Assessment of nutritional patterns for pregnant women to control weight gain

Magda AbdEl–SattarAhmed*, Mona Abo BakrAbd El-Latef **, Amira Hesham Mohamed ***
*Professor of Community Health Nursing, **Lecturer of Community Health Nursing, ***B.Sc Nursing Sciences, Faculty of Nursing - Ain Shams University

Abstract

Background: Nutritional statue during pregnancy is essential for the growth and development of the fetus and The immediate and future health of a woman and her infant can be affected by the amount of weight gained throughout the course of a pregnancy. **Aim:** to assess nutritional patterns for pregnant women to control weight gain. **Design** : descriptive design study was followed **Setting :** The study was conducted in the two maternal and child health centers in Kafer Eldawar through using a purposive sample technique**. Three tools** of data collection were used named interview questionnaire sheet and assessment sheet for Physiological measurement of pregnant women and review of medical record to obtain data about lab analysis. The main **result** of the study illustrated that pregnant women had average level of knowledge regarding nutritional patterns. In contract pregnant women reported practices was unsatisfactory so there was statistically significant difference observed between knowledge and practices regarding nutritional patterns.The current study **concluded that** there was a negative correlation between knowledge and reported practices of pregnant women and weight gain rate during pregnancy. Based on this finding, the investigator **recommended that** health care provider should offer preconception counseling to help women achieve normal pre pregnancy BMI then continue to work with women during pregnancy to gain weight within the recommended range.

Keywords: Nutritional patterns , Pregnant women and Control weight gain

Introduction:

Good nutrition is vital to good health and essential for normal growth and development. It is also essential to establish and maintain a healthy pregnancy and give birth to a healthy child. Good nutritional habits begun before conception and continued during pregnancy, promote adaptation to the maternal and fetal needs. Nutrient needs typically increase more during pregnancy than during any other stage in a woman's adult life. Additional nutrients are required during gestation for development of the fetus as well as for growth of maternal tissues that support fetal development ***(Norton,2015)***.

A critical determinant of a positive pregnancy outcome is a healthy well-balanced maternal diet, A well-balanced diet is one that includes foods from all food groups in appropriate amounts, The Food and Nutrition Board of the Institute

of Medicine (IOM), the National Academy of Science, and the US Department of Health and Human Services developed recommended dietary allowances (RDAs) of nutrient intake required to maintain optimal health of pregnant women ***(Walter ,2017)***

The Recommended Dietary Allowance increases for various Breastfeeding is the feeding of babies and young children with macronutrients The RDA for carbohydrates is 175 grams/day for pregnant women, as compared to 130 grams/day for non-pregnant women. Protein requirements increase from 0.8 grams/kg/day to 1.1 grams/kg/day during pregnancy. It is also important for women to get the right amount of various vitamins and minerals during pregnancy to optimize the growth and development of the fetus. Pregnant women should consume 600 µg/day of synthetic folic acid from fortified foods or supplements, 27 mg/day of iron, 15 µg/day of vitamin D, and 1,000 mg/day of calcium to meet the RDA for these nutrients ***(National Research Council, 2011).***

Maternal nutrition plays an important role in pregnancy outcomes, and is associated with decreasing the risk of many maternal and fetal complications, optimal nutritional status before and during pregnancy contributes to high diet quality and positive pregnancy outcomes, Thus obtaining a nutritional history, assessing and monitoring current dietary intake, and determining weight status before and during pregnancy, The Institute of Medicine (IOM) has established weight gain standards for each trimester of pregnancy based on pre pregnancy body mass index (BMI) status, calculated as weight in kilograms divided by height squared in meters (kg/m^2) ***(Falciglia, 2014).***

The amount of weight a woman gains during pregnancy can directly influence pregnancy outcomes and the long-term health of both mother and child, The IOM gestational weight gain guidelines were created to optimize maternal and fetal health outcomes, Weight gains above these guidelines are associated with many adverse health outcomes ***(Coppage, 2014).***

During pregnancy women who who exceed weight gain recomendation and Infants born to mothers with excessive weight gain are more likely to experience low 5-minute Apgar scores, hypoglycemia, meconium aspiration syndrome, and large for gestational age compared with women who gain within the recommended guidelines After birth, women with excessive gestational weight gain are at increased risk for postpartum weight retention and the development of new or persistent overweight or obesity ***(Whitaker, 2011).***

Community health nurse provide antenatal care which monitors the health and wellbeing of the woman and the progress of her pregnancy, and take a comprehensive assessment of the woman's social, psychological, physical condition, obstetric history and dietary habits, helps to identify any potential risks and enables choices to be offered , this is an important time for community health nurse to give information and discuss issues including keeping well in pregnancy , diet, nutrition and weight control ***(Harris & Nimmo,2013).***

Significance Of the study:

Obesity become one of the most important threats to women health in general, it also become one of the most common medical conditions complicating pregnancy, it has become the most

prevalent preventable cause of death worldwide ***(Lucovnik, 2017)***.

Approximately half of pregnant women exceed the recommendations set by the IOM for weight gain during pregnancy, weight gain in excess of the recommendations puts pregnant women at risk for gestational diabetes, hypertension, preeclampsia, and Cesarean delivery and complications during pregnancy and child birth are the main causes of maternal mortality worldwide ***(Miao et al., 2017).***

Complications related to pregnancy and child birth are among the leading causes of maternal mortality for women of reproductive age in developing countries, resulting in the death of about half million women each year and about 99% from maternal mortality in developing countries, in Egypt maternal mortality ratio 33 deaths per 100.000 in 2015 ***(UNFPA, 2015).***

Aim of the Study:

The study aimed to assess nutritional patterns for pregnant women to control weight gain through:-

- Assessing women knowledge toward control weight gain during pregnancy.
- Assessing women practices toward nutrition pattern during pregnancy.
- Assessing women physical health condition by measuring weight and height.

Research question:

1.Is there a relationship between nutritional patterns and weight gain during pregnancy**?**

2.Is there a relationship between women's knowledge, and their compliance regarding weight gain during pregnancy?

3.Is there a relationship between BMI and health status of pregnant women?

Subject and Methods:

A-Research design:

A descriptive design was used in this study.

B-Setting:

This study was conducted in the two maternal and child health centers in Kafr El Dawar city because it serves many surrounding villages

C-Subject (sampling):

Subjects:

Pregnant women attending maternal child health center in Kafer Eldawar city for follow up.

Sample type:

A purposive sample was selected

Sample size:

The sample of this study included 125 pregnant women from two centers of maternal and child health who agreed to participate in the study the total number of pregnant women recorded at MCH centers 5oo woman in 2016-2017 so the

sample size 25% from total number of pregnant women.

The pregnant women were selected according the following criteria

- Age 20-40 years
- Pregnant women in Second trimester
- Pregnant women Free from chronic disease
- With normal range of BMI (18,5-24,9)

Tools of data collection:

Three tools were used for data collection

- **Tool I:interview questionnaire sheet*:***

The investigator designed tool for pregnant women after reviewing the related literature and expert opinion and used interview questionnaire to assess pregnant women knowledge and practices regarding nutritional patterns during pregnancy it consisted of four parts.

The First part: Socio-demographic characteristics of the women as regards: Age, educational level, income and occupation it included question from 1-4.

The Second Part: Present and past obstetric history: It will concerned with clinical data of pervious abortion, cesarean section, number of birth, type of labor it included question from 1-7.

The Third Part: it included questions from 1-16 to assess women knowledge related to:

- Balanced diet and causes of weight gain during pregnancy.
- Complication of excessive weight gain during pregnancy.

Scoring system:

Each question asked:

Yes score 1

No score 0

Pregnant women asked each question to assess knowledge about balanced diet such as meaning, component, and complications of excessive weight gain during pregnancy zero was minimum score while 4 were maximum score.

A score categorized into: 0>60 denoted un satisfactory knowledge while 60>100 satisfactory knowledge

The fourth part: to assess women's reported practices toward nutrition pattern during pregnancy it included questions about activity of daily living and exercise and dietary habit.

Scoring system:

zero was minimum score while 4 were maximum, score categorized into : 0>60 denoted un satisfactory practices while 60>100 satisfactory practices.

- **Tool II: Physiological measurement of pregnant women included:**

• Weight and height to calculate body mass index (BMI)

BMI = weight (kg) / (height(m))^2

-Underweight <18.5

-Normal 18.5-24.9

- Over weight 25-29.9

-Obese >30 ***(Ministry of health , 2014)***

• Blood pressure

-Normal BP 120/80

-Hypotension < 90/60

-Hypertension stage 1 from 130-139/80-89

-Hypertension stage 2 from 140 or higher / 90 or higher

-Hypertension crisis higher than 180/120 ***(American Heart Association, 2018)***

• **Tool III: Review of medical record of pregnant women**

To obtain data about lab analysis related to: hemoglobin, blood glucose level, albumin level it included items from 1-3 .

Scoring system:

Every item take score from 0-2 , zero was good health status and 1 or 2 were bad health status.

II- Operational design:

Preparatory phase:

It included reviewing of the current local and international related literature using books, articles and scientific magazines to develop tools for data collection.

Validity:

Tools for data collection was reviewed by 3 experts from community health nursing department Ain shams university to test its contents for validity.

Reliability:

Test – retest reliability was applied, the tool proved to be strongly reliable (r-0.8333).

Pilot study:

A pilot study was done on 10% of pregnant women selected regarding previous mentioned criteria and the period of study covered two weeks, it was aimed to evaluate the simplicity and clarity of the tools, helped in the estimation of the time needed to fill questionnaire and also determined facing obstacles for data collection, no modification was needed and the pilot sample wasn't excluded.

Fieldwork:

The investigator attended maternal and child health center of two settings in Kafer Eldawar city, introduce herself to the pregnant women, the purpose of the study was simply explained to the pregnant women who agrees to participate in the study prior to data collection, the actual work of this study started and completed within six months from April (2017) and was completed by the start of October (2017), data were collected by the investigator during interview two days (Sun day &Thurs day)

per week at morning from 9-11 am, an oral consent was obtained from each participant.

The investigator distributed questionnaire then explained how to fill it with clarified filling time was taken about 30 minutes, the investigator clarify any asked question and waited until they completed the questionnaire then collected it, the pregnant women assured that the information collected would be treated confidentially and that it would be used only for the purpose of the study.

Administrative design:

Permission for conducting the study assured from dean of faculty of nursing Ain Shams University directed to administrative authority of M.C.H centers at Kafer Eldwar city.

Ethical consideration:

Approval of ethical committee at faculty of nursing Ain shams university was obtained the investigator clarified the objective and aim of the study to the pregnant women included in the study. The investigator assured maintaining anonymity and confidentiality of the subject data. Pregnant women were informed that they allowed choosing to participate or not in the study and that they have the right to withdraw from the study at any time without giving any reasons.

Statistical design:

The collected data were organized, categorized, tabulated and statistically analyzed using the statistical package for social science (SPSS) version to assess pregnant women level of knowledge and practices regarding physical exercise and daily activity. Data were presented in tables and graphs. The statistical analysis included; percentage (%), the arithmetic mean ($\overline{X}$), standard deviation (SD), T-test (T), Pearson correlation (R) and Chi square.

The observed differences and associations were considered as follows:

P. > 0.05Non- significance (No difference)

P. ≤ 0.05significance difference

P. ≤ 0.001highly significance difference.

Results

Table (1): Distribution of pregnant women according to their personal characteristics N :(125) .

Items	No	Percent
Age		
20 < 25 years	54	43.2%
25 < 30 years	41	32.8%
30 < 40 years	30	24%
Occupation		
House wife	106	84.8%
Employee	19	15.2%
Education level		
Illiterate	41	32.8%
Basic education	19	15.2
Mid-level education	53	42.4
High education	12	9.6
Marital status		
Married	125	100.0
Monthly income		
Enough	51	40.8
Not enough	74	59.2

Table (1): shows that 43.2% of the pregnant women their age between 20 < 25 years and 42.4% of them have mid-level education and 84.8% of pregnant women were house wife while 59.2% of them have not enough monthly income.

Table (2): Distribution of the pregnant women according to their obstetric history. N (125)

Items	No	Percent
Pregnancy times		
Primipara	29	23.2
Multipara	96	76.8
Number of delivery		
Non	29	23.2
One	28	22.4
Two	38	30.4
Three	23	18.4
Four or more	7	5.6
Type of previous delivery		
Non	29	23.2
Normal	36	28.8
Caesarian section	44	35.2
Both	16	12.8
Number of abortion		
No	96	76.8
One	23	18.4
Two or more	6	4.8

Table (2): shows that 76.8% of the pregnant women were multipl para 35.2% have caesarian section delivery and 18.4% of them experience one time abortion.

Table (3): Distribution of pregnant women according to their satisfactory knowledge about nutrition during pregnancy N:(125)

Items	Satisfactory knowledge	
	N	%
Concept of balanced nutrition	97	77.6
Necessary nutrients needed during pregnancy	103	82.4
food rich in calcium	112	89.6
food rich in iron	113	90.4
Food avoided during pregnancy	92	73.6
Normal range for weight increasing during pregnancy	39	30.3
Weight gain during pregnancy above normal range is dangerous	93	74.4
Causes of excessive weight gain during pregnancy	118	94.4
Complication of excessive weight gain during pregnancy	110	88

Table (3): clears that 77.6% of pregnant women have satisfactory knowledge related concept of balanced nutrition, 89.6% of pregnant women have satisfactory knowledge regard food rich in calcium, 94.4% of them have satisfactory knowledge regard causes of excessive weight gain during pregnancy, and 88% of pregnant women have satisfactory knowledge regard complication of excessive weight gain during pregnancy .

Table (4): (Cont) distribution of pregnant women according to there satisfactory knowledge regarding weight control N:(125).

Items	Satisfactory knowledge	
	N	%
Means for weight control	116	92.8
Daily meals to be taken	97	77.8
Types of food that cause weight gain during pregnancy	78	62.4
Importance of exercise during pregnancy	111	88.8
Best sports suited to pregnant women	117	93.6
Contraindication for exercise	115	92
Source of information		
Doctor	116	92.8
nurse	1	0.8
television	3	2.4
One of relatives	3	2.4
Others	2	1.6
Total pregnant women knowledge scale	70	56

Table (4): clears that 62.4% of pregnant women have satisfactory knowledge regard types of food that cause weight gain during pregnancy, 88.8% of them have satisfactory knowledge regard importance of exercise during pregnancy, 92.0% of them have satisfactory knowledge regard contraindications of exercise during pregnancy and 56.0% of pregnant women have satisfactory knowledge.

Table (5): Distribution of pregnant women according to total satisfactory reported practices toward physical exercise, rest, balanced nutrition and weight control N=(125)

Items	satisfactory	
	N	%
Practices toward physical exercise and rest	13	10.4
Practices toward balanced nutrition	57	45.6
Practices toward weight control	111	88.8
Total pregnant women practices scale	49	36.8

Table (5): shows that 10.4% of pregnant women have satisfactory practices toward exercise and daily activities, 54.6 % have satisfactory practices toward balanced nutrition and 88.8% have satisfactory practices toward weight control.

Table (6): Relation between age of pregnant women with total knowledge scale toward nutrition during pregnancy N : (125)

Items		Total pregnant women knowledge scale				Total		Chi squared	P value
		Unsatisfactory		Satisfactory					
		N	%	N	%	N	%		
Age group	20>25yrs	31.	57.4	23	42.6	54	100.0	7.24	0.02677
	25>30yrs	15.	36.6	26	63.6	41	100.0		
	30>40yrs	9.	30.0	21	70.0	30	100.0		
Total		55.	44.0	70	56.0	125	100.0		

P<0.05 significant

Table (6): shows that age of pregnant women has statistically significant with total pregnant women knowledge scale about nutrition during pregnancy.

Table (7): Relation between pregnant women education with total reported practices scale N(125)

Items		Total pregnant women practice scale				Total		Chi squared	P value
		Unsatisfactory		Satisfactory					
		N	%	N	%	N	%		
Education level	Illiterate	38	92.7%	3	7.3%	41	100.0%	36.31	0.00000
	Basic education	14	73.7%	5	26.3%	19	100.0%		
	Mid-level education	26	49.1%	27	50.9%	53	100.0%		
	High level education	1	8.3%	11	91.7%	12	100.0%		
Total		79	63.2%	46	36.8%	125	100.0%		

P<0.001 highly significant

Table (7): shows that pregnant women education level has highly significant with total reported practices scale.

Table (8): Correlation of weight gain rate with total knowledge scale about nutrition during pregnancy and total reported practices scale according to research question NO (1, 2)

Items		Total pregnant women knowledge scale	Total pregnant women practices scale
Weight gain rate	**Pearson correlation coefficient r**	_.411	_.352
	P **value**	.000	.003

Table (8): clears that weight gain rate has a negative statistically significant with pregnant women knowledge and pregnant women nutritional patterns.

Table (9): Relation between BMI and health status of pregnant women according to research question N (3)

Items			**Total pregnant women knowledge scale**		**t**	**P value**
		N	**Mean**	**SD**		
Health status	**good**	**60**	25.28	1.01	-1.54	0.12566
	poor	**65**	25.56	1.05		

p>0.05 non-significant

Table (9): shows that the group with good health status has a mean BMI lower than the poor group by small amount and the difference is not statistically significant.

Discussion:

In the current study, the socio-demographic characteristics of the pregnant women revealed that more than three quarters of pregnant women their age less than 30 years, this findings were in accordance with ***Dayean Shin (2015)*** who study determinants of gestational diabetes mellitus : pre pregnancy weight status and dietary patterns during pregnancy in USA, and reported that majority of pregnant women between age 20 to 29 years.

All of pregnant women were married in this study, this finding were in contrary with ***Hope & Farquhason, (2011)*** who studied mothers characteristics and gestational weight gain patterns in San Diego, and reported that half of pregnant women were single, this disagreement may be due to difference of cultures.

As regard their pregnant women occupation, the result of the present study revealed that majority of pregnant women are house wives, this finding was in accordance with ***Kinnunen, (2012)*** who studied healthy diet and physical activity to prevent excessive weight gestational weight gain, who found that the majority of mothers are house wives.

Concerning pregnant women education less than half of pregnant women had mid-level education, this findings was contrary with ***Barebring et al, (2016)*** who studied food intake and gestational weight gain in Swedish women and found that most of studied pregnant women had high-level of education, the previous finding also was in accordance with ***Guilloty et al, (2015)*** who studied diet, pre pregnancy BMI and gestational weight gain in Puerto Rican women and reported that most of pregnant women had mid-level of education.

Concerning monthly income, the present study revealed that more than half of pregnant women had not enough income to family needs, this result was contrary with ***Herring et al, (2016)*** who studied preventing gestational weight gain among African American women who found that most of women have enough income to family needs, this disagreement may be due to majority of pregnant women in current study are house wives and don't had job.

More than half of the pregnant women are multipara in the present study, this finding was contrary with ***Shericka, (2011)*** who studied physical activity during pregnancy and its association with gestational weight among South Carolina women, and reported that one quarter of pregnant women were multipara this disagreement may be due to increase fertility rate .

In the present study more than one quarter of pregnant women had a caesarian section delivery, this result was contrary with ***Donna, (2012)*** who studied weight changes in pregnancy and associated outcomes in Southern New Mexico, and reported that less than one quarter of pregnant women had a caesarian section delivery, this disagreement may be due to false belief of pregnant women that Caesarean delivery is easier.

The present study revealed that more than half of the pregnant women have satisfactory knowledge regarding nutrition during pregnancy to control weight gain, this result was contrary with ***Shub et al, (2013)*** who studied pregnant women knowledge of weight gain, complications of obesity and weight management strategies in pregnancy in USA, and reported that women's knowledge associated with excess gestational weight gain is poor.

More than two third of pregnant women have satisfactory knowledge regard to foods rich in calcium and foods rich in iron, this finding was in accordance with ***Madden, (2015)*** who studied nutrition and diet quality during pregnancy, and reported that majority of pregnant women aware with food rich in calcium and iron this agreement may be due to increase health awareness of pregnant women.

Also, the present study reveals that 30.3% of pregnant women had satisfactory knowledge regard normal range for weight increasing during pregnancy, this finding was contrary with ***Bookari, et al, (2016)*** who studied Australian pregnant women awareness of gestational weight gain and dietary guidelines, and reported that more than half of pregnant women knowing about recommended gestational weight gain, this disagreement may be due to wrong believe about pregnancy (eating for two).

The present study revealed that majority of pregnant women have satisfactory knowledge related to causes and complications of weight gain during

pregnancy above normal range, this result was in accordance with ***Whitaker, (2015)*** who studied patient and provider perception of weight gain, physical activity and nutrition in pregnancy in South Carolina, and reported that more than half of pregnant women aware with negative impact of excessive weight gain during pregnancy on their personal health, this agreement may be due to increase awareness about complications of excess weight gain during pregnancy from medical staff or media.

The present study revealed that more than three quarters of pregnant women source of information about nutritional patterns during pregnancy to control weight gain comes from doctors while less than one quarter of them source of information comes from nurses, relatives and television, this results was supported by ***Hoeltke,(2017)*** who studied maternal knowledge and adherence of gestational weight gain recommendation in New York, and reported that more than half of pregnant women source of information about nutrition during pregnancy was doctor.

The present study revealed that less than one quarter of pregnant women had satisfactory practices regarding exercise and physical activity, this result was contrary with ***Washington, (2015)*** who studied patient centered interviewing and behavioral counseling for recommended gestational weight gain in Maryland and reported that majority of women had satisfactory physical activity, this disagreement may be due to difference of daily lifestyle.

16.0% of pregnant women in this study had satisfactory practices regarding taking a nap at afternoon, this result were disagree with ***Diana, (2013)*** who study assessment of physical activity, sedentary behavior, diet quality and weight gain during pregnancy in low a state, and reported that about 53% of pregnant women taking a naps, this disagreement may be due to difference of daily lifestyle.

The present study revealed that nearly half of pregnant women had satisfactory practices regarding balanced nutrition, this result was contrary with ***Asci, et al, (2016)*** who studied effect of lifestyle interventions of pregnant women on their dietary habits, lifestyle behaviors and weight gain in turkey, and reported that majority of pregnant women had satisfactory practices toward balanced nutrition, this disagreement may be due to decrease awareness of pregnant women about balanced nutrition.

In this study majority of pregnant women had satisfactory practices toward weight control during pregnancy, this finding was agree with ***Phelan et al, (2018)*** who studied behavioral lifestyle intervention with partial meal replacement to reduce excessive gestational weight gain in California and reported that majority of pregnant women follow weight control strategies, this agreement may be due to their awareness of the danger of excess weight gain during pregnancy.

The present study revealed that pregnant women with 30 to 40 years have the highest proportion of satisfactory knowledge level as pregnant women acquired more experience with increasing their age, this result was reverse with ***Campbell et al, (2016)*** who studied factors that influence excessive gestational weight gain: moving beyond assessment and counseling in Canada and reported that there was non-significant association between knowledge and age of pregnant women, the previous finding was supported by ***Wang et al, (2015)*** who

study knowledge, attitudes and provider advice for Latinas pregnant women and found that better scores correlated significantly with higher maternal age.

The present study revealed that there was a statistically significant difference between education level and practices of pregnant women with increasing the education level the proportion of pregnant women with satisfactory practices increases, this result disagree with ***Holowko et al, (2013)*** who studied social inequality in excessive gestational weight gain in Sweden and reported that education did not provide a protective effect in avoiding excessive gestational weight gain.

Concerning relation between pregnant women BMI and health status, the present study revealed that there was no a statistically significant difference between BMI and health status of pregnant women, this result disagree with ***Hung et al, (2017)*** who studied pre pregnancy BMI, gestational weight gain and risks for adverse pregnancy outcomes among Taiwanese women and report that women with abnormal BMI at risk for adverse maternal outcomes.

Regarding correlation between pregnant women weight gain rate with total knowledge scale and total reported practices scale, the present study revealed that weight gain rate has statistical significant correlation with total practice scale and total knowledge scale, this finding was in accordance with ***Bi et al, (2018)*** who studied status and related factors for gestational weight gain of Chinese pregnant women, and found direct correlation between weight gain rate and practices and knowledge of pregnant women.

Conclusion:

On the light of the results and research questions the study was concluded that:

- 44% of pregnant women had unsatisfactory level of knowledge toward nutrition during pregnancy, 63.2% of them had unsatisfactory level of reported practices toward balanced nutrition, weight control, physical exercise and rest , 0.8% of them source of information was nurse.

- Socio demographic variables of pregnant women as age, educational level, and income played an important role with knowledge and reported practices, there were statistically significant differences between socio demographic variables and knowledge and reported practices.

- There was a negative correlation between knowledge and reported practices of pregnant women and weight gain rate during pregnancy.

- The group of pregnant women with good health status has mean BMI lower than the group of poor health by small amount and the difference is not statistically significant.

Recommendations:

In the light of the findings of the study, the following recommendations are suggested that:

- Increased need for health care providers to provide appropriate guidance and support to women of childbearing age.

- Providers should offer preconception counseling to help women achieve normal pre-pregnancy BMI then

continue to work with women during pregnancy to gain weight within the recommended range.

- Use of active teaching and learning strategies such as discussions, lectures, slides, presentations and educational models could be adopted to bride these gaps in knowledge.

- Mass media such as TV and newspaper to increase awareness among the pregnant women about balanced nutrition and control weight gain during pregnancy.

For further research in this field:

- Further research on practices of pregnant women to control weight gain covering large sample in community level.

- Development strategies for maternal care during the antenatal periods to enhance proper practices of pregnant women's nutritional patterns.

- Training needs could be extended to staff at MCH and private clinics related to health education skills related to proper nutrition, weight gain control during pregnancy.

References:

Asci O, Rathfisch G (2016): effect of lifestyle interventions of pregnant women on their dietary habits, lifestyle behaviors and weight gain in turkey; 10:119–137.

Barebring L& Brembeck P (2016): food intake and gestational weight gain in Swedish women 29; 5:377.

Bi Y & Zhonghua YU, (2018): status and related factor for gestational weight gain of chinese pregnant women ;52(1):26-30.

Bookari K, Yeatman H, (2016): Austaralin pregnant women awareness of gestational weight gain and dietary guidelines **;**8162645.

Campbell EE,Penava D, Dervijer B (2016) : factors that influence excessive gestational weight gain : moving beyond assessment and counseling in Canada the journal of maternal – Fetal medicine.

Coppage K,(2014): hand book of nutrition and pregnancy optimal weight gain 26-35.

Dayean Shin (2015): determinants of gestational diabetes mellitus : pre pregnancy weight status and dietary patterns during pregnancy ProQuest37 **Hope & Farquhason (2011):** gestational weight gain patterns in San Diego 48106-1346 .

Diana (2013): assessment of physical activity,sedentary behavior, diet quality and weight gain during pregnancy in lowa state. 2(1):63-69.

Donna CNM, (2012): weight changes in pregnancy and associated outcomes in Southern New Mexico 48106-1346.

Falciglia A, (2014): hand book of nutrition and pregnancy optimal weight gain . 2(5): 394-401.

Guilloty NI &Soto R (2015): diet, pre pregnancy BMI and gestational weight gain in Puerto Rican women ; 19(11):2453-61.

Harris J & Nimmo S, (2013): introduction to community setting, services, and roles , placement learning in community nursing 40-50.

Herring, S, (2012): preventing gestational weight gain among African American women **.**

Hoeltke V, (2017): maternal knowledge and adherence of gestational weight gain recommendation in New York :10267543.

Holowko & Gmishra (2013): social inequality in excessive gestational weight gain in Sweden. International Journal of Obesity; 38,91-96.

Hung TH & Hsleh (2017) : pre pregnancy BMI, gestational weight gain and risks for adverse pregnancy outcomes among Taiwanese women **;**55(4):575-81.

Kinnunen Ti & Raitanen J (2012): healthy diet and physical activity to prevent excessive gestational weight gain ;66(12) :1344-50.

Lucovnik M, (2017): obesity and pregnancy epidemiology of obesity 2-10.

Madden J, (2015) nutrition and diet quality during pregnancy in Tallahassee 48106 – 1346 .

Miao M, Dai M and Guo X,(2017): influence of maternal over weight, obesity and gestational weight gain on the perinatal outcomes in women with gestational diabetes mellitus a nature research journal ; 305

National Research Council, (2011): weight gain during pregnancy total and pattern of gestational weight gain 144-147

Norton H., (2015): your pregnancy nutrition guide : what to eat when you are pregnant.;15: 5-20.

Phelan S & Rena R Wing (2018): behavioral lifestyle intervention with partial meal replacement to reduce excessive gestational weight gain in California the American journal of clinical nutrition.

Shericka T. Harris (2011): physical activity during pregnancy and its association with gestational weight among south Carolina women 1506039

Shub A, Emily H &Karan J (2013) pregnant women knowledge of weight gain, complications of obesity and weight management strategies in pregnancy **18;(6)278.**

United Nations Population Fund in Egypt (UNFPA), (2015): maternal mortality in Egypt 1990- 2015.

Walter G., (2017): pregnancy and obesity ; planning for pregnancy, how useful are guidelines for weight gain in pregnancy 5(16): 1–13.

Wang ML, Aroyo J, Durker S (2015) :knowledge, attitudes and provider advice for Latinas pregnant women ;21(2):187-193

Washington K, (2015) : patient centered interviewing and behavioral counseling for recommended gestational weight gain ;78 (2): 209–220.

Whitaker K, (2011): patient and provider perception of weight gain, physical activity and nutrition in pregnancy 30-70.

Whitaker K, (2015): patient and provider perception of weight gain, physical activity and nutrition in pregnancy in South Carolina : 3704417**.**