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A Literature Review of Fertility Education for High School Students

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Abstract

Purpose: Fertility education for high school students leads them to be able to decide when to get pregnant and give birth, and to think about their desired life plan. However, knowledge of fertility in Japan is low compared to other countries. This study aims to understand the state of fertility knowledge among high school students in Japan and to clarify issues in fertility education. **Method:** Ten articles published from 2013 to July 2023 were selected for review from ICHUSHI Web Ver. 5 and CiNii with the keywords "high school students," "fertility," and "education." The review was limited to Japanese-language literature due to differences in fertility education and knowledge between Japan and other countries. Results/Conclusion: 60% - 90% of the high school students indicated that their source of information on fertility was school lessons. Half of the students understood egg aging and the effects of smoking and drinking on fertility, but their knowledge of menstruation, male reproductive physiology/function, and infertility was insufficient. 50% - 80% of students wanted to marry by the age of 30, and 70% - 80% wanted to have children. 80% of students who attended a lecture on preconception care considered the lesson an opportunity to think about their future life plans. 90% of school nurse teachers reported that fertility should be taught in schools, and half said that egg aging, causes of infertility, and other topics should be covered in high school. Educational caution points included the consideration of developmental stages and the relatedness of the content to what had already been taught, among other things. High school is the best time for fertility education because it gives students the opportunity to accept

their own sexuality and think about their future. In addition, since many students plan to marry and have children by the age of 30, the acquisition of fertility knowledge can be an effective means of future life design.

Keywords

High School Students, Fertility, Education

1. Introduction

The average age of first marriage in Japan is trending upward year after year; as of 2022 it was 31.1 years for men and 29.7 years for women. The average age of mothers when having their first child is also on the rise, at 30.9 years in 2022 [1]. In the 16th Basic Survey on Birth Trends (2021), the number of couples who had undergone infertility testing and treatment increased from 18.2% to 22.7% (1 in 4.4) compared to the previous survey in 2015, and 6.7% of couples who had been married for less than 5 years had been tested or treated for infertility at the time of the survey [2]. Behind this is the trend toward late marriage due to women's career aspirations and the increasing age of patients undergoing fertility treatment. According to data from the Japan Society of Obstetrics and Gynecology, the group which most commonly receives infertility treatment, are patients around 40 years old, but the pregnancy rate is low and the miscarriage rate high in this group [3]. However, patients have few opportunities to learn about egg aging and the fertile period, and many women believe that they can easily get pregnant as soon as they stop using contraceptives. In Life Planning with an Awareness of the Fertile Period, it was reported that knowledge of fertility in Japan is low and fertility education is required [4]. Since fertility decreases with age, which increases the likelihood of not having children, fertility education is necessary so that the women of the future can conceive, give birth, and build a family when they wish.

The airing of "The Impact of Egg Aging" [5] in 2012, increased interest in fertility. The program featured a survey conducted by Bunting *et al.* in 2009-2010 and reported that, among developed countries, knowledge about fertility was the lowest in Japan [6]. In response to this, the Japanese government stated in the "Outline of Measures for a Society with a Declining Birthrate" a goal to promote the inclusion of correct medical and scientific information about pregnancy and childbirth in materials used in school education. In service of this goal, the Ministry of Education, Culture, Sports, Science and Technology published a health education document designed to help high school students acquire knowledge about fertility entitled "Leading a Healthy Life (For High School Students)" [7]. One of the major benefits of high school students learning about reproductive medicine, infertility, and how age and other factors affect fertility is that they will be able to decide for themselves when they would like to become pregnant and have a child while forming their life plan. Due to increased infertility and complications during pregnancy

and childbirth associated with marriage and pregnancy later in life, a low level of fertility knowledge significantly affects the health of the unborn child as well as that of the mother. In addition, the acquisition of fertility knowledge is necessary because of the role risk factors such as health before conception, smoking and drinking habits, being over- or underweight, infectious diseases, and drug use play in a safe pregnancy and delivery. In Japan, school serves as the source of information on pregnancy and childbirth, so it is important to enhance such learning as a part of high school health education [8].

In consideration of the above points, the purpose of this literature review is to evaluate the education Japanese high school students have received and to identify issues that need to be addressed by the school nurse teachers teaching the subject based on the state of fertility education.

2. Research Method

2.1. Target Literature

We queried the web version of ICHUSHI Ver.5 and CiNii, for literature published from 2013 to July 2023, a period of growing interest in fertility education. In addition, due to differences in fertility education and knowledge between Japan and other countries, we narrowed the search down to Japanese literature. The search keywords were "high school students," "fertility," and "education." As shown in **Figure 1**, 162 ICHUSHI entries and 90 CiNii entries were found,

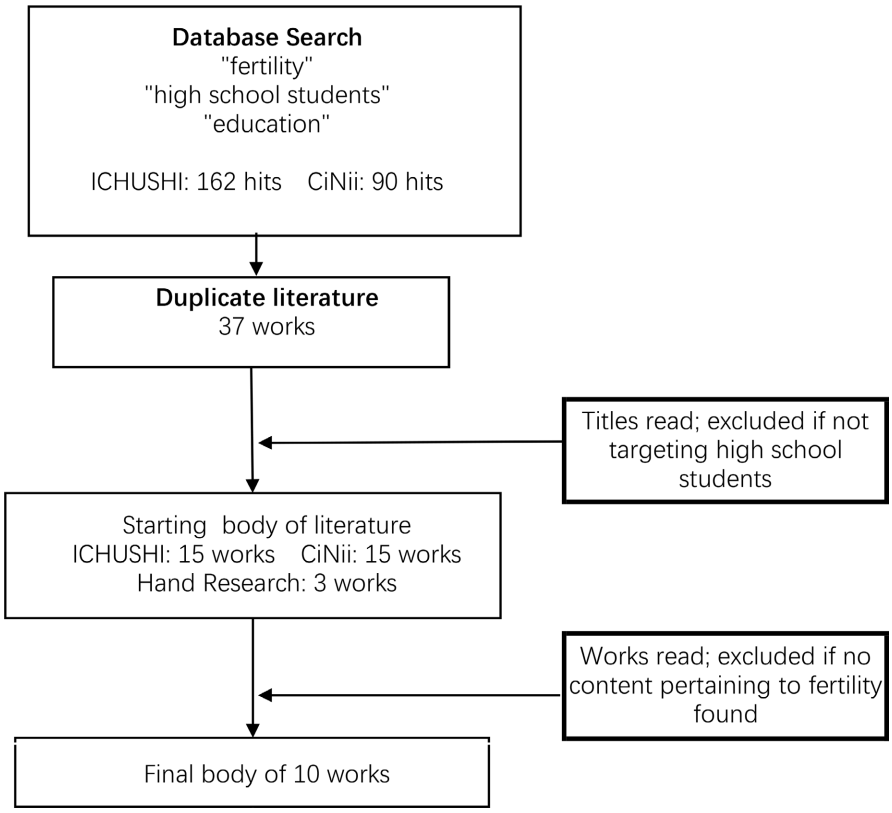

Figure 1. Method of literature search.

from which duplicate literature was excluded. The selection criteria for the target literature were as follows: 1) literature on fertility or sex education whose subject was high school students, 2) literature on fertility or sex education by school nurse teachers, 3) original papers, research reports, practical reports, or educational materials, which were published in academic journals.

The exclusion criteria were: 1) literature whose subject was not high school students, 2) literature whose main theme or purpose was neither fertility or sex education, and 3) literature that did not provide details in the text. Literature was screened by checking the titles and abstracts of the search results. A secondary search of the list of relevant works yielded one hand-researched work, for a final total of ten target works for analysis (**Figure 1**).

2.2. Method of Analysis

Using the matrix method, which is a structure and process for systematically reviewing literature, we organized the selected works by author, year of publication, study design, target of study, purpose, research method, and results. After considering the content of the ten works, we established two angles of analysis: from the perspective of evaluating Japanese high school students' knowledge of fertility, "high school students' knowledge and awareness of fertility"; and from the perspective of school nurse teachers educating on fertility, "points of improvement for the acquisition of correct fertility information." The target works are shown in **Table 1** as items [8]-[17].

3. Results

3.1. Annual Trends and Summary of Target Literature

The distribution of works among the target literature by year published was as follows: one work in 2014, one work in 2015, two works in 2016, one work in 2017, and five works in 2021. Seven works targeted high school students, and two works and one journal were related to school nurse teachers.

As shown in the list of citations, the works cited consisted of eight quantitative studies, one qualitative study (semi-structured interview), and one special report. There were seven works on fertility knowledge and awareness among high school students, two on fertility knowledge and awareness among school nurse teachers, and one on fertility in the school curriculum. High school students were surveyed on their aspirations for marriage/children, pregnancy/childbirth, male & female sexual physiology, and male & female fertility. They were also surveyed via the Cardiff Fertility Knowledge Scale - Japanese Version (hereafter, CFKS-J) on their fertility knowledge, interfertility knowledge, and their assessment of the sex education they had received.

3.2. High School Students' Knowledge and Awareness of Fertility

60% - 90% of high school students named school as their source for information on fertility [13] [14] [16]. On female fertility, 50% - 60% of knew that smoking

Table 1. List of analysis papers.

Citation #	Author	Year	Study Design Data collection method	Subjects	Purpose	Results
8	Satomi Wakasugi	2014	Quantitative Nine schools Questionnaire survey	1816 high school students Male: 75 Female: 1041	Identify the degree of reproductive knowledge essential for life planning	82.5% of boys and 84.0% of girls wanted to have children in the future, and the desired age to have children was 28.1 years for boys and 26.4 years for girls. 31.1% of boys and 58.4% of girls answered that menopause occurs around age 50, and half of both sexes said women can get pregnant at any time as long as they are still menstruating. 26.3% of boys thought that a woman menstruates her entire life, and 11.4% thought that a woman can get pregnant any time in her life as long as she is menstruating.
9	Akihiro Nishio, *et al.*	2015	Quantitative Six schools Questionnaire survey	1866 high school students Male: 1108 Female: 727	Investigate high school students' knowledge and awareness of marriage and childbearing and the factors that influence them, and consider what kind of educational content is necessary and effective.	72% of boys and 81% of girls wanted to marry, with the average age they wanted to marry being 23.3 for boys and 22.6 for girls. 39% of students said they wanted to have children by the age of 25 and 46% said they wanted children by the age of 30. 14% of boys and 22% of girls were well aware of the gradual decline in a woman's fertility after the age of 30, while 36% of boys and 18% of girls didn't know at all. On the gradual decline of a woman's ability to conceive decreasing with age even if she is undergoing fertility treatment, about 10% of boys and girls answered that they were well aware, and 53% of boys and 33% of girls did not know about it at all.
10	Yoshihide Kimura, *et al.*	2016	Quantitative Three schools Questionnaire survey	731 high school students Male: 344 Female: 387	Identify high school students' knowledge about menstruation, ejaculation, and the ages pregnancy and childbirth are possible, as well as their attitudes about marriage and having children.	When asked until what age menstruation continues, 28.6% of boys and 5.3% of girls answered "until death." The most common answer for girls was "until the age of 50," at 39.6%. When asked until what age it is possible to ejaculate, 40.5% of boys and 19.1% of girls answered "until death," with the largest group being girls who answered "until 50 years old," at 27.4%. Regarding the age limit for female fertility, 27.2% of boys and 38.1% of girls answered "until the age of 40," and 21.6% of boys and 3.6% of girls answered "until death." Regarding the age limit of male fertility, 33.6% of boys answered "until death" and 28.4% of girls answered "40 years old." 85.8% of boys and 80.3% of girls wanted to have children.
11	Mika Yamagata, *et al.*	2016	Quantitative Questionnaire survey	350 school nurse teachers	Clarify the state of knowledge and awareness of reproductive function and reproductive medicine held by school nurses involved in adolescent health and sex education	For knowledge of reproduction and age, 27.9% of respondents answered "40 years or older" as the age at which pregnancy rates decrease, and 42.1% answered "45 years or older" as the age until which natural pregnancy is possible. Regarding education on fertility and reproductive medicine, the following were identified as items that should be learned in school: the establishment of pregnancy (98.8%), egg aging (86.1%), and the causes of infertility (84.5%). 90.5% of school nurses were able to teach about the establishment of pregnancy, but only about half were able to cover the cryopreservation and donation of sperm and eggs. 51.8% said they covered egg aging and 40.4% covered the causes of infertility. Half of the respondents answered that "the establishment of pregnancy" should be taught in elementary school, and egg againg and the causes of infertility should be taught in high school.

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12	Yuri Akizuki	2017	Research Journal Documents	None	Examine the possibility of addressing fertility knowledge as part of the school curriculum	Information on fertility that we would like to incorporate into school education is 1) that women's fertility decreases with age (decrease in the number of eggs and deterioration in egg quality); 2) that the frequency of ovulation is approximately once a month (the life span of an egg is 24 hours), but the life span of a sperm is 2 - 3 days, and there is roughly one chance per month of getting pregnant; 3) that menstruation and ejaculation are essential phenomena for the creation of new life in the future, and that it is important to maintain appropriate lifestyle habits in order to be prepared to conceive and give birth in the future; and 4) that sexually transmitted diseases (STDs) can lead to infertility. In addition, educational precautions were 1) consideration of developmental stage, 2) consideration of the relatedness to other subjects and other content already studied, 3) not to spur anxiety in the students, 4) not to give the impression that sexual intercourse always leads to pregnancy, and 5) not to give students a negative impression of sex.
13	Yoko Nakagawa, *et al.*	2021	Quantitative High school students who participated in an adolescent class at a hospital Questionnaire survey	258 second-year high school students Male: 83 Female: 175	Examine high school students' degree of knowledge about fertility and the state of opportunities for them learn about fertility and use the findings as a resource for future sex education by midwives	50% of boys and 59% of girls said school lessons were their source of information on pregnancy and childbirth. Scores were compared by gender, with boys scoring an average of 8.2 points and girls 6.9 points out of 20 in the following categories: male fertility (smoking, drinking, mumps, sperm deterioration, association with masturbation), male reproductive physiology (spermatogenesis period, presence or absence of sperm in pre-ejaculate, sperm count in ejaculate, sperm fertilization ability immediately after ejaculation, sperm viability period), female fertility (smoking, body shape, egg deterioration, female age and pregnancy, egg freezing), When the knowledge of women's reproductive physiology (number of eggs in a lifetime, maximum number of eggs, menstruation and ovulation, eggs excreted by ovulation in one month, and egg survival time). Items related to smoking, drinking, aging of sperm and eggs, and age were understood by 50% - 60% of students, but items related to male reproductive physiology were not as understood as in girls. Regarding marriage and childbirth, 46% of boys and 44% of girls said they wanted to get married by the age of 30, and 34% of boys and 44% of girls said they wanted to have children by the age of 25 - 30.
14	Mari Aoki, *et al.*	2021	Quantitative Three schools Questionnaire survey	478 high school students First-year: 236 Second-year: 250 Male: 223 Female: 255	Use the Japanese version of the Cardiff Fertility Knowledge Scale to determine the state of life planning and fertility knowledge among high school students	The most common age range students hoped to have children was "25 - 29 years" (69.7%), and 88.4% wished to have children by the age of 30. The average correct answer rate of the Cardiff Fertility Knowledge Scale-Japanese version (CFKS-J) was 41.9% overall. Regarding the current state of fertility knowledge among high school students, the items with the highest percentage of correct answers to each CFKS-J item were "a woman's ability to get pregnant decreases after the age of 36" (72.6%) and "women who smoke have a reduced ability to get pregnant" (69.1%). The items with the lowest percentage of correct answers were "about 1 in 10 couples are infertile" (27.6%), "men who have had the mumps are more likely to become infertile in

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					the future" (12.1%), and "women who more than 13 kg overweight may not be able to become pregnant" (10.7%). The percentage of correct answers on the CFKS-J was higher for those who used the Internet as a source of information. On the other hand, 73.7% of all respondents chose school as their source of information. 66.2% of all respondents wanted education from midwives and doctors.
15	Yuri Akizuki, *et al.* 2021	Quanlitative, Semi-Structured Interview Interview	3 school nurse teachers	Examine the experiences of school nurses working in high schools in teaching about sexuality and their recognition of high school students' sexuality issues and fertility education possibilities	School nurses' experiences and issues related to sexuality were abstracted into the following categories: "menstruation," "pregnancy and childbirth," "sexual victimization," "gender dysphoria," and "counseling on sex for male students" Experiences related to fertility education included "female students who are losing weight, students with irregular menstruation, students with eating disorders, and students who have sexual relations with an unspecified number of people." As for the future of fertility education, "teaching knowledge of fertility while having students consider their life design for building a happy family in the future" and "the possibility of incorporating fertility at the timing of menstrual guidance before school trips" were extracted.
16	Sakiko Matsuoka, *et al.* 2021	Quantitative High school students who participated in an adolescent class at a hospital Questionnaire survey	148 second-year high school students Male: 75 Female: 73	Determine the level of knowledge of fertility, sexuality and sexual reproduction among high school students, and to use this knowledge in future sex education provided by midwives	76% of boys and 95% of girls answered "school lessons" for the souce of information on pregnancy and childbirth. 51% of boys and 46% of girls said they want to get married by the age of 30, and 61% of boys and 62% of girls answered that they wanted children by the age of 30. On the effects of smoking, drinking, and aging on male fertility, the correct answer rate was over 70% for both boys and girls. For male reproductive physiology, both genders had 30% correctly answer how long sperm live, while they had less than 10% correctly answer about the period of spermatogenesis. For female fertility, the correct answer rate was more than 80% for both boys and girls on the effects of smoking, drinking, and age-related changes in eggs, but only 60% - 70% answered correctly about the effects of body shape (weight) on fertility and the age limits of pregnancy. On female reproductive physiology, the understanding of conception using frozen eggs and the number of ovulations in a single menstrual cycle was more than 50% for both boys and girls, but the understanding of the number of eggs expelled over a lifetime and the lifespan of eggs was only 10% - 20%.
17	Yoko Furukawa, *et al.* 2021	Quantitative One school Questionnaire survey.	342 third-year high school students	Develop preconception care practices for high school students, who will lead the next generation, and build support through appreciation of preconception care	About 70 percent of the students said they wanted to have children in the future, and half said they wanted two children. The desired age for having a child was 25 - 30 years old and respondents said that they would like to have their first child before 30 - 35 years old. Following the lecture on preconception care, the percentage of correct answers increased by more than 10 points in 6 of the 11 items compared to before and after. After the lecture, 80% of the students answered that they thought about what they had learned about preconception care, their studies or future careers, and life plans. The students listed specific actions and points for improvement, such as "recognizing areas for improvement in health," "recognizing the need to review dietary habits," and "reviewing lifestyle habits such as ensuring adequate exercise and sleep."

and drinking affects fertility, and about egg aging. About 70% of students knew that a woman's ability to get pregnant falls after the age of 30 or 36. [9] [11] [14] [16]. On female reproductive physiology, 40% - 60% of girls and 20% - 30% of boys answered that menstruation continues until a woman's fifties, while 28.6% of boys answered that menstruation continues until death [8] [10] [16]. A majority comprised of 74.4% of girls answered that woman remains fertile until 40 - 50 years old, while 21.6% of boys answered "until death" [10]. Roughly half of students surveyed responded that a woman can get pregnant any time if she is still menstruating [8].

On the topic of male reproductive physiology, 10% - 20% of boys answered correctly for the item "sperm creation/lifetime" [13]. 40.5% thought that ejaculation was possible until death, and "until death" was the most common response regarding fertility as well, with the largest group (33.6%) thinking that a man remains fertile until death [10].

High school students' rate of correct answers on the CFKS-J survey was 41.9%. About 10% of students were aware of facts such as that physique and contraction of the mumps affect fertility, or that one in ten women are infertile [14] [16]. Students who scored highly named the Internet as their source of information [14]. Following a lecture on preconception care, an improvement was seen in six of eleven items related to the subject. 80% of students reported that they had thought about their studies, future careers, and life plan [17].

Around 50% - 80% of students answered that they wanted to get married before 30. Among those, around 30% said they wanted to marry before 25 [13] [16]. Around 70% - 80% of students said they wanted to have children in the future. 60% - 80% said they wanted children between the ages of 25 - 30. Among those, 39% wanted to have children by the time they turn 25 [9] [12] [14] [16] [17]. Regarding the specific age at which they hope to have children, boys answered 28.1 years and girls 26.4 years. Students hoped to finish having children between the ages of 30 - 35 [8] [9] [17].

3.3. Improving Correct Knowledge of Fertility

27.9% of school nurse teachers answered that the age of declining fertility is "40 or older". 42.1% answered that natural pregnancy is possible until "45 or older". While 90.5% of school nurse teachers answered that they were able to teach about the establishment of pregnancy (ovulation, fertilization, and so on), only 40% - 50% said the same for the freezing of egg/sperm cells, egg/sperm donation, egg aging, and the causes of infertility [11]. Among school nurse teachers' fertility education experience were "girls on diets," "irregular menstruation," "eating disorders," and "guidance for sexually promiscuous students" [13].

90% of school nurse teachers said that it was important to learn about fertility and reproductive medicine in school. About half said that the establishment of pregnancy should be covered in elementary school, and egg aging and the causes of infertility covered in high school [11]. They also hoped to include ovulation

frequency, egg/sperm cell longevity, and the significance of menstruation and ejaculation in the curriculum. School nurse teachers employed at high schools cited menstruation, pregnancy, childbirth, sexual victimization, gender dysphoria, and counseling on sexuality for male students as areas of improvement related to sex education [13].

Caution points mentioned included consideration of students' stage of development, overlap with other school subjects, connectedness with previously taught material, avoiding causing anxiety, avoiding giving the impression that sex always results in pregnancy, and avoiding giving students negative impressions about sex [12]. Potential tasks for the future "teaching awareness of fertility while having students consider their life design so they can build a happy family" and "the possibility of including fertility in the instruction on menstruation that happens before the students' class trip [13].

4. Observations

4.1. Annual Trends and Outline of Target Works

Due to rapid societal and lifestyle in recent years, new sex-related issues such as problem behaviors and infectious diseases issues have surfaced. Based on these changes and Japan's low level of fertility awareness, the Japanese Ministry of Education, Culture, Sports, Science and Technology (MEXT) revised its official Courses of Study curriculum guidelines for the first time in ten years in 2017 and 2018 [7] [18]. In addition, the Cabinet Office's "Measures for a Society with a Low Birthrate" revised the high school curriculum guidelines as part of its objective to "disseminate education on pregnancy and the roles of the household and family" in an effort to enhance the content of education on family/household functions and child-rearing support [19]. We expected this to result in a larger number of target works published in 2021, but there was not much literature on future fertility focused on high school students.

4.2. High School Students' Knowledge and Awareness of Fertility

Many high school students named classes at school as their source for fertility information. This indicates that high school age is the best time to provide students with correct fertility information, giving them the opportunity to accept their own sexuality and consider their futures.

In 2020, the Cabinet Office updated its target for the "rate of understanding of correct medical/scientific knowledge on pregnancy and childbirth" from 2015's 34% to 70%, but that target has yet to be met [20]. However, the publication of fertility education materials did have an effect, demonstrated by the fact that half of high school students understand egg aging and the effects of smoking and drinking on fertility. On the other hand, although the students with the highest CFKS-J scores listed the Internet as a source of information, it cannot be definitively said that they acquired correct knowledge online, as it is difficult to judge the correctness of information on the Internet. Considering that fertility is not

determined only by eggs or smoking and drinking habits, there seems to be a lack of knowledge about fertility and infertility.

A considerable number of high school students mistakenly believe that menstruation, ejaculation, and pregnancy are possible "until death". In order to ensure school-based sex education proceeds smoothly with students' developmental stages in mind, MEXT has added the following guidelines: "In elementary school, the curriculum shall cover the physical changes of puberty and the budding interest in the opposite sex; in junior high school it shall cover the maturation of reproductive functions and appropriate behavior in response to changes associated with maturation; in high school it shall cover puberty and health, married life and health, and aging and health to promote and maintain health throughout life" [7] [21]. However, it can be assumed that the additional condition "Reproductive functions shall only be related as necessary" [22] has created a situation in which fertility-related functions are rarely touched upon. Additionally, the literature indicated a need for opportunities to learn about the fertility and reproductive functions of both sexes, as education on pregnancy focuses disproportionately on menstruation and there is little coverage of male fertility and reproductive functions.

The majority of high school students hoped to marry and have children by the age of 30, indicating that high school students do not have thoughts of marrying and having children later in life. In the 16th Basic Survey on Birth Trends (2021), the percentage of never-married persons aged 18 - 34 who intend to get married eventually was 81.4% for men and 84.3% for women, a decrease from the previous survey in 2015 [3]. Additionally, the percentage of unmarried 25 - 29-year-olds in Japan in 2015 had increased to 72.7% for men and 61.3% for women [24]. In light of these findings, it can be speculated that some high school students may not be able to form families at the time they wish due to some factors in the future. On the contrary, many high school students thought that they would marry and have children by the age of 30 and, following a lecture on preconception care, were thinking about their careers and life plans. In other words, the acquisition of correct reproductive and fertility knowledge was shown to be an effective means of future life planning. Saito stated that giving students "an opportunity to think" about themselves and their future may itself lead to a willingness to form a family with an awareness of the transition to adulthood [24]. In other words, aiming for high school students to acquire correct knowledge of fertility in the classroom will provide them with an opportunity to think about their fertility and future by learning about and understanding their own bodies, and will also lead them to rethink their future life plans. In addition, it will raise awareness of the risks of sexual activity and the prevention of sexually transmitted diseases, while at the same time reducing the risk of infertility in the future. To this end, it is desirable to create an environment in which high school students can flexibly respond to various life events and provide opportunities to think about future life events not only at school but also at home,

in the community, and in various other settings.

4.3. Improving Correct Knowledge of Fertility

School nurse teachers did not have sufficient knowledge about fertility. Most responded that they could teach about the "establishment of pregnancy," but only about half of them were able to teach about fertility. On the other hand, respondents felt there was a need for education on fertility, as they answered that "egg aging and factors contributing to infertility" and other aspects of fertility should be taught in high schools. Adachi *et al.* found that "teachers who felt burdened by the education on fertility had a lower amount of knowledge on fertility than those who did not feel burdened" [25]. In addition, Nakamura *et al.* found that "although school nurse teachers have many opportunities to provide individual guidance on sex, they are not confident in their ability to handle the subject and are anxious about it. Therefore, training is required to improve school nurse teachers' own teaching skills" [26]. Furthermore, in its study of teachers who are responsible for "Japanese-style school education in the Reiwa era (2019 to present)," MEXT states the importance of teacher training: "It is even more necessary for teachers to keep learning the latest knowledge and skills as the times are changing rapidly" [27]. In other words, the study indicated that school nurse teachers, as specialists in health education, must acquire knowledge about fertility in order to educate on the subject. However, they have a sense of difficulty in securing time to spend on sex education due to their busy workload, lack of cooperation among teachers, and limited number of class hours [26]. And since consideration of developmental stages, overlap with other subjects, relatedness to previously studied content, and timing of education were identified as educational issues, for effective high school sex education it is essential to create an environment in which school nurses can participate in training, foster a common understanding among teachers, and consider school-wide policies.

5. Conclusions

In this study we clarified high school students' knowledge and awareness of fertility and issues in fertility education.

1) High school is the best time to provide correct knowledge in fertility education, as school classes serve as the source of information on fertility for many high school students.

2) Half of high school students understood the effects of smoking and drinking alcohol on fertility and egg aging, indicating that the inclusion of fertility-related content in educational materials had an effect on student knowledge. However, students' knowledge about fertility and infertility was lacking, suggesting that it was not sufficiently established.

3) From students' incorrect knowledge about menstruation, ejaculation, and pregnancy it was inferred that the current situation is one in which fertility-related functions are rarely touched upon. This suggests that opportunities to

learn about both male and female fertility and reproductive functions are needed.

4) Since many high school students planned to marry and have children by the age of 30, acquisition of correct reproductive and fertility knowledge through school education on fertility would be an effective means of future life design and would increase awareness of the risks of sexual activity and the prevention of sexually transmitted diseases, as well as reduce the risk of infertility in the future.

5) School nurse teachers must face several challenges for effective education on fertility. These include knowledge acquisition, consideration of developmental stages, overlap with other subjects, relatedness to previously studied content, and the timing of education. It is important to consider school-wide policies which allow school nurse teachers to take part in workshops on the subject and foster shared awareness between faculties.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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