



Research article

'It's like donating blood': Ghanaian university students' knowledge and attitudes towards egg and sperm donation

Rosemond Akpene Hiadzi^a, Godwin Banafo Akrong^{b,*}^a *Sociology Department, University of Ghana, Ghana*^b *School of Information Studies, McGill University, Canada*

ARTICLE INFO

Keywords:

Egg donation
Sperm donation
Knowledge
Attitudes
Qualitative
Ghana

ABSTRACT

There is anecdotal evidence that third-party reproduction, in particular gamete donation, is on the rise in Ghana. This is not surprising, considering the country has adopted assisted conception through the use of reproductive technologies for the past three decades. These technologies primarily aid infertile couples in Ghana in fulfilling their procreative responsibilities within the Ghanaian family and society. Potential donors' opinions regarding gamete donation have received minimal attention in the Ghanaian discourse on assisted reproductive technology (ART) usage. This study explores the knowledge and attitudes of undergraduate university students regarding gamete donation. The study utilized a qualitative methodology, which included 21 in-depth telephone interviews with students who were potential gamete donors. The data were thematically analyzed. The results of the study show that the participants knew that gamete donation was performed in Ghana. Positive sentiments about the technique were motivated by altruism, whereas negative attitudes were motivated by the urge to adhere to cultural norms that stigmatize incest and children conceived by artificial means. The decision to donate or decline egg or sperm donation was significantly influenced by one's religious convictions.

1. Introduction

Fertility is declining dramatically in both advanced and emerging economies, and this is becoming a growing cause for concern, as in many West African countries, including Ghana, being able to give birth is considered an honor. Additionally, encouraging births and providing more options for couples who are having trouble getting pregnant are significant components of the internal policies of many countries across the globe. According to the United Nations, Ghana will have 3.647 births per woman in 2023, a 1.33 % decrease from 2022 [1]. However, studies show that having children later in life, which may be linked to having trouble conceiving, is common for many women and men with higher levels of education and a professional career [2,3]. Over time, it has become clear that assisted reproductive technologies allow infertile couples to have children by using donated sperm or eggs.

In Ghana, men and women have begun selling and donating sperm and eggs to known and unidentified recipients, respectively. This practice is progressively becoming more widespread. These donors are typically between the ages of 18 and 40, and observable trends in Ghana indicate that most of them are either professionals or students. Health professionals in Ghana contend that they prefer donors who are between the ages of 20 and 30, or who may have already had children because this enables them to verify the validity of the donor's sperm or egg. Since some recipients believe they want to have intelligent children, university students are preferred.

* Corresponding author.

E-mail addresses: rhiadzi@ug.edu.gh (R.A. Hiadzi), godwin.akrong@mail.mcgill.ca (G.B. Akrong).

<https://doi.org/10.1016/j.heliyon.2024.e30637>

Received 26 May 2023; Received in revised form 30 April 2024; Accepted 1 May 2024

Available online 3 May 2024

2405-8440/© 2024 Published by Elsevier Ltd.

This is an open access article under the CC BY-NC-ND license

(<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

However, whether it is religiously, ethically, or practically right to sell sperm or donate eggs to strangers is unanswered among many Ghanaian university students, and their knowledge and attitude toward such donations have not received much research attention over the years [4,5]. The recipients of the sperm or eggs can select from a list of donors that occasionally includes people who are fair, tall, intelligent, and hairy, among other traits (physical screening) [6–8]. Additionally, medical (for HIV and sickle cell) and social screenings for the donors are performed (for academics, skills, and hobbies). Sperm donations are frequently made through masturbation; the donors are given a private room in which to do so, and the sperm is then stored in the sperm bank, whereas egg donations are made through surgical extraction.

However, studies show that few women are willing to donate their eggs merely out of altruism, and as a result, demand for donor eggs surpasses availability in the majority of reproductive clinics in Ghana [9,10]. Sperm donation, on the other hand, has increased as more men in Ghana are eager to donate their sperm to assist women and couples in need of a child in conceiving [11]. Couples in need of sperm and eggs, as well as clinics in need of donors, have targeted university students for recruitment [12,13]. This is similar to the situation in Ghana, and studies indicate that these university students receive compensation [14,15]. The act of university students donating eggs and sperm in exchange for financial assistance has sparked much debate in Ghana regarding the knowledge and attitudes of these Ghanaian students towards egg and sperm donation, as some citizens believe that these students are being exploited due to their economic hardships. Others have questioned the morality of these students' recruitment, emphasizing that they may begin the sperm or egg donation process without first making a prudent decision.

A further study reported that there is a lack of knowledge about the practice of egg and sperm donation [16]. According to Platts et al. [17], perceived awareness has been demonstrated to be poor, with patients reporting "very little knowledge" about egg donation, even among the infertile population undergoing IVF. Consequently, one can imagine the situation among undergraduate university students, the vast majority of whom are not of childbearing age. However, one's ignorance of egg or sperm donation did not seem to prevent one from expressing hypothetical intentions to donate eggs or sperm or their opinions on the matter [16,18,19]. There is a need for more study to help close this gap because, according to the literature, most studies on knowledge and attitudes about egg and sperm donations have frequently been conducted in Western countries, with only a few in Africa, notably Sub-Saharan Africa (see Appendix 1). This field has garnered a lot of interest, and most sub-Saharan Africans are eager to contribute eggs and sperm to aid childless couples. However, while the knowledge and attitudes of donors, recipients, and medical professionals concerning egg and sperm donation have been thoroughly examined in Western countries, little research has been done among Ghanaian university students. Additionally, studies conducted in these places or regions have been quantitative, highlighting the necessity for additional investigation of this field of study utilizing a qualitative method.

Therefore, the current study aims to determine the knowledge and attitudes of Ghanaian students toward egg and sperm donation. The study makes two contributions. First, the results could point to strategies for raising the proportions of male and female students in Ghana who donate sperm and eggs, respectively. Additionally, as there is now no formal regulation governing egg and sperm donation in Ghana, it will be advantageous for the government of Ghana to be able to carefully craft a policy statement. In light of this, the results of this study are therefore highly interesting.

2. Methods

2.1. Study design

The study was exploratory, and a sample of twenty-one (21) undergraduate students from the main campus of the University of Ghana was selected. According to the 2022 University of Ghana student population data sheet, males make up 51.3 % of the total student population, while girls make up 48.7 % of the student population [20]. To achieve gender parity in the selection of study participants based on this gender distribution, slightly more males were selected than females, resulting in a sample size of 11 males and 10 females. The undergraduates at the University of Ghana were chosen for the study because it is the premier public university in Ghana and is located in Accra, the capital city of Ghana, where the majority of fertility clinics can be found. Interview questionnaires were designed to aid in data collection for the study and were administered via telephone. The interview questions were formulated based on the theory of reasoned action [21,22]. The researchers constructed them with additional input from three experienced practitioners in Egg and Sperm Donation in Ghana. Each interview lasted between thirty and 50 min. The interview questionnaire was tested and revised before implementation. The questions that were determined to be difficult for the respondents were altered and made simpler. The telephone interview was not conducted by the researchers, but interviewers were trained to use a standardized, rapid, warm-call procedure to contact respondents. The technique began with a "warm call," or contacting respondents whose personal information was already available. After warmly greeting the respondents, the telephone interview proceeds with the interviewee asking the questions. The telephone interview asked respondents about their age, educational level, religion, marital status, and so on. It further asked questions such as "Do you know of IVF?" "What do you know about egg or sperm donation?" and "Will you consider doing it? What will make you do it?" And if you were offered a certain amount of money, would you do it? Why?" (see Appendix 2). The telephone interview also provided the opportunity for free text comments.

2.2. Study participants

This study included 21 Ghanaian undergraduate university students between the ages of 20 and 25, excluding postgraduate students from the University of Ghana (UG) and those who were uncomfortable with the subject matter. The researchers sent an open invitation through email to the mailing list of UG undergraduate students, alerting the students about the qualitative study and

requesting a response if they were willing to participate. Initial responses were received from seven students. Following this, a follow-up was conducted with students who responded to the mailing, and these respondents directed the researchers through snowball sampling and purposive sampling to more students they knew would be interested in participating in the study. This is because the study is sensitive. In all, 73 students were identified following snowball and purposive sampling. However, after carefully cleaning the responses to eliminate students who were older than the defined age range and who also were neither Ghanaians nor undergraduates, 21 respondents were finally engaged in the study. These students were open to sharing their knowledge and attitude about third-party reproduction specifically, gamete donation. The 21 undergraduate students were informed that they might withdraw from the study at any time if they felt uncomfortable.

2.3. Inclusion and exclusion criteria

The study included Ghanaian undergraduates at the University of Ghana with academic levels 100 to 400. Additionally, considering that the average age of University of Ghana undergraduate students ranges between the ages of 20 and 25 [20], the study mostly selected participants who fell within this specific age bracket. The study's participants were single individuals who had never married before.

2.4. Data collection and analysis

The study's data collection period was from July 2021 to September 2021. The data was gathered via telephone interviews. Due to the COVID-19 pandemic and the necessity to secure the safety of both the interviewer and the interviewee, this method was ideal for the study. As there is no physical contact between the interviewer and the respondent, anonymity is also guaranteed. Thus, respondents may feel comfortable sharing their opinions on the subject. The interviewer read the interview questions to the respondents and recorded the telephone interviews. Permission was obtained from the respondents before the recording was carried out. At no point did any of the 21 undergraduate students decide to withdraw from the study. The telephone interview audio recordings were then transferred to a laptop and transcribed verbatim. The interview was performed in English because all of the participants in the study were university undergraduates who were able to communicate in English. Before analysis, all the authors had full access to the data. The data were manually analyzed using thematic analysis. The first categorization of the transcripts into manageable units was guided by the objectives of the study. By assigning codes, the transcripts of a particular unit were compared and grouped with those having similar meanings or connotations. Some codes were derived from the terms provided by respondents, and codes with similar meanings were combined to make a category. This was done for each of the many units into which the transcripts were organized. Subsequently, these categories were continuously examined, and a search for patterns was done to assist in grouping categories that had some commonalities into clusters, which ultimately served as the study's themes.

Ethical approval

The University of Ghana's Ethics Committee for the Humanities (ECH) granted ethical approval for this study (reference: ECH 143/20–21), and informed consent was obtained from all participants who took part in the study.

Table 1
Sample population demographics.

Participants No.	Sex	Age	Academic Level	Religion	Marital status	Number of children
P1	Male	23	300	Christian	Single	None
P2	Male	23	400	Christian	Single	None
P3	Female	22	400	Muslim	Single	None
P4	Female	22	400	Christian	Single	None
P5	Female	22	400	Christian	Single	None
P6	Female	21	100	Christian	Single	None
P7	Female	24	400	Muslim	Single	None
P8	Female	22	400	Christian	Single	None
P9	Male	24	400	Christian	Single	None
P10	Male	24	300	Muslim	Single	None
P11	Male	24	400	Christian	Single	None
P12	Male	25	300	Christian	Single	None
P13	Male	22	400	Muslim	Single	None
P14	Male	23	300	Christian	Single	None
P15	Male	24	300	Christian	Single	None
P16	Female	22	400	Christian	Single	None
P17	Male	23	300	Muslim	Single	None
P18	Male	25	200	Christian	Single	None
P19	Female	21	100	Muslim	Single	None
P20	Female	22	200	Christian	Single	None
P21	Female	21	100	Muslim	Single	None

3. Results

Three major themes were derived from the interviews of this study, namely IVF knowledge, knowledge of egg and sperm donation, and attitude toward egg and sperm donation.

The characteristics of the respondent are summarized in [Table 1](#). Twenty-one respondents participated in the study. The majority of respondents were male (53.8 %), while the remainder was female (46.2 %). In addition, the majority of the participants were aged 22 (7 respondents) and 24 (5 respondents). Four (4) respondents were 23 years of age, three (3) were 21 years of age, and two (2) were 25 years of age. With their educational level, ten (10) of the responses were from level 400, six (6) were from level 300, and three (3) were from level 100. Level 200 had two (2) respondents. Fourteen Christians and seven Muslims participated in the study overall. The data also indicate that every respondent was single, had never been married, and had no children.

3.1. IVF knowledge

The majority of participants in the study understood what in vitro fertilization (IVF) was, as demonstrated by the study's findings. The respondents were able to give a full definition of IVF and reported that they learned about it from movies, high school lessons on reproduction, birth control TV shows, family health practitioners, peer conversations, and social media posts. As demonstrated by the outcomes of the interview:

Yes, in school, topics like reproduction introduced me to IVF (P1, 23 years old, level 300 student).

I believe it was a case study examining the pros and cons of IVF. So it was about a single lady, and there needed to be a transfer of sperm ... For her to give birth (P2, 23 years old, level 400 student).

I got to know about it through some family planning, fertility, and birth control education TV shows. That was the first time I got to know about it (P3, 22 years old, level 400 student).

The first time I heard about it, I was sitting with a friend, yes. She's an older person, and she was talking about having a child, but she was having difficulties (P5, 22 years old, level 400 student).

3.2. Knowledge of egg and sperm donation

The respondents' understanding of egg and sperm donation was also assessed. The results show that a significant number of respondents had adequate knowledge of egg and sperm donation, and in other instances, respondents were familiar with sperm donation but unfamiliar with egg donation. For example, according to P1, a 23-year-old Christian and a level 300 student:

I haven't heard of egg donation, but sperm donation, I hear of people speaking about it. I know people go to the hospital to donate sperm because some men are infertile.

Other respondents' accounts of their understanding of egg and sperm donation varied as well:

So some people are interested in other traits, so they will go in for sperm or eggs from people with such traits. So those people are donors, so if an individual wants intelligence or particular traits, they will go for the sperm or eggs and implant them or wait for birth to take place (P2, 23 years old, Christian, a level 400 student).

Yes! Ehm, I think egg donation is when females donate their healthy ovaries to fertility clinics for other people who are unable to have children themselves through the natural process to be able to assess those eggs and then also make babies for themselves. Sperm donation is kind of the opposite of egg donation. Here it deals with males who also donate their sperm to hospitals and fertility clinics for other couples or other males who are unable to fertilize eggs with their sperm to be able to have kids of their own (P7, 24 years old, Muslim, a level 400 student).

Well, I know sperm donation is when a guy or a male decides to donate some of his sperm. There is this thing they call the "sperm bank," so in case someone is not able to conceive, they could use that to help her conceive and get a baby. But there are instances where people actually cannot conceive, and there are also instances where people who want to conceive do not want to be involved in any sexual intercourse with a male (P9, a 24-year-old Christian and a level 400 student).

Moreover, one respondent like a few others compared egg and sperm donation to blood donation. In her narration, she says:

Egg or sperm donation is like donating blood to the hospital. So if a man and a woman want to give birth, but probably there is a low sperm count, they can go to the hospital and get the sperm for the lady to carry the baby, or they will let someone else carry the baby—that's surrogate (P4, a 22-year-old Christian and a level 400 student).

The respondent's knowledge about egg and sperm donation was attained through movies, research through books, traditional media, family, and social media. As demonstrated in the narratives of the respondents:

I got to know about sperm donation through a movie called 'Delivery Man'. He donated sperm, so he ended up giving birth to something like over 100 children. And I think in school as well, topics related to fertilization introduced me to it (P1, a 23-year-old Christian and a level 300 student).

It was through traditional media outlets and movies. I believe a well-known African-American actress has accomplished this. She has published a book, but I cannot recall the title. Her husband is a basketball player. I was inspired to study more about egg and sperm donation because I admired their union and wanted to know more about how they conceived their child (P3, 22 years old, a level 400 student).

I learned about it from reading and from a cousin who enlightened me on the topic. Also, if you are familiar with IVF, you are aware that it is somewhat related to egg and sperm donation. So, it is nearly impossible to hear about IVF without hearing about sperm or egg donation (P7, a 24-year-old Muslim, level 400 student).

I got to know about sperm and egg donation via Twitter when someone posted that if you want to make money, you could be doing egg donation, sperm donation, surrogate mothering, and those things, and I realized that it's a cool idea, charlie (P12, a 25-year-old Christian, level 300 student).

Although the majority of respondents had an understanding of egg and sperm donation and had learned about it through a variety of sources, including reading, family, and social media, the majority of respondents did not know where egg and sperm donation was carried out and did not know anyone who had done it before. However, a few respondents reported that:

No, please. I know that it is mostly done in fertility clinics, but I cannot point to a particular one I know of now (P7, 24 years old, Muslim, level 400 student).

No. I don't know a particular laboratory in Ghana that does that (P2, a 23-year-old Christian and a level 400 student).

3.3. Attitude toward sperm and egg donation

Some respondents indicated clearly that they would never donate their eggs or sperm for a variety of reasons ranging from their discomfort with not knowing their offspring to the mere fact that they were not sure what the process entailed. The following are some examples that illustrate this point:

No. I don't think I would ever donate my sperm, or even if a friend of mine were in such a situation, I wouldn't donate my sperm to him because, at the end of the day, I would still see the child and wouldn't be comfortable with it. I also never see myself being in a situation where because I need money, I would have to donate my sperm (P1, a 23-year-old Christian and a level 300 student).

I have not thought of sperm donation because I don't know how they will get my sperm out. I don't know if they will use a machine or ... So I don't know. I have never thought of it (P2, a 23-year-old Christian and a level 400 student).

No, I will not donate my sperm because if I have a son or a daughter, I would like him or her to know who I am (P9, a 24-year-old Christian and a level 400 student).

No, but if it is for my benefit, as in not being able to have a baby in the future, then fine. But to be a donor for someone else, it's a big no (P3, 22 years old, a level 400 student).

I would tell them no, as I would receive nothing in exchange for my donation. Is it money? What if money wasn't a problem for me? Hence, if money is not a problem, why should I donate? They may adopt if they desire to have children (P1, a 23-year-old Christian and a level 300 student).

Some of the respondents who consented to donate their eggs or sperm did so for altruistic purposes, giving their eggs or sperm to people in need. While some preferred to donate to complete strangers, others believed it was preferable to donate to acquaintances. But they had made their approval subject to certain considerations. They expressed:

I will donate my eggs because I believe I am in a position to assist someone in need of a child. Perhaps out of kindness, I believe. Mmmh... I believe so. I will never do anything for money, so it would be best for me not to donate at all. Donations are not made in exchange for money. I must state that I will only donate my eggs to a stranger, not a known individual. I will attach this condition to my donation. Because, uh, in such cases, it may complicate matters pertaining to the child because, at a particular point in life, the child may wish to know certain things. And if the child discovers that they are the result of an egg donation, my presence will encourage the child to want to know me better and cause the child to avoid the parents to whom I donated the eggs, as the child may feel that they are not the biological parents (P5, 22 years old, level 400 student).

Okay!! I will donate my eggs to infertile people whom I know to be responsible and with whom I am personally acquainted. Yet, I will not simply walk into any hospital and decide to donate my eggs for money (P7, 24 years old, Muslim, a level 400 student).

Personally, I believe it is dependent on the circumstances. I do not have a definitive answer since, as you know, the situation is complicated. I will want to donate sperm in the same manner that someone would want to donate blood for me. But there will be conditions attached. Hmm, maybe, maybe ... I will neither say yes nor no, but perhaps it also depends. Okay, erm. You are aware that you must have a clear and very favorable intention. Why are you requesting my sperm donation? In any case, this is my sperm that I'm coming to donate to you; therefore, you must put it to good use. Moreover, I must know the recipient of my

sperm donation. How badly does the individual need it? If it's something that the individual desperately needs, then I must examine all of these reasons (P10, 24 years old, Muslim, a level 300 student).

One respondent, however, agreed to donate for commercial purposes:

If one needs money, it's a cool option for them to donate an egg or sperm. I see nothing wrong with that. This is because I see it as a form of business; if someone is in need and unable to produce sperm, but you can produce and sell it, why not help the person? Indeed, you receive your money because everyone needs money. Indeed, I am urgently in need of money, so why not undertake this act if it will pay me well? Imagine if you were completely broke and could donate eggs or sperm for money. What am I losing? I will have no contact with the newborn (P12, 25 years old, Christian, a level 300 student).

Furthermore, the study analyzed whether sperm or egg donors would prefer to know the identity of the intended parents and whether their donation resulted in a pregnancy. There was a diversity of opinions expressed by those who responded. For those in support, the following quotes expressed their sentiments:

Yes, of course, if it's acceptable with the recipients, I would like to know because, eh, when I donate my eggs to them, I understand that, eh, it's a transaction, so they are not legally obligated to tell me what they intend to do with them. If it's all right with them, I would like to know if the intended purpose was accomplished, and yes, I would like to know (P7, 24 years old, Muslim, a level 400 student).

Absolutely, I want to know if it served its intended purpose. If it has, that's OK; if not, I have no problem with it because I won't give you something if you intend to use it for something other than what you need it for (P10, 24 years old, Muslim, a level 300 student).

We have a phenomenon in our culture known as incest. Hence, I should be aware of this so that neither one of my family members nor even my children will decide to marry the offspring created via the use of my sperm. I, therefore, want to know (P2, a 23-year-old Christian and a level 400 student).

I would have largely said no ..., but sometimes I feel what happens in movies outside of the fiction actually occurred due to spirituality. In African films, you will observe someone obtaining sperm and using it for rituals. Hence, I would not be comfortable with the fact that my sperm is somewhere and I do not know where it is or what it is doing without seeing the person or the process (P1, a 23-year-old Christian and a level 300 student).

Others also felt they did not want to know the identity of the intended parents to avoid any link with the born child in the future:

No, I won't bother because if you attempt to know all these things, you might know the baby's parents and think, "That's my child" if later on in life, you're having difficulty giving birth (P12, 25 years old, Christian, a level 300 student).

Again, the study explored the general views of respondents regarding the disclosure of the identity of intended parents to gamete donors. This question was not in direct relation to the respondent's desires should they go ahead with gamete donation but generally sought to identify the general sentiments towards this for anyone who goes in to donate their gametes. In line with that, the following responses were generated:

Basically, they shouldn't know. But kids grow up, change, and become curious about their biological parents. You know that some people will eventually find out. If they find out, you'll be the worst person ever. So you have to be very careful with such information. (P10, 24 years old, Muslim, a level 300 student).

They shouldn't know because they'll get hurt. If you assume someone is your genuine parent and later find that they aren't and this was how you were conceived, I don't know if it will affect the children. It's best not to tell them. I don't think you should, unless they're old (P8, 22 years old, Christian, a level 400 student).

Well, for the same reason—if you tell them, they'll doubt it, so they don't need to know. At least they know these are my biological parents, and that's all. Because they're my biological parents, that's it. The kids don't need to know how you had them (P12, 25 years old, Christian, a level 300 student).

Respondents' religious beliefs were also used to determine whether or not they believed it was moral to use donated sperm and eggs in fertility treatment. According to the results, religious beliefs were a significant predictor of sperm and egg donation for fertility treatment. Several respondents were of the view that egg and/or sperm donation was in line with their religious doctrines and although they could not identify any specific encounter with their religion that pointed to that fact, they relied on the general principles of their religion in taking a stance. For instance:

Aww, hmm ... It's not bad. I don't think it's a bad thing in the sight of God, yee. It's not bad, (P6, 21 years old, Christian, a level 100 student).

For those who have a true need, I do not think it is wrong to donate eggs or sperm. From a religious perspective, I don't see any problems with it. By way of illustration, I know that in my church I need to pray about it before I can donate anything of such a nature. Simply put, I don't want to go ahead of God (P11, 24 years old, Christian, a level 400 student).

No, I don't see anything seriously wrong with that. You see, I consider it good in light of my religious beliefs. Because, as you are aware, helping someone with a child is another way to show someone you care about them. You see, in my religion, Jesus basically said that we should love one another. That's the general rule for Christians, just like loving your neighbor as yourself. Therefore, show someone you love them if you can. You may believe that you will never need such assistance and that it won't ever happen to you, but that isn't always the case. In essence, it is good from a religious standpoint. You are assisting those in need. I really want to be able to help someone (P15, 24 years old, Christian, a level 300 student).

Mhmhmh! Based on my level of religiosity and being an open-minded person, I think it's fine for one to embark on egg and sperm donation and IVF because things have changed, times have changed, and the way this contemporary world works is different from three thousand years ago when the bible and the Quran were written. Okay, everything that is happening now wasn't happening then, so for me, I think there are even a lot of things to be updated in the Bible. So if you want to be strictly, eh, religious, you would be kind of left behind because that way, if you cannot have a child naturally, that means that you have to stay childless for the rest of your life, and with my level of religiosity and the way I think, I don't think it's fair for any human being to live childless if you know and you can afford a way to have a child that would become a source of happiness to you. For me, it is unfair, so yes, I do not see anything wrong with it (P7, 24 years old, Muslim, a level 400 student).

So far as religion is concerned, I have not encountered anything suggesting that sperm donation is bad. What I do know is that while it may not be a good idea to abort a child, giving sperm away is not wrong because God has blessed you with more sperm. I am not aware of any religious texts that forbid such behavior (P1, a 23-year-old Christian and a level 300 student).

Others who were not sure what their religion's stances towards egg and sperm donation was still felt there was nothing wrong with it based on basic life principles:

Okay, for my religion I can't tell. I don't know if they accept those things, but I know some religions do not, so that could also be a factor, but generally, I think it is not a bad idea. Well! Ehm, hmmm, well, I don't see it as being bad though, because ehm, all that matters depends on the individual, the one donating and the one receiving—and everyone has his or her own prejudices about these matters, so it depends, but I think it's okay (P13, 22 years old, Muslim, a level 400 student).

Others were also unsure of their stance regarding this and felt they needed to experience it to be sure of what to do:

I have to experience it to see if God actually appreciates it when we donate our eggs or not. In the Bible, I remember someone practicing the withdrawal method. I think in Genesis or so, there was someone; who was it? I have forgotten. There was a man who was wasting his sperm, and God was angry with him, so once I won't be wasting my eggs, I believe it's okay. I am so confused now (P5, 22 years old, Christian, level 400 student).

4. Discussion

This qualitative study explored the knowledge and attitudes of undergraduate university students toward third-party reproduction, with a particular focus on gamete (egg and sperm) donation. According to the thematic findings, the participants knew of assisted conception/reproduction via the use of reproductive technologies. This knowledge, according to the study, was derived by the respondents mainly from media exposure (both electronic and internet-based) as well as from their school environment with respect to their teachers and peers. This result is in line with the conclusions made by various studies that the internet has become a major source of information for young adults who are very much hooked on various social media and as netizens [16,23]. Hence, this further justifies the findings from the current study that university students derived their information about assisted conception and egg and sperm donation from the internet. Again, the secondary socialization that occurs outside the family environment—in schools, among peers, and via traditional media such as radio and television served as important sources of information for these undergraduate students. According to Quaidoo et al. [18], these various agents become important sources of information for young adults between the ages of 20 and 30.

But it's important to highlight that the respondents' claimed understanding of gamete donation is only satisfactory for a broad comprehension of the phenomenon. Some of the study respondents had a limited understanding of the procedures involved in egg and sperm extraction, as well as the hospitals and clinics across the country that were in charge of performing the procedure. Others were unaware of the specifics of gamete donation, including the medical examination, the requirements for donors, etc. This is consistent with the conclusions made known by Ezeome et al. [4], Wang et al. [24], and Platts et al. [17].

The results of the study also showed that the attitudes of some respondents towards egg and/or sperm donation were formed based on observational learning or learning from exposure to others who had gone through similar situations. As such, by watching movies that depict negative consequences of sperm donation, such as fathering many children (with its associated consequences) and sperms being used for spiritual purposes, some respondents have developed a negative attitude towards it and, as such, do not wish to donate their sperms. Likewise, exposure to positive cues through observations of people whom we value/admire can lead to the formation of positive attitudes towards an attitude object, in this case, egg and sperm donation. People thus adjust their attitudes to hold views closer to those of others whom they value; for example, an African-American actress and her spouse, a famous basketball player who, according to a respondent, had undergone third-party reproduction, were seen as a reference group, leading to the adoption of a favorable attitude toward egg and sperm donation.

Additionally, research [25–27] has highlighted that attitudes can influence behavior when they are based on well-considered

notions. The theory of reasoned action holds that a person's decision to act in a particular way is the outcome of a logical process in which potential courses of action are considered, their effects or consequences are weighed, and a decision is made as to whether to act or not [28]. Participants in the study demonstrated the application of the theory of reasoned action. Consequently, when respondents were asked if they would donate their gametes (eggs or sperm), their responses confirmed the rational processes by which they considered behavioral options by highlighting various conditionalities attached to their decision to donate or not to donate, such as the fact that they would only donate to someone in dire need, to a stranger, or to someone who would be a responsible parent.

The consequences that these respondents considered with respect to the question of whether or not they will wish to know the identity of the intended parents and if the assisted conception process resulted in a subsequent pregnancy and live birth mainly were to avoid a situation of incest in the future, to ensure their gametes were indeed used for the intended purpose of artificial conception and no other purpose, and as a way of avoiding a future situation whereby they will feel a bond with the child, especially should they also face challenges with having children later in life. These various responses help to understand how the Ghanaian cultural context shapes attitudes. It is taboo for one to have sexual relations with another person to whom they are related via blood, marriage, or adoption for reasons other than procreation [29]. Again, studies in Ghana have shown that various body parts (including sperms) are sold or used for ritual purposes in exchange for monetary gain or some other advantage [30,31], thus explaining the fears of some respondents.

In general [22], attitudes that show up in behavior seem to be better predictors of behavior. Acceptability of the behavior (subjective norm), for instance, also plays a role. Hence, a broader question exploring the acceptability of disclosing intended parents was posed to determine whether respondents would want to know the recipients of their gametes. Several respondents reported that it was not necessary to disclose the identity of donors to recipients to prevent future emotional distress for children born as a result of such procedures upon learning that one of their parents is not their biological parent.

Attitudes affect behavior in different ways, depending on what is being done and how likely it is that there will be social consequences. Again, this helps explain the attitudes of some respondents towards gamete donation. Although assisted conception, and especially third-party reproduction, is a relatively new phenomenon in the country and the procedure is artificial, it is sometimes shrouded in secrecy. To ensure the social acceptability of the children born through these procedures [32,33] and to prevent any type of stigma towards the couple using assisted conception, couples undergoing IVF treatment in Ghana frequently conceal this information from their family and friends [34]. Due to the secrecy associated with these procedures, the use of donor gametes cannot be disclosed. Thus, gamete donation is sometimes done in secret. Therefore, it is impossible to accurately predict the behavior of these respondents based on their opinions regarding gamete donation and the potential societal implications of stigmatizing the actors involved in third-party reproduction due to the secrecy and privacy surrounding the practice.

Finally, the influence of religion on the acceptability of gamete donation was explored due to the dominance of religion in the social lives of not only Ghanaians but Africans in general. Although gamete donation is a relatively recent phenomenon, respondents affirm that they are unaware of any particular prohibitions in the Bible or Quran. In addition, they utilized basic Christian and Muslim precepts to justify the legitimacy of the procedure. They believed it was a way for them to fulfill their religious commitment to assist one another in society. Other respondents emphasized, however, that they will seek spiritual counsel when the need for gamete donation arises to ensure that God approves of their intended actions and to seek His blessings. This is similar to the findings of [35], who investigated the role of religion in the decision-making process of infertile couples in Ghana on the use of assisted reproductive technology. Other respondents compared gamete donation with other reproductive procedures, such as abortion and the coitus interruptus/withdrawal method, to determine the religious acceptability of these processes. Abortion and coitus interruptus were viewed as fertility-reducing activities, but gamete donation was viewed as a fertility-enhancing practice. Hence, the former was seen as contrary to godly values, while the latter was regarded as consistent with God's procreative purpose for mankind. This further explains the study participants' religious acceptance of gamete (egg and sperm) donation.

4.1. Limitations, future directions, and implications for practice

Even though it is known that knowledge and attitudes affect behavior, they may not always be good predictors of behavior. In this exploratory qualitative study, none of the participants have ever been in a position where they had to decide whether or not to donate their gametes for assisted conception. Because attitudes generated from personal experience are stronger, are held more confidently, are more difficult to change, and are therefore better predictors of behavior, their responses are hypothetical and may not reflect their real behavior. It is therefore recommended that future studies expand on this population of undergraduate students, as they continue to be targeted by fertility clinics and agents seeking donor gametes, but should focus on those actively involved in gamete donation to gain a more comprehensive understanding of the factors that facilitate the practice. Face-to-face interviews with these undergraduate students should be the main focus of future research. This would allow the interviewer to examine and obtain in-depth qualitative justification for their responses, allowing for a more in-depth examination of this complex topic, as behavior and body language cannot be observed during a telephone interview.

Notwithstanding the study's limitations, our findings have important implications for practice. By shedding light on the knowledge and attitudes of undergraduate university students regarding third-party reproduction, with an emphasis on egg and sperm donation, the findings of this study may inform the formulation of policies governing egg and sperm donation. Based on the data, it is clear that additional counseling and educational seminars must be provided to university-level young adults, as they are frequently the largest source for such egg and sperm donations. While religiosity was found to have a significant impact in the present study, both Christian and Muslim religious leaders may be involved in helping to further educate these university students on the religious perspective of egg and sperm donations. Most young adults learn about egg and sperm donation from movies, high school reproduction lessons, peer dialogues, and social media. Ghanaian film producers must aim to make more of such movies and blend them with Ghanaian cultural

values and beliefs. While most respondents learned about egg and sperm donation in high school, the Ghana Educational Service should require senior high students to have enough lessons on this sensitive topic in their textbooks. This is because egg and sperm donation is gaining popularity among the youth in Ghana.

5. Conclusions

Gamete (egg and sperm) donation knowledge among undergraduate university students shows several trends. The students were somewhat aware of donor insemination in Ghana. Their age-appropriate exposure to traditional media, the internet, and education provided this knowledge. Yet, in-depth medical procedure knowledge generally comes from actual experience. As none of the undergraduate students in our study had donated gametes, their knowledge was unsurprising. We also included respondents' thoughts, feelings, and intentions or actions when assessing their gamete donation attitudes. Moreover, people's thoughts and feelings influence their behavior. Intentions may, however, predict behavior better than feelings and beliefs. Hence, intentions often predict behavior. That is why the study examined participants' thoughts, beliefs, feelings, and, most crucially, intentions regarding gamete donation. An examination of these three components showed that those with positive beliefs and feelings about gamete donation also had positive attitudes and intended to donate for altruistic reasons. Socio-cultural (e.g., fear of future incest) and religious beliefs (e.g., fear of gametes being utilized for negative spiritual purposes) drove the practice's unacceptability. Although attitudes are unsatisfactory predictors of behavior, assessing specific actions as opposed to asking about general intentions helps overcome this shortcoming. This study explores specific actions to predict behavior based on attitudes. To that end, respondents were asked their opinions about gamete donation, if they would donate their gametes, and if they wanted to know the recipients and results of their donations. Furthermore, respondents' responses show that societal norms regarding natural conception that shroud assisted conception in secrecy and stigmatize the artificially conceived offspring inhibited some participants from having a positive attitude toward gamete donation. Finally, several participants evaluated gamete donation positively due to the religious mandate to procreate and be compassionate.

Ethics declarations

The research was approved by The University of Ghana's Ethics Committee for the Humanities (ECH), Ghana (Approval number: ECH 143/20–21). Verbal informed consent was obtained.

Funding disclosure

The authors declare that no financial support was received for the research.

Data availability statement

All data generated in this study has not been deposited into any publicly available repository. The data is included in the article/supp. material/referenced in the article.

CRedit authorship contribution statement

Rosemond Akpene Hiadzi: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization.
Godwin Banafo Akrong: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.heliyon.2024.e30637>.

Appendix 1

Articles Reviewed

#	Author (s)	Country	Method	Sample	Participants
1	[36]	Nigeria	Quantitative	180	Medical students

(continued on next page)

(continued)

#	Author (s)	Country	Method	Sample	Participants
2	[37]	USA	Quantitative	124	Undergraduate students
3	[38]	China	Quantitative	2000	Male students
4	[25]	Australia	Qualitative	11 recipients/9 donors	Australian citizens
5	[39]	Belgium	Quantitative	935	University students
6	[40]	Netherlands	Quantitative	1525	Students
7	[32]	Belgium	Quantitative	242	Men
8	[26]	Sweden	Quantitative	712	Primary Healthcare
9	[41]	Nigeria	Quantitative	1150	University Students
10	[27]	Serbia	Quantitative	503	University Students
11	[16]	UK	Quantitative	635	UK-based women
12	[24]	China	Quantitative/Qualitative	329	Men
13	[31]	Nigeria	Qualitative	31	Young females
14	[42]	Portugal	Quantitative	282	Men
15	[43]	Denmark & USA	Quantitative	11 712	Men

Appendix 2

Interview Questions.

Section A: Socio-demographic background

1. How old are you?
2. What level are you in?
3. What is your religion?
4. Do you consider yourself a religious person? Explain.
5. What is your marital status? Any children?
6. What is your monthly expenditure?
7. Do you work?
8. Who do you live with when not in school?
9. Who takes care of your expenses i.e. school fees, accommodation on campus, feeding, clothing, medical, etc.

Section B: Knowledge of third-party donation

10. a. Do you know of IVF?
 - b. Tell me what you know about it. How did you hear about it?
11. Do you know of egg/sperm donation?
12. What do you know about egg/sperm donation? How did you hear of it?
13. Do you know where you can get it done?
14. Do you know anyone who has done it before?
15. Do you know why they did it?

Section C: Attitude toward third-party donation

16. Will you consider doing it? What will make you do it?
17. If you were offered a certain amount of money, will you do it? Why?
18. For those who have done it before ... why did you do it? (If not, skip to 13)
19. How did you get to that point?
20. Share your experience
21. Did you do it for anyone in particular eg. relative, friend, pastor, etc.
22. Will you do it again and why? Will you encourage others to do it and why?
23. Should you donate, would you like to know the intended parents? And whether it resulted in pregnancy and a live birth. Why?
24. Do you think donors should know the recipients of their genetic material? Why?
25. Do you think children born from such procedures should know who their biological parents are? Why?
26. If someone approached you to donate, will you do it and why?
27. Based on your level of religiosity, do you think it is right to donate your eggs/sperms for fertility treatment? Explain

References

- [1] United Nations - World Population Prospects, Ghana fertility rate 1950-2023. *Macrotrends*, n.d. <https://www.macrotrends.net/countries/GHA/ghana/fertility-rate>, 2023.
- [2] K.B. Guzzo, S.R. Hayford, Pathways to parenthood in social and family contexts: decade in review, 2020, *J. Marriage Fam.* 82 (1) (2020) 117–144.
- [3] R. Impicciatore, F. Tomatis, The nexus between education and fertility in six European countries, *Genus* 76 (1) (2020) 1–20.
- [4] I.V. Ezeome, S.O. Akintola, A.S. Jegede, E.R. Ezeome, Perception of key ethical issues in assisted reproductive technology (ART) by providers and clients in Nigeria, *Int. J. Wom. Health* (2021) 1033–1052.
- [5] T. Gerrits, Assisted Reproductive Technologies in Ghana: Transnational Undertakings, Local Practices and 'more Affordable IVF', vol. 2, *Reproductive biomedicine & society online*, 2016, pp. 32–38.
- [6] R.G. Hogan, K. Hammarberg, A.Y. Wang, E.A. Sullivan, 'Battery hens' or 'nuggets of gold': a qualitative study on the barriers and enablers for altruistic egg donation, *Hum. Fertil.* 25 (4) (2022) 688–696.
- [7] S. Goedeke, H. Gamble, R. Thurlow, Motivations for egg donation to previously unknown recipients: donation as a personal, relational act of giving, *Hum. Fertil.* (2021) 1–11.
- [8] Bokek-Cohen Y., Marketing of donor eggs by offering possibilities for imaginary actualization of recipients' ideal self, *J. Consum. Cult.* 23 (4) (2023) 868–902. 14695405221149103.
- [9] A. Whittaker, T. Gerrits, C. Weis, Emerging "repronubs" and "repreneurs": transnational surrogacy in Ghana, Kazakhstan, and Laos, *Int. J. Comp. Sociol.* 63 (5–6) (2022) 304–323.
- [10] T. Gerrits, Global IVF and local practices: the case of Ghana, in: *The Routledge Handbook of Anthropology and Reproduction*, Routledge, 2021, pp. 233–256.
- [11] J.M. Kyei, A. Manu, D. Dwomoh, A.M. Kotoh, K. Agyabeng, A. Ankamah, Ways of coping among women with infertility undergoing assisted reproductive technologies in Ghana, *The Pan African Medical Journal* 41 (2022).
- [12] S. Lafuente-Funes, Shall we stop talking about egg donation? Transference of reproductive capacity in the Spanish bioeconomy, *BioSocieties* 15 (2) (2020) 207–225.
- [13] O.Q. Bakare, O.E. Oluwole, D. Ogunkoya, C. Aja, J. Thomas, Knowledge, attitude and willingness to participate in gamete donation for artificial insemination among undergraduate students in Iagos, *Annals of Health Research* 8 (4) (2022) 277–287.
- [14] S. Goedeke, D. Shepherd, I.S. Rodino, in: *Fertility Stakeholders' Concerns Regarding Payment for Egg and Sperm Donation in New Zealand and Australia*, vol. 14, *Reproductive Biomedicine & Society Online*, 2022, pp. 8–19.
- [15] N. Ihuoma Okafor, J. Ifeanyi-chukwu Ikechebelu, N. Nneka Joe-Ikechebelu, B. Chukwuneme Okpala, C. Clementina Odo, 'Gift with a price tag': Nigerian egg donors' knowledge, experiences and motivations, *Afr. J. Reprod. Health* (6) (2022).
- [16] T. Bracewell-Milnes, J.C. Holland, B.P. Jones, S. Saso, P. Almeida, K. Maclaran, J. Norman-Taylor, D. Nikolaou, N.M. Shah, M. Johnson, M.-Y. Thum, Exploring the knowledge and attitudes of women of reproductive age from the general public towards egg donation and egg sharing: a UK-based study, *Hum. Reprod.* 36 (8) (2021) 2189–2201.
- [17] S. Platts, T. Bracewell-Milnes, S. Saso, B. Jones, R. Parikh, M.Y. Thum, Investigating attitudes towards oocyte donation amongst potential donors and the general population: a systematic review, *Hum. Fertil.* 24 (3) (2021) 169–181.
- [18] E.Y. Quaidoo, A. Ohemeng, M. Amankwah-Poku, Sources of nutrition information and level of nutrition knowledge among young adults in the Accra metropolis, *BMC Publ. Health* 18 (2018) 1–7.
- [19] L.E. Caughey, S. Lensen, K.M. White, M. Peate, Disposition intentions of elective egg freezers toward their surplus frozen oocytes: a systematic review and meta-analysis, *Fertil. Steril.* 116 (6) (2021) 1601–1619.
- [20] S. Mohammed, K.E. Zogli, T. Kankpi, M. Banyeh, Determinants of voluntary HIV/AIDS counseling and testing among university students in Ghana, *Asian Journal of Advanced Research and Reports* (2022) 46–56.
- [21] I. Ajzen, *Constructing a Theory of Planned Behavior Questionnaire: Conceptual and Methodological Considerations*, 2006.
- [22] I. Ajzen, M. Fishbein, Attitudes and the attitude-behavior relation: reasoned and automatic processes, *Eur. Rev. Soc. Psychol.* 11 (1) (2000) 1–33.
- [23] A. Szymkowiak, B. Melović, M. Dabić, K. Jeganathan, G.S. Kundi, Information technology and Gen Z: the role of teachers, the internet, and technology in the education of young people, *Technol. Soc.* 65 (2021) 101565.
- [24] X. Wang, M.X. Chen, F. Zhang, G.Q. Liang, H. Zhu, B.L. Feng, Z.W. Tao, F. Jiang, Sperm donors in Shanghai, China: a study of motivations, characteristics, and semen parameters of actual sperm donors, *Reproductive and Developmental Medicine* 5 (4) (2021) 213–219.
- [25] D.J. Amor, A. Kerr, N. Somanathan, A. McEwen, M. Tome, J. Hodgson, S. Lewis, Attitudes of sperm, egg and embryo donors and recipients towards genetic information and screening of donors, *Reprod. Health* 15 (1) (2018) 1–10.
- [26] G. Armuand, A. Skoog Svanberg, C. Lampic, E. Elenis, G. Sydsjö, Attitudes among paediatric healthcare professionals in Sweden towards sperm donation to single women: a survey study, *Fertility research and practice* 6 (1) (2020) 1–7.
- [27] J.O. Kostić, M. Mitrović, D. Panić, Egg donation: exploring attitudes of students towards donation, *TEME* (2021) 247–263.
- [28] I. Ajzen, The theory of planned behavior: frequently asked questions, *Human Behavior and Emerging Technologies* 2 (4) (2020) 314–324.
- [29] A. Singh, R. Both, A. Philpott, A. 'I tell them that sex is sweet at the right time' – A qualitative review of 'pleasure gaps and opportunities' in sexuality education programmes in Ghana and Kenya, *Global Publ. Health* 16 (5) (2021) 788–800.
- [30] E.S. Owusu, The superstition that dismembers the African child: an exploration of the scale and features of juju-driven paedicide in Ghana, *Int. Ann. Criminol.* 60 (1) (2022) 1–42.
- [31] N.I. Okafor, J.I. Ikechebelu, N.N. Joe-Ikechebelu, B.C. Okpala, C.C. Odo, 'Gift with a price tag': Nigerian egg donors' knowledge, experiences and motivations, *Afr. J. Reprod. Health* 26 (6) (2022) 64–79.
- [32] F. Mahieu, W. Declere, K. Osmanagaoglu, V. Provoost, Anonymous sperm donors' attitude towards donation and the release of identifying information, *J. Assist. Reprod. Genet.* 36 (10) (2019) 2007–2016.
- [33] G.N.O. Okantey, E.B. Adomako, F.D. Baffour, D. Lim, Sociocultural implications of infertility and challenges in accessing assisted reproductive technology: experiences of couples from two health facilities in southern Ghana, *Marriage Fam. Rev.* 57 (5) (2021) 375–396.
- [34] J.A. Anaman-Torgbor, J.W. Jonathan, L. Asare, B. Osarfo, R. Attivor, A. Bonsu, E.A. Fialor, E.E. Tarkang, Experiences of women undergoing assisted reproductive technology in Ghana: a qualitative analysis of their experiences, *PLoS One* 16 (8) (2021) e0255957.
- [35] R.A. Hiadzi, I.M. Boafa, P.M. Tetteh, 'God helps those who help themselves'... religion and Assisted Reproductive Technology usage amongst urban Ghanaians, *PLoS One* 16 (12) (2021) e0260346, 2021.
- [36] H.E. Onah, T.A. Agbata, S.N. Obi, Attitude to sperm donation among medical students in Enugu, South-Eastern Nigeria, *J. Obstet. Gynaecol.* 28 (1) (2008) 96–99.
- [37] D. Lester, A. Furnham, N. Salem, Attitudes toward egg and sperm donation, *Psychol. Rep.* 106 (2) (2010) 579–580.
- [38] S.H. Liu, L. Wang, X.H. Song, Q.L. Zhang, H. Huang, C.Y. Xu, Understanding of and attitude towards sperm donation among males in Shandong Province and their influencing factors and countermeasures, *Zhonghua nan ke xue = National Journal of Andrology* 22 (4) (2016) 315–319.
- [39] V. Provoost, F. Van Rompuy, G. Pennings, Non-donors' attitudes towards sperm donation and their willingness to donate, *J. Assist. Reprod. Genet.* 35 (1) (2018) 107–118.
- [40] G. Pennings, V. Provoost, The attitude of female students towards sperm donation by their partner, *J. Assist. Reprod. Genet.* 36 (2019) 1431–1439.

- [41] O.O. Ogunbode, G.O. Obajimi, Assisted reproductive techniques and gamete donation; knowledge, attitude and willingness to participate among students in a Nigerian tertiary institution, *Med. J. Zambia* 47 (1) (2020) 8–15.
- [42] J. Areias, J. Gato, M. Moura-Ramos, Motivations and attitudes of men towards sperm donation: whom to donate and why? *Sex. Res. Soc. Pol.* 19 (1) (2022) 147–158.
- [43] A.A. Pacey, G. Pennings, E. Mocanu, J. Rothmar, A. Pinborg, S.W. Adrian, C. Burke, A.-B. Skytte, An analysis of the outcome of 11 712 men applying to be sperm donors in Denmark, and the USA, *Hum. Reprod.* 38 (3) (2023) 352–358.