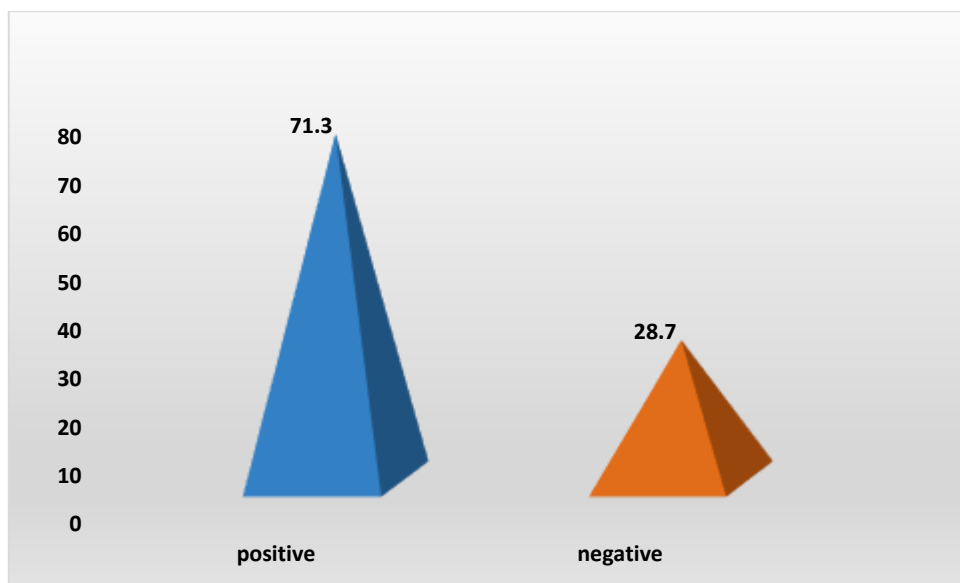
Figure (4): Total nutrition-related attitude among preschool children' mothers (n=320)

Table (4): Correlation between total mean score of mother's awareness, nutritional status and picky eaters of preschool children.

Scores	Total mean score					
	Knowledge	**Attitude**	**Practice**	**BMI**	**Stunting**	**Wasting**
Knowledge						
Attitude	**.161****					
Practice	.065	-.056				
BMI	**-.132***	**.137***	-.030			
Stunting	**-.142***	-.062	-.028	**-.297****		
Wasting	-.052	**.112***	-.024	**.677****	**.344****	

R: Pearson's correlation coefficient   (*) statistically significant at p<0.05
(**) statistically significant at p<0.01

Table (5): Best fitting multiple linear regression model for mothers' knowledge score

Variables	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	-.048	2.404		-.020	.984
Mothers occupation [work]	1.292	.277	.258	4.662	**.000**

R-square=0.091 Model ANOVA   F=7.838   p<0.001
Variables entered and excluded (not significant): Age, education level and current social status

Table (6): Best fitting multiple linear regression model for mothers' attitude score

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.080	.076		14.285	**.000**
Knowledge score	.149	.051	.161	2.906	**.004**

R-square=0.026   Model ANOVA   F=8.45   p<0.001

Table (7): Best fitting multiple linear regression model for mothers' practice score

Variable	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	1.317	.141		9.342	.000
Knowledge score	.087	.056	.092	1.558	.120
Attitude score	-.074	.058	-.072	-1.270	.205
Mothers occupation	-.022	.055	-.023	-.400	.690

R-square=0.013 Model ANOVA   F=1.38   p<0.001

Table (8): Best fitting multiple linear regression model for children BMI percentile score

Variable		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	**Std. Error**	**Beta**		
1	(Constant)	62.948	14.815		4.249	**.000**
	Knowledge score	-4.930	1.946	-.069	-2.533	**.012**
	Attitude score	-15.230	.730	-.599	-20.873	**.000**
	Mothers occupation	24.501	.803	.875	30.514	**.000**

R-square=0.78   Model ANOVA   F=141.26   p<0.001
Variables entered and excluded (not significant): Age, knowledge score, practice score, attitude score and picky eating.

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