

# Awareness of pregnant women and mothers of infants in Poland in the field of prevention of diseases of the oral cavity of children

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## ABSTRACT

**Introduction:** During pregnancy, the future mother's body undergoes changes that affect the health of her oral cavity. During this period a woman should visit a dentist and adopt proper dietary and hygienic habits. The health awareness and knowledge of the future mother about the prevention of oral diseases are necessary to delay the colonization of the child's oral cavity with cariogenic bacteria and thus prevent caries and its complications.

The aim of the study was to assess the awareness of pregnant women and mothers of infants in Poland regarding the prevention of children's oral diseases.

**Materials and methods:** A survey of 125 pregnant women and mothers of infants was conducted.

**Results:** The study shows that the majority of women (84.8%) were convinced of the need to see a dentist during pregnancy. A similar percentage (88.8%) knew that both preventive and therapeutic procedures could be performed during this period.

Two thirds of the women correctly answered the question of which oral hygiene procedures should be performed by the future mother. Only 38.4% of the respondents knew that the condition of the pregnant woman's teeth can influence the development of caries in the child, and 54.4% of the respondents knew about the possibility of transfer of cariogenic bacteria from the mother's oral cavity to the child's oral cavity. 52.8% of women would take their child to the dentist on time, i.e. between 6–12 months of age. Half of the respondents believed that the use of fluoride was safe, and even fewer – 46.4% – believed that a child could use fluoride toothpaste. The main source of information on children's oral health for the women surveyed was the Internet (53.6%). **Conclusions:** The study showed that health awareness and oral health knowledge among pregnant women and mothers of young children are inadequate and that dentists need to intensify educational efforts. **Keywords:** caries prevention; oral hygiene; pregnant women; children.

## INTRODUCTION

Pregnancy is an important period in a woman's life when she pays special attention to her health and the baby she is expecting. During this period, a number of changes take place that are also reflected in the oral cavity. Changes in a woman's hormonal balance can cause inflammation of the oral mucosa [1, 2]. Increased dry mouth, nausea, and vomiting can lead to the formation of non-cariogenic cavities, such as erosion of hard tooth tissue [3]. Changes in lifestyle and diet can lead to an increased susceptibility to caries [4, 5, 6]. The period of pregnancy is important because her correct behavior and healthy habits during this period and in the first months of the baby's life have a great impact on the maintenance of oral health. Primary prevention includes the education of the pregnant woman and a series of actions aimed at delaying the colonization of the child's oral cavity with cariogenic bacteria (*Streptococcus mutans*, *Lactobacillus acidophilus*). The basic element of primary prevention is regular oral hygiene by the mother, which allows to significantly reduce the number of cariogenic bacteria in the mouth [7]. It is recommended to brush teeth twice a day with toothpaste containing 1450 ppm F and to floss the contact

surfaces, to use alcohol-free rinses with fluorine (225 ppm F) or chlorhexidine [8], to clean the tongue, and to use chewing gum with xylitol [9, 10], which has a cariostatic effect [11]. It is recommended that mothers chew chewing gum with xylitol in the amount of 5–10 g per day, at intervals of  $\geq 3$  h, and maintain this habit until the child reaches 2 years of age [12]. It should be mentioned that excessive chewing, especially in people prone to temporomandibular joint problems, may increase the risk of its dysfunction. Pregnant women should visit a dentist for an oral health examination, hygienic treatment with hygiene instruction and oral health education. Expectant mothers are also encouraged to undergo other treatments, such as fluoride varnishes and treatment of possible caries. Women will promote oral health and prevention among family members, including their children, if they are properly informed and aware [13]. The next stage of preventive measures is primary prophylaxis, which concerns the oral cavity of the child, which is already colonized with cariogenic flora, and is focused on reducing the number of pathogens and their negative impact on the child's dentition. For this purpose, it is necessary to start taking care of the baby's oral cavity already in the first months of his life. In the first stage, it consists of cleaning the toothless oral cavity

with a moist gauze. After the appearance of the first teeth, it is necessary to introduce brushing with a special silicone finger cap or a soft toothbrush with a small head [14] and toothpaste with a fluoride content of 1000 ppm F in a trace amount of rice grain. Avoid direct contact between the mother's saliva and the baby's mouth, such as sharing cutlery or licking pacifiers, as this can transfer bacteria to the baby's mouth. Studies show that the number of *Streptococcus mutans* in infants is positively correlated with the number of these bacteria in the mother and with the current state of her oral health [15].

The aim of the study was to assess the level of knowledge and health awareness among pregnant women and mothers of infants in Poland.

## MATERIALS AND METHODS

One hundred twenty-five respondents participated in the survey based on self-report. Pregnant women accounted for 63.9% and mothers of infants accounted for 36.1%. The survey consisted of 22 questions and was available as a link to a Google form on the Internet (<https://forms.gle/yWjJCWgkmJ7BJB3j9>). Questions included in the survey were related to oral health behaviors of women and their children, as well as knowledge about dental caries and ways to prevent it. The survey covers topics related to oral health awareness among pregnant women and mothers of infants. The questions were about their oral health and the oral health of their children. Most of the questions were closed, single-choice, some required the selection of 1 of 3 answers, and there was 1 open-ended question.

## RESULTS

Based on the research conducted, it was found that 84.8% of mothers believed that pregnant women should go to the dentist even if they do not have pain (Fig. 1). 12.8% of the respondents saw the need to visit the dentist only in case of oral pain, while 2.4% of the respondents were convinced that pregnant women should not go to the dentist.

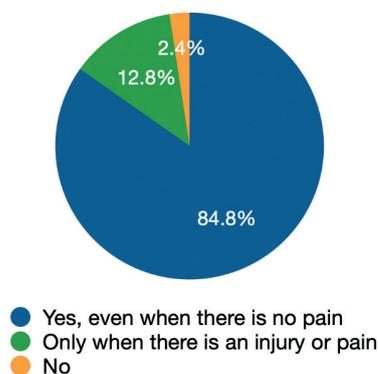


FIGURE 1. Should a pregnant woman visit the dentist during pregnancy?

Figure 2 shows the respondents' answers to the question of which dental procedures can be performed on pregnant women. 88.8% of the respondents answered that hygienic, preventive, and therapeutic procedures can be performed, while less than 5% believed that they cannot be performed during this period because they are dangerous for the child.

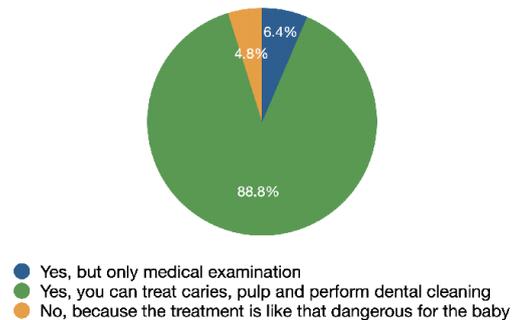


FIGURE 2. Can dental procedures be performed during pregnancy?

The most convenient time to visit the dentist is the second trimester of pregnancy, and this answer was given by almost  $\frac{2}{3}$  of the women. One-third (36%) considered the first trimester of pregnancy to be the most convenient time (Fig. 3).

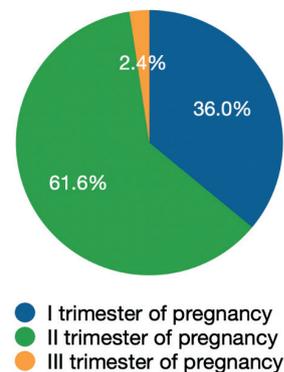


FIGURE 3. Which period of pregnancy is the best to visit the dentist?

Respondents' answers regarding the use of local anesthesia for dental treatment during pregnancy are shown in Figure 4 – 42.4% of patients would agree to such anesthesia, 16% of the women considered this procedure dangerous for the child and would not agree to it. A similar percentage of respondents (16.8%) indicated that they would agree to anesthesia only when pain occurred.

In response to the question of what oral hygiene procedures a pregnant woman should perform, 12.8% of respondents answered that she should only brush her teeth twice a day with fluoride toothpaste, and 1 in 4 thought that a pregnant woman should use a non-fluoride toothpaste. More than 60% of the women believed that a pregnant mother should brush her teeth twice a day with fluoride toothpaste, but should also floss and use fluoride rinses (Fig. 5).

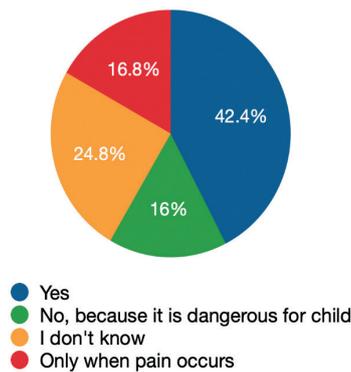


FIGURE 4. Would you agree to local anesthesia for tooth treatment during pregnancy?

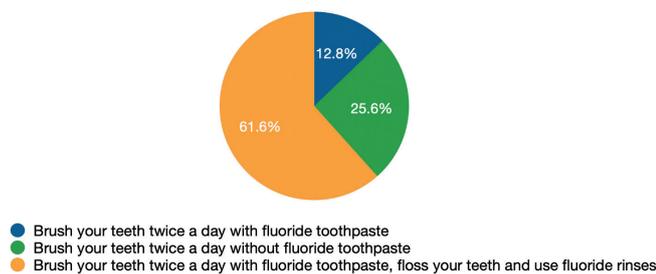


FIGURE 5. What oral hygiene procedures should a pregnant woman perform?

The women surveyed were asked about the possibility of having X-rays and surgical procedures such as tooth extractions during pregnancy. They were asked about their awareness of the spread of cariogenic bacteria from the mother's oral cavity to the child and the safety of fluoride use by children. The detailed responses of the respondents are presented in Table 1.

TABLE 1. Respondents' answers

Questions	Yes	No	I do not know
Can a pregnant woman have an X-ray taken?	23.2%	56.0%	20.8%
Would you agree to take an X-ray of your tooth during pregnancy?	78.4%	21.6%	0.0%
Can a woman remove teeth during pregnancy?	63.2%	10.4%	26.4%
Can the condition of a pregnant woman's teeth affect the development of caries in her child?	38.4%	25.6%	36.0%
Can cariogenic bacteria from the mother's mouth be transferred to the baby's mouth?	54.4%	14.4%	31.2%
Is it recommended to feed the baby with the same cutlery from which the parent eats, and for parents to lick cutlery and pacifiers?	10.4%	89.6%	0.0%
Can a child use fluoride toothpaste?	46.4%	26.4%	27.2%
Is it safe to use fluoride?	50.4%	16.8%	32.8%

A child's first visit to the dentist should take place between the ages of 6–12 months, according to more than half of the women surveyed. 40.8% of the mothers said that the first visit should only take place when the child is 2–3 years old, and 6% of the mothers said that the timing of the child's first visit should depend on the occurrence of pain, injury or other disturbing symptoms (Fig. 6).

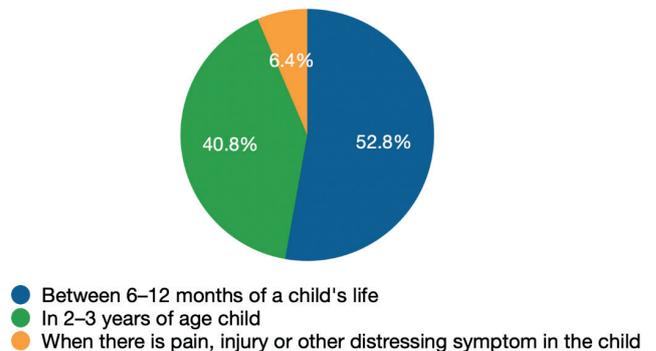


FIGURE 6. When should you make your child's first dental visit?

Research shows that the overwhelming majority of mothers surveyed were aware of the need to clean their child's toothless oral cavity and knew about the introduction of children's toothpaste when the first tooth appeared (Fig. 7 and 8).

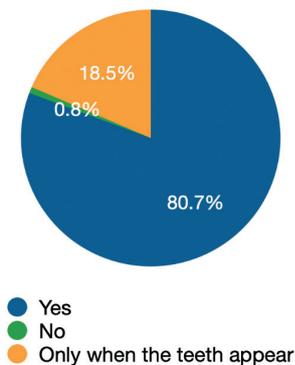


FIGURE 7. Should the oral cavity of a newborn and infant be cleaned?

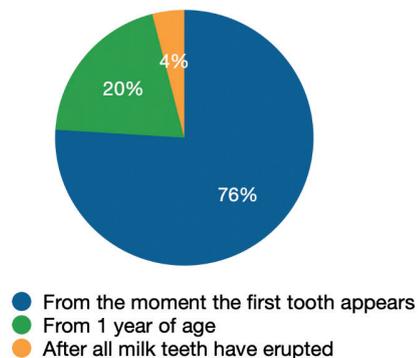


FIGURE 8. When should your child use children's toothpaste?

Figure 9 shows the mothers' responses to the question about the frequency of brushing their children's teeth. 74.8% believed that this treatment should be done twice a day and 7.3% were convinced that brushing once a day was enough.

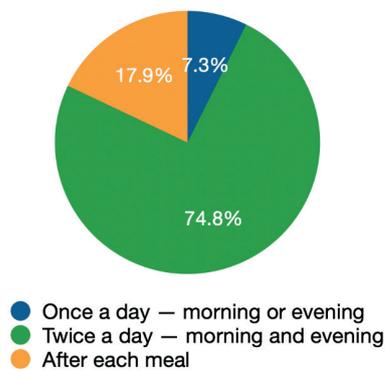


FIGURE 9. How often should you brush your child's teeth?

The majority of respondents (53.6%) reported that they obtained oral health information from the Internet. Dentists were a source of information and knowledge for only 1 in 3 mothers (Fig. 10).

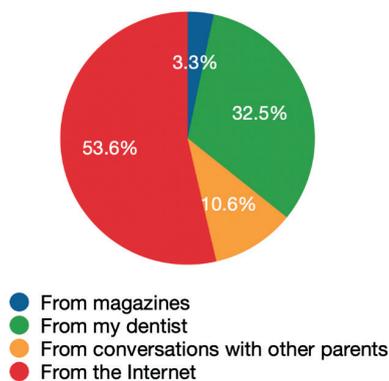


FIGURE 10. Where do you get your knowledge about oral hygiene for you and your child?

## DISCUSSION

Pregnancy is an important period in a woman's life when she takes care of her health and the child she is expecting. This concern includes the prevention of dental caries, which is a major problem in Poland, affecting 86.9% of preschool children [16]. Untreated caries has lifelong consequences, so it is extremely important to educate parents in this area as early as possible. Plutzer and Spencer showed that education of pregnant women is effective, as their oral health promotion program in the form of 3 rounds of preventive counseling (pregnancy, 6–12 months of age) significantly reduced the incidence of severe early childhood caries (S-ECC) in children [17].

Unfortunately, many authors found a high percentage of pregnant women in their studies who did not seek dental care during pregnancy [18]. Lee et al., who analyzed the results of research from the United States from 2012–2015, involving almost 76,000 women according to Pregnancy Risk Assessment Monitoring System (PRASM) guidelines, found that only half of them had at least 1 dental visit during their last pregnancy [19]. On the other hand, research by Hashim shows that more than half (58.3%) of the patients had a dental visit during pregnancy, but for most of them the reason for the visit was toothache [20]. However, these results were better than those obtained by George et al. in Sydney, where 69.5% of the women in their study had no dental care during pregnancy [21]. However, Petit et al. found that only 47% of the women surveyed visited a dentist during pregnancy, mainly for check-ups. Interestingly, the reasons for not visiting the dentist were: lack of complaints (42.7%), lack of time (25%), or lack of information about dental treatment options during pregnancy (14%). According to these authors, the majority of consultations and/or dental treatments were performed in the second trimester. The authors considered this percentage (47%) to be low because in France (as in Poland) free dental consultations are available to pregnant women under the health insurance scheme. Perhaps this low number of pregnant patients presenting to the dentist was due to a lack of information on the part of gynecologists and obstetricians responsible for pregnancy management [22].

Our own research shows that 85% of women were aware of the need for a dental check-up and 60% of them would choose to have one in the second trimester of pregnancy. These data may indicate a higher level of awareness among the women in our study, but our own survey did not verify whether the women actually made this visit.

Bushehab et al. found that only 29.8% of the pregnant women surveyed had regular dental check-ups. They also found that this group of pregnant women had the best hygiene habits – 93.3% of them brushed their teeth more than once a day. Women who had visited the dentist more than a year ago were less likely to brush their teeth at least twice a day (77.9%). According to the authors, frequent visits to the dentist correlate with better hygiene and more frequent hygiene procedures. They also found that regular dental visits increased respondents' health awareness and knowledge [23].

Pregnant mothers need to be aware that dental visits can be used not only for hygienic but also for therapeutic purposes. As many as 88.8% of the women knew this from their own research, and only 5% believed that therapeutic treatments could be dangerous for their child. On the other hand, in a survey of 400 pregnant women conducted by Bushehab et al., 64% of the women stated that they would undergo dental treatment during pregnancy, while 33.5% would refuse such treatment [23]. Data from the literature indicate that the most appropriate time for dental treatment is between 13–21 weeks of pregnancy [14]. 61.6% of respondents to the survey agreed with this recommendation. On the other hand, 1 in 3 (36%) felt that the best time was the first trimester. In the early stages of pregnancy, the range of therapeutic measures should be

reduced to those that are strictly necessary, as the likelihood of miscarriage is higher and fatigue and nausea make patients uncomfortable during visits.

In our study, women were asked if they would agree to receive local anesthesia for dental treatment during pregnancy. Only 42.4% of them would agree to such a procedure, although data from the literature show that pregnant patients can receive local anesthetics without risk, including those with vasoconstrictors, but always with aspiration [24, 25]. Our women were also asked if teeth could be extracted during pregnancy. 26.4% of the respondents did not know the answer and 1 in 10 believed that it was forbidden. Tooth extraction can be done during pregnancy, but it is best to do it in the second trimester [14].

The issue under discussion is the possibility of using X-rays for imaging of dental tissues in pregnant women. Fifty-six percent of the women in our study were convinced that such radiological images cannot be performed during pregnancy, and as many as 78.4% of the respondents would not agree to such a study. In another study conducted in Brazil, which aimed to assess pregnant women's perceptions of the role of health professionals in the dental care of pregnant women, the authors found that in some cases, even health professionals themselves may perpetuate fears and myths related to the dental care of a pregnant woman. For example, pregnant women who participated in the study reported that they were opposed to X-rays during pregnancy because they had heard it from their doctors and did not know about it. They also stated that they were afraid of deformities in the child [26]. According to Doucède et al., the doses of radiation received during most diagnostic procedures performed correctly do not pose any measurable additional risk to the fetus compared to the situation without radiation [27]. However, it should be remembered that all radiological images should be taken with special protective measures, such as a lead apron and a collar to protect the thyroid gland.

Another question was whether the oral health of the mother can influence the formation and development of caries in the child. Unfortunately, our own research did not provide a clear answer. Only 38% of the respondents answered this question correctly and 36% of the women did not know the answer. This indicates an insufficient level of knowledge in the group studied. In the study by Gupta and Chhetry, only 14% of the mothers surveyed knew about the possibility of caries transmission from mother to child, which was a much lower result compared to our own data [28]. It is widely believed that children of mothers with poor oral hygiene and high levels of bacteria are more likely to develop caries.

In addition, research by Köhler and Andrèen has shown that early colonization of the oral cavity with *Streptococcus mutans* bacteria before the age of 3 years leads to higher levels of these bacteria in the oral cavity at the age of 19 years, worse caries rates, and more fillings [29].

This is why primary prevention is so important, based on limiting the transmission of bacteria from the mother's oral cavity to the child's oral cavity. In our survey, 54.4% of respondents were aware of the importance of reducing bacteria

in their children's mouths, and 89.6% were aware that they could not feed their children with the same cutlery they were using. These data are similar to the results of monitoring studies conducted in Poland in 2020, where 59.07% of parents knew that cariogenic bacteria can be transferred to the oral cavity of a child from a third party [16].

Another important element that should not be overlooked is the prevention of dental caries in pregnant women, including, for example, brushing teeth twice a day with fluoride toothpaste containing 1450 ppm of F<sup>-</sup>. Data from the literature indicate that such a procedure reduces the incidence of caries to a greater extent than brushing once a day or less [30]. More than 60% of the women surveyed in our own study knew that a pregnant mother should brush twice daily with fluoride toothpaste, floss between the teeth, and use a fluoride rinse. Results lower than ours were found by Amit et al. [31] and Gupta and Chhetry [28] – in their research, 42.5% and 36% of pregnant women respectively reported brushing their teeth twice a day. A much higher percentage (72%) was observed by Stelmakh et al., who studied pregnant women in the Netherlands. In addition, they showed that 62% of the respondents in their study used additional devices to clean the interdental spaces, and these results are close to our own [32]. Another study shows a lower percentage of pregnant women brushing their teeth twice a day than our own research shows. In a study by Anagnostou et al., 52% of pregnant women brushed their teeth twice a day and 28% reported regular cleaning of interdental spaces with dental floss or another device [33].

The use of fluoride reduces the incidence of tooth decay, and it is thanks to fluoride that the incidence of tooth decay in children has been significantly reduced in most industrialized countries [34]. In our own research, only ¼ of respondents believed that a woman should not use fluoride toothpaste during pregnancy.

In our research, nearly 80% of mothers were aware of the need to clean their baby's toothless oral cavity. Only 18.5% of the women would introduce hygienic procedures only after the first tooth has erupted. A much lower percentage (48%) of parents who clean their child's edentulous oral cavity was found in the research conducted by Grzesiak and Kaczmarek [35].

Older children should use a toothbrush and age-appropriate fluoride toothpaste to clean their teeth [36]. Seventy-six percent of respondents knew that it should be used when the first tooth appears, and 20% of them believed that only a 1-year-old child could use fluoride toothpaste. Chala et al. found that 95.9% of Moroccan mothers did not brush their child's primary teeth immediately after eruption. As many as 53.3% of the respondents considered deciduous teeth to be less important and that only permanent teeth needed care. At the same time, 60.9% of respondents in that study were aware of the positive effect of fluoride in preventing tooth decay [37]. In our study, only half of the mothers believed that fluoride was safe. These fears are unfounded, as many scientific studies provide information on the safety of fluoride and its beneficial effects in maintaining oral health [38, 39].

52.8% of the mothers surveyed also knew from our own research when their child's first dental visit should take place.

According to most experts, it should take place between the ages of 6 and 12 months, when the first milk teeth appear [40, 41]. During this adaptive visit, the dentist examines the patient's oral cavity and gives the parents dietary and hygienic recommendations [42].

In the study by Wrzesińska-Narożniak et al., the percentage of parents with this knowledge was much higher, at 74.6%. These were people who obtained knowledge about health-promoting topics from social media [43]. These results suggest that information from the Internet can be a valuable source of knowledge if it is provided by specialists. Slightly different results were found by Ben David et al. Only 3.3% of the mothers surveyed said that the first dental visit should take place when the child is 6 months old, and 14% of the respondents said that the first visit should take place when the child is 12 months old. In the same study, more than half of the respondents said they received information from the dentist about their child's dental care [44]. The results of the research by Chala et al. confirmed that there are a significant number of mothers who avoid taking their child to the dentist, even when the child has an urgent need. According to the authors, this can lead to dental complications in the child and affect the child's general health. The authors cited the respondents' economic situation as the reason for postponing visits [37].

Unfortunately, the reason for the first visit of many young patients is still a pain symptom, which may indicate advanced caries. Such a visit is more traumatic, longer, and uncomfortable for a young patient and may cause anxiety associated with a dental office from that moment on. In a study, it was found that parents of children who came to their first dental appointment late and only because of pain would go to such a visit much faster if they knew about the importance of dental treatment. In this way, they could avoid stress and high financial expenses for the child [45].

According to our own research, the main source of parents' knowledge about fluoride was the Internet – 53.6%, and dentists – only 32.5%. The low level of knowledge among the respondents of our own research indicates a great need for health education, but most importantly – by competent and trained people. Internet sources have the ability to provide convincing information, which unfortunately is often false and inaccurate. At the same time, they are easily accessible and spread quickly, undermining or completely refuting knowledge confirmed by research by specialists [46]. Dentists should increase the education of parents about prevention (not only fluoride), and parents should carefully check the sources from which they obtain information [47]. For 16% of the women surveyed in the Petit et al. study, media such as television, magazines and newspapers were also sources of information, suggesting further opportunities to use such sources in the future [22].

### Limitations of the study

Survey research has certain limitations due to its structure. As with most of them, there were problems with the accuracy of responses in our study. This means that some respondents did

not answer certain questions in the survey. In order to maintain the clarity of the results, the authors did not take such responses into account. Since this survey was available through an online form, we wanted to obtain as large a representative group as possible. To achieve this, the technique described by Ziman and Gasparyan was used, which consisted of creating regular reminders on social media and sending emails to interested groups and individuals [48]. Unfortunately, although this tactic increases the number of responses, it does not eliminate the bias of the respondents who participated in the study.

## APPLICATIONS

Follow-up visits to the dentist should be an integral part of a pregnant woman's care. During these visits, dentists should intensively educate patients and implement preventive measures in the field of oral health of mothers and their children. The results of the survey showed that the level of knowledge about the prevention of oral diseases among women in Poland is insufficient and requires an increase in the amount of time and money spent on education and health promotion.

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