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Iron-Deficiency Anemia in Pregnancy: Assessment of Knowledge, Attitudes and Practices of Pregnant Women in Yerevan

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Abstract

Iron Deficiency Anemia (IDA) is the most widespread disorder among pregnant women in Armenia. It is associated with adverse pregnancy outcomes (pre-term delivery and low birth weight) as well as increases risk of maternal mortality from hemorrhage in delivery. Since knowledge, attitudes and practices of pregnant women play an important role in IDA prevention, it is necessary to explore them. For this purpose a study in Yerevan was conducted utilizing mixed methodology (qualitative and quantitative methods). The first stage of the study was key informant interviews with pregnant women as well as physicians of Prenatal Consultation Clinics (PCC). In total six pregnant women and six physicians were interviewed. The results of this qualitative phase showed poor knowledge of the pregnant women on IDA risk factors and ways of prevention as well as lack of counseling in the PCCs. The second (quantitative) stage of the study was a telephone survey with a random sample of pregnant women. Sample size was calculated using a formula for single proportion calculation. Sample size (62) was increased 2.5 times, since expected response rate was 40%. Sampling procedures consisted of 3 stages: 1) simple random sampling of PCC; 2) proportionate systematic random sampling of names and telephone numbers of pregnant women from the registration books of the selected clinics; 3) simple random sampling during data collection process. Sixty-two women were interviewed in order to explore their knowledge, attitudes and practices on major risk factors of IDA. Data were entered in EXCEL Microsoft and translated into STATA. A comparison of sociodemographic factors and pregnancy history among different knowledge and attitudes levels, as well as between anemic and non-anemic women was presented in tables and described. A significant difference was found in the frequency of anemia between the strata of PCCs close to the center and far from it. Data were analyzed according to the sum of the score obtained for every correct answer. The scores for knowledge, attitudes and practices were stratified on low, medium and high. The results have shown relatively high levels on attitude scores and low levels on knowledge and practice scores. The weak points and widespread misconceptions in knowledge, attitudes and practices of pregnant women were explored. Recommendations are made to the Ministry of Health to establish certain rules of counseling for all pregnant women independent of their iron status, to develop a brochure on IDA risk factors and prevention and distribute it through PCCs, to give guidelines about administration of iron tablets to the women at high risk of IDA and finally to conduct another study to explore the problem of IDA throughout all regions of Armenia.

Introduction

Iron deficient anemia of pregnancy is a reduction of the concentration level of circulating hemoglobin below normal that occurs during pregnancy due to iron deficiency in a woman's body (1). It is the most severe stage of iron deficiency. Iron deficiency can be defined as a depletion of body iron stores and a restricted supply of iron to various tissues (2).

Iron deficiency is the most prevalent nutritional deficiency all over the world. According to the "State of the worlds children", 1995, approximately 466 million women in the world suffer from iron-deficiency anemia. The most affected by IDA is South Asia where 75% of pregnant women of South Asia are anemic.

Although in the developed world it is not so wide spread as in developing countries, it is not completely solved still in the United States, Canada and European countries. From 3.5% to 7.4% of pregnant women in the USA has IDA in the first trimester. In the third trimester it is even higher: from 15.6 to 58% (4).

IDA in pregnancy is a significant public health problem in Armenia.

The data about its prevalence are controversial. According to the "Situational Analysis of Children and Women" it fluctuates from 43% (in rural residents) to 71% (urban refugees) of pregnant women (5). "The Health and Nutritional Status of Children and Women in Armenia"(6) provides the following data, where pregnant women of Armenia were stratified by their residential status:

	Mild (Hb 7-9.9g/dl)	Moderate (Hb 7- 10.9g/dl)	Total (Hb 10-10.9g/dl)
Urban Residents	4%	14%	18%
Rural Residents	8%	4%	12%
Urban Refugees	3%	18%	21%
Rural Refugees	10%	12%	22%

Or by the stage of pregnancy:

First Trimester	10.77%
Second Trimester	14.04%
Third Trimester	29.03%

According to the Ministry of Health the prevalence increased from 1.1 in 1980 to 12.3 In 1997 (Fig. 1)

In spite of some controversy in data from different sources (which could be attributed to the difference in classification of the degree of severity of IDA) IDA appears to be the most common pathological condition in pregnant women of Armenia (5, 6, 7). The rate of IDA increased rapidly during last years and has not been stabilized until now.

In 1995-1997, 10 women died in Armenia from hemorrhage in delivery (5). It is well established that IDA in pregnancy increases risk of dying from excess blood loss (8). Thus, decrease in IDA of pregnancy will contribute to the reduction of maternal mortality from hemorrhage.

IDA is known to make pregnant women particularly susceptible to urinary tract infections, pyelonephritis, complicated the flow of hypotension and pre-eclampsia. (8, 9). It is associated with adverse health outcome such as low birth weight, pre-term delivery, which in their turn have- long term effect on a child's health (8, 9,10).

Iron metabolism in pregnancy and assessment of iron status

Iron status during pregnancy is influenced by several factors. Among those are the following: 1) dietary iron intake (iron content and bioavailability of iron in food); 2) and diet structure (different substances may inhibit or enhance iron absorption); 3) iron body stores (lower iron stores promote more intensive absorption); 4) adaptive mechanisms of the body (health status of organism and in particular status of the gastrointestinal tract) (11). During pregnancy the requirements of organisms for iron increase approximately by 1 mg: at least 400 mg for the expanded red cell mass, 300-400 mg for fetal hemoglobin, and at least 100 mg to replace the loss from bleeding during and after delivery (12). The total quantity of iron stores in the organism of the adult pregnant woman is normally about 3.2 g. Seventy percent of body iron is contained in hemoglobin, 25% is contained in ferritin, stored in the spleen, bone marrow, liver and body fluids, 4-5% is in mioglobin and the remaining 1% is in the component of intracellular enzymes (4).

Plasma ferritin concentration level is a "gold standard" for iron status assessment, because its concentration directly relates to the total amount of iron content in the blood. Iron deficiency is also characterized by low transferrin saturation, a high erythrocite protoporphyrin concentration and an elevated transferrin receptor concentration (2). Transferrin saturation level declines during pregnancy and erythrocite protoporphirin concentration changes too slowly. For these reasons those tests are not

diagnostically useful in pregnancy. The most useful method to reveal IDA in pregnancy is testing of serum ferritin level along with the transferrin receptor concentration (4).

In developing countries due to economical constraint hemoglobin measurement and hemoglobin response to oral iron treatment are the most accepted approaches (14).

According to CDC the optimal hemoglobin threshold for the first and third trimester is 11.0g/dl, and for the second trimester is 10.5g/dl (4). The reason of such difference is in physiologic hemodilution, which reaches maximum value at the second trimester and then slowly decreases at the third. The haemodilution may have a protective effect by: 1) decreasing blood viscosity and preventing thrombotic events; and 2) reducing the risk of death in cases of excessive peripertum blood loss (11).

Risk factors for IDA

Iron deficiency is the most common type of anemia in pregnant women because many women enter pregnancy with insufficient iron stores (15). The most common causes of iron depletion are nutritional inadequacies, frequent gestation, and short interval between pregnancies, abnormal blood loss, adolescent pregnancy, and multifetal pregnancy (12). Demographic factors such as age, race and socio-economic status also influence the rate of IDA in pregnancy (4).

The changes in nutrition of pregnant women as compared to non-pregnant women occur due to the quality of food, rather than the amount. The recommendation is to eat food containing less fat and carbohydrates and more protein, calcium, iron, and vitamins (16)

Foods, which are rich in iron, include dried beans, green leafy vegetables (especially spinach), whole grain enriched bread and cereal, dried fruits, and eggs. However, iron in vegetarian foods have low bioavailability and are easily affected by inhibitors of iron absorption (17). That is why, the best sources of iron are red meats, especially liver, which contain bioavailable heme iron (18). Usually pregnant women think that it is better to eat liver in a raw condition. In reality iron and protein are absorbed easier from well-cooked liver (1). Among dietary factors that enhance non-heme absorption are ascorbic acid, meat, fish, and some organic acids. Among inhibitors are high dietary amounts of zinc, soy protein, bran, dairy products, tea and coffee, calcium rich antacids, and calcium phosphates (4). The results of a study conducted in Costa Rica have shown that coffee drinking (450ml or more) is associated with risk for IDA (19).

Since the average diet may not adequately meet pregnancy needs, 30-60mg of elemental iron should be given daily to supplement the diet beginning the second or at least third trimester of

pregnancy (20). Effective iron tablets should be prescribed for all pregnant women even when the diet is considered adequate (12). Non-compliance of prophylactically prescribed iron tablets increases the risk of IDA during pregnancy and the perinatal period (12, 20).

Spacing pregnancies less than two years apart is associated with the increase in the rate of maternal iron deficiency due to depletion of iron stores (21).

A pregnant adolescent is particularly susceptible to iron deficiency since nutritional requirements during adolescent pregnancy include those of normal growth of maternal tissues as well as the growth and development of fetal ones (2, 22). Meat is the best source of bioavailable iron, but it is hard for women from low-income families to maintain an adequate diet. That is why, low-income women are at higher risk of IDA because of nutritional inadequacies (8, 10, 23).

Women with less education are more likely to develop IDA during pregnancy, because they are: 1) less aware of adequate diet during pregnancy, 2) more likely to have multiple pregnancies, 3) reluctant to use contraceptives and keep an appropriate interval between pregnancies, and 4) less likely to take iron tablets for prophylactic purposes (34).

Gastrointestinal diseases hinder normal absorption of iron into the blood. Chronic inflammation processes in organism due to rheumatism, pyelonephritis, and tuberculosis cause the depletion of iron stores (1). Severe nausea and vomiting at the early stage of pregnancy hinder adequate dietary intake, disrupts iron balance in the body and as a result provokes IDA of pregnancy (24).

Iron Deficiency Anemia and pregnancy outcome

School and Hediger in a Candem study have shown that women with IDA developed at the first trimester of pregnancy are three times more likely to deliver babies with low birth weight and two times more likely to have a pre-term delivery as compared to women with normal pregnancies or other anemias. According to this study IDA that develops in the second and third trimesters has little effect on these fetal outcomes, possibly, because relationships have been obscured by the difficulty to differentiate pathological anemia from physiological (10). Iron deficiency is also associated with an increased risk of complications during pregnancy, including urinary tract infections, pyelonephritis and pre-eclampsia (25). IDA of pregnancy increases the likelihood of maternal mortality from excessive blood loss in delivery (9). A case-control study conducted in Jordan has proven that IDA during pregnancy increases the risk of IDA in infancy even undetected at birth. It is also associated with an increase in perinatal mortality from acute infections (26).

The question of whether routine iron supplementation has obvious advantage over selective one is still unclear. Individual iron supplementation as well as improved dietary intake of iron are the best, but most difficult approaches to solve the anemia problem (28).

Some arguments against routine iron supplementation are:

1)   Impairment of zinc absorption, 2) Gastrointestinal discomfort (21, 27)

3)   Not all pregnant women have low hemoglobin level. From those who do only part, although the largest, has iron deficiency (29). It reduces compliance, since compliance is better when a woman recognizes individual necessity of iron tablets (28).

According to some explorative studies the most important factors influencing compliance are: 1) lack of knowledge and appropriate attitude toward maternal anemia by both pregnant women and health care providers; 2) unstable home environment and undergoing stress; 3) reluctance in utilization of iron tablets, because of the unattractive features of the tablets and side effects (29). The most significant factors influencing compliance are the metallic taste of the tablets, epygastric discomfort and diarrhea or constipation (27).

A number of approaches are recommended to avoid or solve the problem of non-compliance.

One approach is to change frequency of iron supplementation: to replace daily supplementation by weekly iron supplementation (30). Ridwan in the RCT proved high efficacy of weekly iron supplementation. The problem is that therapeutic amounts of iron used during weekly supplementation are not recommended as a prophylactic tool for community -level field programs, because of more severe side effects (31).

VITERY FE describes another approach in "Fortification of sugar with iron sodium ethylenediaminotetraacetate improves iron status in semi-rural Guatemalan population". (32). The problems with that are uniform distribution and quality control of substances being added to the sugar. This problem is easier to solve if drinking water is fortified (33). Other approaches are to fortify wheat flour, salt or cow milk used in governmental programs for low-income groups. In all cases adequate scientific proof of effectiveness and safety of these alternatives is necessary. (34).

According to the "Health and Nutritional Status of Children and Women in Armenia" iron fortification of food in Armenia "is not justified by the rates of anemia, that are well below the 40% limit that is considered appropriate to recommend general fortification" (5).

Since immediate risk factors considerably depends on knowledge and attitudes of the pregnant women, which in their turn heavily dependent on attitude of health care provider (recognition of the importance of advice), it is possible to reduce the prevalence of the disease through improving of level of knowledge of pregnant women, as well as changing attitudes and practices of primary care gynecologist towards the problem.

In order to develop effective strategies aiming to decrease prevalence of IDA it is necessary to assess current perceptions and knowledge of pregnant women regarding changeable risk factors for IDA. The first step is to address the weakest points in the knowledge and attitudes of pregnant women in the future educational program. Investigation on knowledge and attitudes could not result in a valuable conclusion unless accompanied by exploration of practices.

Since assessing the level of knowledge and practice of pregnant women across Armenia is not possible by means of available resources, only pregnant women in Yerevan (the capital city of Armenia) will be involved in this study.

Method

Research questions

The main aim of the study is to address the following research questions:

- What is the level of knowledge of pregnant women in Yerevan (assessed during August, 1999) on changeable risk factors for IDA in pregnancy?
- What are the attitudes of pregnant women in Yerevan (assessed during August, 1999) towards changeable risk factors for IDA in pregnancy?
- What are the practices of pregnant women in Yerevan (assessed during August, 1999) regarding changeable risk factors for IDA in pregnancy?

Study design

The study is descriptive utilizing mixed methodology (both qualitative and quantitative methods).

The first phase of the study is qualitative. Key informant interviews with primary health care providers at prenatal clinics and pregnant women were conducted in order to explore their attitude toward routine iron supplementation, as well as type of advice routinely provided at primary clinics. Reasons of non-compliance and poor nutrition with the point of view of the physicians as well as pregnant women were explored.

In order to make data on knowledge and practices of pregnant women generalizable for Yerevan the second phase of the study using quantitative methodology was conducted. It was a cross-sectional study to assess knowledge, attitudes and practices of pregnant women on IDA of pregnancy. Factors influencing outcome were taken into account as confounders.

Sample size

The sample size for quantitative analyses is calculated using the following formula:

$n=z_{\alpha-0.5}{}^2$ x p x q / δ^2 , where $z_{\alpha-0.5}$ =1.96 (is a cut-off for two-sided test with 95% CI)

p=0.2, 20% is the expected proportion of pregnant women with adequate knowledge and practices

q=0.8, is (1-p) =0.1,

δ=1/2 of width of CI

$n=1.96^2$ x 0.2 x 0.8 / $(0.1)^2$ =62

Since the method of data collection of the study is a telephone interview, low response rate should be taken into account. The results of the telephone survey regarding EMS users' satisfaction, which was recently conducted by Public Health students, have indicated the response rate that is fluctuated from 30% to 40%. Since pregnant women in general are healthy people willing to answer questions, the higher limit of proportion of complete interviews (40%) is expected to have from the whole sample size. Thus, in order to obtain 62 complete interviews having 40% response rate it is necessary to increase sample size 2.5 times

N = 62 x 2.5 = 155

The total sample size, which is necessary to select from Prenatal Consultation Clinics (PCC), includes 155 pregnant women from Yerevan.

<u>Sampling procedures</u>

Probability sampling technique was used to recruit participants for the study. The sampling universe was all women of Yerevan who were pregnant in August 1999, whose names were in the registration book of a PCC and who have home telephone number recorded in the registration book or medical record.

Since the whole-enumerated list of pregnant women of Yerevan was not available, the sampling procedure consisted of the two stages.

The sampling frame for the first stage was a list of all Prenatal Consultation Clinics of Yerevan. Facilities that were specialized for cases with a high-risk pregnancy were excluded. The resulting list included 21 PCCs. The clinics were enumerated. For the purpose of feasibility <u>4</u> PCCs were selected using simple random sample.

The sampling frames for the second stage were registration books of the selected clinics. The exclusion criteria at the second stage of sampling procedures were the following:

1.   Women who have delivered, have had miscarriage or abortion at the time of sampling

2.   Women who changed the clinic at the time of sampling

3.   Women who did not have telephone number recorded in a registration book or medical record.

Since the selected clinics were serving different number of pregnant women, the proportionate systematic sampling method was applied. It was important for ensuring an equal chance for every sampling unit to be selected. For this purpose, first of all, the total number of pregnant women who were in the register and had not delivered at the time of sampling was obtained for every clinic. It was the following numbers: I - 164, II - 236, III - 125, IV - 279. Then, the proportion of every clinic from the total (804) was calculated (see table below). The next step was to calculate the number of women for every selected clinic, which must to be sampled.

After that from the registration book of every selected clinic utilizing systematic random sampling method an appropriate sample of pregnant women was obtained. For this purpose sampling interval was calculated (5.2) and initial point was selected randomly between the first and fifth units in the register. Thus, the second woman was (k+5)th, the third was (k+10)th, the fourth was (k+16)th and so on, where k is an ordinal number of the first sampled woman.

In two clinics telephone numbers were not recorded at the registration book. Thus, telephone numbers of selected women were taken from their medical records. A woman, whose medical record

came next, replaced a woman who did not have telephone number in her medical record. Hemoglobin level of each chosen woman was checked in the medical record in order to confirm the diagnosis of anemia.

Data collection method

The data were collected via telephone survey.

The third stage of the sampling procedures was developed during data collection process. From the list of telephone numbers of every selected clinic it was necessary to survey only that number of women, which was correspond to the proportion of the total number of pregnant women of selected clinics from primarily computed sample size: 62. For this purpose the number of women selected from every clinic was divided by 2.5. The result was the following: I ~ 13, II ~ 18, III ~ 22, IV ~ 9.

For every woman, who was randomly selected from the list, three trials to connect were permitted.

Table, summarizing sample calculations

Selected clinics	Total # of currently pregnant women	Proportion from the total number	# of women correspondent to the proportion	# of women, which is necessary to survey	Sampling interval	Starting point
I	164	20.4%	32	13	5.2	4
II	236	29.3%	45	18	5.2	2
III	125	15.5%	24	9	5.2	2
IV	279	34.8%	54	22	5.2	3
Total	804	100%	155	62	-	-

<u>Data collection instrument</u>

The survey was conducted using a questionnaire for a telephone structured interview (App. 6). In addition to the information on knowledge, attitudes and practices on changeable risk factors, it includes questions regarding income, education, early gestosis (severe nausea and vomiting during the first stage of pregnancy which hinders adequate intake of food), parity, trimester of pregnancy, coffee and tea consumption as well as other topics. Since there was no standardized questionnaire available on this topic, it was developed specifically for this project. The questionnaire was pretested and revised several times, until no additional changes were necessary.

<u>Attitude questions</u>

The attitude questions were designed in the form of five statements (App.6). The woman from surveyed population got one point for each adequate answer. Thus, the highest possible score was 5 for total 5 adequate answers to the attitude questions.

Question # 25 explores attitude towards iron tablets. The purpose of it is to find out whether a woman considers iron preparation as something harmful and would avoid it, even if being diagnosed as anemic. One point is given for "disagree".

Question # 26 addresses the recognition of possibility to become anemic. This question indirectly testifies to woman's interest in the knowledge about anemia and indicates her preparedness to undertake appropriate steps in order to avoid anemia development. One point is given for "disagree".

Question # 27 searches for information about woman's recognition of importance to follow doctor's advice regarding adequate nutrition during the pregnancy. "Disagree" adds 1 point to the attitude score.

Question # 28 is similar to question # 25 by its content, but is designed in a different way. It testifies to the consistency of information obtained through question # 25. Pregnant women, who agree with both question # 25 and disagree with question # 28, are really afraid of any type of tablets. Those, who are agree both with # 25 and # 28, are inconsistent due to uncertain attitudes toward iron tablets and can relatively easily change it if provided appropriate information about the need for iron tablets. One point is given for "agree".

Question # 29 elucidates the preparedness to use contraceptives in order to ensure the adequate time interval before the next pregnancy. One point is added for "agree".

<u>Knowledge questions</u>

This group of questions testifies to the knowledge of pregnant women regarding nutrition, inter-pregnancy interval and importance of iron tablets.

Question # 17 looks at importance of adequate nutrition for a pregnant woman in order to prevent IDA. This is multiple-choice question, asking for the most important risk factors for IDA. The woman, selecting the second option, will get 1 point.

There are two kinds of questions exploring the issue of the most important foods, which are protective against IDA. Question # 9 is an open-ended, free response question, which is placed among the first questions in order to avoid contamination from the list of the products that are suggested in practice questions. Taking into consideration the importance of the knowledge, a woman who mentioned any kind of meat will get 2 points for this question. Two points will be added as well, if she would choose red meats in a multiple choice question (# 18). Since chicken could also be a good source of iron and protein, although not so good as red sorts of meat, one point will be given for this answer. "Spinach" and "dried fruits" options will get 0.5 each, because these foods contain a lot of iron, which, however, has low bioavailability. Two-point subtraction will be given for indicating of dairy products, since they inhibit iron absorption in gastrointestinal tract. No points are given for mentioning carrots, honey and apples. The total highest score for nutritional knowledge is 7. Score less than 0 is also possible.

Knowledge about inter-pregnancy interval is tested by means of two questions. Question # 19 is designed in the form of a statement. Women, who recognize the importance of keeping certain inter-pregnancy interval in order to avoid IDA, gets 1 point. Question # 20 is a multiple choice one, testing the knowledge about the length of inter-pregnancy interval. The woman that selected answer #3 gets 2 points, as this knowledge is more valuable for healthy practice.

The recognition of iron tablet intake during pregnancy (even in case of appropriate regimen) is tested by means of statement # 16. It is known (12, 20), that iron stores could be considerably depleted before pregnancy due to excessive menstrual blood losses, chronic inflammation, short inter-pregnancy interval as well as other factors. Besides, the demand of the organism for iron increases so much during the second and the third trimester that even fine nutrition rarely could meet it. Thus, keeping an appropriate diet during the pregnancy is necessary, but not a sufficient condition for IDA prevention. Three points are given for a "False" answer.

Practice questions

Practice score was calculated as a sum of points for practice questions. Women who were pregnant for the first time as well as women with interpregnancy interval, which was equal to 2 years or longer, were given 1 point for this factor. Women who had 1 short interpregnancy interval were given 0. For every additional short interval 1 point was subtracted.

Women, who consumed meat not less than 5 times a week were given 3 points (since meat is the main source of bioavailable iron).

Only women, who took iron tablets during the month and longer were given 1 point for compliance.

Woman got one point, if she consumed not more than one cup of coffee a day (19). She got another one, if she consumed not more than two cup of tea a day. Women who consumed more that 3 cup of tea or/and 3 cup of coffee in a day would have 1 point of subtraction from their total practice score. The maximal score for practice is 8.

Analysis

Data entry was performed with Microsoft Excel. Data from the Spreadsheet were translated to Intercooled Stata 6 for statistical analysis. Chi-square test was used in order to test association of dependent variable with ordinal or nominal independent variables. For the purpose of testing difference in means t-test was utilized. Spearman test was applied in order to look for correlation.

Results

Key informants' interviews with PNC physicians

The consent forms for these key informant interviews were not of the usual type. The term "anemia" was not used; physicians were told that the topic of the interview is tablet compliance and following doctor's advice among pregnant women. The purpose of that was to study types of usual advice provided in prenatal clinics. Guide was mostly organized in such a way: general (introductory) questions at the beginning to the more specific (detailed) questions at the end. Four gynecologists and two therapeutists were interviewed. Two of them were 35 and 30, and four were from 50 to 65.

Advice, consistently provided to all pregnant women
Three doctors mentioned advice regarding nutrition, 3 - preparing for breast-feeding and personal hygiene, one regarding contraception after delivery and one regarding polyvitamin intake.

They were asked whether they provide advice regarding nutrition, all of the six answered "yes", although three of them did not mention nutrition when asked about type of advice they usually provided.

Advice regarding nutrition during pregnancy

All physicians mentioned dairy products, as the most important component of the diet during pregnancy. Four physicians underlined the importance of curds as a "source of protein and calcium".

All doctors indicated the importance of fruits and vegetables. Two gynecologists recommended juices and salads from those.

Two gynecologists indicate meat as valuable component of the diet. Two doctors mentioned eggs. One mentioned legumes, another one noted porridge from buckwheat as one of the most important products to eat during the pregnancy.

When giving general characteristic to the nutrition during the pregnancy, physicians mentioned terms such as: "diverse", "appropriate", "adequate", "rich with vitamins and nutrients", "rich with proteins".

Advice about any tablets administration to every pregnant woman

Three of the doctors said that they never administered anything to pregnant women routinely without

any indications. Two of them mentioned vitamins (especially during the autumn) and one indicated a preparation of calcium during the second half of pregnancy. Nobody mentioned iron tablets administered for prophylactic purposes.

Advice giving specifically to prevent (treat) IDA

Five doctors said that they try to correct the mild form of anemia by means of diet. One therapeutist said that she looked at clinical status as well: if paleness or any other symptoms accompany a moderate decrease in hemoglobin level, she should administer iron tablets.

All six doctors mentioned diet and iron tablets as the means of Hb level regulation.

Three doctors mentioned meat as one of the best source of the iron. One physician underlined beef from all kinds of meat. Another one indicated a liver in raw condition.

All doctors said that fruits and vegetables are especially important. The most popular mixtures of the natural products mentioned by physicians were the following:

1) half a kg of carrots + half a kg of red beet + half a kg of apples (or pumpkin in another variant). To mix juice or ground mass of all these products and add half a kg honey, keep refrigerated and take half a cup twice a day.

2) To boil red wine of certain sort ("Saperavi") under low flame until complete evaporation of the spirit and take half cup twice a day.

General opinion about iron tablets

Three physicians expressed positive opinions about iron tablets, which are currently used, and the other three were not satisfied. The reasons for dissatisfaction were:

1)   Passed expire date of iron tablets that prenatal clinics periodically obtained for free distribution

2)   Side effects of these tablets (e. g., nausea, diarrhea as well as allergic reactions),

3)   High prices of the best types of iron tablets.

Advice about inter-pregnancy interval

Only one doctor mentioned advice about contraception after delivery when asked about general advice they usually provide in prenatal clinics. However, when asked whether they give advice about contraception after delivery, all gynecologists answered positively. When asked to specify type of advice they usually give about inter-pregnancy interval, two gynecologists said that they counseled women to avoid next pregnancy during at least a 2-year period after delivery and other two said that this period is individual for every pregnant woman. All gynecologists said that they gave advice about contraceptives and distributed it free of charge if there was supply. Opinions about types of contraceptives were different. Two of them prefer condoms as the most harmless, one mentioned IUD as the most convenient, the fourth said that she selects contraceptives individually for every case.

Opinions about IDA in pregnancy

All physicians have mentioned that IDA is widespread. One of the gynecologists said:

It is the most widespread condition at present. Approximately 80% of pregnant women who visit me have anemia. Comparing with the Soviet period it increased significantly, in reverse proportion to the late stage toxemia, which was actual in the Soviet period and has now undergone decline. I think, the reason of that is a change in nutritional patterns. Formerly a pregnant woman consumed much meat and fat, and meat protected against iron-deficient anemia, but increased risk of becoming overweight and getting a hypertension. Now it is visa versa, because of socioeconomic difficulties pregnant women consume mostly vegetarian foods, which is protective against hypertension, but increases the rate of anemia.

A question regarding the approximate rate of anemia from their experience produced a considerable range of proportion affected by anemia. According to gynecologists it ranged from 40% to 80%. According to the therapeutists it is 30% to 40%.

Physicians as one of the causes of inadequate nutrition and increased rate of anemia noted the worsening socioeconomic condition. One therapeutist thought that the increased rate of IDA is a consequence of ecological problems. From the late are radiation and the low quality of food that

entered the republic from the foreign countries. She said that foreign products mostly expired and contained toxic substances. One gynecologist said that the increased prevalence of anemia during pregnancy is the result of stress and unstable environment within a family due to economic instability of the majority of Armenian households in general.

Opinions regarding women's knowledge and compliance

Only two physicians were satisfied by women's knowledge in general and awareness of healthy nutrition during the pregnancy in particular. One of them said that women read a lot and come to the clinic already having some basic knowledge regarding nutrition.

Another four considered women's knowledge as low and stressed the necessity to improve it.

The physicians said that women mostly follow their advice if they are able. The majority were not satisfied by women's compliance. The main reason they indicated were the above-mentioned socio-economic difficulties. One of them said:

When we give advice regarding nutrition they just look at me and keep silent. Their eyes say: " How to get all these foods? We eat what we can buy." The majority don't like the trouble –it make no sense to them.

The same was said regarding drug compliance and referred to the hospital:

The majority did not like to buy expensive drugs and do not go to the hospital because of the high prices.

Ways of prevention of IDA of pregnancy

The question regarding ways how to improve the situation resulted in the majority suggesting free distribution of iron tablets and vitamins through prenatal clinics. All physicians considered prophylactic supplementation ineffective. They say that a woman does not like to take even vitamins if she is not sure that she is at risk of IDA and individual recognition of necessity of tablets intake is very important.

One gynecologist said:

Sometimes we have a long turn of pregnant women waiting for consultation and we merely don't have time to talk about nutrition with all of them. But such advice is important for every woman. We have brochures regarding breast-feeding distributed in prenatal clinics free of charge. It makes our task much easier. Sure, we stress the importance of breast-feeding when talking with a woman, but the details and answers to the questions she can find in the brochure. It will be highly desirable to have such brochures regarding healthy nutrition during pregnancy, especially for IDA prevention, because it is a really serious problem at present.

The majority of physicians interviewed agree that the increase in knowledge and changing of the attitudes towards iron tablets will contribute to the solution of the problem of anemia. However, they mentioned the increase of economic prosperity as the main way of solving the problem.

Key informant interviews with pregnant women

Key informants' interviews were conducted on six pregnant women selected by convenience sampling method from different PNC.

The interviews lasted about one hour.

Demographic characteristics of pregnant women:

Two of the pregnant women were primaparous and four were multiparous. All women were married. Their ages ranged from 23 to 32 years old. Two women were in the third trimester of the pregnancy, two were in the second and one in the first. Two of the women had a Russian education and the rest had Armenian. Only one woman had high level education (humanitarian), three finished colleges and two finished secondary school.

General knowledge about IDA of pregnancy

Non of the interviewees were aware of the Armenian equivalent word for "anemia" (*sakavarunutjun*). Three of them said that they heard something about it after term "anemia" was replaced in more understandable terms for them i.e. "low percent of blood" (*tsacr arjan tokos*). Two of the others (with Russian education) have recognized the word "anemia", and the sixth woman did not understand any of these three terms.

Four of them did not know whether it was wide spread or not and two said that it is wide spread.

Symptoms and consequences of IDA of pregnancy

One woman stated:

It is a very bad disease. As I know it is incurable and there were cases of death from it.

The women had some knowledge about symptoms of IDA. The following symptoms were noted "darkness in front of the eyes", "dizziness", "weakness" and "faint". However, no one mentioned being pale.

Five women had no idea how IDA affects the baby's health and one woman believed, that anemia could be transmitted to the child from the mother.

Causes of IDA

One of them said:

In general, when a woman does not keep an appropriate diet regimen, and does not ear properly, has emotional troubles, does not walk every day this can contribute to IDA.

Five of the six women anyway mentioned poor nutrition as the cause of anemia. Only one said, "it occurs due to hard work during the pregnancy".

Nutrition

Knowledge about healthy diet during pregnancy and sources of knowledge

Some typical answers to the question regarding healthy diet during pregnancy are:

Normal, rich of nutrients (books are mentioned as the source of information);
Highly caloric (mother, relatives)
Mostly, dairy products (prenatal clinic)
Diet, full of vitamins (prenatal clinic)

The majority think that the diet of pregnant women should be different from the diet of non-pregnant women, but the way it should differ is not the same in their answers. A typical opinion is that woman should follow her own taste and cravings during the pregnancy. One woman said:

It is the peculiarity of the pregnancy that a pregnant woman may have very strong desire to eat something, often not a usual one. And it is necessary to satisfy her desire in order to have healthy baby. For example, I feel a strong need for piquant dishes and pickling and I eat it, although it is better to avoid them during pregnancy.

Two women noticed that the pregnant woman should eat what she usually eat, but in greater amount. Four women stressed the importance of the fruits. One woman said that it is necessary to shift toward dairy products.

Products positively and negatively influencing haemoglobin level and anemia treatment

A very common opinion was that the products, which are protective against IDA, include vegetables and fruits, in particularly: carrots, apples and beets. Honey and nuts were also frequently mentioned as increasing "blood percent". Two women mentioned liver in raw condition. Only one woman mentioned meat, although together with fat. Another woman mentioned milk and curds. Two women indicated red wine "Saperavi", boiled on a low flame, as a method of anemia treatment. Another two mentioned vitamins and just one mentioned iron tablets.

Only one woman answered the question about food decreasing Hb level. She mentioned "matsun"and gave an explanation: " *Matsun* reduces blood pressure and by this way decreases blood percent". She said that this was her own conclusion.

Their own diet

On a general question about opinions regarding their own diet all pregnant women, except one, answering that they are more or less satisfied by it. The typical answers were the following:

We are not hungry.

It is as good as it is possible in our conditions.

That's satisfactory, I am not going to trouble with it.

Only one woman said that if she would have more finances, her nutrition would be much better than it is now. No one mentioned lack of knowledge as a reason for an inadequate diet.

When asked to specify what kind of food they consume more often, they mentioned all products that they reported in the previous answer regarding their knowledge about protective foods. The woman, who thought that dairy products are especially important, also said that she consumed more dairy products during the pregnancy. Four women reported increase in fruits and vegetable consumption during their pregnancies. One woman used the phrase "as diverse, as possible" when describing her diet. Another one mentioned frequent consumption of meat and macarons.

What would they wish to know about the diet during the pregnancy

The majority of informants said that they did not need any additional knowledge about nutrition and that they were satisfied by their knowledge. One interviewee wanted to know more about "the regimen of nutrition and the content of food". Another one said that it would be desirable to be more aware of food, "which is most recommended during pregnancy".

Only two women had used iron tablets, because their district gynecologists provided it. One of them took it during one week during a previous pregnancy, although it was administered for two weeks. The reason for discontinuing was unwillingness to take drugs during pregnancy. When asked, did she considered iron tablets more dangerous than anemia, she said:"Who knows, maybe. Besides, I can fight with anemia by means of rich nutrition". Another woman was taking the tablets for two weeks and reported that it increased the hemoglobin level in her blood.

When asking about their general attitude towards iron tablets the women said that they preferred to avoid any drugs during pregnancy and iron tablets were not an exception. Only one woman who never took tablets said that she would take it in the case of necessity. From the two having experience of iron intake only one said that she would take it again if she became anemic in spite of nausea it caused. Another one said that in the case of anemia she prefers to carry out physician recommendations regarding nutrition to improve the level of "blood percent".

Knowledge and experience about interpregnancy interval

Four women did not understand the question and asked it to be repeated several times.

Two women said that it is necessary to wait for some period until becoming pregnant again. Only one woman said that it should be approximately two years. Another said:"Maybe, one year". When asked, why it was necessary to keep such an interval, one said that it is necessary in order "for the first child to become more on his own" (source of information is a book), another answered "to give rest to the organism"(source of information is neighbor).

From six women three were primaparous, two of them had two children, one had three pregnancies, but one of them was miscarriage. The intervals were 2 and 2.5 years for biparous women and one and two years for women having 3 pregnancies.

Survey results
Socio-demographic data

Overall response rate was 43%. It was higher for close to the center PCC (46%) as compared to the far (40%).

Mean age of responders was 24 years. 68% were 25 years old. Less than 56% of women had university (completed or almost completed) education. Mean income index (average monthly expenditures per person) was 40 $. 56% of women were in the third, 41% in the second and 3% in the first trimester of pregnancy.

Significant difference was found in the rate of anemia between strata of central PCC and PCC far from the center (p-value=0.03) (Table1).

Knowledge

The main cause of IDA

The pregnant women were asked to select the most important risk factor from the list of factors. 50% (31 women) of the sample gave correct answer - they selected poor nutrition. The next most frequent answer is lack of fresh air (14%). 13% of pregnant women thought that the main cause of IDA is stress and 11% are sure that it is radiation. The lowest proportion (5%) gave great importance to the hard physical work during the pregnancy.

The most important foods for IDA prevention

Several products were listed and pregnant women selected those, which are of the most importance. 37% correctly selected red meat, 6% - chicken, 19% - dried fruits, 26% spinach. 39% of the sample thought that dairy products are important for IDA prevention. A lot of women gave great importance to the carrots (58%), honey (51%) and apples (73%).

The same question was asked in open-ended option. 21% of women mentioned meat in open-ended question, and only 13% of the women indicated meat in both open-ended and multiple-choice questions. The most typical responses in open-ended question are the following: fruits, vegetables, apples, carrots, red beets, boiled wine. Among unusual answers are chocolates, apricots, cooked paprika, sweets and watermelon. When asked to specify the source of knowledge 10% indicated a therapeutist of PNC, 21% - gynecologist, 2% - nurse and 67% other sources. Only 9% indicated books among other sources.

Iron tablets importance

27% of women correctly disagreed with the statement that the necessity of iron tablets intake could be avoided, if a pregnant woman keeps an appropriate regimen.

Interpregnancy interval

63% of women agreed that it is necessary to keep certain interval between consequent pregnancies in order to avoid IDA of pregnancy.

32% of women correctly indicated the length of interpregnancy interval in multiple choice question. As the source of this knowledge 7% indicated PCC (gynecologists) and the rest 93% other sources.

The knowledge score is ranged from -2 to 12 (from 17 maximum). Mean knowledge score is 4.13 (std=3.56). 64% of women had low, 31% had medium and 5% had high knowledge score.

Comparison of socio-demographic factors and pregnancy history among pregnant women with different levels of knowledge score is presented in TABLE 2.

There are interesting trends in data reflected in this table. There is positive correlation between income index and level of knowledge score: mean income is 36$ for low knowledge group, 41$ for medium knowledge group and 58$ for high knowledge group.

The women with sufficient interpregnancy interval are equally distributed in low knowledge and medium knowledge groups, but there are more women with short interpregnancy interval in low knowledge group as compared to the medium knowledge group (16% versus 6%).

There are more women with low and medium knowledge score in PNC, which are far from the center as compared to the central ones (31% versus 34%, 11% versus 13%), but there are more women with high knowledge score in central PNC as compared to the far ones (8% versus 3%).

Although these findings are not statistically significant for 0.05 level of significance (probably, because of small sample size), they indicate directions for future investigation.

Attitudes

Five statements were read to the responders in order to explore their attitudes towards practices which are protective from IDA.

64% of women disagreed that they would avoid iron tabs even if were diagnosed as anemic.

56% of women perceived that they could be at risk of IDA.

54% of women noticed that they would follow to the doctor's advice about nutrition, rather than to their own desire.

81% women agreed that if they become anemic they would combine iron tablets, vitamins and proper diet in order to get effective results.

66% of responders were going to use contraceptives after delivery in order to avoid new pregnancy for the certain period of time.

The range of attitudes score is from 0 to 5. Mean attitude score is 3.26 (std=1.32). Low attitudes score had 29 % , medium - 27 % and high - 44 % of the women.

Table 3 reflects comparison of socio-demographic factors and pregnancy history among pregnant women with different levels of attitude score.

The table shows higher proportion of women with school education in low and medium attitude groups as compared to college education (8% versus 6%, 6.4% versus 4.8), and higher proportion of women with college education in a high attitude score group (5% versus 13%).

There are an equal number of women with low attitude score in central and far PCCs. The proportion of women with a medium attitude score is higher in PCCs which are far from the center as compared to central ones (11 versus 16). Proportion of women with high attitude scores is higher in central PCCs as compared to the far ones.

Practices

Diet in pregnancy

45% of women have indicated changes in the diet with the pregnancy. The typical answers are "more fruits, vegetables", "more dairy foods", "the diet is poor, because my appetite become worse", "refuse tea, coffee consumption", "replace pork by beef", "strong desire to eat sweets", "to eat less animal foods and more vegetables". Only 5% of women reported more meat in their diet, as compared to non-pregnant period.

11% of women have reported that they consumed meat not less than 5-7 times a week. 2% consumed liver not less than twice a week. 98% of women consumed fruits several times in a day.

Experience of iron tablets intake

21% of women noticed that they were administered iron tablets during current or previous pregnancies, but only 18% of the sample took them. Only one woman took them for a month, another one for 2 weeks and rest 6 for one week. Women, who were administrated iron tablets, but did not take them, explained it by nausea and vomiting, which were associated with those tablets.

Parity and experience of interpregnancy interval (including prior abortions and miscarriages)

53% of the sample was pregnant for the first time.

62% of the rest had history of one pregnancy besides current. Mean length of interval between pregnancies of those women was 28.41 (std=27.10). 21% of non-primaparous was pregnant for the third time. Mean length of interpregnancy interval was 8.27 (std=5.27) in those women. 48% of non-primaparous had interpregnancy interval less than 2 years.

Severe nausea and vomiting in pregnancy

58% indicated severe nausea and/or vomiting during the pregnancy

Tea and coffee consumption during the pregnancy

73% of women had in average 2 and more cup of coffee in a day. 4% had more than 2 cup of tea during a day.

Practise score ranged from -6 to 8 with mean of 2.61 (std=1.96). 68% of the sample had low, 29% had medium and 3% had high practice score.

Discussion

The results of the study indicated that almost half of pregnant women who participated in the study had satisfactory level of attitude score toward behavior protective against IDA. In the same time the majority had poor knowledge regarding main risk factors of IDA as well as poor practices for IDA prevention. The general knowledge of women about IDA is not sufficient. When asked to mention the most important foods which are protective against IDA many of them said during the survey:" I did not have such problem, so I am not aware of it ".

The results of key informant interviews with respect to the nutrition are consistent with findings of the survey. They both indicated that one of the most widespread misconceptions among pregnant women is possibility to correct and maintain hemoglobin level only by diet alone. More than one-third of the women thought that iron tablets could be harmful to the fetus like any drug. Another widespread erroneous opinion is that fruits and vegetables are the main foods, which protects against IDA. More than one-third mistakenly thought that dairy foods are protective against IDA, while in reality they inhibit iron absorption from gastrointestinal tract.

From key informant interviews it was clear that physicians do not pay enough attention to the counseling procedures. Two-third of the women indicated sources of nutritional knowledge other than

PCC's physicians. The role of the nurse is very limited in the counseling process: 2% of women involved in the survey indicated the nurse as a source of nutritional advice. Only half of key informants indicated that they provided routine advice regarding nutrition. Four of them recommended eating more dairy foods, and only two gave advice to eat meat. Fruits and vegetables are considered as the most important sources of iron. The mixtures of the fruits and vegetables as well as boiled wine are recommended to women, who already had decrease in hemoglobin level. This misconception about boiled wine, nested among physicians, was also reflected in the open-ended answers of pregnant women.

The importance of keeping certain interval between consequent pregnancies is not stressed enough at PCC. Only one physician mentioned that she provided advice about contraception after delivery to the all women. These findings were consistent with the fact that pregnant women participated in key informant interviews as well as in the survey were little aware about optimal length of interpregnancy interval.

Iron tablets were not administrated for prophylactic purposes. Furthermore, they were mostly administrated and taken by anemic women for a short period of time, which was useless in reality. It is clear from the study that a woman is more willing to take iron tablets, when she recognizes individual necessity of their intake.

Significant difference in frequency of anemia between central and remote strata of PCC is needed more exploration. It could be correspond to the reality as well as attributed to the difference in Hb measurement between different PCC, as well as selection bias (see *Limitations*).

Limitations

The study has certain limitations connected with design, sample size, sampling procedures, seasonal peculiarities and data collection method.

The design of the study is crossectional, which does not allow exploring temporal relationships between dependent and independent variables. The number of women with anemia is small, which is, probably, the main reason for lack of statistically significant results. When calculating sample size it would be better to use the formula for difference in proportions in order to look for difference between characteristics and KAP in pregnant women with anemia and without it.

Primarily *four* polyclinics were randomly selected, because of feasibility considerations. It would be better to sample from the larger number of polyclinics in order to get more diversity in the data and increase generalisability of the findings.

Since the study includes diet investigation, the seasonal peculiarities considerably influenced the results. Thus, low frequency of meat consumption can be attributed in some extent to the summer

time, when fruits and vegetables compose the major part of the diet. Low frequency of tea consumption can be explained by the same reason.

Another limitation, which is connected with seasonal specificity, is low response rate due to the absence of women in the city because of summer vacations (which, however, was expected).

Data collection method (telephone survey) excluded from the study those women who did not have a telephone at home or whose telephones were not working during the study. Exclusion of people due to absence of telephone as well as due to summer vacations could result in selection bias (if non-responders differed from responders by some characteristics, which influenced outcome).

Strengths

Mixed methodology allows qualitative and quantitative description of the IDA risk factors. Key informant interviews with both physicians and pregnant women allow comparison of different points of view on the same issues.

Principle of random selection in all three stages of sampling contributes to the representativeness of the results and protects from biases. Proportionate sampling method provides equal chance to the sampling units to be selected.

Data collection instrument contains open-ended questions to check consistency of answers to the multiple-choice questions.

Findings from the study indicates low level of knowledge and practices of pregnant women, but relatively high level of their attitudes, which means that improvement in knowledge will be effective. Improvement in knowledge will result in improvement in practices, since women are willing accept and use it.

The study explores weakest points and misconceptions in knowledge, attitudes and practices of pregnant women. The study constitutes a useful example for future investigation of IDA problem in Armenia.

Recommendations

Study findings provides information for choosing strategy of actions. They are directed to the Ministry of Health:

❑ To conduct study for further exploration of IDA of pregnancy in different regions of Armenia avoiding as much as it possible the limitations of the present (increase sample size, select sample from larger number of PCC et cetera).

❑ To establish certain rules and standards for PCC's physicians of providing advice to the all pregnant women visiting prenatal clinic

❑ To involve nurse of PCC in the process of counselling by means of their training

❑ To elaborate a brochure, which describes symptoms, risk factors and ways of IDA prevention.

❑ To administer iron tabs for one month or longer to the pregnant women during second trimester who are at higher risk of IDA development, i. e. has short interpregnancy interval in their experience or who is from low-income family.

In order to get better compliance both gynecologist and therapeutist of PCC should talk to the pregnant woman and explain the importance of iron intake.

The following issues should be particularly stressed in advice provided to all pregnant women visiting PCC:

1) Importance of meat consumption for IDA prevention

2) Limiting tea and coffee consumption and separating them from meal time

3) Importance of keeping at least 2 years interval between pregnancies for IDA prevention.

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Proportion of pregnant women with anemia among all pregnant women of Armenia at the end of the pregnancy
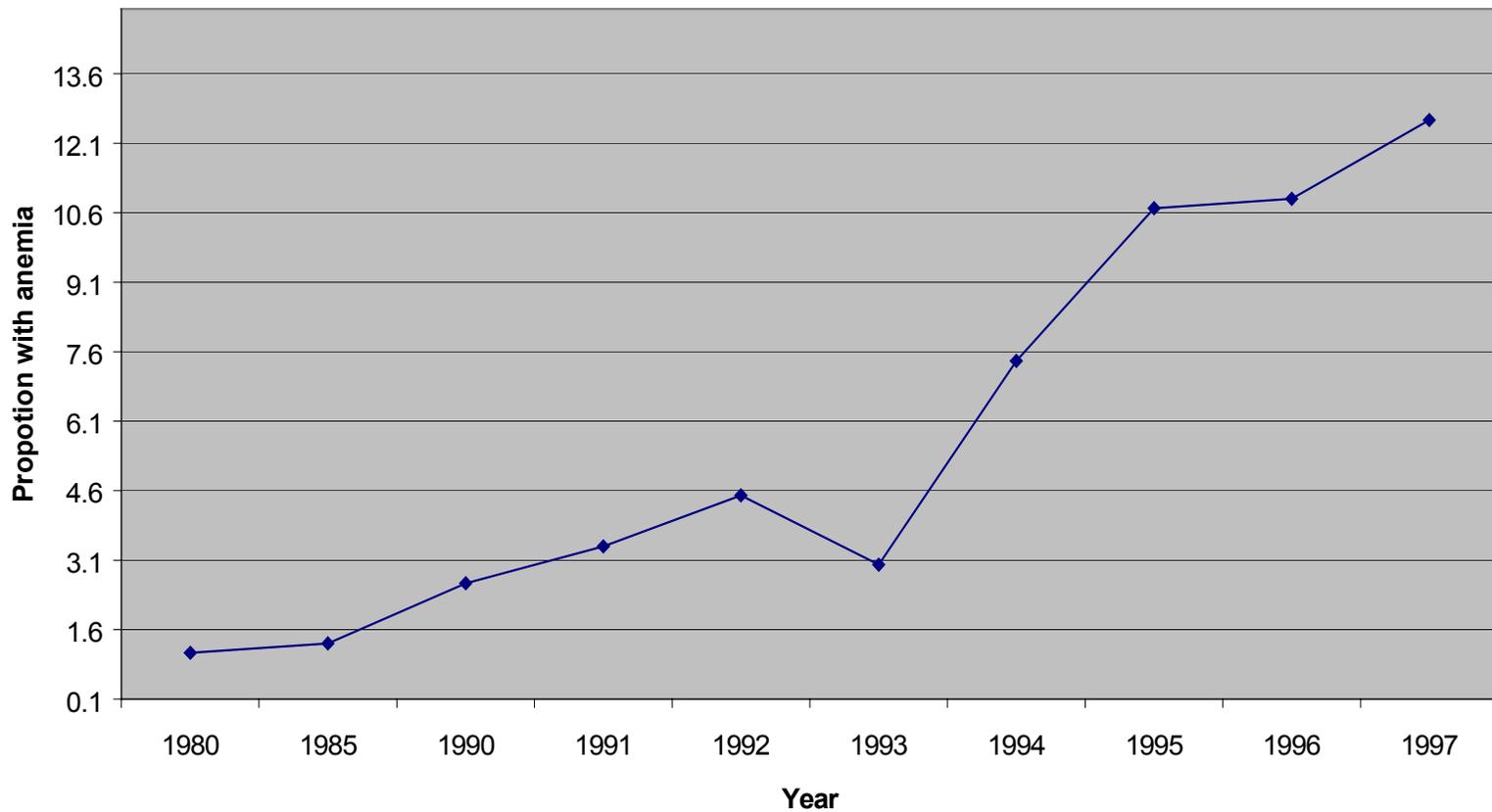
Figure 1

Data source is Ministry of Health, Republic of Armenia

Appendix 1

Figure 2. **Conceptual Framework of Dependent and Independent Variables**


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                    ┌──────────────────────────┐
                    │     IDA in Pregnancy      │
                    └──────────────────────────┘
                                 ▲
                    ┌──────────────────────────┐
                    │       PRACTICES          │
                    └──────────────────────────┘
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                    │       KNOWLEDGE          │
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   ┌──────────────┐   ┌──────────────┐   ┌──────────────┐
   │ Usage of iron│   │  Pregnancy   │   │  Nutrition   │
   │ preparations │   │   History    │   │              │
   └──────────────┘   └──────────────┘   └──────────────┘
        ▲                  ▲                  ▲
   ┌──────────────────────────────────────────────┐
   │       SOCIO – DEMOGRAPHIC FACTORS            │
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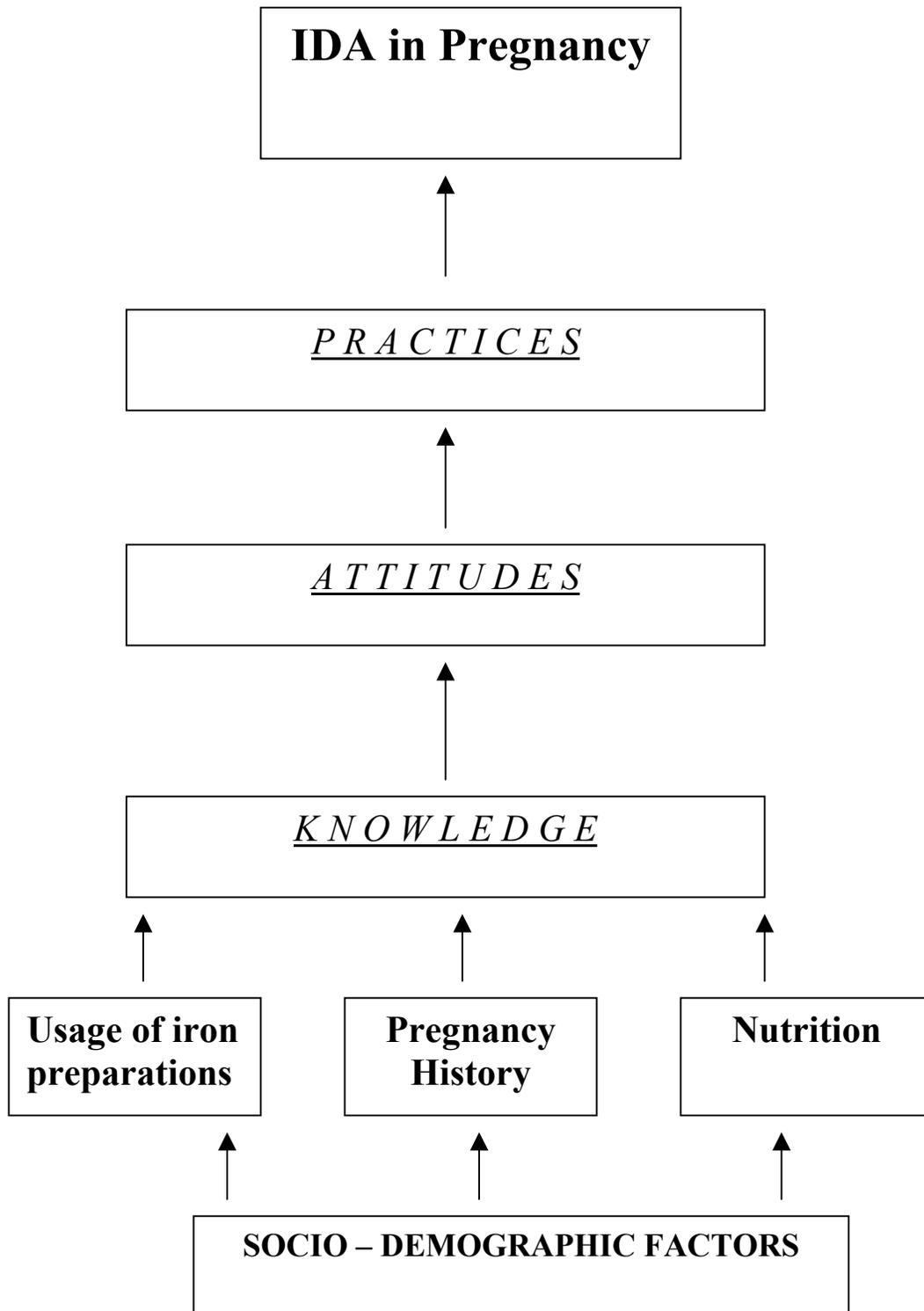
Table 1. **Comparison of Socio-Demographic Factors and Pregnancy History between pregnant women with anemia and without**

	Women with anemia	Women without anemia	Total
Age, mean(std)	**23.6 (3.70)**	**27.2(6.03)**	**24.145**
Age by categories			
18-20	**1.61(1)**	**22.58(14)**	**24.19(15)**
21-25	**4.84(3)**	**38.71(24)**	**43.55(27)**
26-30	**3.22(2)**	**19.35(12)**	**22.57(14)**
30-38	**4.84(3)**	**4.84(3)**	**9.68(6)**
Education			
High school	**1.61(1)**	**17.74(11)**	**19.35(12)**
College	**3.23(2)**	**20.97(13)**	**24.19(15)**
University and <	**9.68(6)**	**46.77(29)**	**56(35)**
%(n) of Health Care Worker	**1.61(1)**	**11.29(7)**	**12(8)**
Average Monthly Expenditures, %(n)			
<50$	**0**	**4.84(3)**	**4.84(3)**
50-100$	**4.84(3)**	**22.58(14)**	**27.42(17)**
101-200$	**4.84(3)**	**35.48(22)**	**40.32(25)**
201-300$	**3.23(2)**	**14.52(9)**	**17.74(11)**
>300$	**1.61(1)**	**6.45(4)**	**8.06(5)**
N of People living in a Household, mean (std)	**4(1.41)**	**4.53(2.18)**	**4.45(2.08)**
Income Index (US$), mean	**42.78(17.34)**	**39.42(29.14)**	**39.90(27.6)**
Gestational age, mean (std)	**6.67(1)**	**5.38(1.73)**	
Gestational age by trimesters % (n)			
First	**0**	**3.28(2)**	**3.28(2)**
Second	**1.64(1)**	**39.34(24)**	**40.98(25)**
Third	**13.11(8)**	**42.62(26)**	**55.74(34)**
Parity (n of pregnancies) %(n)			
I	**4.84 (3)**	**48.39 (30)**	**53.23 (33)**
II	**8.06 (5)**	**20.97 (13)**	**29.03 (18)**
III	**0**	**9.68 (6)**	**9.68 (6)**
IV-VIII	**9.68 (6)**	**6.45 (4)**	**16.13 (10)**
Interval, %(n)	**Less than 2 yrs**		
	2 yrs and more		
Between last and current pregnancy (for 2 & more pregnancies)	**6.45(4)**	**16.13(10)**	**22.57(14)**
	3.22(2)	**20.97(13)**	**24.19(15)**
Between first and second pregnancies (for 3 & more pregnancies)	**1.61(1)**	**16.13(10)**	**17.74(11)**
	0	**0**	**0**
Site of PNC %(n)			
Central	**12.9(8)**	**37.1(23)**	**50(31)**
Far from center	**1.61(1)**	**48.39(30)**	**50(31)**

Table 2. **Comparison of Socio-Demographic Factors and Pregnancy History among Pregnant Women with Different Levels of Knowledge Score**

	% (n) of women with low knowledge score	% (n) of women with medium knowledge score	% (n) of women with high knowledge score
Age, mean(std)	24.25(4.26)	25.2(4.74)	21.29(1.11)
Age by categories %(n)			
18-20	16.13(10)	4.84(3)	3.23(2)
21-25	27.42(17)	8.06(5)	8.06(5)
26-30	12.9(8)	9.68(6)	0
30-38	8.06(5)	1.61(1)	0
Education %(n)			
High school	12.9(8)	4.84(3)	1.61(1)
College	17.74(11)	3.23(2)	3.23(2)
University and <	33.87(21)	16.3(10)	6.45(4)
%(n) of Health Care Worker	6.45(4)	4.84(3)	1.61(1)
Income Index (US$)	36.43(22.50)	40.74(20.79)	57.96(54.87)
Gestational age by trimesters % (n)			
First	3.28(2)	0	0
Second	26.23(16)	9.84(6)	4.92(3)
Third	34.43(21)	14.75(9)	6.56(4)
Parity (n of pregnancies) %(n)			
I	37.1(23)	12.9(8)	3.23(2)
II	14.52(9)	14.52(9)	0
III	6.45(4)	1.61(1)	1.61(1)
IV-VIII	6.45(4)	1.61(1)	0
Interpregnancy interval %(n)	Less than 2 yrs		
	2 yrs and more		
Between last and current pregnancies (for 2 & more pregnancies)	16.13(10)	6.45(4)	0
	11.29(7)	11.29(7)	1.61(1)
Between first and second pregnancies(for 3 & more pregnancies)	8.06(5)	6.45(4)	3.23(2)
	0	0	0
Site of PNC %(n)			
Central	30.65(19)	11.29(7)	8.06(5)
Far from center	33.87(21)	12.9(8)	3.23(2)

Appendix 5

Table3**. Comparison of socio-demographic factors and pregnancy history among pregnant women with different levels of attitude score**

	% (n) of women with low attitude score	% (n) of women with medium attitude score	% (n) of women with high attitude score
Age by categories %(n)			
18-20	**8.06 (5)**	**8.06 (5)**	**8.06(5)**
21-25	**12.9 (8)**	**9.68 (6)**	**20.97(13)**
26-30	**6.45 (4)**	**6.45 (4)**	**9.68(6)**
30-38	**1.61 (1)**	**3.23 (2)**	**4.84(3)**
Education %(n)			
High school	**8.06 (5)**	**6.45 (4)**	**4.84 (3)**
College	**6.45 (4)**	**4.84 (3)**	**12.9 (8)**
University and <	**14.52 (9)**	**16.13 (10)**	**25.81 (16)**
%(n) of Health Care Worker	**1.61 (1)**	**4.84 (3)**	**6.45 (4)**
N of People living in a Household, mean(std)	**4.2(1.56)**	**4.1 (1.3)**	**4.6 (2.2)**
Income Index (US$)	**38.61 (24.3)**	**40.07 (17.24)**	**40.66 (34.97)**
Gestational age by trimesters % (n)			
First	**1.64 (1)**	**0**	**1.64 (1)**
Second	**18.03 (11)**	**9.84 (6)**	**13.11 (10)**
Third	**9.84 1 (6)**	**16.39 (8)**	**29.51 (18)**
Parity (n of pregnancies) %(n)			
I	**22.58(14)**	**12.9(8)**	**18.03(11)**
II	**3.23(2)**	**9.68(6)**	**13.11(10)**
III	**1.61(1)**	**3.23(2)**	**4.84(3)**
IV-VIII	**1.61(1)**	**1.61(1)**	**4.84(3)**
Interpregnancy interval %(n)	**Less than 2 yrs**		
	2 yrs and more		
Between last and current pregnancies (for 2 & more pregnancies)	**6.9 (2)**	**13.79 (4)**	**27.59 (8)**
	6.9 (2)	**17.24 (5)**	**27.59 (8)**
Between first and second pregnancies(for 3 & more pregnancies)	**3.23(2)**	**4.84(3)**	**9.68(6)**
	0	**0**	**0**
Site of PNC %(n)			
Central	**14.52 (9)**	**11.29 (7)**	**24.19 (15)**
Far from center	**14.52 (9)**	**16.13 (10)**	**19.35 (12)**

Appendix 6

Knowledge, Attitudes, Practices of Pregnant Women on Iron Deficient Anemia in Pregnancy

A questionnaire for telephone survey

Hello, my name is ….. I am a student of Public Health Department of AUA. I am interested in gathering information about the opinions and practices of pregnant women with iron-deficient anemia. This information is important for elaborating strategies to improve quality of care provided at prenatal clinics. Your participation in this survey will contribute to this purpose. Your name and telephone number has been obtained from your prenatal consultation clinics randomly. The information you are going to provide will be used only in scientific purposes, your name will remain confidential. The interview will take 10 minutes. Do you agree to be interviewed? Thank you, let's start.

1. How many months (weeks) pregnant are you?

    _____months _____weeks

2. Is it your first pregnancy?

    Yes (*go to the q. #8*)   1
    No   2

3. How many times have you been pregnant?

    2
    3
    4
    more than 4_____

4. How long was the interval between your previous and current pregnancy?

    _____year(s)_____months

    (Ask question #5 only if the woman has had more than 2 pregnancies)

5. How long was the interval between first and second pregnancy?

    _____year(s)_____months

    (Ask question #6 only if the woman has had more than 3 pregnancies)

6. How long was the interval between second and third pregnancy?

    _____year(s)_____months

    (Ask question #7 only if the woman has had more than 4 pregnancies)

7.   Indicate, please, intervals between your rest pregnancies

8. Did your diet change with your pregnancy?

            Yes   1

            No *(go to the q. #9)*   2

8.1 If yes, please specify how_____

_____

9. What are some products which are particularly important during pregnancy in order to prevent IDA of pregnancy ?

_____   _____   _____

_____   _____   _____

Don't know_____88 *(go to the q. #11)*

10. How do you know that these products are important during pregnancy?

From prenatal clinic

                                     prenatal therapeutist   1

                                      gynecologist   2

                                      nurse   3

From other sources   specify_____

11. Please, indicate how often you consume following products. For each please choose one of the following answers:

                                Read answers, only one answer for every product is possible

More than once a day   1

5-7 times a week   2

2-3 times a week   3

Once a week   4

Less than once a week, rarely   5

Never   6

Other frequency, specify……………………………..7

    11.1   Meat   _____

    11.2   Legumes   _____

    11.3   Green Leaf Vegetables   _____

    11.4   Liver   _____

    11.5   Eggs   _____

    11.6   Fruits   _____

12. Where you ever prescribed iron tablets during your pregnancy?

            Yes   1

            No *(go to the q. #16)*   2

13. Did you ever take iron tablets during your pregnancy?

       Yes   1
       No *(go to the q. #15)*   2

14. How long did you take them?
               (circle one answer)

       Less than one week   1
       From one to two weeks   2
       More than two weeks, less than one month 3
       One month and longer   4

(skip to the q. #16)

15. Please explain why you did not take the iron tablets prescribed to you:

_____

_____

16. For the next question please respond true or false. Iron tabs could be always avoided, if a pregnant woman keeps appropriate regimen.

       True   1
       False   2

17. Please, select only the best answer for the next question. Iron-deficiency anemia is the result of

             Read all answers, circle one

     Radiation   1
     poor diet   2
     emotional stress   3
     intensive physical activity during pregnancy   4
     lack of fresh air   5
    other, specify_____

18. For the next question chose, please, all that you think are correct. The most important products to prevent IDA of pregnancy are:

            Read all answers, circle all selected

       18.1   red meat
       18.2   chicken
       18.3   dried fruits
       18.4   spinach
       18.5   carrot
       18.6   dairy products
       18.7   honey
       18.8   apple

19. Keeping a certain interval between two pregnancies is important in order to prevent IDA development. Is this statement true or false

True	1
False	2

20. The length of inter-pregnancy interval should be

Read answers, select the best answer

at least 5 months	1
from 1 year to 2 years	2
at least 2 years	3
4 at least 3.5 years	4

21. From where did you get this information?

Circle an appropriate answer

From prenatal clinic

prenatal therapeutist	1
gynecologist	2
nurse	3

From other sources   specify_____

22. Did (do) you have nausea or vomiting at the beginning of the pregnancy?

Yes	1
No	2

23.   How many cups of coffee do you consume daily in average?

_____

24.   How many cups of tea do you consume daily in average?

_____

For the following statements, please, answer agree or disagree

25. If I were anemic I would not take iron tabs

Agree	1
Disagree	2

(Ask question #26 only if the woman is not anemic)

26. I am not at risk for anemia during pregnancy

Agree	1
Disagree	2

27. It is important for me for to eat what I want during my pregnancv, even if a doctor says I should try other foods to prevent IDA.

Agree   1

Disagree   2

28. If I were anemic, I would take iron tablets combined with vitamins and proper diet to achieve better result

Agree   1

Disagree   2

29. I plan to use contraceptives after delivery to achieve at least two years interval before next pregnancy

Agree   1

Disagree   2

30. What is your completed educational level?

1. School   1
2. College   2
3. Institute/University   3
4. Post-graduate   4
5. Other, specify_____

30.1 Does your education related to medical?

Yes   1

No   2

31. How old are you?

_____years old

32. What are your family average monthly expenditures?

Read answers, circle one

Less than 50$ 1

50-100$ 2

101-200$ 3

201-300$ 4

301-400$ 5

More than 400$ 6

32. How many people are living in your household?

_____people

Thank you very much. Health to you and your children.