



**PRENATAL ULTRASOUND IRRADIATION
AS AN UNDERESTIMATED RISK FACTOR FOR THE
BIRTH OF CHILDREN WITH DIFFERENT ABILITIES
(AKA SPECIAL EDUCATIONAL NEEDS)**

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Abstract:

The increasing number of pathological conditions among children nowadays and in the past decades is the main reason for writing this paper and conducting the study described in it. Some of the conditions referring to in this article are: autism and autism spectrum disorder (ASD), dyslexia, late onset of speech, epilepsy, attention deficit hyperactivity disorder (ADHD), emotional and behavioural disorders. By the means of observation we can conclude that the current prevalence of these conditions and others as well, are pandemic, especially in the developed countries with modern societies where the pregnancy monitoring using different devices is a common practice. The main question we search the answer to in this text is: “Is there any direct or indirect relation between the routine ultrasound irradiation scanning during pregnancy and the number and severity of the disabilities in the children affected by it?” The summarized results from a self-initiated and conducted study on the subject are presented in this paper. The study is realized in the period of eight years (2011-2019), however, here a more than four years data is summarized. The first four years the researcher spend time applying semi-structured interview to different people involved in the ultrasound checking (obstetricians, midwives, doulas, parents) while the next four years she disseminated a questionnaire addressed to pregnant women and mothers of children with different abilities (aka special educational needs) and typical development children. The author concludes that there is absolute necessity for change in the medical routine practice applied to healthy pregnant women with low-risk pregnancies – both nationally, in Bulgaria where the study is conducted, and internationally – for the sake of children’s, and mothers’, health and the need of *informed consent* of parents *before* the procedure is applied to the unborn, fragile and unprotected child. The effects of

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ultrasound wave's irradiation on the mothers' health should not be underestimated either.

Keywords: prenatal ultrasound, Doppler, danger, risk, children with different abilities, special educational needs, informed consent, conscious parenting, responsible parenting, pregnancy monitoring devices

1. Introduction

Why would a mainstream teacher or a special teacher be professionally interested in a medical procedure applied as a routine to pregnant women and their unborn children, now and in the past decades? What connection could be found between the use of routine prenatal ultrasound (RPU) and the professional duties and activities a teacher has? Well, there is much of a solid relation among these. We discuss different viewpoints in the next pages and summarize them at the end of our theoretical review. Then, we present summary of our study on that issue and summarize this data as well.

A teacher should be fully aware for their students' developmental characteristics. They are supposed to be as much informed as possible for their students' lives before attending their classes in order to meet their concrete interests, individual needs and desires: what factors have influenced students' lives so far, at what condition are they now, is their emotional, physical, mental, psychological and developmental state positive or there are major factors that have declined their development by this point. Since life, in traditional conceiving mechanisms, begins in womb – this is the start of every human's life. Next stage: pregnancy. Unfortunately, during pregnancy there are many possible influences that may result in negative consequences for the unborn individual.

During the author's work with children with different abilities (DA) for over two decades now, there were certain indicators observed that were leading towards the fact that the irradiation on unborn children with ultrasound waves causes them harm and damages their actively developing systems and organs. One of the first notifications came from parents of children with DA with whose children the author worked. Parents of children with DA are constantly searching for the reasons why their child has a disability. And in this search they are actively collaborating with experts and specialists.

It is a matter of fact that currently there is almost not a single group of children in the kindergartens or class in the schools where there is not at least one child or student with different abilities. How came that the number of children with DA increased so drastically in the past decades? Is it only the genetics, the intoxicated food, polluted water and air, the illnesses, the medications and aggressive treatment with medicines? We attempt at disclosing some of the answers by the end of this article. It took us several years of theoretical research and eight years of practical study to be able to claim the conclusions at the end of the text.

1.1 Terminology Used in This Paper

1. In this paper we refer to “children with special educational needs” as “children with different abilities”. We find the first term more offensive, negative and subjective than the second. Detailed justification of this terminology preference is presented in previous publication of the author (see Saeva, 2019).
2. We do not use the term “mother-to-be” when we refer to a pregnant woman. We deeply believe that once a woman is carrying a child, she is already a mother with all responsibilities and consequences of motherhood at this stage. Thus, throughout the text we use “mother” applying for both pregnant women and women who have already given birth.
3. Using the term “prenatal ultrasound” we refer to all medical procedures applied to pregnant women, which use prenatal ultrasound wave, such as: ultrasound scan, Doppler, amniocentesis, fetal heart tones monitoring devices.

1.2 The Study Limitations

This paper discusses only the prenatal ultrasound, not all ultrasound scans used in medicine to detect, diagnose and treat illnesses. Additionally, it refers only to the cases of low-risk pregnancies of healthy women and their healthy babies. Any case of life-threatening issues or illness should be considered as a medical condition. This paper discusses prenatal ultrasound scans and irradiations used as “screening tools”, not as diagnostic or therapeutic tools, applied as a routine procedure to all pregnant women and their babies, irrespectively of their actual need of such scans.

2. Theoretical Findings

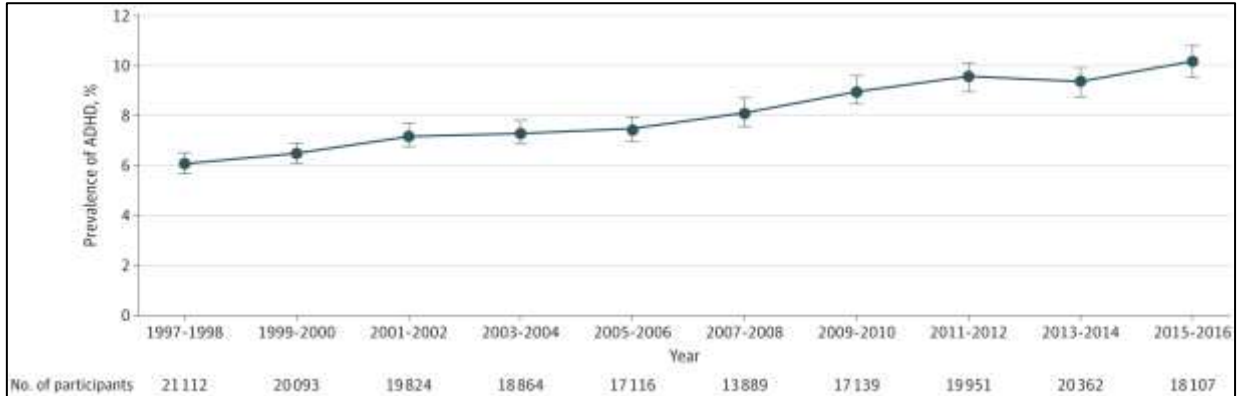
In this part we are going to present some statistics on the prevalence of some of the conditions we mentioned above as increasing. One of those is autism. According to Dr. Bob Sears (n.d.), the Centers for Disease Control and Prevention report that autism now affects 1 in 59 children in America. Table 1 shows this disturbing tendency.

Table 1: Autism prevalence [original source: Sears (n.d.) Retrieved from: <https://tacanowblog.com/2018/04/26/autism-rate-1-in-59-kids-its-time-to-care/>]

AUTISM PREVALENCE			
AS REPORT BY CDC - ADDM REPORT: 2000 - 2014			
Birth Year	Survey Year	Year Reported	Autism Rate
2006	2014	2018	1 in 59
2004	2012	2016	1 in 68
2002	2010	2014	1 in 68
2000	2008	2012	1 in 88
1998	2006	2009	1 in 110
1996	2004	2009	1 in 125
1994	2002	2007	1 in 150
1992	2000	2007	1 in 150

NOTES: ADDM - Autism and Developmental Disabilities Monitoring Network
Source: www.cdc.gov

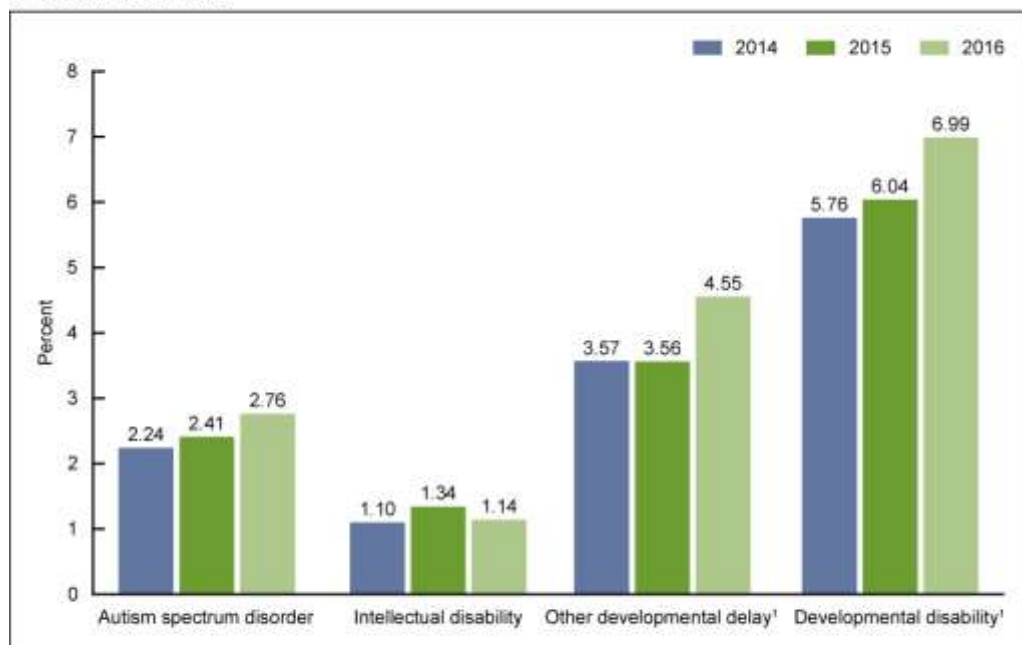
Unfortunately, other countries register the same increasing statistics in their societies as well. In Graph 1 we present the data regarding attention deficit/hyperactivity disorder (ADHD) prevalence.



Graph 1: ADHD prevalence. [original source: Xu et al. 2016 Retrieved from: <https://jamanetwork.com/journals/jamanetworkopen/fullarticle/2698633>]

Again, we see that there are increasing levels of the condition during the past two decades. Let us monitor the other conditions blamed to occur as a result of ultrasound irradiation – among other factors as well such as predisposition, genetics, medications, illnesses, intoxication. In Figure 1 we present some of those.

Figure 1. Prevalence of children aged 3–17 years ever diagnosed with selected developmental disabilities, by year: United States, 2014–2016



¹Linear increase from 2014 to 2016 is statistically significant ($p < 0.05$).
 NOTES: Developmental disability includes autism spectrum disorder, intellectual disability, and any other developmental delay. Access data table for Figure 1 at: https://www.cdc.gov/nchs/data/databriefs/db291_table.pdf#1.
 SOURCE: NCHS, National Health Interview Survey, 2014–2016.

Figure 1: Prevalence of ASD, intellectual disability, other developmental delay and developmental disability [original source: Zablotsky et al. 2017. Retrieved from: <https://www.cdc.gov/nchs/data/databriefs/db291.pdf>]

The table, graph and figure above show the tendency of the increasing number of individuals who are diagnosed with different kinds and degrees of disabilities making them target group of special education.

There are many medical books where the specifications of ultrasound waves used in medicine are described (see Hofer 2013; Szabo 2013; Gibbs, Cole & Sassano 2011). Even though much of the technical functions of the ultrasound waves are discussed, less is mentioned about the short-term and long-term effects on humans' health and life both in adults (mothers) and in the unborn children.

According to Dr. Sarah J. Buckley (2005), there is a summary on the risks of ultrasound in human studies, which are published in May 2002 in the prestigious US journal "Epidemiology". The summary states that: "...there may be a relation between prenatal ultrasound exposure and adverse outcome. Some of the reported effects include growth restriction, delayed speech, dyslexia, and non-right-handedness associated with ultrasound exposure. Continued research is needed to evaluate the potential adverse effects of ultrasound exposure during pregnancy. These studies should measure the acoustic output, exposure time, number of exposures per subject, and the timing during the pregnancy when exposure(s) occurred." (Marinac-Dabic D., et al., 2002). By the opinion of S. J. Buckley (2005), "studies on humans exposed to ultrasound have shown that possible adverse effects include premature ovulation,²⁴ preterm labour or miscarriage,^{15 25} low birth weight,^{26 27} poorer condition at birth,^{28 29} perinatal death,²⁸⁻³⁰ dyslexia,³¹ delayed speech development,³² and less right-handedness.³³⁻³⁶ Non right-handedness is, in other circumstances, seen as a marker of damage to the developing brain.^{35 37} One Australian study showed that babies exposed to 5 or more Doppler ultrasounds were 30% more likely to develop intrauterine growth retardation (IUGR) - a condition that ultrasound is often used to detect.²⁶"

All this data concentrates around the questions about the value prenatal ultrasound in low-risk pregnancies has. Additionally, S. Pope (2019) states that the Chinese research conducted over the past two decades ends any speculations about the need and the dangers of fetal ultrasound. The Chinese studies were not wanting in potential subjects, due to the one-child policy in China in recent decades that resulted in the genocide of millions of babies (mostly girls) whose pregnancies were selectively terminated after the parents learned the sex of the fetus via ultrasound. The method used by Chinese scientists is: women who declared their will for termination of pregnancy were given controlled dosages of diagnostic ultrasound before the scheduled abortion. The abortive matter (e.g. brain, kidney, eye, chorioamnion tissue) was then examined in the laboratory via biochemical analyses and/or electron microscopy. Eventually, Chinese scientists have provided the evidence that at various intensities, even those considered low by Western standards, prenatal ultrasound is more than just a "risk". Prenatal ultrasound might be better understood as a damaging form of medical radiation when applied at the levels of exposure not uncommonly found in clinical scenarios (Pope 2019). The actual effects on babies who survived the routine prenatal ultrasound scans, which are presumed and promoted to be safe for millions of babies, are described in Jim West's latest book (see West, 2015).

One of the most worrying biological effects ultrasound waves have on living mammal's tissue is the process known as 1) cavitation, where gas cavities, called "bubbles" or "voids", collapse and can generate an intense shock wave. In the opinion of Buckley (2008), the other two main negative biological effects, aside from cavitation, are: 2) heat and 3) acoustic streaming.

Regarding the heat effect Barnett & Maulik (2001) declare that *“When modern sophisticated equipment is used at maximum operating settings for Doppler examinations, the acoustic outputs are sufficient to produce obvious biological effects, e.g. significant temperature increase in tissue or visible motion of particles due to radiation pressure streaming effects. The risk of inducing thermal effects is greater in the second and third trimesters, when fetal bone is intercepted by the ultrasound beam and significant temperature increase can occur in the fetal brain.”* This practically “fries” the fetus' brain cells. Additionally, an Australian study registered that babies who received more than 5 Dopplers were 30% more likely to develop intrauterine growth retardation (IUGR) than babies that received routine (pulsed) ultrasound. This is deeply ironic because Doppler is often used specifically to detect IUGR (Kesser, 2019). It is also purposeless to apply such a risky procedure for detecting IUGR since there is no treatment for it and once diagnosed, it remains untreated and causes increasing levels of distress in mothers that affects the rest of their pregnancy and remains there even three months after the birth of the (healthy) baby. Doppler ultrasound uses continuous waves, while ultrasound scanners use pulsed waves. Some experts claim that Doppler is 33 times stronger than ultrasound scan. Of course, the scanning differs in many indications – its duration, intensity, frequency, technician's expertise, even differ from one device to another.

Some of the conditions and disorders, based on the results of 50 human studies, that can be persuasively argued that prenatal ultrasound is responsible for causation or initiation, are: Autism spectrum disorder, ADHD, genetic damage, inheritable by future generations, jaundice, childhood cancers, e.g., leukemia, lymphoma, brain, etc., chorioamnionitis (inflammation of the maternal-fetal junction), personality anomalies, ophthalmological diseases and various malformations, skin diseases such as eczema, allergies (Pope 2019). Additionally, West claims that prenatal ultrasound initiates severe vulnerabilities in the fetus to subsequent stressors such as vaccines or other pharmaceuticals which can then serve as triggers and keys to unlock the potential condition or disorder.

In the year 2000, Professor Ruo Feng, of the Institute of Acoustics, Nanjing University, China, suggested the five points of protection against the devastating effects of prenatal ultrasound, namely:

1. Ultrasound should only be used for specific medical indications.
2. Ultrasound, if used, should strictly adhere to the smallest dose principle, that is, the ultrasonic dose should be limited to that which achieves the necessary diagnostic information under the principle of using intensity as small as possible, the irradiation time as short as possible.

3. Commercial or educational fetal ultrasound imaging should be strictly eliminated. Ultrasound for the identification of fetal sex and fetal entertainment imaging should be strictly eliminated (emphasis added).
4. For the best early pregnancy (1st trimester), avoid ultrasound. If unavoidable, minimize ultrasound. Even later, during the 2nd or 3rd trimester, limit ultrasound to 3 to 5 minutes for sensitive areas, e.g., fetal brain, eyes, spinal cord, heart and other parts.
5. For every physician engaged in clinical ultrasound training, their training should include information on the biological effects of ultrasound and ultrasound diagnostic dose safety knowledge (Pope 2019).

After briefly analysing the current tendencies in prenatal ultrasound scanning and register of its damages on the fetus, next we present our personal efforts in this area – the results of our research on this topic for several years now.

3. Research Design

In this part of the paper we explain our research intentions and to what results they led us in an eight-years period (2011-2019).

3.1 Aim of Research

The aim of our research is to analyse the opinion of women (both pregnant and already given birth) about the safety of the ultrasound scanning during pregnancy. The mothers can be divided in three subgroups: first-time pregnant women, mothers of children with DA, mothers of children with typical development.

3.2 Objectives of Research

Some of the important objectives we focus at are:

- To theoretically overview the past and current researches on the practice of ultrasound scanning during pregnancy – harms that the ultrasound waves cause to the fetus and its consequences.
- To interview specialists (obstetricians, midwives and doulas) and mothers using semi-structured interview.
- To design a questionnaire for mothers.
- To disseminate it and analyse its results.
- To draw relevant conclusions and to summarize all data gathered.

3.3 Research Question

The main question we are attempting to find answer to in this research is: “Is there any direct or indirect relation between the routine ultrasound irradiation scanning during pregnancy and the increasing number and severity of the disabilities in the children affected by it?”

3.4 Hypothesis

We assume that there is connection between the routine ultrasound irradiation scanning during pregnancy and the increasing number and severity of disabilities in the children affected by it. Additionally, we suppose that mothers lack information about the dangers of prenatal ultrasound and therefore are unable to make informed consent on that procedure performed on their bodies and the bodies of their unborn children.

3.5 Research Methods and Methodology

The methods and research phases we implemented are presented in Table 2 below.

Table 2: Research methods and methodology

Research method	Time period	Results
Theoretical research of literature findings	November 2011- April 2019	The analysis is partially (due to the article's limited volume) presented in the first part of this paper
Observation	November 2011 - April 2019	The data led us forward to conducting this research
Semi-structured interviews with obstetricians, midwives, doulas, pregnant women, mothers of typical development children and mothers of children with DA	November 2011 - April 2019	The analysis is to be presented in another author's article
Questionnaire for pregnant women and mothers of children with and without DA (see Appendix)	January 2015 - February 2019	The analysis is presented in the second part of this paper

3.6 Research participants

Our participants are mothers of children with DA and typical development children. In Table 3 we present more information about them.

Table 3: Participants in the study

Number of year of participation	Period of participation	First-time pregnant women	Mothers of children with DA	Mothers of typical development children
1st year	January 2015 - December 2015	16	118	216
2nd year	January 2016 - December 2016	28	96	164
3rd year	January 2017 - December 2017	9	210	142
4th year	January 2018 - December 2018	25	197	37
5th year	January 2019 - February 2019	2	14	17
Total:	4 years and 2 months	80	635	576
Total number of participants:		1291		

4. Results Analysis

Below we present the summarized data gathered from the three main groups of participants we sent our questionnaire to, namely: first-time pregnant women, mothers of children with different abilities, mothers of typical development children. The full text of the questionnaire is presented in the Appendix section of this paper.

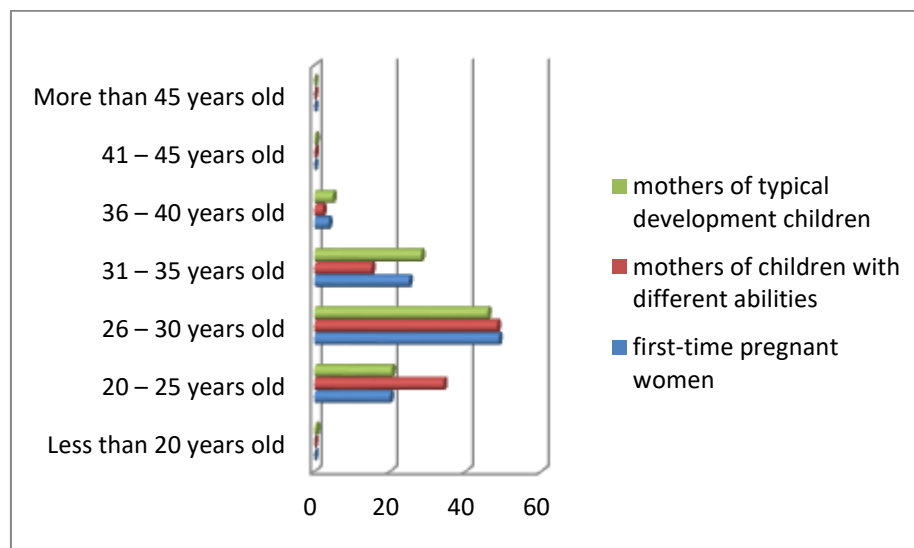


Figure 2: Age of participants

We see that most of the participants are aged in the 26-30 years old range. There is the tendency of later onset of motherhood – around women’s 30^{es}. In details, the data is analysed and summarized as it follows:

- Among the first-time pregnant women there are 2 (2.5%) who are less than 20 years old; 16 (20%) are 20-15 years old; 39 (48.75%) are 26-30 old; 20 (25%) are aged 31-35, and 3 (3.75%) are aged 36-40. There are no representatives here of the age range 41-45 and more than 45 year-olds.
- Among the mothers of children with different abilities there are no one who is less than 20 years old; 217 (34.17%) are 20-25 years old; 307 (48.34%) are 26-30 years old; 96 (15.11%) are 31-35 years old; 14 (2.2%) are 36-40 years old; 1 (0.15%) is 41-45 years old. There are no mothers aged more than 45.
- Among the mothers of typical development children there are 3 (0.52%) who are less than 20 years old; 118 (20.48%) are 20-25 years old; 264 (45.83%) are 26-30 years old; 163 (28.29%) are 31-35 years old; 28 (4.86%) are 36-40 years old; 2 (0.34%) are aged 41-45. There are no ladies above 45 years old participating in our study.

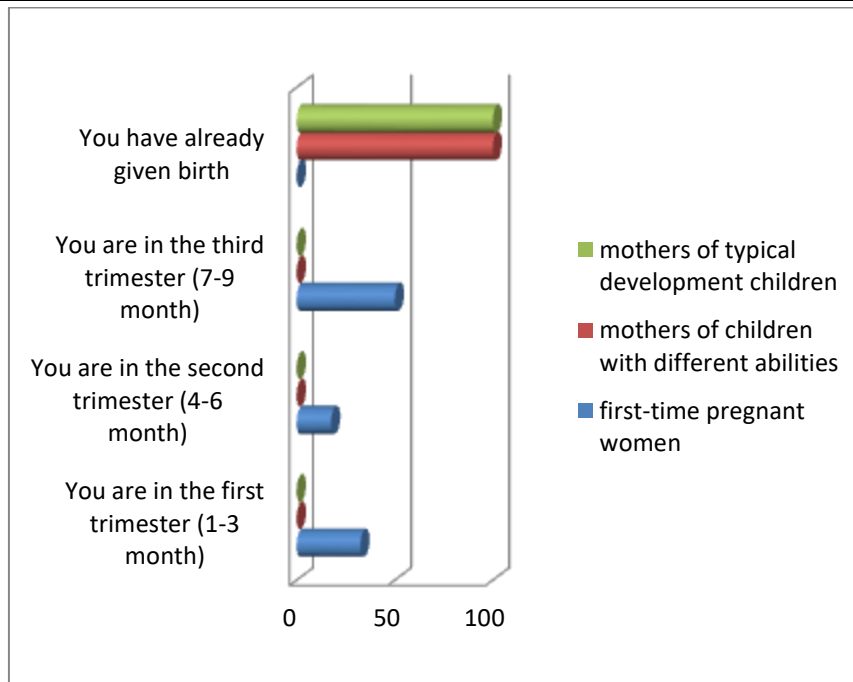


Figure 3: Pregnancy status of participants

All mothers of children with and without DA have already given birth. Among the pregnant women 26 (32.5%) of them are in their first trimester, 14 (17.5%) are in their second, and 40 (50%) of them are in their final three months of the pregnancy.

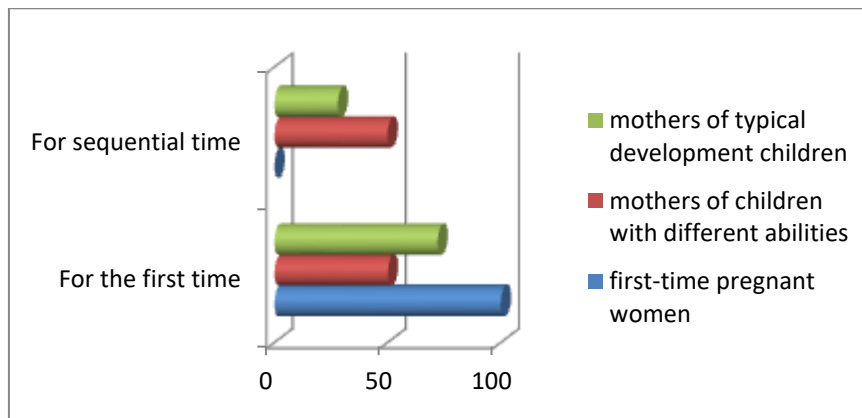


Figure 4: Answers of the question: "are you pregnant (or you have given birth)?"

We notice that most of the mothers of children with DA avoid being pregnant after delivering a child with different ability. Logically, first-time pregnant women are with child for the first time. Among the mothers of children with DA there are 318 (50.07%) who were pregnant for the first time and the other half of 317 (49.93%) are pregnant for the next time in their lives. Among mothers of typical development children there are 415 (72.04%) of them who were pregnant for the first time and the rest of 161 (27.96%) are pregnant for the sequential time.

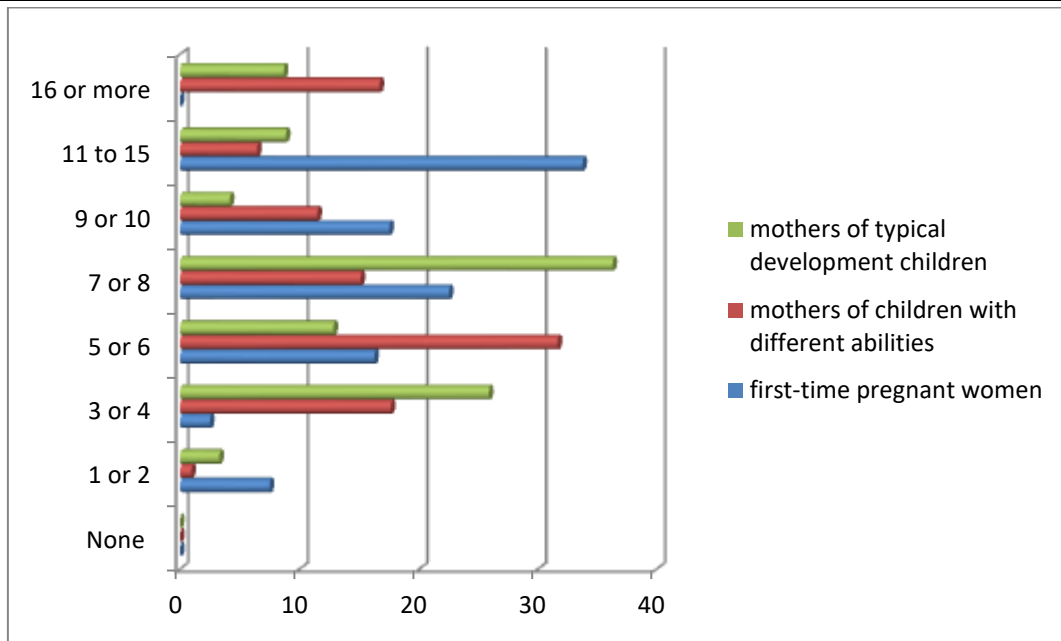


Figure 5: Answers of the question: "What number of prenatal ultrasound scans did you and your baby experienced during pregnancy?"

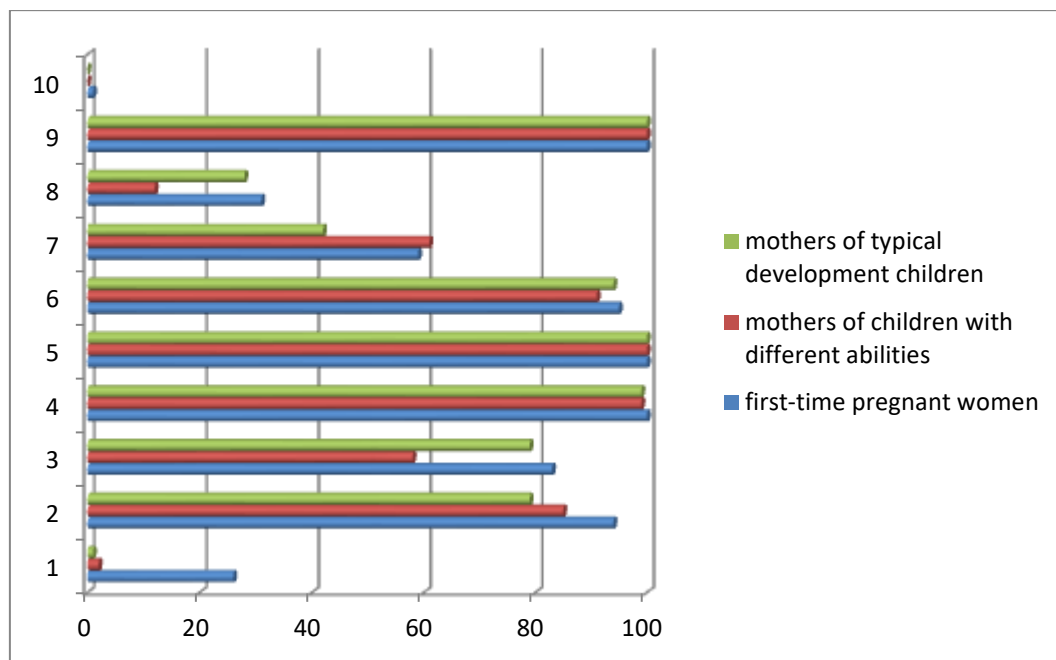
We notice a tendency in modern obstetrician medical care that healthy, low-risky pregnant women are being called for a routine ultrasound check more often than needed (every two or three weeks!). It is disturbing that in all three groups of mothers, there is not a single woman who has not been irradiated by ultrasound waves during pregnancy. Here are the results in numbers and percentages:

- Among the first-time pregnant women there are 6 (7.5%) who have had 1-2 routine ultrasound scans (RUS), 2 (2.5%) had 3-4 RUS, 13 (16.25%) had 5-6 RUS, 18 (22.5%) had 7-8 RUS, 14 (17.5%) had 9-10 RUS, 27 (33.785%) had 11-15 RUS and there are not pregnant women who were exposed to ultrasound waves 16 or more times.
- Among the mothers of children with different abilities there are 6 (0.94%) who had 1-2 RUS, 112 (17.63%) had 3-4 RUS, 201 (31.65%) had 5-6 RUS, 96 (15.11%) had 7-8 RUS, 73 (11.49%) had 9-10 RUS, 41 (6.45%) had 11-15 RUS and there are 106 (16.69%) of mothers who have exposed their babies to 16 or more RUS.
- Among the mothers of typical development children there are 19 (3.29%) who had 1-2 RUS, 149 (25.86%) had 3-4 RUS, 74 (12.84%) had 5-6 RUS, 209 (36.28%) had 7-8 RUS, 24 (4.16%) had 9-10 RUS, 51 (8.85%) had 11-15 RUS, and 50 (8.68%) had 16 or more RUS during the course of their pregnancies.

Numbers used in Figure 6 below for abbreviating the reasons of mothers:

- 1) You want to tell the news of your pregnancy using the image of your prenatal ultrasound.
- 2) You need to be reassured by the obstetrician that everything with your baby is all right.
- 3) You want to spend joyful time looking at your unborn child.

- 4) You trust your obstetrician on the number and duration of prenatal ultrasounds needed for your baby.
- 5) You can't wait to see your baby.
- 6) You want to know your baby's sex.
- 7) You want to upload images of your baby's ultrasounds in the social media.
- 8) You want to make an album of your child with pictures before and after birth.
- 9) You want to observe how your baby behaves in your womb.
- 10) Other (please, specify).



Note: the percentage exceeds 100% due to the fact that mothers have the option here to point more than one answer.

Figure 6: Mother's motives for exposing themselves and their babies to routine ultrasound scans (RUS)

We register the need of mothers to know the sex of their babies irrespectively of the group they belong to (first-time mothers, DA mothers or TD mothers). All of the women are impatient to see their babies, they all trust their obstrecian on the need and frequency of RUS that their pregnancy needs, and all women want to see their child during the different stages of growth in womb – what the baby is doing, how they behave, how do they look and just need to see their expected child looking forward to meeting them after birth.

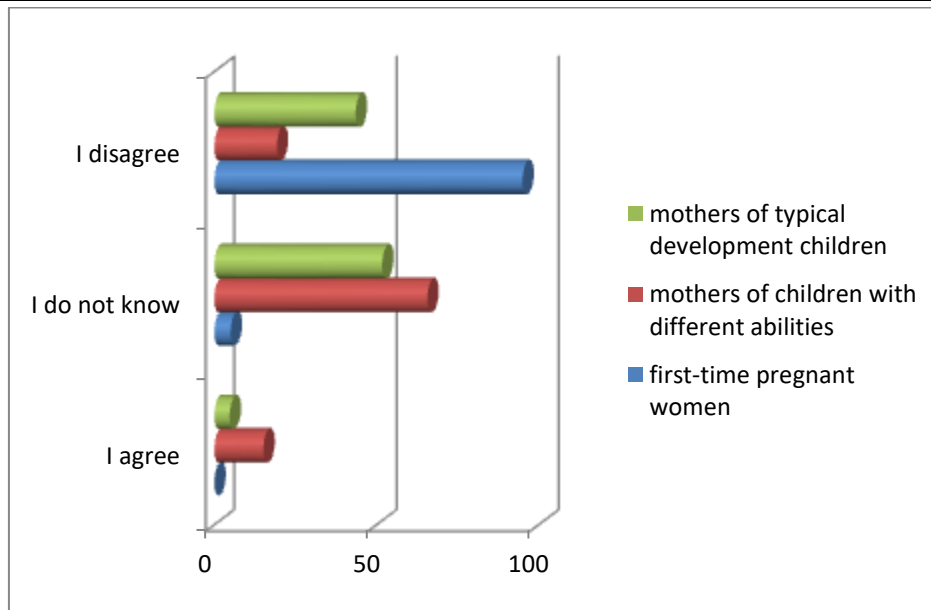


Figure 7: Answers of the question: "is ultrasound irradiation during pregnancy hiding short-term and long-term risks to your health"

We notice the fact that first-time pregnant women do not consider ultrasound waves as a potential risk procedure for their health – 76 (95%) of them think so. There are 4 (5%) of them who are not sure about whether there is or there is not that possibility. In the group of mothers of DA children, there are 96 (15.12%) who agree that there is certain risk for women’s health provoked by the ultrasound waves. Other 417 (65.66%) of this group participants do not know if there is such risk for them, and the final 122 (19.22%) of them disagree with this statement. The third group of mothers – the ones of typical development children, there are 27 (4.70%) who claim that they agree with the statement, 298 (51.73%) answer that they do not know, and the rest 251 (43.57%) of the ladies disagree with the statement.

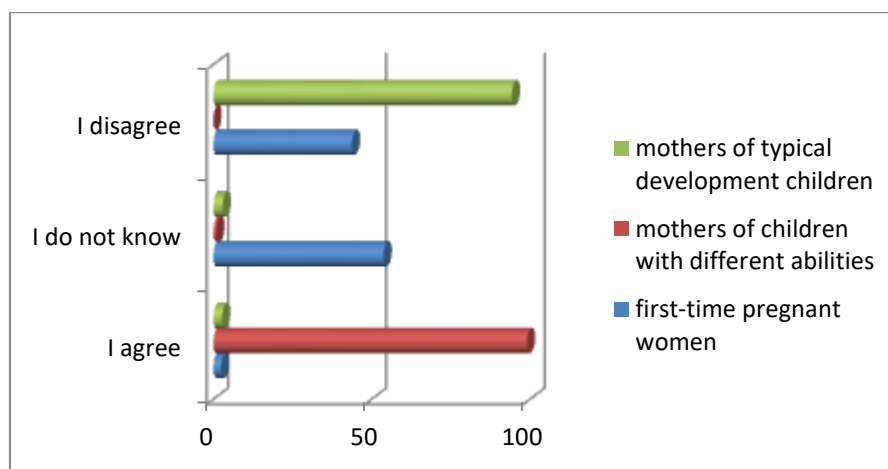


Figure 8: Answers of the question: "is ultrasound irradiation during pregnancy hiding short-term and long-term risks to your child's health"

We register differences in mothers' opinion.

- In the group of first-time mothers there are 2 (2.5%) of them who agree with the statement, 43 (53.75%) of them do not know, and the rest 35 (43.75%) of pregnant women disagree with the possibility that RUS may cause any damage to their babies.
- On the contrary, in the group of DA children mothers there are 629 (99.05%) of them who consider RUS as a potential danger to the health of the unborn child, 6 (0.95%) of them are not sure whether this is so or not. There are no mothers who disagree with the statement.
- The group of mothers of typical development children there are 16 (2.77%) of them who agree with this statement, 17 (2.95%) of them do not know, and the rest 543 (94.27%) of mothers disagree with the statement.

Numbers used in Figure 9 for abbreviating the mothers' answers:

- 1) explains to you the risks and benefits for you and your baby;
- 2) gives you instructions of what to do in order to begin the ultrasound examination;
- 3) other (please, specify).

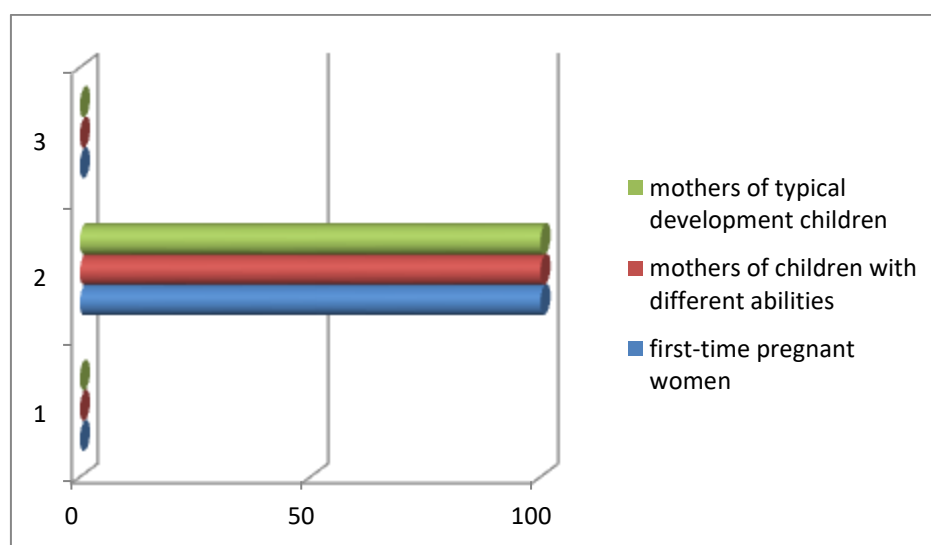


Figure 9: Answers of the question: "Before the ultrasound check your obstetrician...:"

It is astonishing to register that all (100%) women from all (100%) three groups of our study before the ultrasound exam receive nothing but instructions (such as to lay down or to remove their clothes from the belly) from their obstetricians. We would define this as deeply worrying tendency; however, we have witnessed the same attitude during the years of our study by the means of observation as a research tool described above. This makes us conclude that either obstetricians: 1) are not aware of the risks RUS hides for both mother and baby, especially for the baby, or 2) they know about these but do not warn their pregnant patients about them. Either way, this speaks worse for doctors' practice.

Numbers used in Figure 10 below for abbreviating the mothers' answers:

- 1) He/She does not call me, it is my decision whether to go or how often to go;
- 2) Twice for the whole pregnancy;
- 3) Three times during the pregnancy (one check for each trimester);
- 4) Once a month;
- 5) Twice a month;
- 6) Every week;
- 7) Other (please, specify).

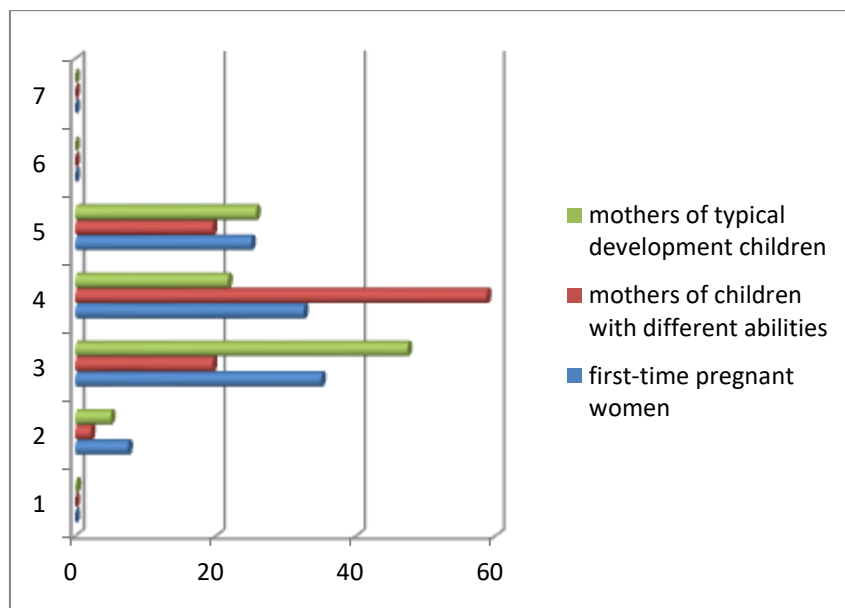


Figure 10: Answer of the question: "How often are you called to visit the obstetrician's office for a routine ultrasound check?"

Fortunately, there are no mothers registered who are visiting doctor's office every week. Unfortunately, however, there is only one woman (0.17%) in the group of mothers with typical development children who relies on her own judgement whether and when to go to visit the doctor for an ultrasound examination. According to the groups, the results are the following:

- In the group of first-time pregnant women there are 6 (7.5%) who are called twice for the whole pregnancy so far, 28 (35%) are visiting doctors three times for the pregnancy so far, 26 (32.5%) go once a month for a RUS, 20 (25%) go twice a month.
- In the group of DA children mothers 14 (2.2%) have been scanned twice for the whole pregnancy, 124 (19.53%) have been once for each trimester (three times in total), 373 (58.74%) have been there for a RUS once a month, and finally 124 (19.53%) have gone twice a month.
- In the group of typical development children's mothers 29 (5.03%) have been to the doctor's office twice for the whole pregnancy, 273 (47.39%) have visited them for RUS three times during the pregnancy (one check for each trimester), 125

(21.7%) have gone once a month for a check, and 148 (25.69%) have been there twice a month.

5. Discussion and Conclusion

Even though the presented survey is conducted on national level in Bulgaria, the author's observations and her international contacts make her conclude that there is both national and international tendency in medicalization of the period of pregnancy. All this leads to its logical consequences, which are not in favor of human health, both physical and mental.

After the data above is presented, a question emerges: How a special teacher or a mainstream teacher would benefit from this information? There are two main aspects for accomplishing this:

- 1) All information provides knowledge and leads to taking informative decisions. A teacher, a special teacher, usually serves and as a person for parents to share with and for them to be consulted by. This is the time when a teacher can inform parents about the need to be precautious with medical interventions using ultrasound irradiation during pregnancy regarding their future children.
- 2) A teacher is – at certain point of their life – a parent as well. They can use this information to provide safe environment for themselves as well as for their babies.

Below we provide more detailed information on these two aspects. Some of the conclusions we are able to declare at the end of our theoretical and experimental study are:

1. Pregnant women and their families must have to opportunity for informed consent for all medical interventions using ultrasound wave irradiation.
2. Pregnancy is highly controlled by medical doctors and medical devices. This leads to its relevant consequences, one of which is the delivery of children, who have been conceived healthy but eventually are being damaged during this important period of their lives – the in utero development.
3. A healthy pregnant woman with a healthy baby is often unnecessarily disturbed after having an ultrasound check with false positive diagnosis. This leads to her losing much of her connection to her unborn child, transferring the worries to the father of the child and the family in general, being anxious about the birth and rising of the child. This mothers' anxiety continues even after the birth of a healthy baby months after the delivery.
4. The opposite case is also reliable. There are about 40% of the disabilities that are unable to be detected by the means of an ultrasound scanning. Additionally, in cases of termination of pregnancy due to diagnosis of severe damage of the fetus, in a post mortem examination it occurs that the damages are not as severe as observed in the ultrasound monitoring. This leads mothers to different

psychological and emotional conditions, sometimes taking years to recover, if ever.

5. Obstetricians are working with the parents, especially with mothers, and their children *before* birth. Special and mainstream teachers are working with mothers, parents and families and their children *after* birth. The medical doctors use the eight-nine *months* of pregnancy for (unnecessary in most cases) interventions on the child and mother while teachers have many *years* for working with the child to recover them from the damages, as much as possible, caused by the use of routine ultrasound irradiation on the developing brain cells, systems and organs of the unborn baby.
6. Prenatal psychology and prenatal pedagogy are scientific areas that much benefit from information collected during prenatal ultrasound scanning. This should be restricted for the safety of the baby.
7. Mothers of typical development children basically do not consider ultrasound scanning as a risky routine procedure. They state that they have had these testing during pregnancy/pregnancies and have delivered healthy children. Additionally, they claim that they have received comfort from seeing and knowing that their baby is all right, which has been confirmed by their obstetrician conclusion and scanning results. They view RUS as a way “to take care” of their children and protect them from any medical conditions that could be fixed during the period of pregnancy (e.g. by intrauterine surgery).
8. First-time, low-risky, healthy pregnant women are more eager to visit the routine ultrasound scans, and do it more often, due to their excitement of seeing their babies, however, those of them who are in their third trimester declare that in case of their next pregnancy, they would restrict themselves from having that many unneeded ultrasound scannings and medical testings.
9. Mothers of children with different abilities blame themselves for not being aware of the risks medical testings and interventions during pregnancy have had on their babies, especially the irradiation with ultrasound waves. Additionally, they blame their obstetricians for not informing them on the dangers these procedures hide for the health of their babies.

After all data analysed, both theoretical and empirical, we are in the position to answer the question we asked in the beginning of our research, namely: “Is there any direct or indirect relation between the routine ultrasound irradiation scanning during pregnancy and the number and severity of children the disabilities?” We would answer: Yes, there is certain risk and danger on damaging key developing structures in the unborn child by the ultrasound waves, especially the brain and all pregnant women should be informed about these before the routine ultrasound scanning is implemented on them and their babies.

While some babies survive the prenatal routine ultrasound irradiations without having any damages in their later lives, there is another group of babies who have

individual predisposition and when irradiated in utero, they develop certain conditions in the first years after birth.

Many organizations working with women, pregnant women, babies and children (e.g. the American College of Obstetricians & Gynecologists) recommend ultrasound scans only for specific reasons.

As a result from our research our hypothesis was confirmed, the research aim is achieved and the research objectives are successfully completed.

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Appendix: Questionnaire for mothers

Dear Mothers,

I am conducting a study on the topic of use of prenatal ultrasound in the period of pregnancy. In case that you wish to join my efforts, you are kindly asked to fill in a separate questionnaire for each of your pregnancies. The questionnaire protects your anonymity. It consists of eleven questions and answering them would not consume more than five minutes of your time – which I highly appreciate! Please, feel free to add any important comments on the subject of research in the last question of the questionnaire. Please, do fill in this questionnaire in case that you are (have been) healthy during pregnancy and your pregnancy is considered low-risky.

For any questions, please, do not hesitate to contact me at: (xxx – my e-mail here) and on (xxx – my cell phone number here).

1. You are:

- Less than 20 years old;
- 20 – 25 years old;
- 26 – 30 years old;
- 31 – 35 years old;
- 36 – 40 years old;
- 41 – 45 years old;
- More than 45 years old.

2. Currently,

- You are in the first trimester (1-3 month);
- You are in the second trimester (4-6 month);
- You are in the third trimester (7-9 month);
- You have already given birth.

3. You are pregnant (or you have given birth):

- For the first time;
- For sequential time.

4. By now, you and your baby (babies) have had:

- 0 routine prenatal ultrasound scans;
- 1-2 routine prenatal ultrasound scans;
- 3-4 routine prenatal ultrasound scans;
- 5-6 routine prenatal ultrasound scans;
- 7-8 routine prenatal ultrasound scans;
- 9-10 routine prenatal ultrasound scans;
- 11-15 routine prenatal ultrasound scans;
- 16 or more routine prenatal ultrasound scans.

5. The reason/s that you have routine prenatal ultrasounds is/are:

- You want to tell the news of your pregnancy using the image of your prenatal ultrasound.
- You need to be reassured by the obstetrician that everything with your baby is all right.
- You want to spend joyful time looking at your unborn child.
- You trust your obstetrician on the number and duration of prenatal ultrasounds needed for your baby.
- You can't wait to see your baby.
- You want to know your baby's sex.
- You want to upload images of your baby's ultrasounds in the social media.
- You want to make an album of your child with pictures before and after birth.
- You want to observe how your baby behaves in your womb.
- Other (please, specify).

Note: If you wish, you can mark more than one answer here.

6. Is ultrasound irradiation during pregnancy hiding short-term and long-term risks to your health?

- I agree;
- I do not know;
- I disagree.

7. Is ultrasound irradiation during pregnancy hiding short-term and long-term risks to your child's health?

- I agree;
- I do not know;
- I disagree.

8. Before the routine ultrasound check your obstetrician:

- Explains to you the risks and benefits for you and your baby.
- Gives you instructions of what to do in order to begin the ultrasound examination.
- Other (please, specify)

Note: If you wish, you can mark more than one answer here.

10. How often are you called to visit the obstetrician's office for a routine ultrasound check?

- He/She does not call me, it is my decision whether to go or how often to go;
- Twice for the whole pregnancy;
- Three times during the pregnancy (one check for each trimester);
- Once a month;

- Twice a month;
- Every week;
- Other (please, specify).

11. Please, feel free to add here any comments or thoughts on that subject.

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Please, identify your status. You are:

- first-time pregnant woman;
- mother of a child with different ability;
- mother of a child with typical development.

Thank you for your cooperation!

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