Nazarbayev University School of Medicine
Master of Public Health

Undergraduate students' knowledge, attitude and perceptions of infertility, infertility risks and treatment within universities in Astana, Kazakhstan.

Master of Public Health Integrating Experience Project
Professional Publication Framework

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ABSTRACT

Background: Infertility is a global issue that affects millions (Sami,2006). According to the World Bank, the fertility rate has declining trend in Kazakhstan. Infertility does not have only medical consequences, it also leads to psychosocial and economic issues, thus has public health importance (Rouchou, 2013). Social consequences of infertility consist of stigma, marital instability, social health risks and domestic violence (Rouchou, 2013). This types of social aspects of infertility were detrimental in setting psychological issues in infertile people. The psychological problems included depression, anxiety and identity predicaments (Hasanpoor-Azghdy, 2014). Fertility has immense importance for infertile people. But infertility treatment is costly, thus can bring a financial burden to those who cannot afford it (White, 2005; Boivin, 2007). Knowledge of infertility risks and its treatment options can help to decrease the incidence of infertility by educating youth.

Objective: The aim of this study was determining the level of knowledge and attitude of undergraduate students about infertility, infertility risks, treatment and its social consequences. Then, to find any differences in their level of knowledge and attitude based on sociodemographic characteristics.

Design: This study used cross-sectional survey with validated questionnaire items (Rouchou, 2015; Abolfotouh, 2013). Along with descriptive statistics, t-test, one-way analysis of variance (ANOVA), and multiple linear regression were conducted to determine associations between level of knowledge, attitude and sociodemographic factors.

Study population: The selection criteria of the study was being Kazakhstani resident, an undergraduate student in universities in Astana, aged 18 and above, any major of study except medicine.

Results: The final sample size obtained was 482 survey responses with 417 fully answered questionnaires. Overall, there were some gaps in the level of knowledge about some risk

factors for infertility such as diabetes, obesity, and role of age on female fertility. Higher knowledge about biological risks of infertility and treatment options were found in students having biology as their field of study. Additionally, higher age was associated with better knowledge of biological causes of infertility and its treatment. Having parents living in Southern Kazakhstan was associated with better knowledge about lifestyle risks of infertility compared to parents in Northern Kazakhstan. More positive attitude toward social consequences of infertility was found in students with higher parents' income. Overall, the female student knew more about biological causes of infertility than male students.

Conclusions: This study identified target population with a low level of knowledge and poor attitude toward infertility, infertility risks, treatment and its social consequences. Thus, it can inform educational programs to decrease the incidence of infertility and it's public health consequences.

INTRODUCTION

Public Health consequences of infertility

Infertility is a global health problem that affects millions of people (Sami,2006). According to World Health Organization, a person is clinically infertile after failing to achieve pregnancy after 12 months of regular unprotected sexual intercourse. It has public health consequences that involve several areas such as social, psychological and economic.

Firstly, infertility causes social problems including stigmatization, relationship problems and domestic violence (Rouchou, 2013). Several studies show that infertile people are stigmatized by society, where childbearing plays a significant role (Hollos, 2008). For example, in Turkey and Sub-Saharan Africa since fertility is viewed traditionally, it is pressurized for couples to reproduce (Rouchou, 2013; Dyer,2002). Studies in Sub-Saharan Africa and Indian subcontinent showed that infertility can touch legal and family aspects in a form of restricting inheritance and property rights, and divorce followed by expulsion from the home of infertile people (Balen,2009). Some communities view infertile person based on spiritual perspective, as a source of illnesses and disasters (Balen,2009). Moreover, it was researched that infertility can cause social health risks from risky sexual behaviors. A study in Ghana showed that men and women engaged in unprotected sex to prove that they were not the source of infertility (Rouchou, 2013). Consequently, the rates of sexually transmitted diseases and AIDS increased in this region (Rouchou, 2013). Further, findings from developing countries indicate that females are subjected to physical, verbal and emotional abuse by their husbands after revealing their infertile status. For instance, more than two-thirds of women were exposed to such abuse in rural regions of India (Rouchou, 2013).

Secondly, infertility has psychological consequences which are manifested in the form of depression, anxiety and identity predicaments (Hasanpoor-Azghdy, 2014). It can entail judgments coming from family members, friends, and coworkers. Therefore, disability to

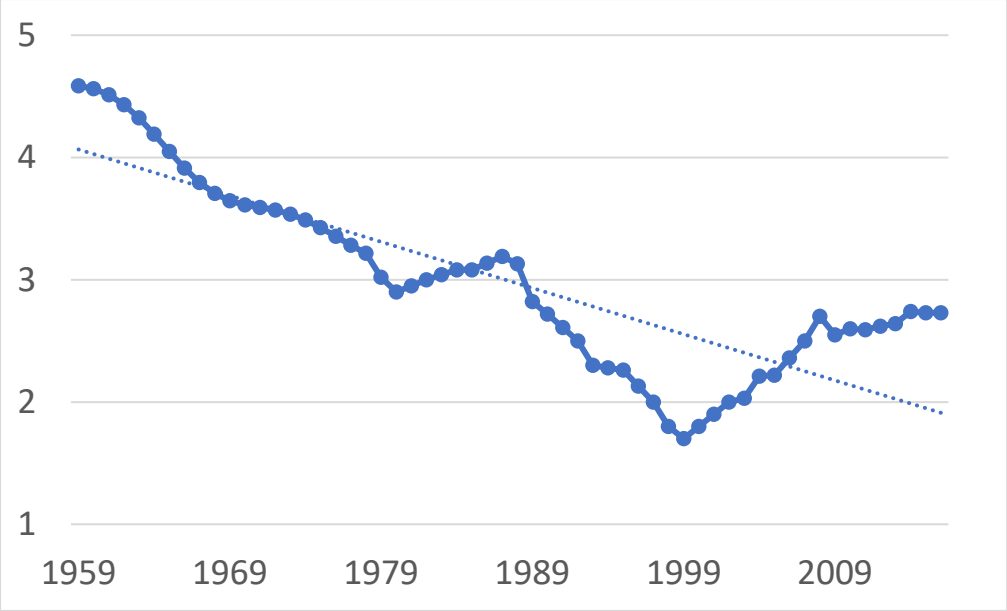
fulfill the social role in form of conceiving a child can further lead to psychological stress (Schmidt, 2009). Indeed, research in South Africa indicates that infertile females experienced anger, feeling of desperation and low self-esteem (Rouchou, 2013). Also, according to physicians' diagnosis 50 % of Nigerian infertile women were depressed due to their infertility (Rouchou, 2013). What is more, findings from Danish study show that infertile women are at increased risk of suicide (Kjaer, 2011). Therefore, psychological consequences of infertility are viewed as big concern for researchers.

Thirdly, infertility has a detrimental impact on the economic stability of people. Studies indicate that infertility treatment is unaffordable to many infertile people, but they still tend to prioritize it because childbearing is very important in their lives. For example, infertile females in Nigeria sick attempting treatment spending almost all their earnings (Dyer, 2012). Thus, people who cannot afford themselves infertility treatment but approach it, further have financial problems (Dyer, 2012). Also, females can lose their financial security after divorce because of infertility in developing countries (Dyer, 2012). In addition, loss of financial security is under big concern for regions, where children are a source of labor and play role in old age security of their parents (Dyer, 2012). For instance, in India children increase family earnings and ensure the financial stability of parents at their older age, therefore infertility in Indian families brings financial burdens (Dyer, 2012).

The rationale of the study

There is lack of knowledge regarding the effect of age on fertility found in several studies. The situation in Kazakhstan according to fertility rate data has declining trend (Figure 1).

Figure 1: Fertility rate, total (births per woman) in Kazakhstan 1959-2016 (The World Bank).



Having children is a socially crucial factor in Kazakhstan, therefore being fertile plays social and phycological roles in the country. The absence of knowledge regarding infertility may increase the likelihood of couples not to avoid certain risk factors that cause infertility. Therefore, it is important to make studies that assess knowledge, beliefs, and perceptions of people regarding infertility risks and possible treatment options. Research in this area majorly focused on investigating infertile couples, thus leaving the exploration on students' level of knowledge and their attitudes toward infertility topic. It is important to study students since early engagement in risky behaviors, lack of knowledge about infertility can lead to delaying childbearing.

Although some undergraduate students may not be at the stage of family planning, they were not excluded from the scope of the research, since this study focused on the level of knowledge, attitude, and perceptions related to infertility. Therefore, the survey that was used in the current study did not have sensitive questions or questions related to student behaviors. Basic knowledge and beliefs of undergraduate students from universities in Astana were explored from the survey responses. The questions asked about attitudes of students toward infertility risks, treatment options and social consequences of infertility. There was no

respondent risk since the participation in the study was voluntary and students under the age of 18 were excluded. The oral consent form ensured the anonymity and confidentiality of the participants, informing about the right to ask questions related to the survey and about the opportunity to withdraw from the study any time prior or during the survey collection.

Overall, the study provides an overview of knowledge and attitudes of students toward infertility risks, treatment, and social consequences. In addition, there are no known published studies done in Kazakhstan related to infertility knowledge and attitude. Therefore, the current study is the first study of its kind for Kazakhstan, thus the findings may help to bring attention to the issues with infertility in the country by informing intervention programs.

Aims and Research Questions of the Study

The study aims to identify knowledge and attitudes of undergraduate students in Astana about infertility and to compare results with what was found in other countries. The study findings will distinguish the level of understanding infertility.

The research questions of the study are the following:

1. Are there any differences in undergraduate university students' level of knowledge about infertility risks and treatment options according to sociodemographic characteristics?
2. Are there any differences in undergraduate university students' level of attitude toward infertility and its social consequences based on sociodemographic characteristics?

RESEARCH METHODS

Study Design

A cross-sectional study of undergraduate students in Astana using self-administered survey was conducted. The study design was appropriate to answer 2 research questions of the study and was efficient for completing on time.

Study Population

The eligibility criteria for this study were undergraduate students in universities of Astana, who were aged 18 and above, had Kazakhstani citizenship, were not studying medicine, and were able to read and understand the questions in the survey.

Sample Size Calculation

Sample size calculation was done using StatCalc in Epi Info 7.2.2.2 for Unmatched Case-Control Study. As gender was found in several types of research to account for the difference in the level of knowledge about infertility, the sample size calculation was based on this sociodemographic characteristic. The proportions for the level of knowledge found in the study by Emel Ege conducted in 2011 among university students in Turkey were used for calculating sample size of this study. The level of knowledge and practices about sexual and reproductive health was chosen as exposure for expected difference between cases (males) and controls (females). The distribution according to the gender of students on knowledge and practices about sexual and reproductive health was 42.5% for females and 57.5% for males among students in Turkey (Ege,2011). The approximation applied to calculate study sample size was the Continuity Correction with the assumption of a two-sided confidence level of 95%, the power of 80% and a ratio of controls to cases being 1 (Fliess,1981). Thus, the highest sample size calculated by StatCalc in Epi Info 7.2.2.2 was 374 (Figure 3). This total sample size number of 374 was further adjusted for refusals or missing data considering the response rate of 80%, therefore the final needed sample size was 468.

Sampling Strategy

To achieve estimated sample size, 10 randomly selected universities out 18 were contacted in Astana. The request for permission to conduct the survey was sent to the heads of universities by faculty investigator of the current study. 5 universities in Astana permitted to conduct the survey during classes or at other time convenient for study participants. Undergraduate students were only approached by student investigator if it was permitted to conduct the survey by universities. Thus, the time, venue and study participants were randomly chosen by university administrative staff or faculty members.

Data Collection

After ethical approval was obtained and consent forms were provided, data were collected using a self-administered survey distributed to undergraduate students in 5 universities. The student investigator collected data during January and March of 2018.

Study Instrument

The study instrument was a survey attached in Appendix 1 that used validated questionnaire items about knowledge of infertility risks and treatment, attitude toward infertility and its social consequences (Rouchou, 2015; Abolfotouh, 2013). The validated questions were previously developed and used in researches on infertile couples in Saudi Arabia, on graduate and undergraduate students in the UK, on undergraduate students in the USA, on students in Sweden, on college students in Grenada, and on the selected adult population in Pakistan.

General questions: For the purpose of this study, study participants were asked 4 general questions in part 1 and 2 of the survey. Student investigator used a shortened version of questions on general information about respondents and knowledge about age at which fertility of females declines (Appendix 1).

Knowledge about biological causes of infertility: Part 3 of the survey assessed by question 5, that consisted of a total 12 statements, knowledge about biological causes of infertility (Rouchou, 2015). The correct answer was scored as "1", while incorrect answer and "Don't know" answer was given "0". An overall score was found by summation of all correct answers. Thus, the maximum score was 12 points, and the minimum was 0.

Knowledge about lifestyle risks of infertility: Question 6 in part 3 was concerned with 11 statements about lifestyle risks that can possibly cause infertility (Rouchou, 2015). The correct response was scored as "1", while incorrect and "Don't know" as "0". Thus, the highest score was 11 points calculated by summing correct responses, and lowest was 0.

Knowledge about traditional risks of infertility: In part 3 there was question 7, that assessed 2 statements about traditional risks of infertility such as black magic and supernatural causes (Rouchou, 2015). The total score was calculated as in questions 5 and 6, so the highest score was 2 and lowest was 0.

Knowledge about infertility treatment: Question 8 in part 3 assessed knowledge about treatment options for infertility in 7 statements (Rouchou, 2015). Only correct responses were given "1", while incorrect and "Don't know" were given "0", thus the range of score was 0-7.

Attitude toward infertility: 7-item attitude statement scale with a five-point Likert scale to find undergraduate students' attitude toward infertility (Abolfotouh, 2013). Questions 9-15 in part 4 of the survey were used for evaluation (Appendix 1). Thus, each question was analyzed and given a specific number from 1 to 5 based on positivity or negativity of the attitude. The total score for responses ranged from 7 to 35 points.

Attitude toward social consequences of infertility: 6-item attitude statement scale about social consequences of infertility were used in questions 16-21, and the total score that was based on a five-point Likert scale had maximum 30 and minimum 6 (Abolfotouh, 2013).

Socio-demographic characteristics: The instrument also included questions about age, gender, year of study, the field of study, relationship status, parents' average monthly income, nationality, parents' origin (Appendix 1, Part 5).

Study Variables

The outcome variables of this study were level of knowledge and attitude. Thus, 4 levels of knowledge and 2 levels of attitude were regarded as outcome variables. Specifically, level of knowledge about biological causes of infertility, lifestyle causes of infertility, traditional causes of infertility, infertility treatment options. Also, attitude toward infertility, and social consequences of infertility. Independent variables were 8 sociodemographic characteristics: age, gender, year of study, the field of study, relationship status, nationality, parents' average monthly income, nationality, parents' origin.

Ethical Considerations

Nazarbayev University School of Medicine Research Ethics Committee (NUSOM REC) approved this study. Request for permission was sent to the heads of universities prior to the survey. The oral consent form was read to students before distributing surveys (Appendix 2). There was a minimal risk for participants due to the oral consent form and no personal behavior questions in the study instrument. Thus, participants' anonymity was guaranteed since they didn't have to write their names or sign any written consent forms. The voluntary basis of answering the survey ensured that after being acknowledged with the informed consent, students knew their rights. If responders felt that they did not want to or could not complete the survey for their personal reasons, they could withdraw from the study. If the withdrawal happened, the survey response was not used in the research. There were no benefits for participants since the survey responders were introduced into the study on a voluntary basis. Survey participants received no incentives for participating in the survey.

Data Management

The student investigator entered data in Excel 365 and analyzed it using STATA 13 software. For data cleaning purposes, the student investigator performed digit check, spell check and range checks.

Statistical Analyses

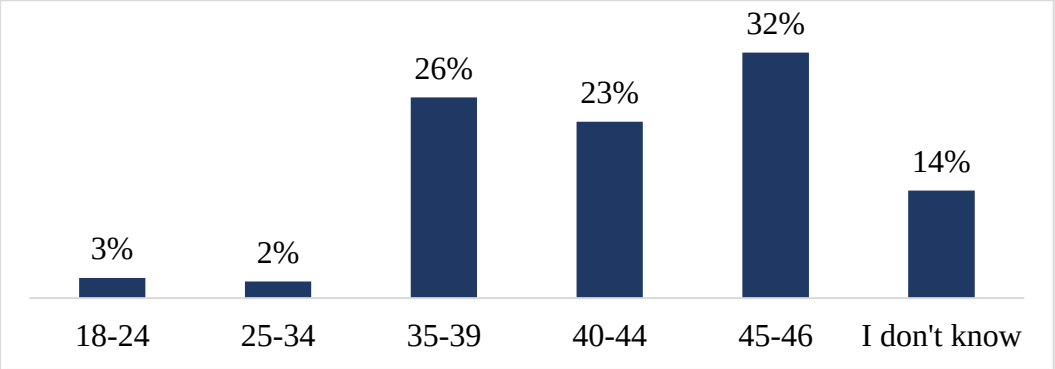
Basic descriptive statistics were done on question 1-4 and 8 sociodemographic characteristics. Most independent variables were categorical, while dependent variables were continuous. First, bivariate t-test and ANOVA was performed to identify independent variables that were statistically significantly associated with outcome variables. For categorical variables, dummy variables were generated to do the multivariate analyses. Second, multiple linear regression was performed to find the final model for statistically significant independent variables for the level of knowledge and attitude. Only those independent variables that were found to be statistically significant from t-test and ANOVA analysis were carried out into multiple linear regression.

RESULTS

General question responses

Sample size obtained was 482 subjects with 417 fully answered responses. Only 0.83 % of respondents indicated that they have a child. Majority of students being 85 % answered that they wish to have a child while remaining percent does not out of all surveyed participants. The opinion of students on an open-ended question that asked about ideal age for having children was diverse. For example, there were responses indicating ideal age from 18 till 40, but most students (almost 20 %) indicated 25 years as their response. There were more students (32 %) answering that at the age of 45-46 there is a marked decrease in female fertility, but less (26 %) students answering correctly that it is on the age range of 35-39 (Figure 2).

Figure 2: The response to the question 4 in the survey (In what age range is there a marked decrease in a woman's ability to become pregnant?)



Sociodemographic characteristics

Out of 474 survey participants who indicated their age, the mean age was 19.49 years with standard deviation of 1.41, ranging from 18 till 24. From 480 participants, who indicated their gender, 56.46% were females and 43.54% were males (Figure 4). Out of participants indicating their year of study, specifically 480 students, 38.13% were in the 1st year, 26.46 % were in the 3rd year, 23.54 % were in a 2nd year, 11.67 % in a 4rth year (Figure 6). Most of the study participants had biology as their field of study, they accounted for 23.96 %, the second large group was law students with 19.38 %, then economics students with 16.04 %, 14.7 % of engineering students, and humanities students with 11.88 % (Figure 7). In addition, there was a group of students (14.58 %) categorized as "Others" having fields of studies such as mathematics, computer science, natural sciences, the technology of forestry, robotics, ecology, agronomy, architectural design, chemistry, and physics.

Most participants were single accounting 70.74 %, while 26.53 % in a relationship including students who were married (1.05 %), engaged (1.47 %) and in a civil union (0.42 %) (Figure 8). The remaining 2.74 % of students were separated (2.53 %) and divorced (0.21 %).

According to parents' average income of study participants, the highest percentage of responders accounting 31.12 % were in income of 100,000-199,000, while the lowest in

400,000-499,000, still there was 19.45 % in a range of 200,000-299,000 and 16.02 % of students indicating "500,000 and above" response (Figure 9). Majority of student participants' parents have formed Northern Kazakhstan 33.81 %, then 20.38 % from Southern Kazakhstan, while nearly 1 % choose "Other" as an answer but did not indicate the region (Figure 10). Almost all students were Kazakh accounting for almost 91 %, while others were Chechen, German, Korean, Russian, Ossetian, Tatar, Ukrainian and Uzbek.

Bivariate analyses

The results of an independent t-test with statistical significance at $p<0.05$

determined differences in outcome variables based on gender. Gender was statistically significantly different for male and female participants according to a p-value of 0.0002 only for 1 outcome variable out of 6, specifically the level of knowledge about biological causes of infertility (Table 1).

Table 1: Bivariate results: t-test of scores by gender (grouping variable)

Scores	**p-value**
Knowledge about Biological causes of infertility	**0.0002***
Knowledge about Lifestyle causes of infertility	0.3589
Knowledge about Traditional causes of infertility	0.4294
Knowledge about infertility Treatment options	0.7984
Attitude toward Infertility	0.2088
Attitude toward Social consequences of infertility	0.0933

Note: *statistically significant at $p<0.05$

The ANOVA was used to determine whether the mean of 6 dependent variables was the same in different unrelated groups of independent variables using statistical significance below p-value of 0.05. It was possible to determine which specific groups were significantly different from each other using post hoc tests, however, it was not performed since it was to be found from multiple linear regression analysis.

There was a statistically significant difference in the mean score between different groups in independent variables for the following outcome variables: knowledge about biological infertility causes, knowledge about lifestyle risks that can lead to infertility, knowledge about infertility treatment options, and attitude toward social consequences of infertility (Table 2). As determined by one-way ANOVA for the level of knowledge about biological infertility causes, age, the field of study, year of study and parents' origin were statistically significant characteristics. There was a statistically significant difference between groups for a mean score of knowledge about lifestyle risks that can lead to infertility by age, the field of study, year of study, relationship status and parents' origin. Further, there was a statistically significant difference between groups for knowledge about infertility treatment options by age, the field of study and year of study. Also, relationship status and parents' income were found to be statistically significantly different for attitude toward social consequences of infertility.

Table 2: Bivariate results: ANOVA of scores by age, the field of study, year of study, relationship status, parents' income and parent origin

score	age	field of study	year of study	relationship status	parents' income	parents' origin

Knowledge about Lifestyle risks that can lead to infertility	**<0.0001***	**0.0108***	**0.0009***	**0.0115***	0.6240	**0.0440***
Knowledge about Biological infertility causes	**<0.0001***	**<0.0001***	**<0.0001***	0.7646	0.7886	**0.0113***
Knowledge about Traditional causes of infertility	0.0688	0.7503	0.3444	0.6116	0.1991	0.5149
Knowledge about infertility Treatment options	**<0.0001***	**<0.0001***	**<0.0001***	0.4320	0.4485	0.2130
Attitude toward Infertility	0.4627	0.9056	0.1260	0.5381	0.9326	0.9326
Attitude toward Social consequences of infertility	0.9075	0.0902	0.8604	**0.0269***	**0.0269***	0.7298

Note: *statistically significant at $p<0.05$

Multiple linear regression

The outcome variables, that had statistically significant sociodemographic characteristics from the bivariate analyses using t-test and ANOVA, were included in the multiple linear regression to find associations between variables while adjusting for potential confounders. Results were considered statistically significant having a p-value below 0.05 in the multiple

linear regression models. Independent variables that were not statistically significant were removed from the final linear regressions.

A final multiple linear regression analysis determined that gender, some age categories, and field of study were statistically significantly associated with the level of knowledge about biological causes of infertility (Table 3). Thus, if gender is male compared to female, the level of knowledge about biological causes of infertility on average decreased by 1.1222 units, while adjusting for other potentially confounding variables. Additionally, studying in the fields of economics, engineering, law, humanities, and others in comparison to the field of biology were all associated with decrease in the level of knowledge about biological causes of infertility. While the increase in the age categories of 21 and 22 was associated with an increase in the level of knowledge about biological causes of infertility by 1.1006 and 1.3839 respectively as compared to the age category of 18 years of age.

Table 3: Multivariate results: Multiple Linear Regression of Knowledge about Biological causes of infertility

Knowledge about Biological causes of infertility	**group**	**Coefficients**	**95% Confidence Interval**	**p-value**
gender (reference Female)	**Male**	-1.1222	-1.71 to -0.53	**<0.0001***
Age category (Reference 18)	**19**	-.35737	-1.21 to 0.49	0.409
	20	0.7689	-0.107 to 1.64	0.085
	21	1.1006	0.17 to 2.03	**0.020***
	22	1.3839	0.21 to 2.56	**0.021***

	23,24	1.4910	-1.01 to 3.99	0.241
Field of study	**Economics**	-2.0935	-3.03 to -1.16	**<0.0001***
(Reference Biology)	**Engineering**	-2.0187	-3.00 to -1.04	**<0.0001***
	Law	-2.0092	-3.02 to -1.00	**<0.0001***
	Humanities	-1.9310	-2.99 to -0.87	**<0.0001***
	Other	-3.2295	-4.22 to -2.23	**<0.0001***

Note: *statistically significant at $p<0.05$

According to the final multiple linear regression model, age categories 21 years and 22 years, parents' origin, the field of study and relationship status were statistically significantly associated with the level of knowledge about lifestyle causes of infertility (Table 4). Being 20, 22, and 23 to 24 years old students as compared to 18-year old students were associated with increases in the level of knowledge about lifestyle causes of infertility. Having parents living in Southern Kazakhstan as compared to Northern Kazakhstan was associated with an increased level of knowledge about lifestyle causes of infertility by 0.6719 units. Meanwhile, a negative coefficient for "Other" category in the field of study and "Single" in relationship status showed that in comparison with biology field of study and "In a relationship" respectively were associated with a decrease in the level of knowledge about lifestyle causes of infertility.

Table 4: Multivariate results: Multiple Linear Regression of Knowledge about Lifestyle causes of infertility

Knowledge about Lifestyle causes of	**group**	**coefficients**	**95% Confidence**	**p-value**

infertility			**Interval**	
Age category **(Reference 18)**	**19**	-0.3467	-0.93 to 0.27	0.270
	20	0.6902	0.05 to 1.32	**0.033***
	21	0.4717	-0.21 to 1.15	0.172
	22	1.0033	0.14 to 1.87	**0.023***
	23,24	1.8992	0.06 to 3.73	**0.042***
Parents' origin **(Reference Northern Kazakhstan)**	**Southern Kazakhstan**	0.6719	0.08 to 1.26	**0.027***
	Western Kazakhstan	0.1483	-0.48 to 0.78	0.646
	Central Kazakhstan	0.2540	-0.34 to 0.85	0.406
	Eastern Kazakhstan	0.2643	-0.49 to 1.02	0.495
	Other	-0.9905	-3.14 to 1.16	0.366
Field of study **(Reference Biology)**	**Economics**	-0.6548	-1.34 to 0.03	0.060
	Engineering	-0.2076	-0.91 to 0.50	0.565
	Law	-0.4940	-1.23 to 0.24	0.190
	Humanities	0.0459	-0.73 to 0.82	0.907
	Other	-0.7664	-1.49 to -0.05	**0.037 ***
Relationship Status **(Reference In a relationship)**	**Single**	-0.6132	-1.09 to -0.14	**0.011***
	Separated/divorced	0.1887	-1.08 to 1.46	0.770

Note: *statistically significant at p<0.05

Multivariate linear regression analysis for the level of knowledge about infertility treatment options found statistically significant associations with the age category of 21 and 22 as compared to 18-year old students and with all fields of study as compared with the field of biology (Table 5).

Table 5: Multivariate results: Multiple Linear Regression of Knowledge about infertility Treatment options

Knowledge about infertility Treatment options	**group**	**coefficients**	**95% Confidence Interval**	**p-value**
Age category (Reference 18)	**19**	0.2640	-0.28 to 0.81	0.340
	20	0.5173	-0.04 to 1.08	0.071
	21	0.7067	0.12 to 1.30	**0.019***
	22	1.1848	0.43 to 1.94	**0.002***
	23,24	1.1144	-0.49 to 2.72	0.172
Field of study (Reference Biology)	**Economics**	-0.8216	-1.42 to -0.22	**0.007***
	Engineering	-1.2601	-1.89 to -0.63	**0.000***
	Law	-0.9456	-1.58 to -0.30	**0.004***
	Humanitarian	-1.0405	-1.72 to -0.36	**0.003***
	Other	-1.4205	-2.05 to -0.79	**<0.001***

Note: *statistically significant at p<0.05

Multiple linear regression analysis found some important statistically significant association between relationship status, parents' income and attitude toward social consequences of infertility (Table 6). After adjusting for confounders, the two highest parents' income categories were found to be associated with the improved attitude towards social consequences of infertility as compared to 100,000-199,000 tenge as average monthly income of parents. Additionally, "Single" as relationship status decreased the level of attitude by 0.8757 with a reference group of students in a relationship.

Table 6: Multivariate results: Multiple Linear Regression of Attitude toward Social consequences of infertility

Attitude toward Social consequences of infertility	**group**	**coefficient**	**95% Confidence Interval**	**p-value**
Relationship status (Reference In a relationship)	**Single**	-0.8757	-1.62 to -0.13	**0.021***
	Separated/Divorced	-1.0357	-2.99 to 0.91	0.296
Parents income (tenge) (Reference 100,000-199,000)	**Less than 100**	-0.335	-1.41 to 0.74	0.542
	200-299	-0.0026	-0.93 to 0.93	0.996
	300-399	0.8940	-0.17 to 1.96	0.099
	400,000-499,000	1.3447	0.03 to 2.66	**0.045***
	500,000 and above	1.0881	0.08 to 2.10	**0.034***

Note: *statistically significant at $p<0.05$

DISCUSSION

This study was designed to determine differences based on sociodemographic characteristics in the level of knowledge about infertility, infertility risks, treatment options and attitude toward infertility and its social consequences in undergraduate students in Astana.

The study found that the majority (85 %) of undergraduate students in this study wanted to have children, consistent with a study on fertility awareness and parenting attitudes among American male and female undergraduate university students, where nearly 90 % wanted to become parents (Peterson,2012). However, the question in the current study did not specify the time frame for having children. It is possible that students in this study understand the question to mean "do you want children now", not in the future. Both male and female students of the study overestimated the ages at which female fertility has marked decline. This finding corresponded well to results found among American undergraduate students (Peterson,2012). Most students (32%) believed that female fertility declines only after age 45 years, differing from a study in Canada (Sabarre, 2013). The current study indicates that there is a need to increase awareness of students about the effect of aging on fertility. Though we explored the ideal age for having children, the current study found no association between students' perception of ideal age for being parents and their knowledge about age impact on female fertility. These findings were consistent with findings from Sweden (Lampic, 2006).

Study findings show some gaps in knowledge about infertility- for example, biological risks such as diabetes and obesity were underestimated by most students as risk factors for infertility. Almost half of the responders did not know the effect diabetes has on infertility and only 28% of them correctly identified obesity as a risk factor for infertility. In addition, only 4.37 % of survey participants correctly thought that there can be problems conceiving a child the second time. Still, students of this study were reasonably knowledgeable of

treatment options of infertility such as in vitro fertilization, hormonal injections, artificial insemination. Additionally, findings show that most of the study participants perceived medical treatment of infertility as an appropriate option and most did not consider "traditional healers" and "prayer" as effective. However, a substantial number of undergraduates still considered these later approaches to infertility as valid. Future studies are needed to explore the role of cultural and religious beliefs regarding medical treatment of infertility.

Though most students (57%) in this study did not believe in black magic and supernatural phenomenon as potential causes of infertility (Table 8), this contrasted findings from a study done among Saudi couples, where the majority of 67.5 % of participants believed in black magic as a cause of infertility and 58.8 % in Djinns/supernatural interventions as a cause of infertility (Abolfotouh, 2013).

Moreover, study results showed that students perceived infertility risks such as sexually transmitted diseases, genetics, smoking, alcohol, and history of genitourinary tract infections affecting females more than males. Undergraduate students of this study might believe that females are more susceptible to infertility than males, consistent with findings from a study in Grenada (Rouchou, 2015). This could suggest the presence of a false sense of security concerning risk factors and male fertility.

Overall, the study found that biology as a field of study is associated with higher knowledge about biological causes of infertility and treatment options as compared to other fields of study. Findings also showed that higher parents' income is associated with a better attitude towards social consequences of infertility among students. Additionally, having parents living in Southern Kazakhstan was determined to be associated with a higher level of knowledge about lifestyle risks leading to infertility as compared to parents living in Northern Kazakhstan.

In the current study, higher age in students was associated with better knowledge about biological causes of infertility and its treatment options. Also, female students knew more about biological causes of infertility than male students. Furthermore, gender was not a significant factor for the level of knowledge about lifestyle risks of infertility.

Strengths of the Study

This study focused on infertility that is an important public health issue. It is the first study that investigated undergraduates' knowledge and attitude of infertility, infertility risks, its treatment and social consequences within universities in Astana, Kazakhstan. To measure the level of knowledge and attitudes validated questionnaires were used. Another strength of this study is the large sample size obtained. The study identifies target groups for educational programs about infertility risks and treatment.

Limitations of the Study

One of the limitations of this study that should be considered when interpreting study results is potential reporting bias. Another potential limitation is that not all risk factors for infertility were included in the survey. The study findings are not generalizable for the whole Kazakhstan since it was done only in Astana even though undergraduate students were from different regions of the country. Also, this is a cross-sectional study, where temporality of factors and scales cannot be determined.

CONCLUSION

Findings identify target populations with low knowledge/poor attitudes towards infertility and infertility causes, with characteristics associated with socioeconomic groups, age, gender, places of origin and fields of study, and characterizes knowledge/attitude deficiencies. This study can inform interventions to lower risk of infertility and reduce the public health consequences of this growing problem.

RECOMMENDATION

Further assessments should be conducted to develop effective interventions that will lower the risk of infertility. Studies that further characterize the risk of infertility need to be conducted.

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TABLES AND FIGURES

Table 6: Knowledge about the potential causes of infertility

Causes	Yes N (%)	No N (%)	Don't know N (%)
a) Abnormal menses (ovulatory factors) Total=481	208 (43.24)*	58 (12.06)	215 (44.70)
b) Abnormal sperm production and/or function Total=482	277 (57.47)*	28 (5.81)	177 (36.72)
c) Blocked fallopian tubes (tubes that carry the egg from the ovary to the uterus) Total=482	267 (55.39)*	17 (3.53)	198 (41.08)
d) Sexually Transmitted Infection in women Total=482	292 (60.58)*	51 (10.58)	139 (28.84)
e) Sexually Transmitted Infection in men Total=482	282 (58.51)*	55 (11.41)	145 (30.08)
f) History of infections of the genitourinary tract in women Total=482	156 (32.37)*	71 (14.73)	255 (52.90)
g) History of infections of the genitourinary tract in men Total=482	142 (29.58)*	78 (16.25)	260 (54.17)
h) Genetics in female Total=482	311 (64.52)*	51 (10.58)	120 (24.90)
i) Genetics in male Total=481	296 (61.54)*	55 (11.43)	130 (27.03)
j) Hormonal problems Total=481	344 (71.52)*	37 (7.69)	100 (20.79)
k) Diabetes Total=482	90 (18.67)*	152 (31.54)	240 (49.79)
l) Obesity Total=482	136 (28.22)*	152 (31.54)	194 (40.25)

Note: *correct response

Table 7: Knowledge about the possible lifestyles causing infertility are:

Causes	Yes N (%)	No N (%)	Don't Know N (%)
a) Drinking alcohol in women Total=482	325 (67.43)*	95 (19.71)	62 (12.86)
b) Drinking alcohol in men Total=482	246 (51.04)*	151 (31.33)	85 (17.63)
c) Smoking in women Total=482	326 (67.63)*	88 (18.26)	68 (14.11)
d) Smoking in men Total=482	254 (52.70)*	141 (29.25)	87 (18.05)
e) Vigorous exercise Total=482	99 (20.54)*	216 (44.81)	167 (34.65)
f) Previous contraceptive pill use in women Total=480	260 (54.17)	75 (15.63)*	145 (30.21)
g) Previous condom use in men Total=481	80 (16.63)	243 (50.52)*	158 (32.85)
h) Previous use of intrauterine devices in women Total=481	155 (32.22)	74 (15.38)*	252 (52.39)
i) Environmental factors (lead, radiation) Total=481	321 (66.74)*	40 (8.32)	120 (24.95)
j) Psychological stress Total=482	288 (59.75)*	79 (16.39)	115 (23.86)
k) Marriage at an advanced age (35 and above) Total=482	183 (37.97)*	173 (35.89)	126 (26.14)

Note: *correct response

Table 8: Knowledge about other potential causes of infertility

Causes	Yes N (%)	No N (%)	Don't know N (%)
a) Black magic Total=482	82 (17.01)	276 (57.26)*	124 (25.73)
b) Djinns/supernatural causes Total=482	72 (14.94)	275 (57.05)*	135 (28.01)

Note: *correct response

Table 9: Knowledge about the possible treatment options of infertility

Causes	Yes N (%)	No N (%)	Don't Know N (%)
a) Fertility drugs Total=481	349 (72.56)*	37 (7.69)	95 (19.75)
b) Surgery Total=481	229 (62.16)*	78 (16.22)	104 (21.62)
c) Hormone Injections Total=481	254 (52.81)*	55 (11.43)	172 (35.76)
d) Traditional healer Total=481	95 (19.75)	238 (49.48)*	148 (30.77)
e) In vitro fertilization (fertilizing an egg by sperm in a test tube or elsewhere outside the body) Total=480	310 (64.58)*	38 (7.92)	132 (27.50)
f) Artificial insemination (injection of semen into the uterus or oviduct by other than natural means) Total=480	325 (67.71)*	35 (7.29)	120 (25.00)
g) Prayer Total=480	157 (32.71)	195 (40.63)*	128 (26.67)

Note: *correct response

Table 10: Attitude toward infertility

	Strongly agree N (%)	Agree N (%)	Neither agree, no disagree N (%)	Disagree N (%)	Strongly disagree N (%)
1. I think that infertility is a disease Total=481	117 (24.32)	148 (30.77)	93 (19.33)	99 (20.58)	24 (4.99)*
2. I think that infertility is a handicap Total=481	21 (4.37)	38 (7.90)	75 (15.59)	249 (51.77)	98* (20.37)
3. I think that infertility is a simple problem Total=480	17* (3.54)	57 (11.88)	79 (16.46)	215 (44.79)	112 (23.33)

4. I think infertility should be treated medically Total=481	248* (51.56)	168 (34.93)	50 (10.40)	7 (1.46)	8 (1.66)
5. I think it is a human right to have children Total=481	309* (64.24)	117 (24.32)	35 (7.28)	7 (1.46)	13 (2.70)
6. I think that it is society's obligation to help childless couples Total=481	104* (21.62)	120 (24.95)	142 (29.52)	89 (18.50)	26 (5.41)
7. I think that if a couple conceives once, they might have problems conceiving again Total=481	21* (4.37)	63 (13.10)	152 (31.60)	196 (40.75)	49 (10.19)

Note: *positive attitude

Table 11: Attitude toward the social consequences of infertility

	Strongly agree N (%)	Agree N (%)	Neither agree, no disagree N (%)	Disagree N (%)	Strongly disagree N (%)
1. I think that if the woman cannot have a baby, this is grounds for divorce Total=480	22 (4.58)	54 (11.25)	92 (19.17)	174 (36.25)	138* (28.75)
2. I think if a woman cannot have children, this is a valid reason for the man to marry a second time Total=478	20 (4.18)	77 (16.11)	133 (27.82)	143 (29.92)	105* (21.97)
3. I think if a couple cannot have a child, they should adopt Total=480	66* (13.75)	165 (34.38)	163 (33.96)	64 (13.33)	22 (4.58)

4. I think it is socially acceptable in my community to have a baby with the help of a medical treatment Total=479	120* (25.05)	142 (37.77)	142 (29.65)	33 (6.89)	4 (0.84)
5. I think it is socially acceptable in my community to have a baby with the help of a surrogate (someone who gives birth to a baby for you) Total=479	54* (11.27)	124 (25.89)	185 (38.62)	89 (18.58)	27 (5.64)
6. I think fertility drugs are acceptable Total=479	130* (27.14)	178 (37.16)	138 (28.81)	21 (4.38)	12 (2.51)

Note: * positive attitude

Figure 3: Epi Info Sample Size Calculation Scheme

Unmatched Case-Control Study (Comparison of ILL and NOT ILL)

Two-sided confidence level: 95%

Power: 80 %

Ratio of controls to cases: 1

Percent of controls exposed: 42.5 %

Odds ratio: 1.83045

Percent of cases with exposure: 57.5 %

	Kelsey	Fleiss	Fleiss w/ CC
Cases	175	174	187
Controls	175	174	187
Total	350	348	374

Figure 4: Gender distribution of study participants

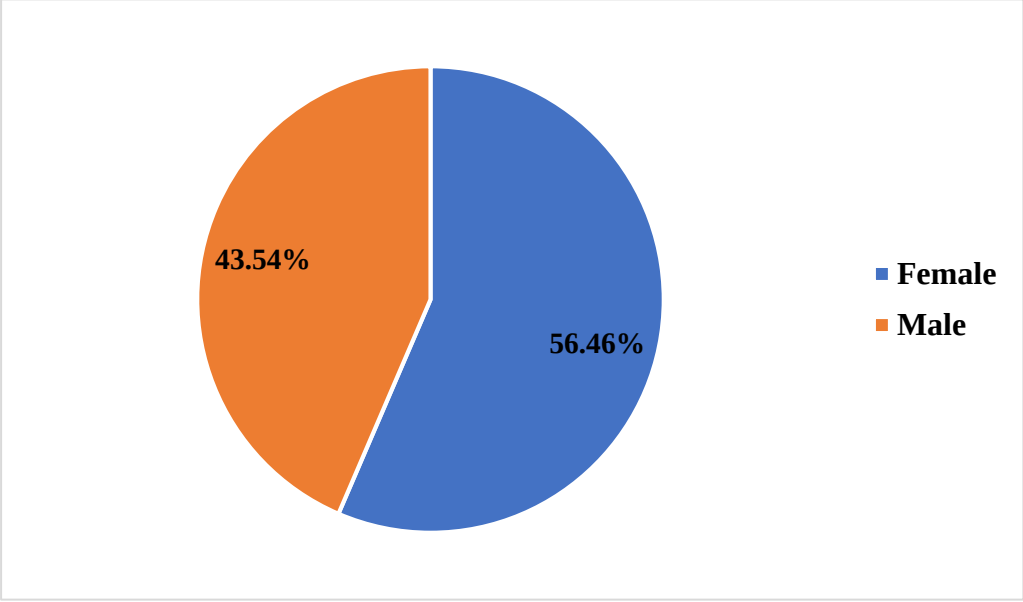


Figure 5: Age distribution of study participants (in years)

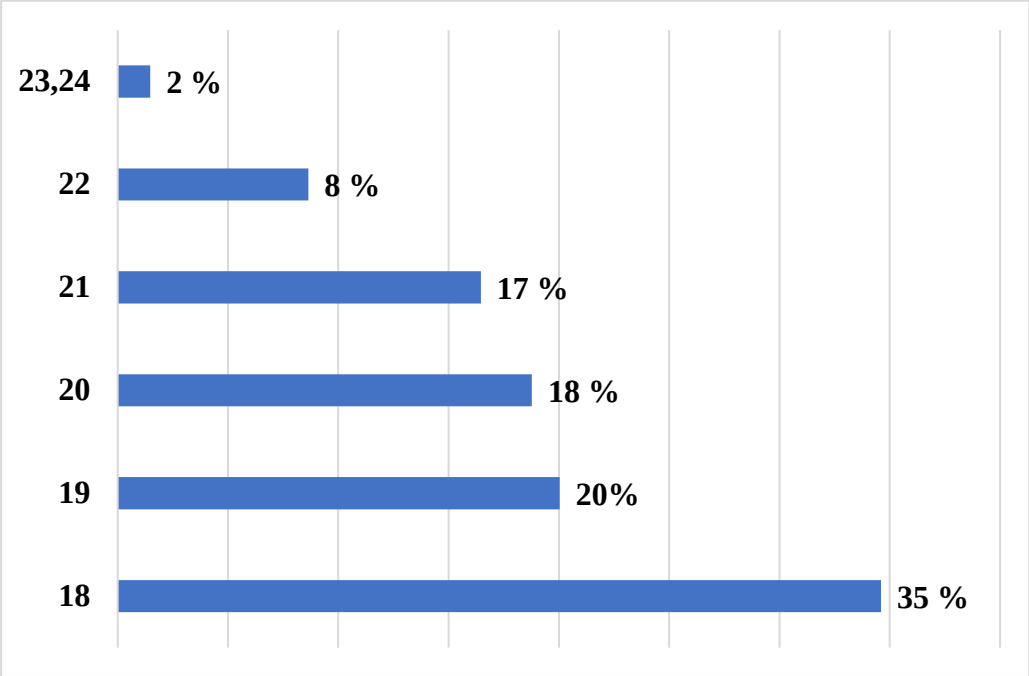


Figure 6: Study participants' year of study

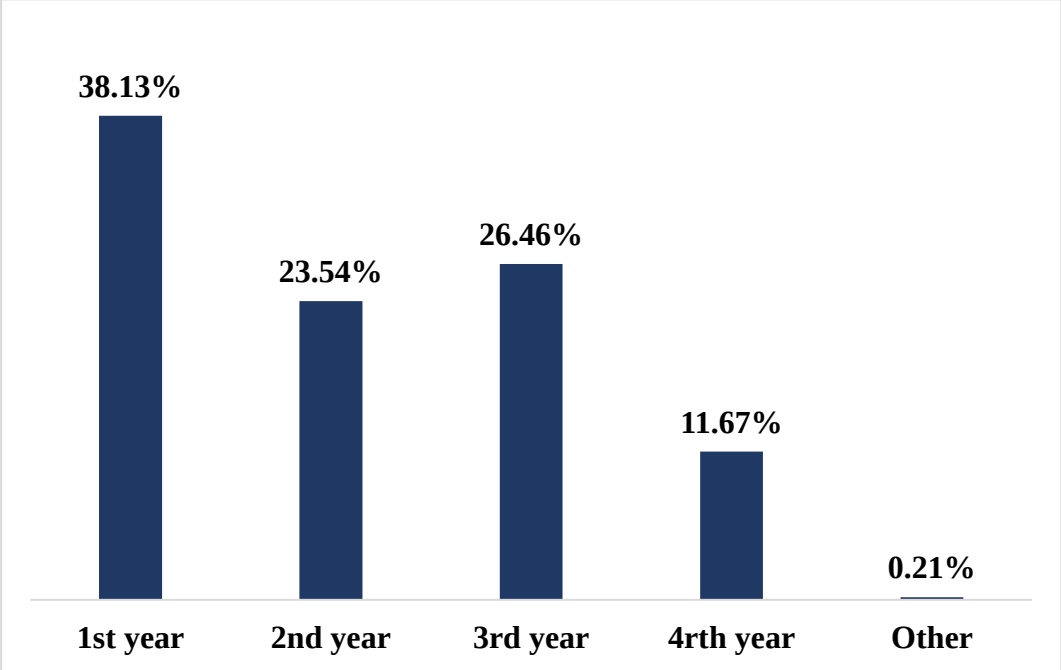


Figure 7: Participants' field of study

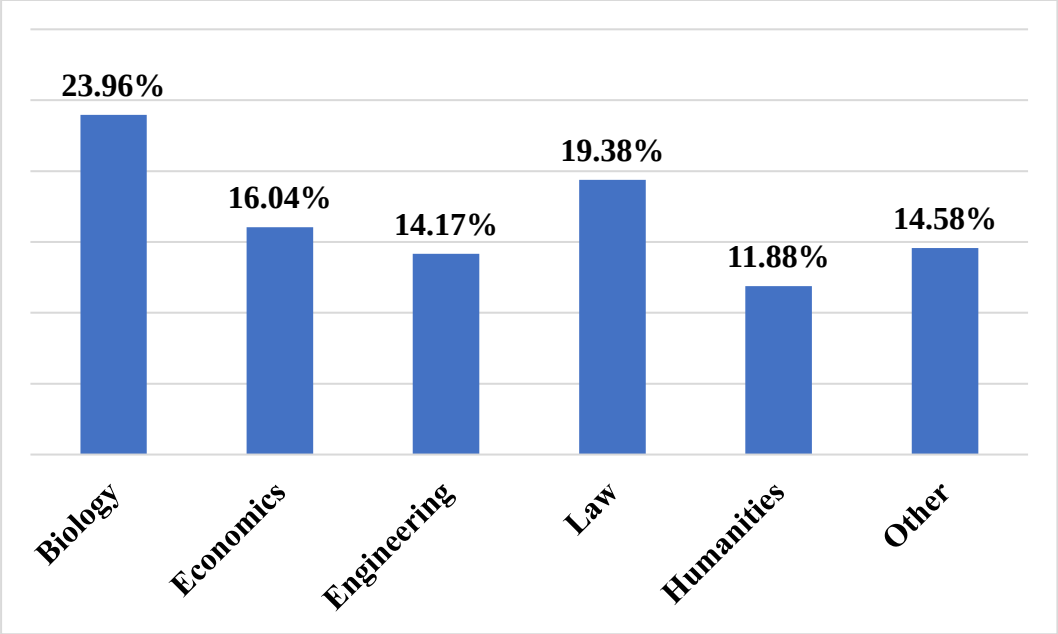


Figure 8: Relationship status of participants

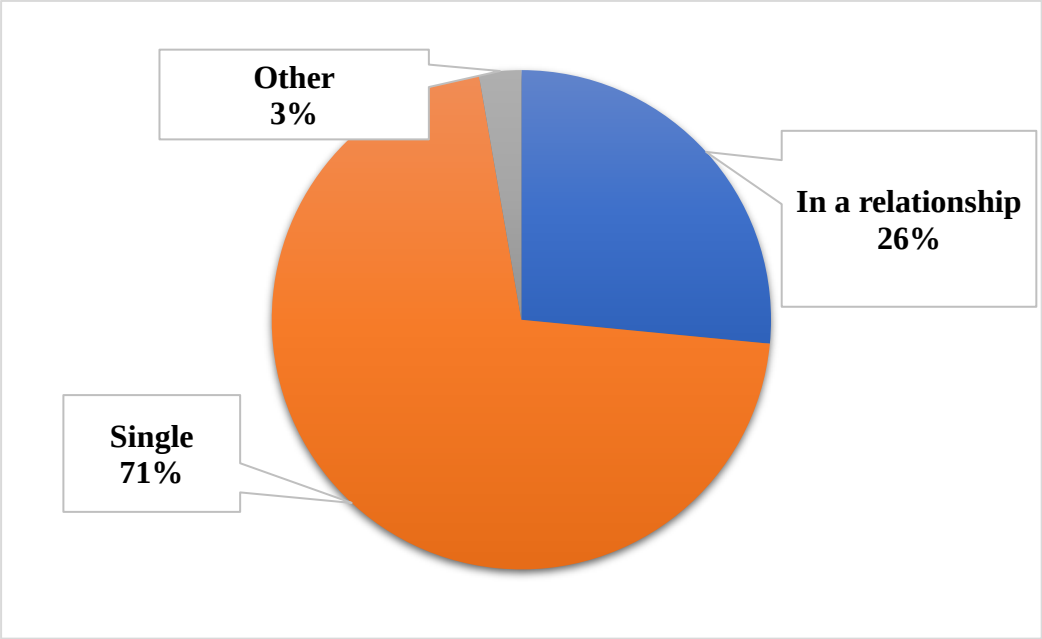


Figure 9: Average monthly income of participants' parents (tenge)

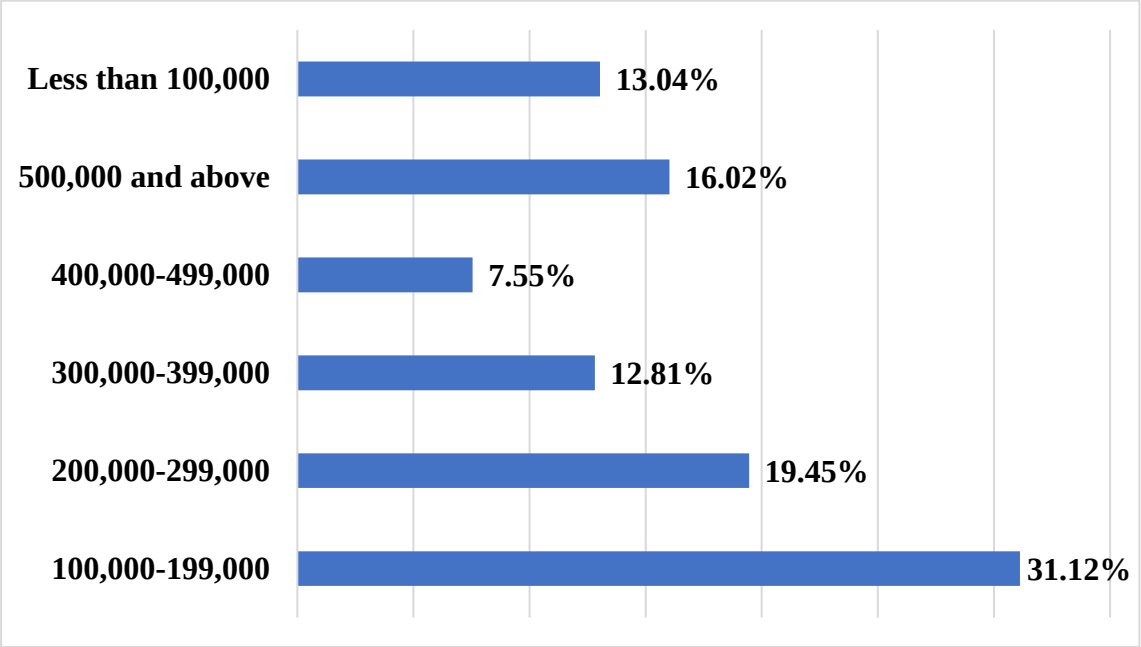
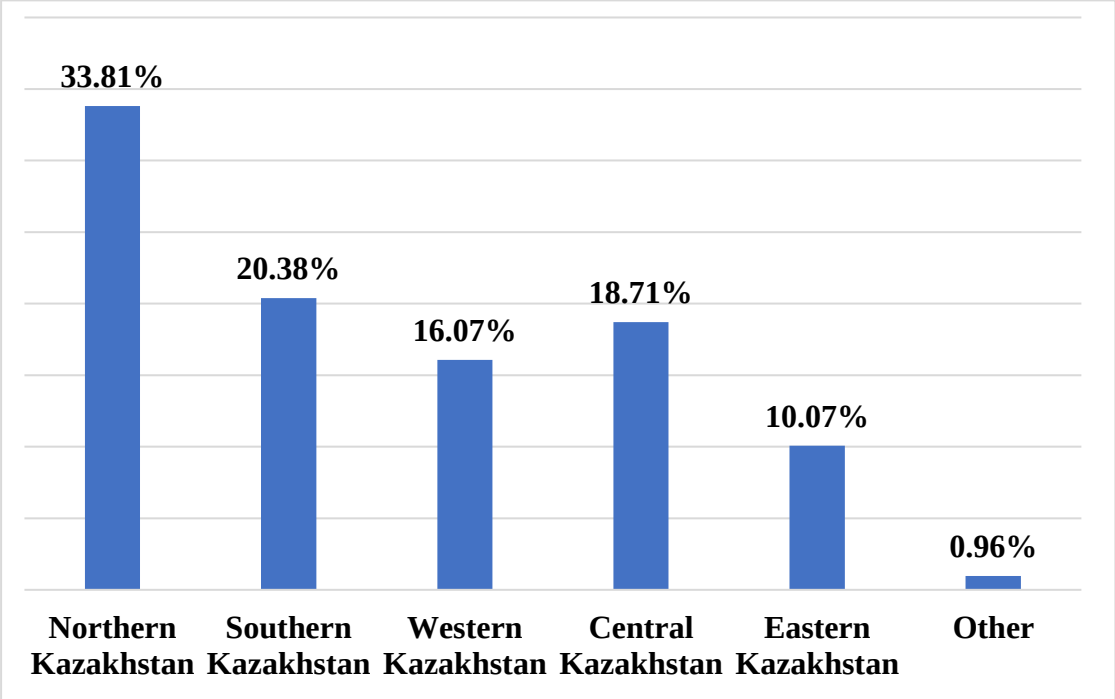


Figure 10: Distribution of participants' parent's origin



APPENDIX 1**: Study Instrument in English, Russian, Kazakh**

Questionnaire about undergraduate students' knowledge, attitude and perceptions of infertility, infertility risks and treatment within universities in Astana, Kazakhstan.

Hello Dear Student:

The research team of the Nazarbayev University School of Medicine is going to conduct a study to assess the level of knowledge, attitudes and perceptions of undergraduate students concerning infertility, infertility risks and treatment. You will not benefit from this study, but study findings may help to inform intervention programs to more effectively address problems of infertility. Your opinions on this topic are very important for us.

You have been randomly selected for this survey. Could you please help to fill in the questionnaire? All your answers are confidential and will be used only in the generalized form for research purposes. The duration of the interview will be no longer than 15 minutes.

With Best Regards,

Byron Crape, MSPH, Ph.D., Nazarbayev University School of Medicine
Raushan Alibekova, MD, Ph.D., Instructor, Nazarbayev University School of Medicine
Diyora Abdukhakimova, MPH student, Nazarbayev University School of Medicine

Part 1: Respondent Information

For questions 1-3, please choose one answer for each of the questions:

1. Do you have any children?
   - ☐ Yes
   - ☐ No
2. Do you wish to have any children?
   - ☐ Yes
   - ☐ No
3. In your opinion, what is ideal age to have children? *(please write in)*

   _____

Part 2: Knowledge about infertility

For question 4, please choose one answer:

4. In what age range is there a marked decrease in a woman's ability to become pregnant?
   - ☐ 18-24
   - ☐ 25-34
   - ☐ 35-39
   - ☐ 40-44
   - ☐ 45-46

☐ I don't know

Part 3: Knowledge about probable causes of infertility and treatment

5. **The potential causes of infertility are:**

(Choose one answer for each of the statements)	*Yes*	*No*	*Don't know*
a) Abnormal menses (ovulatory factors)	☐	☐	☐
b) Abnormal sperm production and/or function	☐	☐	☐
c) Blocked fallopian tubes (tubes that carry the egg from the ovary to the uterus)	☐	☐	☐
d) Sexually Transmitted Infection in women	☐	☐	☐
e) Sexually Transmitted Infection in men	☐	☐	☐
f) History of infections of the genitourinary tract in women	☐	☐	☐
g) History of infections of the genitourinary tract in men	☐	☐	☐
h) Genetics in female	☐	☐	☐
i) Genetics in male	☐	☐	☐
j) Hormonal problems	☐	☐	☐
k) Diabetes	☐	☐	☐
l) Obesity	☐	☐	☐

6. **The possible lifestyles causing infertility are:**

(Choose one answer for each of the statements)	*Yes*	*No*	*Don't know*
a) Drinking alcohol in women	☐	☐	☐
b) Drinking alcohol in men	☐	☐	☐
c) Smoking in women	☐	☐	☐

d) Smoking in men	☐	☐	☐
e) Vigorous exercise	☐	☐	☐
f) Previous contraceptive pill use in women	☐	☐	☐
g) Previous condom use in men	☐	☐	☐
h) Previous use of intrauterine devices in women	☐	☐	☐
i) Environmental factors (lead, radiation)	☐	☐	☐
j) Psychological stress	☐	☐	☐
k) Marriage at an advanced age (35 and above)	☐	☐	☐

7. **Other potential causes of infertility are:**

(Choose one answer for each of the statements)	*Yes*	*No*	*Don't know*
a) Black magic	☐	☐	☐
b) Djinns/supernatural causes	☐	☐	☐

8. **The possible treatment options of infertility are:**

(Choose one answer for each of the statements)	*Yes*	*No*	*Don't know*
a) Fertility drugs	☐	☐	☐
b) Surgery	☐	☐	☐
c) Hormone Injections	☐	☐	☐
d) Traditional healer	☐	☐	☐
e) In vitro fertilization (fertilizing an egg by sperm in a test tube or elsewhere outside the body)	☐	☐	☐
f) Artificial insemination (injection of semen into the uterus or oviduct by other than natural means)	☐	☐	☐
g) Prayer	☐	☐	☐

Part 4: Attitudes toward infertility and its social consequences

A. Attitude toward infertility

*For questions 9-15**,** please rate your agreement or disagreement with following statements:*

	Strongly agree	*Agree*	*Neither agree, no disagree*	*Disagree*	*Strongly disagree*
9. I think that infertility is a disease	☐	☐	☐	☐	☐
10. I think that infertility is a handicap	☐	☐	☐	☐	☐
11. I think that infertility is a simple problem	☐	☐	☐	☐	☐
12. I think infertility should be treated medically	☐	☐	☐	☐	☐
13. I think it is a human right to have children	☐	☐	☐	☐	☐
14. I think that it is society's obligation to help childless couples	☐	☐	☐	☐	☐
15. I think that if a couple conceives once, they might have problems conceiving again	☐	☐	☐	☐	☐

B. Attitude toward the social consequences of infertility

*For questions 16-21**,** please rate your agreement or disagreement with following statements:*

	Strongly agree	*Agree*	*Neither agree, no disagree*	*Disagree*	*Strongly disagree*
16. I think that if the woman cannot have a baby, this is grounds for divorce	☐	☐	☐	☐	☐
17. I think if a woman cannot have children, this is a valid reason for the man to marry a second time	☐	☐	☐	☐	☐
18. I think if a couple cannot have a child, they should adopt	☐	☐	☐	☐	☐
19. I think it is socially acceptable in my community to have a baby with the help of a medical treatment	☐	☐	☐	☐	☐

	Strongly agree	*Agree*	*Neither agree, no disagree*	*Disagree*	*Strongly disagree*
20. I think it is socially acceptable in my community to have a baby with the help of a surrogate (someone who gives birth to a baby for you)	☐	☐	☐	☐	☐
21. I think fertility drugs are acceptable	☐	☐	☐	☐	☐

Part 5: Demographic Information

22. What is your age? *(please write in)*

_____

23. What is your gender?

- ☐ Male
- ☐ Female

24. What is your year of study?

- ☐ 1st year
- ☐ 2nd year
- ☐ 3rd year
- ☐ 4th year
- ☐ Other_____

25. What is your field of study?

- ☐ Biology
- ☐ Computer Science
- ☐ Economics
- ☐ Education
- ☐ Engineering
- ☐ Law
- ☐ Other_____

26. What best describes your current relationship status?

- ☐ Single (not in a relationship)
- ☐ In a relationship (not engaged, not married)
- ☐ Engaged
- ☐ Married
- ☐ In a civil union

☐ Separated
☐ Divorced
☐ Widowed

27. What is your parents average monthly income (in tenge)?
☐ Less than 100 000
☐ 100 000 – 199 000
☐ 200 000 – 299 000
☐ 300 000 –399 000
☐ 400 000 – 499 000
☐ 500 000 and above

28. What is your nationality?
☐ Kazakh
☐ Russian
☐ Other_____

29. Where do your parents live?
☐ Southern Kazakhstan
☐ Northern Kazakhstan
☐ Central Kazakhstan
☐ Eastern Kazakhstan
☐ Western Kazakhstan
☐ Other_____

Thank you for your participation

Анкета оценки уровня знаний, взглядов и восприятия студентов по вопросам бесплодия, рисков бесплодия и лечения среди студентов бакалавриата в университетах Астаны, Казахстан.

Здравствуйте, Уважаемый Студент:

Исследовательская группа Школы Медицины Назарбаев Университета проводит исследование для оценки уровня знаний, взглядов и восприятия студентов бакалавриата по вопросам бесплодия, рисков бесплодия и лечения. Вы не сможете воспользоваться этим исследованием, но результаты исследования могут помочь информировать программы вмешательства для более эффективного решения проблем бесплодия. Ваше мнение по этой теме очень важно для нас.

Вы были выбраны методом случайного отбора для участия в исследовании. Просим Вас заполнить этот анкетный опрос. Мы гарантируем Вам полную конфиденциальность и анонимность, Ваши ответы будут использоваться только в обобщенной форме в целях исследования. Продолжительность опроса не превышает 15 минут.

С наилучшими пожеланиями,

Байрон Крэйп, MSPH, Ph.D., Школа Медицины, Назарбаев Университет,
Раушан Алибекова, MD, Ph.D., Школа Медицины, Назарбаев Университет,
Диёра Абдухакимова, студент MPH, Школа Медицины, Назарбаев Университет.

Часть 1: Информация о респонденте

Для вопросов 1-3, пожалуйста, выберите один из предложенных ответов:

1. У вас есть дети?
   - ☐ Да
   - ☐ Нет
2. Вы хотите завести детей?
   - ☐ Да
   - ☐ Нет
3. По вашему мнению, какой идеальный возраст, чтобы завести детей? *(напишите)*

   _____

Часть 2: Знания о бесплодии

Для вопроса 4, пожалуйста, выберите один из предложенных ответов:

4. В каком возрасте существует значительное снижение способности женщины забеременеть?
   - ☐ 18-24
   - ☐ 25-34
   - ☐ 35-39
   - ☐ 40-44
   - ☐ 45-46

☐ Я не знаю

Часть 3: Знания о вероятных причинах бесплодия и лечении

5. **Потенциальными причинами бесплодия являются:**

(Выберите один ответ для каждого утверждения)	*Да*	*Нет*	*Не знаю*
a) Аномалии менструации (овуляторные факторы)	☐	☐	☐
b) Аномалии производства и / или функции спермы	☐	☐	☐
c) Заблокированные фаллопиевы трубы (трубки, которые переносят яйцо из яичника в матку)	☐	☐	☐
d) Инфекция, передающаяся половым путем у женщин	☐	☐	☐
e) Инфекция, передающаяся половым путем, у мужчин	☐	☐	☐
f) История инфекций мочеполового тракта у женщин	☐	☐	☐
g) История инфекций мочеполового тракта у мужчин	☐	☐	☐
h) Генетика у женщин	☐	☐	☐
i) Генетика у мужчин	☐	☐	☐
j) Гормональные проблемы	☐	☐	☐
k) Диабет	☐	☐	☐
l) Ожирение	☐	☐	☐

6. **Возможный образ жизни, вызывающий бесплодие:**

(Выберите один ответ для каждого утверждения)	*Да*	*Нет*	*Не знаю*
a) Употребление алкоголя у женщин	☐	☐	☐
b) Употребление алкоголя у мужчин	☐	☐	☐
c) Курение у женщин	☐	☐	☐

d) Курение у мужчин	☐	☐	☐
e) Чрезмерные тренировки	☐	☐	☐
f) Предшествующее использование противозачаточных таблеток у женщин	☐	☐	☐
g) Предшествующее использование презервативов у мужчин	☐	☐	☐
h) Предшествующее использование внутриутробных устройств у женщин	☐	☐	☐
i) Факторы окружающей среды (свинец, радиация)	☐	☐	☐
j) Психологический стресс	☐	☐	☐
k) Брак в позднем возрасте (35 лет и старше)	☐	☐	☐

7. **Другие потенциальные причины бесплодия:**

(Выберите один ответ для каждого утверждения)	*Да*	*Нет*	*Не знаю*
a) Чёрная магия	☐	☐	☐
b) Джинны/ Злые духи / сверхъестественные причины	☐	☐	☐

8. **Возможные варианты лечения бесплодия:**

(Выберите один ответ для каждого утверждения)	*Да*	*Нет*	*Не знаю*
a) Лекарственные препараты	☐	☐	☐
b) Хирургическое вмешательство (операция)	☐	☐	☐
c) Гормональные инъекции	☐	☐	☐
d) Целитель	☐	☐	☐
e) Экстракорпоральное оплодотворение (оплодотворение яйца спермой в пробирке или в другом месте за пределами тела)	☐	☐	☐
f) Искусственное осеменение (инъекция спермы в матку или яйцевод, за исключением естественных методов)	☐	☐	☐
g) Молитва	☐	☐	☐

Часть 4: Отношение к бесплодию и его социальным последствиям

A. Отношение к бесплодию

По вопросам 9-15, пожалуйста, оцените своё согласие или несогласие со следующими утверждениями:

	Полностью согласен	*Согласен*	*Затрудняюсь ответить*	*Не согласен*	*Полностью не согласен*
9. Я считаю, что бесплодие — это болезнь	☐	☐	☐	☐	☐
10. Я считаю, что бесплодие является инвалидностью	☐	☐	☐	☐	☐
11. Я считаю, что бесплодие - простая проблема	☐	☐	☐	☐	☐
12. Я считаю, что бесплодие следует лечить с помощью медицины	☐	☐	☐	☐	☐
13. Я считаю, что это право человека иметь детей	☐	☐	☐	☐	☐
14. Я считаю, что обязанность общества помогать бездетным парам	☐	☐	☐	☐	☐
15. Я думаю, что если пара зачала ребёнка один раз, у них могут возникнуть проблемы, чтобы зачать снова	☐	☐	☐	☐	☐

В. Отношение к социальным последствиям бесплодия

По вопросам 16-21, пожалуйста, оцените своё согласие или несогласие со следующими утверждениями:

	Полностью согласен	*Согласен*	*Затррудняюсь ответить*	*Не согласен*	*Полностью не согласен*
16. Я считаю, что если женщина не может иметь ребёнка, это является основанием для развода	☐	☐	☐	☐	☐
17. Я считаю, что если женщина не может иметь детей, это серьёзная	☐	☐	☐	☐	☐

причина, по которой мужчина может жениться во второй раз					
18. Я считаю, что если у пары не может быть ребенка, они должны завести приёмного	☐	☐	☐	☐	☐
19. Я считаю, что в моей общине социально приемлемо завести ребёнка с помощью медицинского лечения	☐	☐	☐	☐	☐
20. Я считаю, что в моей общине социально приемлемо завести ребенка с помощью суррогатной матери (кто-то, кто рожает ребенка для вас)	☐	☐	☐	☐	☐
21. Я считаю, что лекарственные средства для лечения бесплодия приемлемые	☐	☐	☐	☐	☐

Part 5: Демографическая информация

22. Сколько вам лет? *(напишите)*

_____

23. Ваш пол?

- ☐ Мужской
- ☐ Женский

24. Ваш год обучения?

- ☐ 1-й год
- ☐ 2-й год
- ☐ 3-й год
- ☐ 4-й год
- ☐ Другое_____

25. Какова ваша область обучения?

- ☐ Биология
- ☐ Информатика
- ☐ Экономика
- ☐ Образование
- ☐ Инженерия
- ☐ Юриспруденция
- ☐ Другое_____

26. Что лучше всего описывает ваш текущий статус отношений?

☐ Не в отношениях
☐ В отношениях (не помолвлены, не женаты)
☐ Помолвлены
☐ Женаты
☐ В гражданском союзе
☐ Расстались
☐ Разведены
☐ Вдовец/Вдова

27. Каков средний доход ваших родителей (в тенге)?
☐ Менее 100 000
☐ 100 000 – 199 000
☐ 200 000 – 299 000
☐ 300 000 –399 000
☐ 400 000 – 499 000
☐ 500 000 и более

28. Ваша национальность?
☐ Казах/казашка
☐ Русский/русская
☐ Другое_____

29. Где живут ваши родители?
☐ Южный Казахстан
☐ Северный Казахстан
☐ Центральный Казахстан
☐ Восточный Казахстан
☐ Западный Казахстан
☐ Другое_____

Спасибо за ваше участие

Қазақстан студенттерінің, оның ішінде Астана қаласының университеттерінде оқитын бакалавр студенттерінің бедеулік жайлы білім деңгейі, көзқарасы мен қабылдауы, бедеулікке байланысты тәуекелдер және емдеу шаралары туралы зерттеу сауалнамасы.

Сәлеметсіз бе, қадірлі студент:

Назарбаев Университеті Медицина мектебінің зерттеу тобы бакалавриат студенттерінің бедеулік, бедеулікке байланысты тәуекелдер және емдеу туралы білім деңгейін, көзқарасы мен қабылдауын зерттеу жүргізу үстінде. Сіз бұл зерттеуден пайда ала алмайсыз, бірақ зерттеудің нәтижелері бедеулік проблемаларын тиімді шешумен айналысатын араласу бағдарламаларын дамытуға көмектеседі. Осы тақырыпқа қатысты Сіздің пікіріңіз біз үшін өте маңызды.

Сіз осы зерттеуге қатысу үшін кездейсоқ іріктеу әдісімен таңдалдыңыз. Осы сауалнаманы толтыруыңызды сұраймыз. Біз толық құпиялылық және анонимдік сақталатынына кепілдік береміз, Сіздің жауаптарыңыз тек зерттеу мақсаттарында жалпыланған түрінде пайдаланылатын болады. Сауалнаманың ұзақтығы 15 минуттан аспайды.

Құрметпен,

Байрон Крейп, MSPH, Ph.D., Профессор, Назарбаев Университетінің Медицина мектебі
Раушан Алибекова, MD, Ph.D., Оқытушы, Назарбаев Университетінің Медицина мектебі
Диёра Абдухакимова , ҚДС Магистратурасының студенті, Назарбаев Университетінің Медицина мектебі

1 Бөлім: Респондент жайлы ақпарат

1-3 сұрақтар бойынша ұсынылған жауаптардың біреуін таңдаңыз:

1. Сіздің балаларыңыз бар ма?
   - ☐ Иә
   - ☐ Жоқ
2. Сіз балалы болуды қалайсыз ба?
   - ☐ Иә
   - ☐ Жоқ
3. Сіздің пікіріңіз бойынша, балалы болу үшін ең ыңғайлы жас қандай? (жазыңыз)

   _____

2 Бөлім: Бедеулік туралы білім

4 сұрақ бойынша ұсынылған жауаптардың біреуін таңдаңыз:

4. Әйелдің жүктілікке қабілеттілігінің айтарлықтай төмендеуі қандай жаста болады?
   - ☐ 18-24
   - ☐ 25-34
   - ☐ 35-39
   - ☐ 40-44
   - ☐ 45-46
   - ☐ Мен білмеймін

3 Бөлім: Бедеулік пен емдеудің ықтимал себептері туралы білім

5. **Бедеуліктің ықтимал себептері мыналар:**

(Әр пікірдің тұсындағы бір жауапты шеңбермен белгілеңіз)	*Иә*	*Жоқ*	*Білмеймін*
a) Етеккірдің ауытқулары (овуляциялық факторлар)	☐	☐	☐
b) Сперматазоидтардың өндірістегі ауытқулары және / немесе қызметі	☐	☐	☐
c) Бітелген фаллопиялық түтіктер (жұмыртқаны жасушасын аналық безден жатырға әкелетін түтіктер)	☐	☐	☐
d) Әйелдердегі жыныстық жолмен берілетін инфекциялар	☐	☐	☐
e) Еркектердегі жыныстық жолмен берілетін инфекциялар	☐	☐	☐
f) Әйелдердегі зәр жолдары инфекцияларының болуы	☐	☐	☐
g) Ерлердегі зәр жолдары инфекцияларының болуы	☐	☐	☐
h) Әйелдердегі генетика	☐	☐	☐
i) Ерлердегі генетика	☐	☐	☐
j) Гормондық проблемалар	☐	☐	☐
k) Қант диабеті	☐	☐	☐
l) Семіздік	☐	☐	☐

6. **Бедеулікті тудыратын ықтимал өмір салттары мыналар:**

(Әр пікірдің тұсындағы бір жауапты шеңбермен белгілеңіз)	*Иә*	*Жоқ*	*Білмеймін*
a) Әйелдердің ішімдік ішуі	☐	☐	☐
b) Еркектердің ішімдік ішуі	☐	☐	☐
c) Әйелдердің темекі тартуы	☐	☐	☐
d) Еркектердің темекі тартуы	☐	☐	☐
e) Шамадан тыс жаттығулар	☐	☐	☐
f) Әйелдердің контрацепция құралдарын алдын-ала қолдануы	☐	☐	☐
g) Еркектердің презервативті бұрын қолдануы	☐	☐	☐
h) Әйелдердің жатырішілік құрылғыларын бұрын қолдануы	☐	☐	☐
i) Қоршаған орта факторлары (қорғасын, радиация)	☐	☐	☐
j) Психологиялық стресс	☐	☐	☐
k) Кеш жастағы неке (35 жастан асқан)	☐	☐	☐

7. **Бедеуліктің басқа да ықтимал себептері мыналар:**

(Әр пікірдің тұсындағы бір жауапты шеңбермен белгілеңіз)	*Иә*	*Жоқ*	*Білмеймін*
a) Қара магия	☐	☐	☐
b) Жындар / жаман рухтар / табиғаттан тыс себептер	☐	☐	☐

8. **Бедеулікті емдеудің мүмкін шаралары мыналар:**

(Әр пікірдің тұсындағы бір жауапты шеңбермен белгілеңіз)	*Иә*	*Жоқ*	*Білмеймін*
a) Дәрі-дәрмектер	☐	☐	☐
b) Хирургиялық араласу (операция)	☐	☐	☐
c) Гормондық инъекциялар	☐	☐	☐
d) Емші	☐	☐	☐
e) Экстракорпоралдық ұрықтандыру (сынақ түтігінде немесе дененің сыртында басқа жерлерде жұмыртқаны ұрықтандыру)	☐	☐	☐
f) Жасанды ұрықтандыру (табиғи әдістерді қоспағанда, сперманы жұмытрқа жасушаға немесе	☐	☐	☐

жатырға инъекциялау)			
g) Дұға ету	☐	☐	☐

4 Бөлім: Бедеулікке және оның әлеуметтік салдарына байланысты көзқарас

А. Бедеулікке қатысты көзқарас

9-15 сұрақтар үшін төмендегі пікірлермен келісетініңізді не келіспейтініңізді көрсетуіңізді сұраймыз:

	Толықтай келісемін	*Келісемін*	*Жауап беруге қиналамын*	*Келіспеймін*	*Толықтай келіспеймін*
9. Бедеулікті ауру деп ойлаймын	☐	☐	☐	☐	☐
10. Мен бедеулікті мүгедектік деп санаймын	☐	☐	☐	☐	☐
11. Бедеулікті қарапайым мәселе деп есептеймін	☐	☐	☐	☐	☐
12. Бедеулікті медицина көмегімен емдеу керек деп ойлаймын	☐	☐	☐	☐	☐
13. Балалы болу әр адамның құқығы деп есептеймін	☐	☐	☐	☐	☐
14. Бедеу жұптарға көмектесу қоғамның міндеті деп ойлаймын	☐	☐	☐	☐	☐
15. Менің ойымша, егер ерлі-зайыпты бір рет балалы болса, оларға қайтадан балалы болу қиынға соғуы мүмкін	☐	☐	☐	☐	☐

В. Бедеуліктің әлеуметтік салдарына қатысты көзқарас

16-21 сұрақтар үшін төмендегі пікірлермен келісетініңізді не келіспейтініңізді көрсетуіңізді сұраймыз:

	Толықтай келісемін	*Келісемін*	*Жауап беруге қиналамын*	*Келіспеймін*	*Толықтай келіспеймін*
16. Менің ойымша, егер әйел балалы болмаса, бұл ажырасудың негізгі себебі болуы мүмкін	☐	☐	☐	☐	☐

17. Менің ойымша, егер әйел балалы болмаса, бұл ер адам үшін екінші рет некеге тұрудың маңызды себебі	☐	☐	☐	☐	☐
18. Менің ойымша, егер жұптар бедеу болса, олар бала асырап алуға міндетті	☐	☐	☐	☐	☐
19. Менің қауымымда медициналық емдеу арқылы балалы болуға оң көзқараспен қарайды деп ойлаймын	☐	☐	☐	☐	☐
20. Менің қауымымда суррогат анадан (сіз үшін баланы тудыратын адамнан) балалы болуға оң көзқараспен қарайды деп есептеймін,	☐	☐	☐	☐	☐
21. Мен бедеулікке арналған дәрі-дәрмектерге оң көзқараспен қараймын	☐	☐	☐	☐	☐

5 Бөлім: Демографиялық деректер

22. Жасыңыз нешеде? (жазыңыз)

_____

23. Сіздің жынысыңыз қандай?

- ☐ Еркек
- ☐ Әйел

24. Сіздің оқу жылыңыз қандай?

- ☐ 1-ші жыл
- ☐ 2- ші жыл
- ☐ 3- ші жыл
- ☐ 4- ші жыл
- ☐ Басқасы_____

25. Сіздің оқуыңыз қандай?

- ☐ Биология
- ☐ Информатика
- ☐ Экономика
- ☐ Білім
- ☐ Инжиниринг
- ☐ Заң
- ☐ Басқасы_____

26. Сіздің қазіргі қарым-қатынасыңыздың күйін төмендегі жауаптардың қайсысы жақсы сипаттайды?
    - ☐ Қарым-қатынаста емеспін
    - ☐ Қарым-қатынастамын (бірақ атастырылған немесе некеде тұрған емеспін)
    - ☐ Атастырылғанмын
    - ☐ Үйленгенмін
    - ☐ Азаматтық некедемін
    - ☐ Бөлінгенмін
    - ☐ Ажырасқанмын
    - ☐ Жесірмін

27. Ата-ананыздың орташа табысы (теңгемен) қандай?
    - ☐ 100 000-нан аз
    - ☐ 100 000 – 199 000
    - ☐ 200 000 – 299 000
    - ☐ 300 000 –399 000
    - ☐ 400 000 – 499 000
    - ☐ 500 000-нан көп

28. Ұлтыңыз қандай ?
    - ☐ Қазақ
    - ☐ Орыс
    - ☐ Басқасы_____

29. Ата-аналарыңыз қайда тұрады?
    - ☐ Оңтүстік Қазақстан
    - ☐ Солтүстік Қазақстан
    - ☐ Орталық Қазақстан
    - ☐ Шығыс Қазақстан
    - ☐ Батыс Қазақстан
    - ☐ Басқасы_____

Қатысқаныңыз үшін рақмет

APPENDIX 2**: Consent form in English, Russian, Kazakh**

Institution: School of Medicine, Nazarbayev University

Investigators:

Byron Crape, MSPH, Ph.D., Nazarbayev University School of Medicine
Raushan Alibekova, MD, Ph.D., Instructor, Nazarbayev University School of Medicine
Diyora Abdukhakimova, MPH student, Nazarbayev University School of Medicine

Project: Questionnaire about undergraduate students' knowledge, attitude and perceptions of infertility, infertility risks and treatment within universities in Astana, Kazakhstan.

Informed consent

The purpose of this questionnaire is to study the knowledge, perception and attitude of students on the topic of infertility, its risks and treatment. The results of this study can help inform intervention programs to more effectively address infertility problems. This questionnaire does not contain sensitive and personal behavior questions. If you have questions about any meaning in the form of consent, please ask and get all the clarifications.

You can withdraw from this survey. Remember, even if you agree to go through it, you have the right to stop answering questions at any time.

Anonymity and confidentiality of the participant

There will be no identifying information collected in this survey, and your answers will not be associated with your personality. You can ask questions regarding this survey. By participating in this survey, you consent to the use of your anonymous responses for the purposes of this study at any time.

Participant authentication

Having started filling out this survey, you confirm that you have read the information mentioned above, you had the opportunity to ask questions regarding the information above, you agree to participate in this study, you are at least 18 years old, you are a citizen of Kazakhstan, and you have been notified of the opportunity to stop participating in this study at any time, which will not lead to any consequences.

Организация: Школа Медицины, Назарбаев Университет

Главные исследователи:

Байрон Крэйп, MSPH, Ph.D., Школа Медицины, Назарбаев Университет,
Раушан Алибекова, MD, Ph.D., Школа Медицины, Назарбаев Университет,
Диёра Абдухакимова, студент MPH, Школа Медицины, Назарбаев Университет.

Проект: Анкета оценки уровня знаний, взглядов и восприятия студентов по вопросам бесплодия, рисков бесплодия и лечения среди студентов бакалавриата в университетах Астаны, Казахстан.

Заявление об информированном согласии

Цель данного анкетирования-изучить знания, восприятие и отношение студентов по теме бесплодия, его рисках и лечении. Результаты этого исследования могут помочь информировать программы вмешательства для более эффективного решения проблем бесплодия. Данный опросник не содержит чувствительных и личных вопросов поведения.

Если у вас есть вопросы о каком-либо значении в форме согласия, пожалуйста спросите и получите все прояснения.

Вы можете отказаться от участия в данном анкетировании. Помните, даже если вы согласитесь его пройти, у вас есть право прекратить отвечать на вопросы в любое время.

Анонимность и конфиденциальность участника

Никакая идентифицирующая Вас информация не будет собрана в данном опросе, и Ваши ответы не будут ассоциированы с Вашей личностью. Вы также можете задать вопросы касательно данного анкетирования. Принимая участие в данном опросе, Вы даёте согласие на использование Ваших анонимных ответов в целях этого исследования в любое время.

Аутентификация участника

Начав заполнение данного опроса, Вы подтверждаете, что Вы прочли информацию, указанную выше, у Вас была возможность задать вопросы касающиеся информации выше, Вы даёте своё согласие участвовать в исследовании, Вам не менее 18 лет, Вы являетесь гражданином Казахстана, и Вы были оповещены о возможности прекратить участие в этом исследовании в любое время, что не приведёт ни к каким последствиям.

Мекеме: Назарбаев Университетінің Медицина мектебі

Басты зерттеушілер:

Байрон Крейп, MSPH, Ph.D., профессор, Назарбаев Университетінің Медицина мектебі

Раушан Алибекова, MD, Ph.D., оқытушы, Назарбаев Университетінің Медицина мектебі

Диёра Абдухакимова, ҚДС магистратура бағдарламасының студенті, Назарбаев Университетінің Медицина мектебі

Жоба: Қазақстан студенттерінің, оның ішінде Астана қаласының университеттерінде оқитын бакалавр студенттерінің бедеулік пен бедеулікке әкеліп соғатын жағдайлар және оны емдеу жолдары туралы білім деңгейі, қабылдауы мен көзқарасын тексеру.

Ақпараттандырылған келісімнің мәлімдемесі

Бұл сауалнаманың мақсаты – студенттердің бедеулік және оған әкелетін қауіп-қатерлер мен оның емдеу жолдары бойынша білімін, қабылдауын және көзқарасын зерттеу. Зерттеу нәтижелері бедеулікке қатысты проблемаларды шешуге бағытталған бағдарламалардың тиімділігін арттыруға көмектеседі. Сауалнамада жеке басқа қатысты сұрақтар жоқ. Егер келісімге байланысты қандай да бір сұрақтарыңыз болса, онда қысылмай сұрауыңызды, түсінбеген жеріңізді анықтап алуыңызды өтінеміз.

Сіз бұл сауалнамаға қатысудан бас тарта аласыз. Есіңізде болсын, алғашында сауалнамаға қатысуға келіссеңіз де, сіздің оны кез келген уақытта тоқтатуға құқығыңыз бар, яғни сіз сұрақтарға жауап беруді қалаған уақытта тоқтата аласыз.

Қатысушының анонимділігі мен құпиялылығы

Бұл сауалнамада сізді анықтайтын ақпарат жиналмайды және сіздің жауаптарыңыз сіздің жеке басыңызға қатысты ақпараттармен байланыстырылмайды. Сонымен қатар сіз зерттеушілерге сауалнама жайлы сұрақтар қоя аласыз. Осы сауалнамаға қатыса отырып, сіз өзіңіздің анонимді жауаптарыңыздың зерттеу мақсаттарында кез келген уақытта қолданыла алатындығына келісім бересіз.

Қатысушының растауы

Осы сауалнаманы толтыра отырып, сіз жоғарыдағы ақпаратты оқығаныңызды, жоғарыда келтірілген ақпаратқа қатысты сұрақтарыңызды қоюға мүмкіндігіңіз болғанын, сіз зерттеуге қатысуға келісім беретініңізді, жасыңыз 18-ден асатынын, Қазақстан Республикасының азаматы болып табылатыныңызды және ешқандай зардапсыз осы зерттеуге қатысудан кез келген уақытта бас тартуға мүмкіндігіңіз бар екенін растайсыз.

LIST OF POTENTIAL JOURNALS FOR PUBLICATION

1. Journal of Adolescent Health
2. Journal of Translational Medicine
3. Sexual & Reproductive HealthCare
4. Perspectives in Public Health
5. Public Health
6. Prevention Science