PREVALENCE OF THYROID GLAND ENLARGEMENT AMONG
10-17 YEAR OLD FEMALE SCHOOLCHILDREN IN YEREVAN,
ARMENIA: SCREENING SURVEY

Master of Public Health Thesis Project Utilizing Research Grant Proposal Framework

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Abstract

**Background:** Iodine deficiency disorders (IDD) are a critical public health problem in over 130 countries. Iodine deficiency can bring disorders in children, can adversely affect women health, can result in physiological and psychological damages in different age groups and finally can reduce the quality of life of general population. WHO and International Council for Control Iodine Deficiency Disorders (ICCIDD) accepts the prevalence of endemic goiter ((thyroid gland enlargement (TGE)), the Total Goiter Rate as a basic indicator for IDD expressivity. The severity of IDD based on the prevalence of goiter classifies into low, mild, moderate and severe categories. In the information bulletin of ICCIDD Armenia is presented as severe endemic zone for goiter.

**Objectives:** Screening of female adolescents at the age of 10-17 provides an opportunity to establish TGE of a group who are very vulnerable. The present proposal is going to assess the prevalence of TGE goiter among 10-17 year old female in Yerevan, identify the main contributing factors and assess the main complications of TGE within this age group. This will help to fill the research gap in this field, particularly for female adolescents and identify the severity of problem for this target population and also assist in developing prevention and intervention strategies for IDD eradication particularly for this age group in Yerevan, Armenia.

**Methods and materials:** Multistage cluster sampling technique will be used to assess the prevalence of goiter in the analytical cross-sectional survey. 220 female schoolchildren at the age of 10-17 from different schools of Yerevan will participate into the study. Study instrument involves a questionnaire to assess the participants’ iodine related nutritional habits, and also a protocol for physicians to assess the participants health status. Pearson $\chi^2$ test of association and simple and multiple logistic regressions techniques will be used to assess the relationship between the study variables.
Ethical considerations: Clinical Institutional Review Board of the American University of Armenia approved the proposal for the study. The consent for school directors and parental consent/school assent will be distributed at the beginning of each interview to ensure the confidentiality and voluntariness of the study participants.

Research team and budget: Research team will consist of project director, the data implementation and monitoring team, data collectors’ team, data enterers’ team and data analysis team. It is intended to accomplish the study within twelve weeks. The total budget for conducting this survey amounts 4,042,000 AMD.
Specific Aims

The objective of this proposal is to assess the prevalence of thyroid gland enlargement (TGE) among 10-17 year old female schoolchildren in Yerevan Armenia, identify contributing factors and to explore the main complications of TGE within this age group.

The rationale of the study

This age group is vulnerable to the lack of thyroid hormones which are often the result of insufficient iodine intake (Bettendorf, 2002). Adolescence is a period of rapid growth and development of the body, when the hormonal secretion is more activated and the need of nutrients like vitamins and important micronutrients are much higher than in the other age groups (Mallari, 2002; Shabalova, 2003; Styne, 2003). Insufficient iodine intake during puberty may lead to TGE (Battendorf, 2002; Styne, 2003). Female adolescents as future mothers are particularly vulnerable to iodine deficiency. Abnormalities of thyroid gland as a result of TGE may cause irregularity or absences of the menstrual period and inhibit pubertal development and linear growth. Furthermore, it may suppress reproductive function leading to miscarriages, stillbirths and neonatal deaths in the future (Styne, 1995; Styne, 2003). Thus revealing thyroid gland enlargement earlier among female adolescents will help to correct thyroid gland dysfunctions on time and prevent future health complications.

The proposed study has the following research questions:

1. What is the prevalence of TGE among 10-17 year old female schoolchildren in Yerevan?
2. What are the main contributing factors of TGE among 10 -17 year old female schoolchildren in Yerevan?
3. What are the main complications of TGE among 10-17 year old female schoolchildren in Yerevan?
Background

General Background

Iodine deficiency disorders (IDD) are a critical public health problem. Iodine deficiency can bring disorders in children, can adversely affect women health, can result in physiological and psychological damages in different age groups and finally can reduce the quality of life of general population; these all are significant public health concerns (ICCIDD, 2001; Knobel & Medeiros-Neto, 2004; Rakhmanin et al., 2004).

IDD occurs when people do not regularly receive the required minimal amount of iodine through diet (ICCIDD, 2001). Iodine occurs in a variety of chemical forms, the most important being: iodide (I-); iodide (IO3-), and elemental iodine (I2) (Higdton, 2003). It is present in fairly constant amounts in seawater but its distribution over land and fresh water is uneven. Since iodide is soluble, soils are lowest in iodine in areas where there is much rainfall or where glaciers have melted and leached the iodine out of the soil. Because of this fact mountainous countries especially high mountains (e.g., Himalayas, Andes, Alps) and areas of frequent flooding, also many other areas have less iodine in the soil (e.g., Central Africa, Central Asia, much of Europe) (Chandrajith, Dissanayake, & Tobschall, 2005; Higdton, 2003; ICCIDD, 2001).

Iodine is an essential part of the chemical structure of thyroid hormones. Thyroid hormones are produced by thyroid gland. Thyroid hormones are released into the bloodstream and carried by it to target organs, particularly liver, kidneys, muscles, heart, and brain. Thyroid hormones regulate a number of physiologic processes, including growth, development, metabolism, and reproductive function. Formation of normal quantities of thyroid hormones ultimately depends on the availability of adequate quantities of exogenous iodine (Dedov, Melnichenko, & Fadeev, 2000; Higdton, J., 2003).
Most of iodine comes from food. Seafood is usually a good source because the ocean contains considerable amount of iodine. Freshwater fish reflect the iodine content of the water where they habitate, which may be deficient. Other foods vary tremendously in iodine content, depending on the content of iodine in the soil and water where there were grown and also what may have been added in the food. Plants grown in iodine-deficient soil do not have much iodine, nor does meat or other products from animals fed on iodine-deficient plants. Dairy products are usually a good source, but only if the cows get enough iodine (Higdton, J., 2003; Paggi 1998).

Iodine deficiency may lead to hypertrophy (enlargement) of the thyroid gland, also known as goiter. The process begins as an adaptation in which the thyroid is more active in its attempts to make enough thyroid hormone for the body's needs, despite the limited supply of raw material (iodine) (ICCIDD, 2001, Knobel & Medeiros-Neto, 2004). If this adaptation is successful and the iodine deficiency is not too severe, the person may escape with only an enlarged thyroid and no other apparent damage from the iodine deficiency. Older individuals with goiters may develop nodules (lumps) in their thyroids, and sometimes these can begin making too much thyroid hormone when suddenly exposed to iodine. Also, the nodular goiters in iodine deficiency have an increased rate of one type of thyroid cancer, called "follicular cancer”. Goiters can sometimes enlarge enough to produce compression of other neck structures and may need surgical removal for that reason (ICCIDD, 2001; Knobel & Medeiros-Neto, 2004; Knudsen et al., 2002). Other risk factors for endemic goiter than iodine deficiency in foodstuff are family history in goiter (susceptibility to TGE can be inherited), dietary habits, gender (women are more susceptible than men), and high doses of radiation (Knobel & Medeiros-Neto, 2004; Knudsen et al., 2002; Paggi, 1998).

The World Health Organization (WHO) classifies the thyroid gland enlargement (TGE) into the following categories: 0 - when thyroid gland is not palpable; IA - when
thyroid gland is palpated and is not visible; IB - when thyroid gland is palpated and is visible in the normal position of a neck and II grade, when thyroid gland enlargement is visible in a distance (Dedov, Melnichenko, & Fadeev, 2000; ICCIDD, 2001).

WHO and International Council for Control Iodine Deficiency Disorders (ICCIDD) accepts the prevalence of endemic goiter ((thyroid gland enlargement (TGE)), the Total Goiter Rate (TGR) as a basic indicator for IDD expressivity. The severity of IDD based on the prevalence of goiter classifies into low (TGR=0.0%-4.9%), mild (TGR=5.0%-19.9%), moderate (TGR=20.0%-29.9%) and severe (TGE >30.0%) categories (ICCIDD, 2001).

The lack of iodine in the diet is especially harmful for pregnant women, their unborn children and also for breastfeeding women. Iodine deficiency during pregnancy is associated with increased incidence of miscarriages, stillbirths, and birth defects (Johnson, C. A., 2002; Lacka & Lakoma, 2002; Rohmer, 2002; Malkawi, 2002). Even milder deficiencies of iodine during pregnancy, can impede fetal development and lead to physical and mental retardation of fetus). Iodine deficient women who are breastfeeding may not be able to provide sufficient iodine to their infants who are particularly vulnerable to the effects of iodine deficiency (Radetti, Zavallone, Gentili, Beck-Peccoz, & Bona, 2002).

Fetal iodine deficiency is caused by iodine deficiency in mother. One of the most devastating effects of maternal iodine deficiency is congenital hypothyroidism, a condition that is sometimes referred to as cretinism and results in irreversible mental retardation (Hetzel, Mano, 1989; Knobel & Medeiros-Neto, 2004; Radetti, Zavallone, Gentili, Beck-Peccoz, & Bona, 2002).

Infant mortality has increased in areas of iodine deficiency, and several studies have demonstrated an increase in childhood survival when iodine deficiency is corrected (Shabalova, 2003; Willgerodt, Keller, Perschke, Stach, 1997; Zimmermann, 2004). Infancy is a period of rapid brain growth and development. Sufficient thyroid hormone, which
depends on adequate iodine intake, is essential for normal brain development. Even in the absence of congenital hypothyroidism, iodine deficiency during infancy may result in abnormal brain development and, consequently, impaired intellectual development (ICCIDD, 2001; Shabalova, 2003).

Iodine deficiency in children and adolescents is often associated with goiter and hypothyroidism (Bettendorf, 2002). The incidence of goiter rate among children is 4-6%; it peaks in adolescence and is more common in female adolescents (two-three times higher in girls) (Shabalova, 2003). In the regions with iodine deficiency the goiter rate riches to 5-30%, depending on the severity of iodine insufficiency (ICCIDD, 2001). During puberty the need in energy and nutrients increases due to the natural maturation process. As a signal of maturation process the synthesis of hormones activates strongly (Fluery et al., 1999; Puberty and adolescents, 2002; Shabalova, 2003; Styne, 2003; Styne, 1994). Insufficient supply of hormone precursors like inadequate iodine supply may hinder the natural maturation of the body (Battendorf, 2002, Weber, Vigone, Stroppa, Chiumello 2003). TGE and hypothyroidism may result in retarded mental and physical development, as well as failures in development of reproductive system, such as retardation in the development of the secondary sexual features and retarded start of menstrual cycles (menarche) in female adolescents, menstrual cycle’s disorders (Shabalova, 2003; Styne, 1995). These reproductive health abnormalities among female adolescents will lead to complicated pregnancies, stillbirths and miscarriages in the future (Battendorf, 2002; Shabalova, 2003; Styne, 1995; Weber, Vigone, Stroppa, Chiumello 2003).

Schoolchildren with IDD in iodine deficient areas show poorer school performance, lower IQs, and a higher incidence of learning disabilities than matched groups without IDD from iodine-sufficient areas (Battendorf, 2002; Shabalova, 2003).
Inadequate iodine intake may also result in goiter and hypothyroidism in adults (Dedov, Melnichenko, & Fadeev, 2000). Although the effects of hypothyroidism are more subtle in the brains of adults than children, recent research suggests that hypothyroidism results in slower response times and impaired mental function (ICCIDD, 2001).

The WHO has identified 130 countries as having a problem with IDD. Over 2.2 billion people in the world may be at risk of iodine deficiency and recent estimates suggest over one billion experience some degree of goiter. Fifty million are believed to be significantly mentally handicapped as a result of iodine deficiency which is therefore the most prevalent preventable cause of impaired intellectual development in the world today (ICCIDD, 2001; WHO, 2003).

Globally, IDD were estimated to result in 2.5 million Disabilities Adjusted Life Years (DALYs) (0.2% of total). Approximately 25% of this burden occurs in the African region, 17% in South Eastern Asian region, and 16% in Eastern Mediterranean region. Iodine deficiency is controlled through direct supplementation with oral or intramuscular iodized oil, addition of iodine to a vehicle such as irrigation water, or most commonly iodization of salt (WHO, 2002).

Based on the passage of a special resolution at the World Health Assembly in 1990 and subsequent resolutions in 1992 and 1996, the Department of Nutrition for Health and Development (NHD) of WHO has established universal salt iodization programs around the world (ICCIDD, 2001). Universal salt iodization (USI) is as when all salt for human and animal consumption is iodized to the internationally agreed recommended levels (ICCIDD, 2001).

In 1994 the WHO produced a document in collaboration with the United Nations Children’s Fund (UNICEF) and the International Council for Control of Iodine Deficiency Disorders (ICCIDD), which was entitled “Indicators for assessing IDD and their control
through salt iodization.” Its purpose was to provide guidance concerning the use of surveillance indicators for IDD. The document was distributed widely to participants involved in IDD prevention and control (ICCIDD, 2001).

Many countries have established salt iodization as the intervention of choice (national IDD eliminating program), which is considered the easiest and cheapest way of prevention of iodine deficiency. Over the past decade the number of people with access to iodized salt had increased dramatically. The number of countries with national salt iodization programs during this period reached to 128, and out of them 18 countries achieved sustainable elimination of IDD (Delange, Burgi, Chen, & Dunn, 2000). Because of these programs, two-thirds of households living in ID-affected countries now have access to iodized salt (ICCIDD, 2001). Different studies revealed significant decrease in the prevalence of goiter after using iodized salt in the diet particularly in iodine deficient countries (Willgerodt, Keller, Perschke, & Stach, 1997; Zimmermann, 2004; Zimmermann, Wegmuller, Zeder, Torresani, & Chaouki, 2004; Zhao, & van der, 2004).

**Background for Armenia**

Armenia is a mountainous country landlocked from the ocean – the unique natural source of iodine (WHO, 2003). The deficit of iodine in food stuff consumed by the population of Armenia was compensated in former Soviet time by importing iodized salt into the country. After the collapse of the USSR, the receipt of iodized salt was limited for the period of 1992-1995. According to the WHO Global Database on Iodine Deficiency Disorders the goiter prevalence today in Armenia is 25-30% (Branca & Cairella, 1998; WHO, 2003).

In 1995, the UNICEF and the Armenian Ministry of Health started their collaboration for Universal Salt Iodization program and subsequent elimination of IDD in the country. The UNICEF has had considerable experience working with public health services from different
countries in conducting such programs. The planned program primarily aimed to reveal the real prevalence of IDD problems in Armenia and to educate the general public of Armenia on the topic. Another aspect of the program was to gain control over the salt iodization process, its storage, and distribution (Branca & Cairella, 1998; WHO, 2003;).

In 1996, UNICEF provided special laboratory equipment for iodine quality and quantity control in salt. The equipment for stream iodization obtained by UNICEF was installed in 1997. UNICEF also provided one year supply of potassium iodide. In 1996, the Ministry of Health (MoH) of Armenia established a special department of IDD Control in Yerevan. In 1997 UNICEF provided this department with ultrasound and urine iodine laboratory equipment (Branca & Cairella, 1998; WHO, 2003).

In 1995, the MoH of Armenia reported that many mountainous districts of Armenia (Kapan, Sisian, Gugark) with a total of about half a million people had cases of IDD but did not collect any regular statistics. In the same year, UNICEF and the MOH conducted a program of IDD elimination in collaboration with the Republican Endocrinology Center (Branca & Cairella, 1998).

In 1995 the Republican Endocrinology Center conducted a survey on the prevalence of goiter in two target groups: 3211 school-age children (6-12 years) and 633 pregnant women of different regions of Armenia and found that goiter was present in 39.9% of the children (IA 25.5%, IB 7.8%, II 6.6%) and 50.4% of women (IA 26.4%, IB 11.2%, II 12.8%) (ICCIDD/WHO, 2003; WHO, 2003). Six regions had more than 30.0% goiter prevalence and five had moderate prevalence (20.0-30.0%) (Fig.1, 2). In addition, more than 30 cases of cretinism were described in different regions of Armenia. Concentration of iodine in all samples of soil and water collected was not above 0.0001 weight % and iodine was absent in samples of salt collected from the different regions of Armenia (Branca & Cairella, 1998).
Another survey conducted in 1998 by UNICEF in Armenia revealed among 2596 households (15-45 year old female) the total goiter rate in grade 1 was 25.0% and 6.0% in grade 2. Moreover among observed urban residents the goiter rate in grade 1 was 22.0% and rural residents was 28.0%, in grade 2 it was almost the same for rural and urban residents (a little bit high for rural residents). Low iodine urinary had 33.0% percent of observed children. Among pregnant woman this rate was 32.0%. These numbers provide evidence that Armenia is an endemic zone for goiter (ICCIDD/WHO, 2003; Rossi & Branca, 2003).

It is estimated that approximately 84% of Armenian households now have adequately iodized salt; meanwhile the figure was 70% in 1998. In spite of the remarkable increase of the use of iodized salt today there is a considerable variation by region, ranging from a high of 95% of households in Ararat and Armavir Marzes to 59% of households in Tavush Marz (Branca & Cairella, 1998). This variation in iodine content is greater than expected given that there is only one salt plant in Armenia, and the plant is reported to iodize salt and regularly check for adequate iodization (Branca & Cairella, 1998).

There is evidence that non-iodized salt is still imported from Iran or Russia. The lower price of imported salt is the main reason of being widely available and affordable in certain regions. The storage of iodized salt affects its efficiency. It is also known that exposure of iodized salt to moisture diminishes the iodine content (Branca & Cairella, 1998).

In spite of the attempts of the MoH of Armenia and the UNICEF’s remarkable support there is no IDD elimination program currently operating in Armenia. There is lack of effective surveillance, especially in mountainous areas. There is also a need for more effective medical and educational interventions (Branca & Cairella, 1998, IDD prevalence and control data, 2003; WHO, 2003).

A pilot study conducted at “Arabkir” children’s and adolescents polyclinic in Yerevan in July-august, 2005 among 27 female adolescents at the age of 10-17 revealed TGE (goiter)
among 37% of study participants. Out of them 20% were in grade Ia, 50% in grade Ib and 30% in grade II. The distribution of reproductive health development stage was the following: 74.1% normal, 3.7% sexual precocity and 22.2% delayed puberty. The detailed results of the pilot study are presented in the Appendix 1.

The reproductive complications are often the result of iodine insufficiency in childhood and during puberty (Mallari, 2002; Shabalova, 2003; Styne, 1994; Styne, 2003). Clinical manifestations of hidden forms of hypothyroidism often may occur in a more stressful for the body situations such as pregnancy. It means that the best prevention of these types of complications can be the earlier diagnosis of iodine insufficiency condition. From this prospective the adolescents are also vulnerable to the iodine deficiency because of rapid hormonal changes and active maturations during this period (Battendorf, 2002, Weber, Vigone, Stroppa, Chiumello 2003, Styne, 1995). Adolescence is the period of growth that bridges childhood and adulthood. This period includes puberty, or the development of sexual maturity, when a child begins to develop adult secondary sexual characteristics as their hormone balance shifts towards an adult state. The WHO defines adolescence as the period of life between 10 and 20 years of age (Mallari, 2002). In girls, physical changes may begin at 10 years or even at an earlier age. When the girl child's body begins to show maturity, curves develop, the breasts get painful and begin to grow. Hair sprouts in the pubic area and under the arms. That is when the cycle of menstruation begins (menarche). The average age for menarche is considered 12 year old (Puberty and adolescents, 2002; Styne, 1994).

So the goal of this study is to investigate the thyroid gland enlargement among female adolescent schoolchildren, namely at the age of 10-17 years old, when their maturation occurs. The selection of 10-17 age range for the study population is based on the WHO’s definition of the adolescence age range (Mallari, 2002). The upper fence of the age range is
17 instead of 20 because in Armenia the school graduation age range is 17 which correspond to the last (tenth) grade of school education.

The reason on focusing on female schoolchildren is that the lack of iodine occurring during maturation often leads to complications at the reproductive age (Battendorf, 2002, Weber, Vigone, Stroppa, Chiumello 2003; Styne, 1995). Thus it is important to find the iodine shortage from the beginning, before it will manifest in childbearing age. Also the prevalence of goiter is two-three times higher than in boys which emphasize the importance of conducting the survey among the female population of the same age range (Shabalova, 2003). Since there are no studies on this topic conducted in Armenia for this age range, this study will help to fill the research gap in this area and be a source for further researches.

Methods and Materials

Study Design

Cross-sectional one group study design is offered for evaluating the prevalence of thyroid gland enlargement in female schoolchildren at the age of 10-17 at one point in time.

Study Population

The study population is female schoolchildren at the age of 10-17 from different schools of Yerevan. The inclusion criteria are the following:

1. 10-17 year old female schoolchildren from different schools of Yerevan
2. Residency in Armenia

Exclusion criteria are the following:

1. Female children at the age of 10-17, who attend a special auxiliary schools in Yerevan. These children require different approach of investigation and also their
physical health status cannot be controlled in the study. This exclusion is done for the feasibility of the study.

2. Female schoolchildren at the age of 10-17, who attend so called elderly schools in Yerevan. This exclusion is made because of the feasibility of the study. These schools are absent in the lists of schools. Also these schools enroll children from 8th grade, which is 15 year old. It means that only some age range of the study population is involved there.

**Study Settings**

The real study is going to be conducted at different schools in Yerevan. It is required the study be conducted in school period, approximately from 9:00 to 17:00. After the preliminary arrangements of the schools’ directors, the next step will be selection of study participants and individual meeting with their parents. During the meeting with study participants’ parents, their permission for their child participation will be asked and the parental assent forms will be provided to them (where they can learn all the necessary information about the study).

**Sample Size**

Sample size is calculated based on the formula offered for cross-sectional surveys (Aday, 1996). The sample size formula will be: 

\[ n = \frac{Z^2 \cdot p \cdot q}{d^2} \]

For 95% confidence interval (CI) type one error will be \( \alpha = 0.05 \) and \( Z = 1.96 \) (two-sided test).

Since there is no goiter prevalence data for female schoolchildren at the age of 10-17, the assumption was made based on the data for children in recent survey and on literature review. So the goiter prevalence for this age group assumed 40% based on the data of recent surveys on this topic (IDD prevalence and control data, 2003; WHO, 2003).
Thus the parameters are the following: \( p = 0.4; q = 1 - p = 1 - 0.4 = 0.6; \) d-tolerable error assumed 10%.

The preliminary sample size is considered: \( n = \frac{1.96^2 \times 0.4 \times 0.6}{0.1^2} = 92 \)

Considering the design effect of sampling technique the sample size will be adjusted for the expected response, which is preliminary assumed 95% based on the previous survey on this topic (Manukyan, 2003). So the sample size will be:

\[
\frac{92}{0.95} = 97
\]

Considering the cluster design effect of sampling technique, factor 2 has to be applied leading the sample size to 216 (Aday, 1996).

\[
97 \times 2 = 194
\]

Considering the missing values in the questionnaires during analysis, the sample size is increased by 10% (Aday, 1996).

\[
194 + 0.1 \times 194 = 220
\]

**Sampling Methodology**

The recommended survey method is multistage cluster sampling technique recommend by ICCIDD, WHO guideline for program managers of IDD control (ICCIDD, 2001). This will give an equal opportunity to every respondent to be involved in the study. Then randomly assigned school from the overall school list will be considered as one cluster. And from the list of schools databases 10-17 year old female schoolchildren will be randomly selected as the study participants.

According to the National Statistical Center and also to the Ministry of Education’s data obtained from the Yerevan Municipality there are 189 schools in Yerevan.

One tenth of the total schools will be selected to be involved in the survey (Floyd & Flower, 2002). It means that 19 schools (189/10 = 19) will be selected from the total schools’ list for the survey. The systematic sampling technique will be used for the selection of
schools from the overall schools list with the interval 10 (189/19=10). From the total school’s list (enumerated list of schools) one school will be randomly selected. Randomly one number from 1 to 189 will be selected, which will correspond to the particular school and then with the interval 10 in increasing direction from the initial school the next schools will be selected until there will be 19 schools. In case of having starting point at the end of the list or reaching to the end of the list without completing the required number of schools, the selection of the following tenth school will be performed at the beginning of the total schools’ list. This will be the basic list of schools. It is intended to have an additional list of schools for replacement in case of having difficulties, such as refusal by the school administration to get involved their schools in the study. The additional list of schools will be created in the same way as for the basic school list. In case of having the same starting point for the systematic sampling as in the basic list, that starting point will be replaced and another attempt of random selection (from 1 to 189) of the starting point will be performed.

From each school 220/19= 12 female 10 -17 year old schoolchildren will be randomly selected from the school’s enrollees list (obtained from a class journal).

Children in Armenia usually starts attending schools at 7 year old (which is considered the first grade of study), consequently 10, 11, 12, 13, 14, 15, 16, 17 year old females will be enrolled in the 4th, 5th, 6th, 7th, 8th, 9th and 10th grades. After the identification of the school, the next step will be random selection of the classes. After listing and enumerating all the classes from the fourth to tenth grades, three classes will be randomly selected and then four female schoolchildren will be randomly selected from each class from the class journal (after excluding the males’ names from the names of all class enrollees). This will be the basic list. There will also be an additional list of survey participants in case of refusal of participants from the basic list. The additional list will include female schoolchildren from the same class or from the following class one ahead of the same grade
(if it is the last class of that level the first class will be selected as a source of people for replacement). Each person from the basic list will have two replacements from the same age from the additional list.

**Study Instruments**

Interviewer administered questionnaire and a protocol for physicians to assess the health status of the participants connected with goiter and reproductive health are the instrument of the study (Appendices 2, 3).

The questionnaire and the protocol for physicians are developed based on the previous surveys on the topic, where there is a developed guideline for doctors to evaluate the endocrine status of a child (Adamyan, 2003; Branca & Cairella, 1998; Manukyan, 2003).

The questionnaire involves questions about participants’ socio-demographic characteristics (age, residency), general questions (such as questions about family size, financial status of the family) and questions to assess nutritional habits related to iodine consumption.

The protocol for physicians includes two types of questions – patient (participant) reported questions and doctor reported questions. Patient (participant) reported questions (health status and clinical information section), which the physician will ask to the patient, are aimed to assess the occurrence of the symptoms common for goiter. Patient (participant) reported questions are intended to complement the physical examination questions performed by the physicians. Doctor reported questions (physical assessment section) include anthropometric measurements (stature, weight and body-mass index), assessment of the occurrence of symptoms common for thyroid dysfunctions (bradycardia, tachycardia, anemia, tremor of extremities, exophthalmia, hirsutism, dry skin), thyroid gland palpation and assessment of participants’ reproductive health development based on the document of MoH
of Armenia to assess the reproductive health development of female adolescents (Appendix 4). This document is based on using a specific scale -Tanner scale for assessment of reproductive health development of female adolescents (Evers & Heinman, 1990; Shabalova, 2003).

**Anthropometry**

Weight: of all female schoolchildren will be measured with the right portable electronic scale which is the property of the investigators. All children will be weighted with “one layer of clothing”, without shoes and coat.

Stature (height): of all female schoolchildren will be checked on the stadiometres of schools’ medical rooms. It is known that all schools in Yerevan are provided with the weight scales and stadiometres. The investigators will have centimeters in case of absence a stadiometre at school.

Anthropometrical measurements of each participant (Height in cm, weight in kg and body-mass index (BMI) in coefficients) will be compared with the internationally accepted standards of measurements (weight-for-age, stature-for-age and BMI-for-age percentiles) for the particular age group of females (provided in the CDC-growth charts and attached to the instrument) (CDC, 2005).

**Thyroid gland palpation**

Thyroid gland palpation will be performed to evaluate the presence of palpable and visible goiter. The findings will be recorded based on the WHO’s goiter classification: grade 0 (no goiter), grade I A (goiter is palpable but not visible) and grade I B (goiter is palpable and visible in the normal position of neck) and grade II (goiter is perceptible form the distance) (ICCIDD, 2001).
There are other more advanced methods, such as hormonal analysis, ultrasound or median urinary rate of iodine to evaluate goiter and thyroid function (ICCIDD, 2001). However these methods are expensive and cannot be affordable for this study.

Several studies demonstrated thyroid gland palpation as an effective and cost-effective way of measuring TGE (goiter) especially in field surveys conducted in iodine deficient regions (Castaneda, et al., 2002; Kasatkina, Shilin, Matkovskaiia, & Pykov, 1993; Nordmeyer, Simons, Wenzel, & Scholten, 1998; Peterson et al., 2000; Zimmermann, Saad, Hess, Torresani, & Chaouki, 2000). These studies claim that thyroid gland palpation has almost 70-85% specificity and 65-95% sensitivity. Moreover thyroid gland palpation in accordance with thyroid gland ultrasound has 100% specificity for detecting TGE (goiter) (Castaneda, et al., 2002).

The instrument was pretested and also was used during the pilot study conducted among 27 female adolescents at the age of 10-17. No major problems related to the content of the instrument were observed and no actual changes were made after piloting the instrument.

Assessment of the development of the secondary sexual features

Generally assessment of the development of the reproductive health among female adolescences consists of clinical (physical), laboratory and instrumental examinations (Shabalova, 2003). Clinical examination involves assessment of the secondary sexual features, which can give initial and very important information about the reproductive health development of the female adolescent. Assessment of the secondary sexual features is performed according to the document of MoH in, which is based on the Tanner scale (offered by Tanner in 1969 and reviewed by Frasier in 1980), to assess the reproductive health development of female adolescents. This document involves assessment of the development of mammal glands, pubic and armpits (axial) hair sprouts and menarche. The next more
advanced assessments of the reproductive health development among female adolescence includes measuring sex-hormone levels in blood (laboratory analysis) and ultrasound, X-ray and other instrumental analysis of internal reproductive organs (uterus, ovaries and tubes) (Evers & Heineman, 1990; Shabalova, 2003). Laboratory and instrumental analysis are very expensive and cannot be affordable in this study. The clinical assessment of the secondary sexual features is the most cost-effective approach (it requires only manpower- physician) and is very accurate for gaining the preliminary information about the reproductive health development of female adolescents particularly in screening surveys (Evers & Heineman, 1990; Shabalova, 2003).

Two licensed doctors will perform both thyroid gland palpation and physical examination (assessment of the secondary sexual features) simultaneously for each participant in the study. These will give an opportunity to minimize the diagnostic errors and increase inter-rater reliability (Aday, 1996). Cronbach’s alpha will be calculated to test the agreement between observers.

Study Variables

The independent variables of the study are the followings: type of salt used, usage of iodine supplements, usage of imported/ canned fish, family history in goiter, BMI and financial status of the family. Iodized salt is considered the “Extra” salt, based on the estimation (Adamyan, 2003, Branca & Cairella, 1998). Usage of iodized salt will be measured binary scale with yes or no answers. Usage of imported/ canned fish will be assessed with binary scale (yes or no answers). Family history and goiter will be measured with yes or no answers. BMI-for-age will be categorized as underweight (BMI < 5th percentile), normal (5th ≤ BMI < 85th percentiles), at risk of overweight (85th ≤ BMI < 95th percentiles), overweight (BMI ≥ 95th percentile). Stature will be categorized as short stature
(stature< 5th percentile), normal stature (5th ≤ stature-for-age<95th percentiles) and tall stature (stature-for-age≥95th percentile). The classification of stature and BMI into the following categories is performed based on the internationally accepted standards (CDC, 2005). Financial status of the family will be assessed categorically as very good, good, middle, bad, very bad.

The dependent (outcome) variables are the thyroid gland enlargement and reproductive health development. Thyroid gland enlargement will be assessed in binary scale into (yes (present) or no (absent)). Reproductive health development will be assessed in nominal scale into the following categories: normal puberty, sexual precocity, delayed puberty.

Table 1. Independent and dependent variables.

<table>
<thead>
<tr>
<th>Dependent Variable</th>
<th>Type</th>
<th>Measures</th>
</tr>
</thead>
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<tr>
<td>TGE</td>
<td>Binary</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Reproductive health development</td>
<td>Nominal</td>
<td>Normal, sexual precocity, delayed puberty</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>Type</th>
<th>Measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using iodized salt</td>
<td>Binary</td>
<td>Yes/No</td>
</tr>
<tr>
<td>FH in goiter</td>
<td>Binary</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Stature (height)</td>
<td>Ordinal</td>
<td>Short, Normal, Tall</td>
</tr>
<tr>
<td>BMI</td>
<td>Ordinal</td>
<td>Underweight, normal, overweight</td>
</tr>
<tr>
<td>Financial status</td>
<td>Ordinal</td>
<td>Very good, good, middle, bad, very bad</td>
</tr>
</tbody>
</table>

The pilot study revealed the measurement scale of study variables was appropriate for offered statistical techniques for data analysis and did not need any changes.
**Analysis**

Data will be entered into a computer and analyzed using Stata 7.0 and SPSS 11.0 software. Double entry and subsequent cleaning will be used to ensure the accuracy of the data entry (Aday, 1996; Floyd & Fowler, 2002). Statistical analysis will be used to assess the prevalence of TGE (goiter). The explanatory variables will include some of established risk factors for goiter that have been found in previous studies (Adamyan, 2003; Branca & Cairella, 1998; Manukyan 2003; Paggi, 1998).

Descriptive statistics will be used to describe the characteristics of study participants, such as age, type of salt used, family history of goiter, financial status and so forth.

$\chi^2$ test of association will help to assess the relationship of each independent variable with the outcome, and also to test the association between two outcome variables, TGE and reproductive health development (Aday, 1996; Pagano, 1992). For studying factors affecting TGE and finding the factors predicting the occurrence of TGE (goiter) logistic regression model will be appropriate due to binary character of the outcome variables. Simple and multiple logistic regression models will be used to test the association of dependent and independent variables (Aday, 1996; Pagano, 1992).

**Study Limitations**

The limitations of the study can be classified into three groups - the limitations leading to selection bias, limitations leading to information bias and limitations leading to instrumentation bias.

Excluding auxiliary and elderly schools’ female schoolchildren from the study population may create a selection bias. The reasons for excluding them are already explained in the paper.
Since the major part of the study instrument consists of the physical examination some diagnostic errors can be anticipated. To reduce these fallacies and to increase the validity of the instrument at least two physicians will examine the same person simultaneously, and then the Cronbach’s alpha will be calculated to assess the agreement between raters (doctors).

Absence of advanced laboratory and instrumental analysis because of their financial infeasibility can impede more accurate diagnosis of the cases. This fact may be a cause of instrumentation bias.

Latency of clinical manifestation of goiter and reproductive health development disorders may be a limitation of study instrument. Since these health disorders require time for their manifestation, some latent cases may not be estimated during the study, and can be developed some time later.

Several contributing factors other than mentioned in the paper, such as some genetic disorders, other concurrent diseases with TGE, can act as potential confounders. They can not be controlled in this study and may be a source of residual confounding.

**Ethical Considerations**

Clinical Institutional Review Board of American University of Armenia approved this research grant proposal.

The topic of this study is sensitive due to some inconveniences related to the physical examination of the study participants. The thyroid gland palpation and medical examination for assessing reproductive health development of the study participant can create some discomfort and thus result in unwillingness to participate in the study. In order to assess these issues a written parental consent/child assent will be provided to study participants and their mothers (or other caregivers) and also a written consent for the schools’ directors will be
provided prior to study (Appendices 5-8). The content of the parental consent/child assent includes the research nature, the risks and benefits of participating in the study, and explains that participation is voluntary. The consent for the schools’ directors explains the purpose of the study, its risks and benefits and confidentiality and voluntaries issues, and asks the directors permission to include their schoolchildren for participating in the survey.

**Research Team and Timeline**

Research team will consist of project director, who will coordinate the data implementation and monitoring team, data collectors’ team, data enterers’ team and data analysis team (Appendix 9). Project director will control finances and allocate them according to each team needs. Data implementation and monitoring team will be responsible for selecting schools, making arrangements with schools directors, selecting the study participants and making arrangements with their parents. There will be four people in this team, a manager and three members. They will coordinate the work of data collectors. Data collectors’ team will consist of licensed medical doctors (only endocrinologists) who will conduct interviews and perform physical examination of study participants. It is intended to involve two endocrinologists in this study. They will work in pairs. Data collectors will undergo a special training before studying the actual survey.

Data enterers’ team will involve two people, who are aware with SPSS. They will be responsible for entering the data into computer and cleaning the data.

A statistician will analyze the data and make a report. It is intended to accomplish the project within three months (Appendix 9). The time will be allocated considering some organizational issues before starting the fielding (arrangements and meeting with school directors, meeting with schoolchildren parents, meeting with data collectors and their training), data collection process, data entry and cleaning, data analysis and final report.
Budget

Budget narrative

Budget is calculated taking into the consideration salaries for employees, office space and equipment (renting), electro energy, telephone and other communal expenses, transportation, Xerox, stationeries, incentives for study participants and other expenses (Attachment 4). Salaries of team members are based on the mean level of salaries existing in the international organizations and non-governmental organizations in Armenian market. Project director and implementation and monitoring team members will receive monthly salaries. Data collectors and data enterers will be paid for each complete interview. The fee for service in the children’s polyclinic is 2000 AMD. Since the data collectors will be the doctors they will be paid based on this approach, and the payment for each complete interview is intended to be 2000+1000=3000 AMD. Since it is decided to involve 19 schools in the study, it is preliminarily planned to spend 15 km travel on each school on average, and 100 km for other unexpected reasons, thus the final travel will be 15*19+100= 385, approximately 400 km). Considering the fact that 1 km for taxi travel is 100AMD on average in Armenian market, the total expenditure on travel will be 400*100=40 000 AMD. Fee for office renting with computers are based on the average price of this accommodations renting in Armenian market. Electricity expenses are calculated approximately considering the charge of computers and other electricity expenses such as refrigerator, air conditioners and so forth. Since there are 220 study participants it is preliminarily intended to have 220 incentives, with 1000 AMD price for study participants overall 220*1000= 220 000 AMD.

It is intended to allocate resources for portable electronic scales, for communal expenses, other unexpected expenses as well. Considering all the above mentioned factors the total sum of all expenditures is 4,042,000 AMD.
Since it is planned to accomplish the project within three months during calculation of budget this issue was taken into account.

WHO/ICCIDD estimated Armenia is an endemic zone of goiter. All above mentioned factors support that female adolescents as future mothers are particularly vulnerable to iodine insufficiency. Thus the early investigation of thyroid gland abnormalities will help to prevent short as well as long term health complications. Moreover no researches have conducted in this field for this particular age range in Armenia. This proposal to investigate the TGE among female adolescents at the age of 10-17 year old will help to assess the situation of goiter within this age group and also to fill the research gap in this area for Armenia. Allocation of financial resources amounted 4,042,000 AMD will help to conduct the study and understand the situation of goiter in female adolescents in Yerevan, Armenia. The findings of the study will serve as a good source of information for developing prevention and intervention strategies for IDD eradication particularly for female adolescents at the age of 10-17 in Yerevan, Armenia.
## Budget

<table>
<thead>
<tr>
<th>Required resources</th>
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<th>Cost of a unit/item in AMD</th>
<th># of required</th>
</tr>
</thead>
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<td>Project director</td>
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</tr>
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<td>monthly fee for renting</td>
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<td>Computers (renting)</td>
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</tr>
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<tr>
<td><strong>Total cost</strong></td>
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<td>Other communal expenses</td>
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<td><strong>Total cost</strong></td>
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<td><strong>Transportation</strong></td>
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<td>Xerox</td>
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<td>Required resources</td>
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<td></td>
</tr>
<tr>
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<td>-------------------</td>
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<td></td>
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<td>Salaries for employees</td>
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<td></td>
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<tr>
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<tr>
<td>Transportation</td>
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<td></td>
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<tr>
<td>Portable electronic scales</td>
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<td></td>
</tr>
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<td>Incentives for study participants</td>
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<td>Other expenses</td>
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<td><strong>Total cost in of all required resources in AMD</strong></td>
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References


Figures

Figure 1. The Prevalence of Goiter in Different Regions of Armenia

Figure 2. The Prevalence of Goiter in Different Regions of Armenia

Appendices

Appendix 1  Pilot Study Results

Administrative/General

A pilot study was conducted at “Arabkir” children’s polyclinic in Yerevan because of the unavailability of schools in summer time. The schools in Yerevan are officially closed from 25th of May. The study could not be conducted earlier due to some organizational problems. It was preliminarily intended to interview approximately 25-30 female schoolchildren at the age 10-17 visiting “Arabkir” children’s and adolescents’ polyclinic in summer time. Female adolescents usually come to polyclinic with their parents (often with mother). Pilot study was conducted from July 22 from August 13 at the above mentioned polyclinic. After the preliminary introduction the participant and her parent (or caregiver) received the parental consent/children assent. There haven’t been any refusals from the study participants, the response rate was 100%, and overall there were twenty seven completed interviews.

Ethical considerations.

Clinical Institutional Review Board of American University of Armenia approved this pilot study. The topic of this study is sensitive due to some inconveniences related to the physical examination of the study participants. The thyroid gland palpation and medical examination for assessing reproductive health development of the study participant can create some discomfort and thus result in unwillingness to participate in the study. In order to assess these issues a written parental consent/child assent form was provided to the pilot study participants and their mothers (caregivers) prior to interview. The consent included the research nature, the risks and benefits of participating in the study, and explained that participation was voluntary.
American University of Armenia  
College of Health Sciences

PARENTAL CONSENT/CHILD ASSENT  
The prevalence of thyroid gland enlargement among 10-17 year old female schoolchildren in Yerevan. Armenia. Screening Survey.

Explanation of Research Project: Good morning/afternoon. My name is Hripsime Martirosyan. I am a medical doctor and second year MPH student of the American University of Armenia, department of Public Health. As a part of my course requirement, I am conducting a research project. The purpose of this research project is to assess the prevalence of thyroid gland enlargement (goiter) and to examine the association of the goiter and reproductive health disorders among 10-17 years old female schoolchildren in Yerevan. Female 10-17 year old schoolchildren will be eligible to participate in the research project. Your child has been chosen randomly as a visitor of “Arabkir” children’s policlinic. The study protocol includes the conduction of an interview using the questionnaire, assessment of thyroid gland size (it is a small gland in front of the throat) through palpation and physical examination. Physical examination means assessment of your child’s different body parts’ development and function through observation and palpation. The details about physical examination are given in the document for assessing the sexual development of female adolescents. Here is the document. The interview and physical examination will take place in a separate room, in the medical room and no other people except the research investigators will be present during the examination. The interview and physical examination will take place only once and last about 10-15 minutes. Your child has the right to stop the interview and physical examination at any time she wants. We appreciate your child’s participation in this study. The information given by your child will be useful and valuable for this research.

Risk/Discomforts. There is no high risk for your child’s participation in this study. There is some discomfort associated with thyroid gland palpation and physical examination. Otherwise the research process risk and inconveniences are the same as encountered in your child’s daily life.

Benefits. Your child will directly benefit from the participation in this survey in a sense that in cases of finding thyroid gland enlargement (goiter) or finding any kind of health abnormalities you will informed and your child will be referred to the proper specialist for more detailed diagnosis. The individual information provided by your child will help to evaluate the current situation with thyroid gland enlargement in Yerevan, and develop preventive strategies.

Confidentiality. The interviews will be conducted anonymously without recording any identifying information such as your child’s name, address, or telephone number. Your child’s individual responses will only be checked by the Public Health department of the American University of Armenia. Summery information that does not permit the identification of individuals may be submitted to the Ministry of Health of Armenia. Your child’s confidentiality and anonymity will always be protected.
Voluntariness: Your child’s participation in this study is voluntary. It is your and your child’s decision whether to participate in the study. Your child has the right to stop providing information at any time she wishes or skip any question she considers inappropriate. Your child’s refusal to participate in the study or your child’s decision to withdraw from the study at any time will not affect her in anyway.

Whom to contact: If you have any questions or want to talk about this research study you may call the person who is in charge for the study: Varduhi Petrosyan, Associate professor at the Public Health department, phone number (3741) 512564 or Yelena Amirkhanyan, Teaching Associate at the Public Health department, phone number (3741) 512568. The person in charge of the study will answer to your questions.
The Prevalence Of Thyroid Gland Enlargement Among 10-17 Year Old Female Schoolchildren In Yerevan.
Armenia: Screening Survey
The Prevalence Of Thyroid Gland Enlargement Among 10-17 Year Old Female Schoolchildren In Yerevan. Armenia: Screening Survey
Descriptive statistics

General characteristics of study participants.

The mean age of the participants was 13.6 years. About 56% of participants were from Yerevan and the rest (44.0%) were from various marzes of Armenia. About 4% of participants assessed their family’s financial status as very good, 33% good, 59% middle and 4% bad. About 96% were using iodized salt, about 81% didn’t like imported seafood (canned or frozen) and 19% eat imported seafood. About 92% had never used any type of iodine supplements and only 7% used them. Only about 4% of participants currently use iodine supplements and 96% do not use any of them. The brief characteristics of study participants are given in the Table 1.

Table 1. General characteristics of study participants

<table>
<thead>
<tr>
<th>Characteristic (%)</th>
<th>Number (n)</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
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<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>3.70</td>
</tr>
<tr>
<td>11</td>
<td>5</td>
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<tr>
<td>12</td>
<td>3</td>
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<td>13</td>
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<td>14.81</td>
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<td>14</td>
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</tr>
<tr>
<td>17</td>
<td>3</td>
<td>11.11</td>
</tr>
<tr>
<td>Total</td>
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<tr>
<td>City of permanent Residence</td>
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<tr>
<td>Yerevan</td>
<td>15</td>
<td>55.56</td>
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<tr>
<td>Other</td>
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<td>44.44</td>
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<tr>
<td>Total</td>
<td>27</td>
<td>100.00</td>
</tr>
<tr>
<td>Use of iodized salt</td>
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<tr>
<td>Yes</td>
<td>26</td>
<td>96.30</td>
</tr>
<tr>
<td>Don’t know/difficult to answer</td>
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<tr>
<td>Family’s financial status</td>
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<td>Very good</td>
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<td>Middle</td>
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<tr>
<td>Bad</td>
<td>1</td>
<td>3.70</td>
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The Prevalence Of Thyroid Gland Enlargement Among 10-17 Year Old Female Schoolchildren In Yerevan. Armenia: Screening Survey
The Prevalence Of Thyroid Gland Enlargement Among 10-17 Year Old Female Schoolchildren In Yerevan. Armenia: Screening Survey

<table>
<thead>
<tr>
<th></th>
<th>No, do not like</th>
<th>22</th>
<th>81.48</th>
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<td>Use of imported seafood (canned or frozen)</td>
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<td>5</td>
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<td>7.41</td>
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<td>Ever use of iodine supplements</td>
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<td>Yes</td>
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<td>3.70</td>
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<td>27</td>
<td>100.00</td>
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</table>

*Health status and clinical information of study participants.*

About 59% of pilot study participants were having menses and the mean age of menarche (start of menstruation) was 12.2 years. About 15% have ever been told by the doctor having goiter and about 15% had family history (FH) in TGE (goiter). About 18% of menstruated participants mentioned any type of menstrual disorders.

The mean weight of study participants was 52.4 kg, the mean stature (height) was 156.2 cm and the mean BMI was 21. Based on the stature-of-age and BMI-for-age classification the participants anthropometric measurements were the following: about 4% had short stature, about 89% had normal stature and about 7% had tall stature. Based on the BMI assessment about 7% of participants were underweight, 67% had normal BMI, 15% were considered at risk of overweight and 11% were overweight. The brief characteristics of study participants health status and clinical assessment are given in the Table 2.
Table 2. Health status and clinical assessment characteristics of study participants.

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<td>16</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>5.88%</td>
</tr>
<tr>
<td>11</td>
<td>1</td>
<td>5.88%</td>
</tr>
<tr>
<td>12</td>
<td>9</td>
<td>52.94%</td>
</tr>
<tr>
<td>13</td>
<td>5</td>
<td>29.41%</td>
</tr>
<tr>
<td>14</td>
<td>1</td>
<td>5.88%</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.00%</td>
</tr>
<tr>
<td><strong>TGE (goiter) in history</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4</td>
<td>14.81%</td>
</tr>
<tr>
<td>No</td>
<td>22</td>
<td>81.48%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>1</td>
<td>3.70%</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.00%</td>
</tr>
<tr>
<td><strong>FH in TGE (goiter)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>8</td>
<td>29.63%</td>
</tr>
<tr>
<td>No</td>
<td>17</td>
<td>62.96%</td>
</tr>
<tr>
<td>Don’t know</td>
<td>2</td>
<td>7.41%</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.00%</td>
</tr>
<tr>
<td><strong>Stature</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short stature</td>
<td>1</td>
<td>3.70%</td>
</tr>
<tr>
<td>Normal</td>
<td>24</td>
<td>88.89%</td>
</tr>
<tr>
<td>Tall stature</td>
<td>2</td>
<td>7.41%</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.00%</td>
</tr>
<tr>
<td><strong>BMI</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight</td>
<td>2</td>
<td>7.41%</td>
</tr>
<tr>
<td>Normal</td>
<td>18</td>
<td>66.67%</td>
</tr>
<tr>
<td>At risk of overweight</td>
<td>4</td>
<td>14.81%</td>
</tr>
<tr>
<td>Overweight</td>
<td>3</td>
<td>11.11%</td>
</tr>
<tr>
<td>Total</td>
<td>27</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

*Prevalence of TGE (goiter) and reproductive health developmental stage.*

According to the pilot study results the prevalence of TGE (goiter) was 37%, out of which 20% in grade IA, 50% in grade IB and 30% in grade II. The distribution of reproductive health development stage was the following: 74.1% normal, 3.7% sexual precocity and 22.2% delayed puberty.
Association between independent variables and outcome.

Table 3. Association between independent variables and outcome (TGE) and TGE and Reproductive Health development (RHD) stage.

<table>
<thead>
<tr>
<th>Independent variable</th>
<th>TGE n=10</th>
<th>No TGE n=17</th>
<th>Pearson (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of iodized salt</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, n=26</td>
<td>10 (38.5%)</td>
<td>16 (61.5%)</td>
<td>0.61</td>
</tr>
<tr>
<td>Don’t know/difficult to answer, n=1</td>
<td>0 (0.0%)</td>
<td>1 (100.0%)</td>
<td>0.43</td>
</tr>
<tr>
<td>FH in goiter</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, n=8</td>
<td>4 (50.0%)</td>
<td>4 (50.0%)</td>
<td>1.14</td>
</tr>
<tr>
<td>No, n=17</td>
<td>5 (29.4%)</td>
<td>12 (70.6%)</td>
<td>(0.56)</td>
</tr>
<tr>
<td>Don’t know/difficult to answer</td>
<td>1 (50.0%)</td>
<td>1 (50.0%)</td>
<td></td>
</tr>
<tr>
<td>Family’s financial status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very good, n=1</td>
<td>0 (0.0%)</td>
<td>1 (100%)</td>
<td></td>
</tr>
<tr>
<td>Good, n=9</td>
<td>4 (44.4%)</td>
<td>5 (55.6%)</td>
<td>1.4</td>
</tr>
<tr>
<td>Middle, n=16</td>
<td>6 (37.5%)</td>
<td>10 (62.5%)</td>
<td>(0.71)</td>
</tr>
<tr>
<td>Bad, n=1</td>
<td>0 (0.0%)</td>
<td>1 (100%)</td>
<td></td>
</tr>
<tr>
<td>Stature</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short stature, n=1</td>
<td>0 (0.0%)</td>
<td>1 (100.0%)</td>
<td>0.73</td>
</tr>
<tr>
<td>Normal stature, n=24</td>
<td>9 (37.5%)</td>
<td>15 (62.5%)</td>
<td>(0.69)</td>
</tr>
<tr>
<td>Tall stature, n=2</td>
<td>1 (50.0%)</td>
<td>1 (50.0%)</td>
<td></td>
</tr>
<tr>
<td>BMI</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Underweight, n=2</td>
<td>1 (50.0%)</td>
<td>1 (50.0%)</td>
<td></td>
</tr>
<tr>
<td>Normal weight, n=18</td>
<td>6 (33.3%)</td>
<td>12 (66.7%)</td>
<td></td>
</tr>
<tr>
<td>At risk of overweight, n=4</td>
<td>1 (25.0%)</td>
<td>3 (75.0%)</td>
<td>(0.65)</td>
</tr>
<tr>
<td>Overweight, n=3</td>
<td>2 (66.7%)</td>
<td>1 (33.3%)</td>
<td></td>
</tr>
<tr>
<td>Assessment of RHD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Normal, n=20</td>
<td>7 (35.0%)</td>
<td>13 (65.0%)</td>
<td>(1.06)</td>
</tr>
<tr>
<td>Sexual precocity, n=1</td>
<td>0 (0.0%)</td>
<td>1 (100.0%)</td>
<td>(0.59)</td>
</tr>
<tr>
<td>Delayed puberty, n=6</td>
<td>3 (50.0%)</td>
<td>3 (50.0%)</td>
<td></td>
</tr>
</tbody>
</table>

The pilot study demonstrated that there was not statistically significant ascension between TGE and iodized salt consumption, defined through Pearson chi² test of association. Almost all the participants (96.3%) were using iodized salt and among those 38.5% had TGE and 61.5% didn’t have TGE (Pearson chi² (1) = 0.61 and Pr=0.43). The pilot study also
revealed no statistically significant association between TGE and FH in goiter (Pearson chi$^2$ (2) = 1.14 and Pr=0.56); (Pearson chi$^2$ (4) = 0.73 and Pr=0.69); BMI and TGE, Pearson chi$^2$ (5) = 1.63 and Pr=0.65) and TGE and RHD Pearson chi$^2$ (6) = 1.06 and Pr=0.59). The absence of the relationship of the mentioned variables with the outcome can be explained with the small sample size. In case of the large sample size the relationship of the predicted variables and TGE can be analyzed more thoroughly revealing the actual association between them. Also the small sample size didn’t allow using more accurate statistical analysis such as simple and multiple logistic regressions.
Appendix 2  Questionnaire (English version)

American University of Armenia  
College of Health Sciences

Prevalence of the thyroid gland enlargement among 10-17 year old female schoolchildren in Yerevan

ID number ____________________
Date of interview (day, month, year) ____________________
Starting time: ________

Socio-Demographic

1. What is your age? ____________________

2. Birthplace: □ Yerevan  □ Other, please specify ____________________

3. City of permanent residence: □ Yerevan  □ Other, please specify ____________

Nutrition

4. How would you rate your consumption of salt?
   □ I avoid foods rich in salt
   □ I do not pay attention to the amount of salt in my diet
   □ I eat moderate quantity of salt
   □ I eat lot of salt
   □ Don’t know/difficult to answer

5. What type of salt is often used in food preparation in your home?
   □ "Big salt” made in Armenia
   □ Salt from Ukraine
   □ Salt from Iran
   □ “Extra” grinded salt made in Armenia
   □ Don’t know/difficult to answer

6. What type of salt do you use as a table salt?
   □ "Big salt made in Armenia
   □ Salt from Ukraine
   □ Salt from Iran
   □ "Extra” grinded salt made in Armenia
   □ Don’t know/difficult to answer

7. Do you eat imported seafood (canned or frozen)?
   □ No, I do not like them (go to question 9)
   □ No, my parents do not buy them (go to question 9)
   □ Yes
8. If yes, please specify how often you eat them.

<table>
<thead>
<tr>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Daily</td>
</tr>
<tr>
<td>Daily seasonal</td>
</tr>
<tr>
<td>Weekly</td>
</tr>
<tr>
<td>Weekly seasonal</td>
</tr>
<tr>
<td>Monthly</td>
</tr>
<tr>
<td>Monthly seasonal</td>
</tr>
<tr>
<td>Yearly</td>
</tr>
<tr>
<td>Yearly seasonal</td>
</tr>
</tbody>
</table>

9. Have you ever used any type of iodine supplements? (check all that apply)

- Iodine tablets
- Iodine droppings
- Oil iodine solution injections
- Other
- None of the mentioned above
- Don’t know/difficult to answer

10. Do you currently use iodine supplements?

- Iodine tablets
- Iodine droppings
- Oil iodine solution injections
- Other
- None of the mentioned above
- Don’t know/difficult to answer

**General information**

11. How many people are living at your family including you? ________________

12. How many children do your parents have including you? __________________

13. How would you assess your families’ current living financial status?

- Very good
- Good
- Middle
- Bad
- Very bad
- Don’t know/difficult to answer

14. Has any member of your family have the following items in working condition?

- Bathroom at home
- Hot water at home
- Multicolor TV
- Video
- Automatic washing machine
- Telephone
- Personal computer
- Satellite
- Cottage
- Cell phone
- Automobile
- None of the mentioned above
A protocol for a physician to assess the health status of 10-17 year old female schoolchildren aimed to reveal goiter and to assess the reproductive health development

Health Status and Clinical Information

15. Do you menstruate now?  □ Yes □ No (go to question 21).
16. When did your menstruation start? _______________
17. Was your menstruation regular at the beginning?  □ Yes □ No
18. Do you menstruate regularly now?  □ Yes □ No (please clarify) _______________
19. Do you have menstrual disorders?  □ Yes □ No (go to question 21)
20. Do you have the following complains during menstruation generally? (The doctor checks all that apply reading the information in the brackets for a child).
   □ Amenorrhea (absence of menstruation six months or more)
   □ Opsomenorrhea (light menstruation)
   □ Menorrhagea (menstrual bleeding lasts more than seven days)
   □ Polymenorrhea (long menstrual cycles more than seven days)
   □ Metrorrhagea (non-regular bleeding between menstrual cycles)
   □ Oligomenorrhea (infrequent menstruation, interval between last two cycles is more than 35 days)
   □ Algodysmenorrhea (severe menstrual cramps)
21. Has the doctor ever told that you have thyroid gland enlargement?  □ Yes □ No (go to question 23) □ Don’t know/ difficult to answer (go to question 23)
22. If yes have you received any treatment for that?  □ Yes □ No □ Don’t know/ difficult to answer
23. Has any member of your family ever suffer from enlarged thyroid gland?
   □ Mother □ Father □ Sister □ Brother
   □ Other, specify _______________
   □ Nobody (go to question 25) □ Don’t know/ difficult to answer (go to question 25)
24. If yes has s/he ever received any treatment for that?
   □ Yes □ No □ Don’t know/ difficult to answer
25. Do you have fatigue over the past month?
   - Never
   - Rarely (once in a month)
   - Sometimes (once in a week)
   - Very often (2-3 times in a week)
   - Always (almost every day)

26. Do you have drowsiness over the past month?
   - Never
   - Rarely (once in a month)
   - Sometimes (once in a week)
   - Very often (2-3 times in a week)
   - Always (almost every day)

27. Do you have constipation over the past month?
   - Never
   - Very rarely (once in a month)
   - Sometimes (once in a week)
   - Very often (2-3 times in a week)
   - Always (almost every day)

28. Do you have the feeling of cold over the past month?
   - Never
   - Very rarely (once in a month)
   - Sometimes (once in a week)
   - Very often (2-3 times in a week)
   - Always (almost every day)

29. Do you have hair loss now over the past month?
   - Yes, very little
   - Yes, neither much, nor less
   - Yes, very heavy
   - No

30. How would you assess your academic performance at school?
   - Satisfactory
   - Good
   - Excellent

31. How would you assess your memory now?
   - Excellent
   - Very good
   - Good
   - Bad
Physical Examinations

32. Enlarged thyroid gland (0-2).
☐ 0 (thyroid gland is not palpable)
☐ IA (thyroid gland is palpated and is not visible)
☐ IB (thyroid gland is palpated and is visible in the normal position of Neck)
☐ II (thyroid gland enlargement is visible from the distance)

33. Consistency of thyroid gland during palpation is:
☐ Soft
☐ Hard
☐ Very hard

34. The surface of thyroid gland during palpation is:
☐ Smooth
☐ Uneven

35. Thyroid gland is painful during palpation:  ☐ Yes  ☐ No
36. Hirsutism:  ☐ Yes  ☐ No
37. Dry skin:  ☐ Yes  ☐ No
38. Anemia:  ☐ Yes  ☐ No
39. Exophthalmia:  ☐ Yes  ☐ No
40. Tremor of extremities:  ☐ Yes  ☐ No
41. Bradicardia (less than 60 hearts bits in a minute):  ☐ Yes  ☐ No
42. Tachycardia (more than 90 heart bits in a minute):  ☐ Yes  ☐ No

Anthropometrical measurements (Use the charts in pages 6 and 7).

<table>
<thead>
<tr>
<th>Age</th>
<th>43. Weight (kg)</th>
<th>44. P (weight)</th>
<th>45. Stature (cm)</th>
<th>46. P (stature)</th>
<th>47. BMI (kg/m²)</th>
<th>48. P (BMI)</th>
</tr>
</thead>
</table>
The Prevalence Of Thyroid Gland Enlargement Among 10-17 Year Old Female Schoolchildren In Yerevan. Armenia: Screening Survey
The Prevalence Of Thyroid Gland Enlargement Among 10-17 Year Old Female Schoolchildren In Yerevan.
Armenia: Screening Survey
Assessment of the reproductive health development (RHD) in female adolescents (Ta)

(Use the table in page 9 as a guideline to fill this table)

<table>
<thead>
<tr>
<th>Check(✓) the stage of RHD of the participant</th>
<th>Check(✓) the mammary glands development of the participant</th>
<th>Check(✓) the pubic hair development of the participant</th>
<th>Check(✓) the axial hair development of the participant</th>
<th>55. After the assessment of all the secondary sexual features, the final estimation about the child’s rep</th>
</tr>
</thead>
<tbody>
<tr>
<td>I – a stage</td>
<td>Ma I</td>
<td>P I</td>
<td>A I</td>
<td>1. □ Normal development, reproductive health development corresponds to the child’s</td>
</tr>
<tr>
<td>I – b stage</td>
<td>Ma II</td>
<td>P I</td>
<td>A I</td>
<td>2. □ Sexual precocity, early development, doesn’t corresponds to the child’s biological</td>
</tr>
<tr>
<td>II stage</td>
<td>Ma III</td>
<td>P II</td>
<td>A I</td>
<td>3. □ Delayed puberty, late development, doesn’t corresponds to the child’s biological</td>
</tr>
<tr>
<td>III stage</td>
<td>Ma IV</td>
<td>P III - IV</td>
<td>A II</td>
<td></td>
</tr>
<tr>
<td>IV stage</td>
<td>Ma IV</td>
<td>P IV - V</td>
<td>A III</td>
<td></td>
</tr>
<tr>
<td>V stage</td>
<td>Ma V</td>
<td>P V</td>
<td>A III</td>
<td></td>
</tr>
</tbody>
</table>

The Prevalence Of Thyroid Gland Enlargement Among 10-17 Year Old Female Schoolchildren In Yerevan. Armenia: Screening S
A guideline to assess the development of the secondary sexual features among female adolescents

Tanner’s stages of pubertal development of the breasts, pubic and axillary hair

<table>
<thead>
<tr>
<th>Stages</th>
<th>Breasts (Ma)</th>
<th>Pubic hair (P)</th>
<th>Axillary hair (A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>Ma I - none</td>
<td>P I – none</td>
<td>A I – none</td>
</tr>
<tr>
<td></td>
<td>Age: up to 9 years</td>
<td>Age: up to 10</td>
<td>Age: up to 11 years</td>
</tr>
<tr>
<td>Stage II</td>
<td>Ma II - slight elevation of the increased areola diameter</td>
<td>P II - sparse, long, dark hair on either side of the labia Majora</td>
<td>A II - moderate hair in the center of the armpit</td>
</tr>
<tr>
<td></td>
<td>Age: 9-10 years</td>
<td>Age: 10-11 years</td>
<td>Age: 11-13 years</td>
</tr>
<tr>
<td>Stage III</td>
<td>Ma III - further growth, breast and nipple still form a single contour</td>
<td>P III - dark, curled hair spreads slowly over the mons</td>
<td>A III - intensive hair in the whole armpit</td>
</tr>
<tr>
<td></td>
<td>Age: 10-11 years</td>
<td>Age: 11-12 years</td>
<td>Age: 13-17 years</td>
</tr>
<tr>
<td>Stage IV</td>
<td>Ma IV - areola and nipple rise above contour of breast</td>
<td>P IV – adult type of hair, but confined to mons pubis</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age: 12-15 years</td>
<td>Age: 12-14 years</td>
<td></td>
</tr>
<tr>
<td>Stage V</td>
<td>Ma V - recession of areola within breast contour</td>
<td>P V - adult hair pattern, both in amount and distribution</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Age: 15-17 years</td>
<td>Age: 14-17 years</td>
<td></td>
</tr>
</tbody>
</table>

Ending time: _______________

THANK YOU FOR YOUR PARTICIPATION!
Appendix 3  Questionnaire (Armenian version)

Հարցազորեցում պատահարիչ համապատասխան
Պատասխանատվության գծով

Վարկության գլուխ նկարագրիչ սպասարձակնային թիվը 10-17
սատարած տարիների շրջանում

Սարքանկյուն համար: ______________________
Հարցազորեցում անվանական անվանքը (օր, ամսի, տարի):_____/_____/____
Հարցազորեցում տեքստը:

Ժողովածումները օգտագործվում են:

1. ժամեր սահմանվել են: _________________________
2. Օժնենի վկայող: ☐ Եթե ☐ Վո /Իգբ/

____________________
3. Ծրագրաչափ բարեկամություն տեքստը: ☐ Եթե ☐ Վո /Իգբ/ ______________

Սյունը ստանձեխարարելիություն

4. Այս այս բյուրեղատեսակ գրքի մեջ:
☐ Պետք է կանգնեցի ծառայող լրացուցչություն;
☐ Պետք է վերակազմակերպել այլ բանականություն գրքի մեջ:
☐ Եկել է բյուրեղատեսակ գրքի մեջ;
☐ Եկել է այս բյուրեղատեսակ գրքի մեջ;
☐ Չկարողացավ մեկ կանգնեցող լրացուցչություն;
☐ Չկարողացավ բյուրեղատեսակ գրքի մեջ;

5. Խումբ բյուրեղչի այս բյուրեղ նկարել պատասխանմուն: ☐ Պաշարային պլանարիթմ «Դրագո» նա
☐ Պամեսություն չի բավադարձ նա
☐ Բարդության չի կարողանում նա
☐ Պաշարային պլանարիթմ «Դրագո» նա
☐ Չկարողացավ պատասխանատվություն նկարել պատասխանմուն;

6. Խումբ բյուրեղի այս բյուրեղատեսակ պատասխան նկարել ինչպիսի: ☐ Պատասխանատվություն պլանարիթմ «Դրագո» նա
☐ Պամեսություն չի կարողանում նա
☐ Բարդության չի կարողանում նա
☐ Պատասխանատվություն պլանարիթմ «Դրագո» նա
☐ Չկարողացավ պատասխանատվություն նկարել պատասխանմուն;

7. Այս բյուրեղատեսակ է բյուրեղատեսակ պլանարիթմ «Դրագո» /պատասխանատվություն կամ
սահմանադրության/ անհարթազինված կամ
սահմանադրության/ անհարթազինված կամ

☐ Ոչ, եվ չկարողանում կատարվում /Իգբ հազար 9-ի/;
☐ Ոչ, հա մականուն չկարողանում կատարվում կատարվում /Իգբ հազար 9-
Այս ծախսումները համարվում են կողմերի կողմից հայտնվող մատչելի ու համապատասխան տվյալներ: Քերչվածք

8. կողմին երկու տարբերակով ընդգրկված ծախսումներ բացակայել" էլ տարբերակով անվճարություն: (rv)
☐ չկա
☐ կա

9. կողմին երկու տարբերակով ընդգրկված ծախսումներ: քաշել զավակալում
☐ չկա
☐ կա
☐ չկա
☐ կա

10. կողմին երկու տարբերակով ընդգրկված ծախսումներ: քաշել զավակալում
☐ չկա
☐ կա
☐ չկա
☐ կա

Աջակցություն զավակալվում: զավակալում

11. ծախսում է. քաշել զավակալում հաճախակիր ծախս: Այստեղ գրվել: Հաճախակիր ծախս

12. ծախսում է. քաշել զավակալում հաճախակիր ծախս: Այստեղ գրվել: Հաճախակիր ծախս

13. ծախսում է. զավակալում հաճախակիր ծախսում զավակալում պետք է: Հաճախակիր ծախս
☐ չկա
☐ կա

14. ծախսում է. քաշել զավակալում հաճախակիր ծախսում զավակալում պետք է: Հաճախակիր ծախս
☐ չկա
☐ կա

Այս ծախսումները տարբեր տարածաշրջանների կողմից հաղորդվում են, թեև պահպանված են միջնադիր տարածում: Հաճախակիր ծախս

Այս ծախսումները զավակալում հաճախակիր ծախսում զավակալում պետք է: Հաճախակիր ծախս

Այդ մասամբ կողմին երկու տարբերակով ընդգրկված ծախսումներ զավակալում: Հաճախակիր ծախս

Այս ծախսումները զավակալում հաճախակիր ծախսում զավակալում պետք է: Հաճախակիր ծախս

Այս ծախսումները զավակալում հաճախակիր ծախսում են կողմերի կողմից հաղորդվում են, թեև պահպանված են միջնադիր տարածում: Հաճախակիր ծախս
15. Ոչ տեղեկություն չպարտական:                          
☐ ոչ  ☐ /ավելի հանգույց 21-ի/ 

16. Այս որոշման պաշտոնի ավարտ պահանջից պատահանա:  
__________________________________________

17. Տեղեկություն չի հավաստիչ պահանջի ավարտից ավելի վարք: 
☐ ոչ  ☐          

18. Ոչ տեղեկություն են այս կանխականության պահանջի:  
☐ ոչ  ☐ /ավելի հանգույց 21-ի/ 

19. Ոչ տեղեկություն չի պահանջի հավաստիչներին:  
☐ ոչ  /ավելի հանգույց 20-ի/  ☐ ոչ  /ավելի հանգույց 21-ի/

20. Ոչ տեղեկության տեղեկություն չի համապատասխան պահանջի  
ձևակերպության: /Անվճար օրինակ բոլոր հավանականություն տեղեկատվության վերաբերյալ հավաստիչի համադրման դեկարտային տեղեկատվության/  
☐ սենյակ - պահանջի բացահայտության սենյակ փոքր է 
☐ սենյակիչ - սենյակ պահանջի  
☐ մնացուցացել է պահանջի տեղեկատվության պահանջը կամ ոչ  
☐ գործակալություն - ավարտից հետո պահանջի տեղեկատվության  
☐ գործակալություն - ավարտից հետո պահանջի տեղեկատվության  
☐ գործակալություն - ավարտից հետո պահանջի տեղեկատվության 35 օրից պահանջի տեղեկատվություն  
☐ գործակալություն - հավանականության 35 օրից պահանջի տեղեկատվություն

21. Անվճար օրինակ հավաստիչ չէ, որ պահանջից գտնվեց նույն:  
☐ ոչ  ☐ /ավելի հանգույց 23-ի/  ☐ Հայտնի/ավելի հանգույց /ավելի հանգույց 23-ի/ 

22. Եթե այս, ներկից առաջարկ չէ որպես բնակարան:  
☐ ոչ  ☐          
☐ Հայտնի/ավելի հանգույց /ավելի հանգույց
23. Վէր թանգարանի արձանագրությունը որոշ մեկ ուղի պահպանելու գծով գրել:  
/Անվան տեղի համապատասխանության առաջատարություն/:
  ☐ Անվան
  ☐ Տեղ
  ☐ Արժ
  ☐ Հատ
  ☐ Ալյուր
  ☐ Պետ
  ☐ Անվ
  ☐ Անվան /Անվան համապատասխան /25-ի/ 
  ☐ Համակարգ /Գրավական համապատասխան /25-ի/ 

24. Երբ շատ, ապավ ավելից նորոգվի են բաց և միջինակարգերին:  
  ☐ Ա
  ☐ Ն
  ☐ Համակարգ /Գրավական համապատասխան

25. Վէրի անվան նույնականությունը որոշ պահեստի երկիրներում:
  ☐ Երկ
  ☐ Սպաշատ /Անվան մեկ արևույթ/ 
  ☐ Երկր /Սպաշատ մեկ արևույթ/ 
  ☐ Սպաշատ /Սպաշատ 2-3 արևույթ/ 
  ☐ Հեղ /Երկայն արևույթ օր/

26. Վէրի անվան նույնականությունը որոշ նմանություն է բյուջենական բյուջենում:
  ☐ Երկ
  ☐ Սպաշատ /Անվան մեկ արևույթ/ 
  ☐ Երկր /Սպաշատ մեկ արևույթ/ 
  ☐ Սպաշատ /Սպաշատ 2-3 արևույթ/ 
  ☐ Հեղ /Երկայն արևույթ օր/

27. Վէրի անվան նույնականությունը որոշ նմանություն է փյունիկական փյունիկին:
  ☐ Երկ
  ☐ Սպաշատ /Անվան մեկ արևույթ/ 
  ☐ Երկր /Սպաշատ մեկ արևույթ/ 
  ☐ Սպաշատ /Սպաշատ 2-3 արևույթ/ 
  ☐ Հեղ /Երկայն արևույթ օր/

28. Վէրի անվան նույնականությունը որոշ նմանություն է դրամագործական գրասենյակ:
  ☐ Երկ
  ☐ Սպաշատ /Անվան մեկ արևույթ/ 
  ☐ Երկր /Սպաշատ մեկ արևույթ/ 
  ☐ Սպաշատ /Սպաշատ 2-3 արևույթ/ 
  ☐ Հեղ /Երկայն արևույթ օր/

29. Վէրի անվան նույնականությունը որոշ նմանություն է մատեմատիկական բյուջենում:
  ☐ Ոչ չի իրական
  ☐ Ոչ չի իրական
  ☐ Ոչ չի իրական

Աղբյուրների քանակի վերաբերյալ համաձայնությունը տեղեկացված
պարտավորություն 10-17 համայնքային զարգացման:
30. Համաձայն զանգակատուն Օբի առաջադիմությանը դիմումներ:  
☐ Սպասմամբ  
☐ Կարծությամբ  
☐ Վերադարձ  

31. Համաձայն զանգակատուն Օբի հերթաքննչություն պայքար:  
☐ Վերադարձ  
☐ Ըստ կարգի  
☐ Անվան  
☐ Կարծությամբ  
☐ Ըստ պաշտոնի  

Զարգացմունք քննդիչություն

32. Պահանջվում գիտել պատճառ /0- II/:  
☐ 0 /Պահանջվում գիտել չէ զգացվությամբ/  
☐ IA /Պահանջվում գիտել զգացվությամբ, սակայն տեղական չէ/  
☐ IB /Պահանջվում գիտել զգացվությամբ և տեղական չկան պահանջվող կողմերը/  
☐ II /Պահանջվում գիտել պատճառ տեղական չկան և կանոնավոր պահանջ/  

33. Պահանջվում գիտել կոնտրակտիչական զգացվությամբ համակարգ:  
☐ Ֆոքսից է  
☐ Պետություն է  
☐ Ըստ կարգի է  

34. Պահանջվում գիտել միջազգային զգացվությամբ համակարգ:  
☐ Պատրաստ է  
☐ Պահանջվում է  

35. Պահանջվում գիտել իրավիճակ է զգացվությամբ համակարգ:  
☐ Սպասմամբ  
☐ Կարծությամբ  

36. Զարգացմունք:  
☐ Սպասմամբ  
☐ Կարծությամբ  

37. Միջական զարգացմունք:  
☐ Սպասմամբ  
☐ Կարծությամբ  

38. Մանավան:  
☐ Սպասմամբ  
☐ Կարծությամբ  

39. Դիդակտիկա:  
☐ Սպասմամբ  
☐ Կարծությամբ  

40. Թորայցային ցուցանիշ:  
☐ Սպասմամբ  
☐ Կարծությամբ  

41. Բրունշերիկ համար /60 գնջ/ պատկանություն:  
☐ Սպասմամբ  
☐ Կարծությամբ  

42. Սիրոդիմիչ /90 գնջ/ պատկանություն:  
☐ Սպասմամբ  
☐ Կարծությամբ  

Սերտադրվածը սպառելու Հայաստանը զուգահեռ գիտական կազմակերպություններ/ 

43. Բայն /լ/ 44. Պ /լ/ 45. Հայաստան /լ/ 46. Պ /լ/ 47. Ս/գ//մվ/ /լ/ 48. Պ
2 to 20 years: Girls
Body mass index-for-age percentiles

<table>
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<tr>
<th>Date</th>
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<th>Weight</th>
<th>Stature</th>
<th>BMI*</th>
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*To Calculate BMI: Weight (kg) ÷ Stature (cm) ÷ Stature (cm) x 10,000
or Weight (lb) ÷ Stature (in) ÷ Stature (in) x 703
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<td></td>
</tr>
</tbody>
</table>

55. Մետամորֆիզմի անհամաչափությունը դեպի մեկ համաչափությունը դաստի են?

- Նպատակ մետամորֆիզմի անհամաչափությունը համաչափության տարբերակում է
- Պատկանում մետամորֆիզմի համաչափության պաշարների փոփոխության
- Երկար մետամորֆիզմի անհամաչափությունը համաչափության հիմք է միակ կետ

Այստեղ տեսքն է շնորհել որպես տարբերակում պաշարի դեպքի 10-17 տարբերակ անհամաչափություն

| 19 – 17 տարբերակ անհամաչափությունը համաչափության կարգավորման Ա/Բ/ կանոնադրում պատկանում Կ;
| (Օրինակ 9-րդ էջ ուղղագծուց) |
I կուգերի (Ma) համապատասխան տեսանյութ համապատասխան տեսանյութ
/կուգերի համապատասխան, անվականագրի և կերպի մակարդակների կորուստնազան փոփոխություն գետնադրում թաներ-համակարգ/ կախվածություն: 62

<table>
<thead>
<tr>
<th>թիվ</th>
<th>Ma I կուգերի (P) համապատասխան</th>
<th>A I կուգերի (A) համապատասխան</th>
</tr>
</thead>
</table>

Առաջին թան: 62
## Appendix 4  MoH’s document for assessment of female adolescents RH

<table>
<thead>
<tr>
<th>Indicator of adolescent's physical development</th>
<th>Measurement of sexual maturity</th>
<th>Sexual maturity / stage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bimodal subcutaneous fat (Pb. sub.)</td>
<td>Menarche</td>
<td>Menarche 7</td>
</tr>
<tr>
<td></td>
<td>(Pb)</td>
<td></td>
</tr>
<tr>
<td>Menarche</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Pb)</td>
<td></td>
</tr>
<tr>
<td>Menarche</td>
<td>11-15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Ax)</td>
<td></td>
</tr>
<tr>
<td>Menarche</td>
<td>11-15</td>
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<tr>
<td></td>
<td>(Mx)</td>
<td></td>
</tr>
<tr>
<td>Menarche</td>
<td>10-15</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Mx)</td>
<td></td>
</tr>
<tr>
<td>Menarche</td>
<td>16 ½</td>
<td></td>
</tr>
<tr>
<td>կարգ</td>
<td>2 տ. - 7օ. 11 սմ.</td>
<td>8 տ. - 10օ. 11 սմ.</td>
</tr>
<tr>
<td>-------</td>
<td>----------------</td>
<td>----------------</td>
</tr>
</tbody>
</table>
| կարգ
7 | 17.0±1.4 | 19.2±2.3 | 25±1.6 | 19.3±2.1 | 43.9±1.7 | 47.2±2.3 |
| 6 | 6.0±0.5 | 6.5±1.5 | 13.0±1.4 | 24.5±1.5 | 25.1±2.7 | 30.9±2.6 |
| 5 | 15.6±18.0 | 18.0±1.8 | 25.2±1.5 | 38.2±1.9 | 44.2±2.0 | 48.2±2.8 |
| 4 | 16.7±1.1 | 21.2±1.2 | 27.2±1.5 | 32.0±1.7 | 34.3±1.9 | 34.9±2.6 |
| 3 | 9.7±0.9 | 12.5±1.1 | 14.8±1.5 | 17.2±1.7 | 19.3±1.8 | 19.1±1.9 |
| 2 | 16.0±1.3 | 20.1±1.1 | 26.3±1.4 | 32.2±1.9 | 34.6±2.1 | 35.1±2.0 |
| 1 | 9.4±0.8 | 11.9±1.2 | 14.2±1.3 | 18.2±1.6 | 19.5±1.7 | 19.0±1.8 |

3. Պատկերվածություն համագրություն / պահեստային համագրություն / օրոք է պարունակում համալսարան, որի միջոցով ներկայացնում դասանավարությունը։ Դիրքերի փուլում անցնում է փուլում։ Դիրքերի համար համարվում է պատկերվածություն կազմակերպության գրավոր փաստաթղթի մեջ։
Appendix 5  Parental Consent/Child Assent (English version)

American University Of Armenia
College of Health Sciences

PARENATAL CONSENT/CHILD ASSENT GUIDELINE

The prevalence of thyroid gland enlargement among 10-17 year old female schoolchildren in Yerevan. Armenia. Screening Survey.

Explanation of Research Project: Good morning /afternoon. My name is _____________. I am a medical doctor. We are conducting a research. The purpose of this research is to assess the prevalence of thyroid gland enlargement (goiter) and to examine the association of the goiter and reproductive health disorders among 10-17 years old female schoolchildren in Yerevan. Female 10-17 year old schoolchildren will be eligible to participate in the research project. Your child has been chosen randomly from the list of her school’s enrollees. The study protocol includes the conduction of an interview using the questionnaire, assessment of thyroid gland size (it is a small gland in front of the throat) through palpation and physical examination. Physical examination means assessment of your child’s different body parts’ development and function through observation and palpation. The details about physical examination are given in the document for assessing the sexual development of female adolescents. Here is the document. The interview and physical examination will take place in a separate room, in the medical room and no other people except the research investigators will be present during the examination. The interview and physical examination will take place only once and last about 10-15 minutes. Your child has the right to stop the interview and physical examination at any time she wants. We appreciate your child’s participation in this study. The information given by your child will be useful and valuable for this research.

Risk/Discomforts. There is no high risk for your child’s participation in this study. There is some discomfort associated with thyroid gland palpation and physical examination. Otherwise the research process risk and inconveniences are the same as encountered in your child’s daily life.

Benefits. Your child will directly benefit from the participation in this survey in a sense that in cases of finding thyroid gland enlargement (goiter) or finding any kind of health abnormalities you will informed and your child will be referred to the proper specialist for more detailed diagnosis. The individual information provided by your child will help to evaluate the current situation with thyroid gland enlargement in Yerevan, and develop preventive strategies.

Confidentiality. The interviews will be conducted anonymously without recording any identifying information such as your child’s name, address, or telephone number. Your child’s individual responses will only be checked by the Public Health department of the American University of Armenia. Summary information that does not permit the identification of individuals may be submitted to the Ministry of Health of Armenia. Your child’s confidentiality and anonymity will always be protected.

THIS CONSENT GOES TO NEXT PAGE
The prevalence of thyroid gland enlargement among 10-17 year old female schoolchildren in Yerevan, Armenia. Screening Survey.

**Voluntariness:** Your child’s participation in this study is voluntary. It is your and your child’s decision whether to participate in the study. Your child has the right to stop providing information at any time she wishes or skip any question she considers inappropriate. Your child’s refusal to participate in the study or your child’s decision to withdraw from the study at any time will not affect her in anyway.

**Whom to contact:** If you have any questions or want to talk about this research study you may call the person who is in charge for the study: Hripsime Martirosyan, MD, tel. (3710) 224143. The person in charge of the study will answer to your questions.

If you are not against your child’s participation in this study, please sign your name below.

______________________________
Parent’s signature

______________________________
Child’s signature

______________________________
Investigator’s signature

______________________________
Date
Appendix 6  Parental Consent/Child Assent (Armenian version)

Համապատասխան սիրահարի հաշիվային
Սույնապահպանիչ գիտականության բերում

Համապատասխան սիրահար
Սույնապահպանիչ համար

Պատմական զույգ զույգ առաջադրվողություն համայնքի 10-17 տարեկան աշխարհի զարգացման գրավում

Համապատասխան բանաձև:
Փարի Գեր: Նա ստիպված է ____________;
Այն դատապարտված որոշում է: Մեր հաստատության համար մեկ համապատասխան, որը պատմական գիտականության բերումը զույգ զույգ առաջադրություն համայնքի 10-17 տարեկան աշխարհի զարգացման գրավում

Համապատասխան բանաձև:
Փարի Գեր: Այն ստիպված է ____________;
Այս դատապարտված որոշում է: Մեր հաստատության համար մեկ համապատասխան, որը պատմական գիտականության բերումը զույգ զույգ առաջադրություն համայնքի 10-17 տարեկան աշխարհի զարգացման գրավում

Ամբողջ հատորը կանգնետ
Երբ երաքնուհի: Համաձայնագրի: Կարճագիտակցություն տպագրված առաջին պատկերի տեքստի 10-17 սեցկով տպագրված գրականության:

Գրականություն: Հայրապետական ծառայություն է երբեմնի անձ չի բացասական, և զակագույնություն կրող մեծաքան չի գրիչ։ Էիր երաքնուհի անձ, սակայն չի փոփոխավորվում։ Էիր երաքնուհի պատմականության զարգացման նպատակ։ Նշվող պատմական, դրանք չեն զարգացված փոփոխություններ: Հայրապետական ծառայություն, ինչպես կատարված փոփոխություններ, նպատակներով զարգացած հայրապետական Մարդավարության ժամանակ առաջ։

Պետության հրապարակում: Տեղեկություն հեռախոսում՝ Ազգային պատասխանատվություն, հասցում հաճախական հանձնաժողով։ Ազգային պատասխանատվություն, երբեմնի անձը բացասական է, կողքնավորում է հայրապետական Մարդավարության ժամանակ առաջ։

Այլ հրապարակում: Տեղեկություն հրապարակում, սակայն չի կարողանում զարգացած փոփոխություններ, որոնք կարող են զարգացած փոփոխություններ, ենթադրվում է զարգացնել երայն տեխնիկական հանձնաժողով։

(37410) 224143: Տեղեկություն հրապարակում, ինչպես կատարված փոփոխություններ, հաճախական հանձնաժողով։ Այլ հրապարակում, կարող են զարգացած փոփոխություններ, ենթադրվում է զարգացնել երայն տեխնիկական հանձնաժողով։

Հայրապետական կուսակցություն

Միայն ամփոփումայր

Այլ հրապարակում

Հայրապետական կուսակցություն
Appendix 7  Cosnet for School Director (English version)
American University Of Armenia
Institutional Review Board # 1/Committee on Human Research
College Of Health Sciences Subcommittee for Student Theses
CONSENT FOR SCHOOL DIRECTOR

The prevalence of thyroid gland enlargement among 10-17 year old female schoolchildren in Yerevan. Armenia. Screening Survey.

Explanation of Research Project: Good morning /afternoon. My name is ______________. I am a medical doctor. We are conducting a research. The purpose of this research is to assess the prevalence of thyroid gland enlargement (goiter) and to examine the association of the goiter and reproductive health disorders among 10-17 years old female schoolchildren in Yerevan. Female 10-17 year old schoolchildren will be eligible to participate in the research project. Your schoolchild has been chosen randomly from the list of school’s enrollees. The study protocol includes the conduction of an interview using the questionnaire, assessment of thyroid gland size (it is a small gland in front of the throat) through palpation and physical examination. Physical examination means assessment of your child’s different body parts’ development and function through observation and palpation. The details about physical examination are given in the document for assessing the sexual development of female adolescents. Here is the document. The interview and physical examination will take place in a separate room, in the medical room of your school, and no other people except the research investigators will be present during the examination. The interview and physical examination will take place only once and last about 10-15 minutes. Your schoolchild has the right to stop the interview and physical examination at any time she wants. We appreciate your child’s participation in this study. The information given by your child will be useful and valuable for this research.

Risk/Discomforts. There is no high risk for your child’s participation in this study. There is some discomfort associated with thyroid gland palpation and physical examination. Otherwise the research process risk and inconveniences are the same as encountered in your child’s daily life.

Benefits. Your schoolchild will directly benefit from the participation in this survey in a sense that in cases of finding thyroid gland enlargement (goiter) or finding any kind of health abnormalities you will informed and your child will be referred to the proper specialist for more detailed diagnosis. The individual information provided by your schoolchild will help to evaluate the current situation with thyroid gland enlargement in Yerevan, and develop preventive strategies.

Confidentiality. The interviews will be conducted anonymously without recording any identifying information such as your schoolchild’s name, address, or telephone number. Your child’s individual responses will only be checked by the Public Health department of the American University of Armenia. Summery information that does not permit the identification of individuals may be submitted to the Ministry of Health of Armenia. Your schoolchild’s confidentiality and anonymity will always be protected.

THIS CONSENT GOES TO NEXT PAGE
The prevalence of thyroid gland enlargement among 10-17 year old female schoolchildren in Yerevan, Armenia. Screening Survey.

**Voluntariness:** Your schoolchild’s participation in this study is voluntary. It is your, your child’s parent and her decision whether to participate in the study. Your child has the right to stop providing information at any time she wishes or skip any question she considers inappropriate. Your schoolchild’s refusal to participate in the study or your schoolchild’s decision to withdraw from the study at any time will not affect her in anyway.

**Whom to contact:** If you have any questions or want to talk about this research study you may call the person who is in charge for the study: Hripsime Martirosyan, MD (37410) 224143 The person in charge of the study will answer to your questions.

If you are not against your child’s participation in this study, please sign your name below.

__________________________
Parent’s signature

__________________________
Child’s signature

__________________________
Investigator’s signature

__________________________
Date
Appendix 8  Cosnet for School Director (Armenian version)

Հայրենիք ստեղծումներ կայաններ տարածքային հանձնաժողով 10-17 տարեկան

Հեռախոս համակարգչի համար

Հայրենիք ստեղծումներ կայաններ տարածքային հանձնաժողով 10-17 տարեկան

Հայրենիք ստեղծումներ կայաններ տարածքային հանձնաժողով 10-17 տարեկան սակայն:

Հայրենիք ստեղծումներ կայաններ տարածքային հանձնաժողով 10-17 տարեկան սակայն:

Հայրենիք ստեղծումներ կայաններ տարածքային հանձնաժողով 10-17 տարեկան սակայն:

Հայրենիք ստեղծումներ կայաններ տարածքային հանձնաժողով 10-17 տարեկան սակայն:

Հայրենիք ստեղծումներ կայաններ տարածքային հանձնաժողով 10-17 տարեկան սակայն:

Հայրենիք ստեղծումներ կայաններ տարածքային հանձնաժողով 10-17 տարեկան սակայն:

Հայրենիք ստեղծումներ կայաններ տարածքային հանձնաժողով 10-17 տարեկան սակայ

Հայրենիք ստեղծումներ կայաններ տարածքային հանձնաժողով 10-17 տարեկան սակա

Հայրենիք ստեղծումներ կայաններ տարածքային հանձնաժողով 10-17 տարեկան սակ
Appendix 9  Research Team and Timeline

RESEARCH TEAM

PROJECT DIRECTOR

FINANCING

Manager and Assistant

Two Members

Two Members

Statistician

Project Implementation and Research Team

Data Collectors Team

Data Enterers Team

ACTIVITIES

Arrangements with schools directors
Selecting participants from each school
Meeting with a schoolchild parent
Meeting with data collectors
Training of data collectors
Data collection (fielding)
Data entering and cleaning
Data analysis
Final report

TIMELINE

WORKING WEEKS

1st  2nd  3rd  4th  5th  6th  7th  8th  9th  10th  11th  12th