Factors Associated With Willingness To Donate Oocytes Among Female Students In A Tertiary Institution

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Research

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Abstract

Background: The shortage of oocyte donors in the face of increasing demand for infertility treatment globally has become a concern for stakeholders involved in assisted reproduction. Local research on oocyte donation is relatively limited in Ghana and tends to neglect female university students who constitute a large donor group for oocyte donation.

Objective: This research sought to investigate the knowledge and attitude of female university students towards oocyte donation in assisted reproduction.

Method: A questionnaire-based, cross sectional study was conducted among 295 female undergraduate students. The outcome variable was willingness to donate an oocyte or not. Factors investigated were socio-demographic characteristics, knowledge and attitude towards oocyte donation. Knowledge items were measured on a binary scale, where a correct response scored '1' and an incorrect response scored '0'. Knowledge was rated as either high (score >3) or low (score ≤3). Attitude items were measured on a 5-point Likert scale and rated as positive (score >24) or negative (score ≤24). Descriptive and inferential statistics were computed with STATA version 15, assuming statistical significance at $p < 0.05$.

Results: Majority of the students, 278 (94.2%), were Christians and had a low level of knowledge about oocyte donation (61%). Fifty-two percent and 44% of students showed a positive attitude towards oocyte donation and were willing to donate oocytes respectively. Being a Christian [AOR = 0.24, 95% CI: 0.07-0.92], spending between GhC500-1000 a month [AOR = 2.47, 95% CI: 1.48-4.11] and having a positive attitude towards oocyte donation [AOR = 2.12, 95% CI: 1.30-3.34] were associated with willingness to donate oocytes.

Conclusion: The low levels of knowledge among the female university students highlights the need for information regarding oocyte donation in assisted reproduction. Existing barriers can be addressed through further research, public education and by encouraging dialogue between health authorities, academia and religious leaders could be potentially beneficial in addressing the plight of infertile couples.

Plain English Summary

Couples who have difficulty achieving a pregnancy have an option of being assisted at fertility clinics. This process typically involves uniting the female and male reproductive cells under monitored conditions and after a period of maturation, implanting the embryo back in the female womb to grow further. There are conditions where a female is unable to produce eggs of good quality and has to rely on eggs from another female. For this to happen, there must be females who are willing to donate their eggs. However, there are often not enough donors and information of about the willingness to donate human eggs is less well researched. The present study was conducted among female university students using questionnaires to assess knowledge about egg donation and the factors that influence willingness to donate human eggs in this group, which is often one of the largest donor groups locally. Results indicated that knowledge about egg donation was low, although the proportion of respondents willing to donate

was relatively high compared to an earlier study. The desire to help couples was the main motivation to donate eggs. Students who were Christians, those whose monthly expenditure ranged between GhC500 to GhC1000 and had a positive attitude were more willing to donate oocytes compared to their counterparts. The paucity of knowledge about human egg donation to assist reproduction calls for education in the target group and general public. Further research and dialogue between health authorities, academia and religious leaders could be potentially beneficial in addressing the plight of infertile couples.

Introduction

Infertility is recognized as a problem of public health importance globally [1]. This is because it is associated with a significant social, psychological and economic burden [1]. However, it assumes a higher significance in settings where procreation is accorded greater cultural and social value. It is estimated that about 8-12% of couples worldwide are infertile [2]. The rate is even higher in sub-Saharan Africa, where the prevalence has been estimated as 30% [3]. The World Health Organisation (WHO) considers an infertility rate exceeding 15% as a public health problem [4]. In Ghana, it has been reported that the infertility rate among women of childbearing age is 15% [5] or slightly higher at 15.8% [6]. Although these reported rates halve the average rate reported for the sub-Saharan African region, there is significant social stigma [7], physical trauma [8] and psychological distress [9] associated with infertility which negate the gains. Infertility and adverse consequences associated with it have been neglected in Ghana due to the overarching menace of overpopulation and unmet need for contraception [8].

The scientific breakthrough and availability of in vitro fertilization (IVF) in low-income countries offers hope and relief to infertile couples. In Ghana, since the first IVF baby was born in 1995, a growing number of IVF clinics, mostly private, have emerged offering IVF and other forms of assisted reproduction [10]. In a typical IVF procedure, an infertile female undergoes ovarian hyperstimulation to produce oocytes. These oocytes are fertilized in a laboratory ("in vitro") and develop into one or more embryo(s), which are transferred to the uterus. However, in some situations the use of donor oocytes may be the only potential option for a couple to have a baby through IVF. The most obvious indication for accessing this service is poor ovarian reserve due to ageing. Sub-fertility increases as the woman ages and becomes significant after the age of 35 years, as ovulatory cycles and quality of oocytes decreases leading to diminished ovarian reserve [11]. The growing desire by women to achieve higher career goals and the global trend towards modernization often results in the choice of a single woman or a couple to delay pregnancy until they are in their late 30s or early 40s, often unaware of a risk of decreasing fertility [10].

Paramount among potential reasons for limited access to donor oocytes include lack of awareness, negative religious and cultural perspectives [12]. Other reasons may include ethical, medical and other complications associated with the process [13]. A few studies have explored the effect of knowledge and attitudes towards oocyte donation among the donors [14-16], but there is a dearth of local studies. Although the number of potential recipients is continuously increasing at fertility clinics, there is a shortage of donors available to ensure the establishment of successful oocyte donor programs in Ghana.

As young women, and female university undergraduates in particular, are increasingly being recruited to become oocyte donors, the present study seeks to identify gaps in knowledge and attitudes towards oocyte donation that can be addressed through appropriate education and referral [17].

Methods

Study design

An analytic cross-sectional study employing a quantitative method was used for the study. A questionnaire-based survey was conducted from 29th April, 2019 to 10th June, 2019. The survey was carried out on a university campus which was chosen on the basis that university students are a major donor pool for fertility centers and oocyte donor recruitment agencies. Additionally, the university offers the advantage of accessibility to the study population as it had large numbers of undergraduate female students.

Study setting and population

The university campus which is situated in Legon, Accra, has four colleges, nineteen schools, five institutes and eleven centers of learning. It is the largest of the university's three campuses. Currently, the student population exceeds 40,000; of which 85.4% are undergraduates. The main campus consists of 14 halls of residence and 2 hostels. All the halls of residence house both sexes, excluding two halls that each accommodate only males and only females.

The target population for the study consists of female undergraduate students between the ages of 18-30 years. This group was selected on the basis that most fertility centers prefer this age group for oocyte donation as they are in their peak fertility years [18] and able to provide informed consent. Additionally, high IVF success rates have been associated with the use of oocytes from younger patients. Further, it is believed that the limited financial resources coupled with a greater financial burden associated with university education makes the financial compensation offered to oocyte donors a valuable source of income for the students [19].

Sample size estimation and sampling

The sample size was determined using the formula for estimating a single population proportion. The proportion for substitution in the formula (23%) was based on a previous study on the willingness of female college students to donate an oocyte when given the opportunity [17]. A precision of 0.05, a confidence level of 95% and a non-response rate of 10% were assumed and a final sample size of 300 was computed.

A multi-stage sampling was employed. The first stage involved selection of the residential halls. A list of all halls of residence with female undergraduates was obtained from the university's computing system. This yielded 14 halls of residence from which 12 were selected to participate in the study. Of the two halls

that were excluded, one hall each provided accommodation to only male students and only foreign students respectively. Each hall formed a stratum from which the survey respondents were selected.

The second stage involved the selection of survey respondents. The total population of female undergraduate students in each of the selected halls was obtained with the aim of selecting equal numbers of female students (25) to obtain a total of 300 respondents. In each hall of residence, a list of all the room numbers with female occupants was obtained. The numbers were coded and a computer-generated random sampling of 10 rooms was obtained. Students from the rooms selected were approached with the questionnaires and those who consented to participate were given questionnaires. The selected rooms were visited one after the other until the total number of 25 students were obtained. The process was repeated in all halls to attain the required samples size.

Data Collection

Structured questionnaires were administered to eligible students who consented to participate in the study. The questionnaires consisted of closed ended, open-ended questions and Likert type questions. The questions were divided into four main sections namely: socio-demographic characteristics (7 items), knowledge about egg donation (11 items), attitude towards egg donation (18 items), and personal choices (11 items). Questions in the sections on knowledge about oocyte donation were adapted from [17] and Bernsen [20], whereas items in the sections on attitude towards oocyte donation and personal choices were adapted from [21] and [17].

Twelve research assistants, each representing a hall of residence, were trained in data collection procedures and good ethical conduct. A pretest was conducted in a different tertiary institution to ascertain clarity of the questions and anticipate any practical difficulties. Data collection took place in the halls of residence, mostly in the late afternoon, evenings and weekends as most students were available at these times. Returned questionnaires were scrutinized to eliminate errors and ensure completeness prior to data entry and analysis. Questionnaires with several missing entries were eliminated.

Study variables and data processing

The responses to the question “Will you be willing to donate oocytes (eggs) for in-vitro fertilization (IVF) if you were approached?” were ‘Yes/No’ indicating willingness and unwillingness to be an oocyte donor respectively. This was the outcome variable and it was dichotomous. Demographic characteristics of respondents were age, sex, college of study as a proxy of the program of study, marital status, monthly expenditure in Ghana cedis as a proxy of income levels, occupation and place of residence when outside the campus. Other variables included knowledge of oocyte donation within the context of assisted reproductive technology (ART) and the attitude towards oocyte donation.

Knowledge was assessed as a composite variable made up of seven items. Each question was scored ‘0’ for an incorrect answer and ‘1’ for a correct answer, resulting in a minimum score of zero and a maximum

score of seven. To assess the overall knowledge score, a score above three was interpreted as a high level of knowledge and a score of three or less, denoted a low level of knowledge.

Respondents' attitude, ethical stance and concerns regarding oocyte donation were assessed using 18 questions measured on a 5-point Likert scale, divided into three subscales namely: (i) General attitude towards egg donation (9 items), (ii) Ethical aspects of egg donation such as cash rewards for donors (2 items) and (iii) Issues of anonymity (7 items). A Cronbach's alpha reliability co-efficient was used to assess the level of internal consistency between the questions within each subscale. Satisfactory values of 0.67, 0.80 and 0.78 were obtained respectively. Among the subscales, 'General attitude' was used as an indication of overall attitude towards oocyte donation, with scores ranging from 9 to 45. A respondent's attitude was categorized as positive if the sum of scores was greater than 24 and deemed negative if a score of less than or equal to 24 was obtained.

Statistical Analysis

Descriptive statistics generated for socio-demographic characteristics of respondents included frequencies, percentages, mean and standard deviation. The Pearson's chi-square test, Fischer's exact test and logistic regression analysis were used to determine association between willingness to donate an oocyte or not (outcome variable), and socio-demographic characteristics, level of knowledge about oocyte donation and the attitude towards oocyte donation (explanatory variables). Crude and adjusted odds ratios were presented with the 95% confidence limits constructed around the estimates.

Results

In all, 300 students were surveyed out of which 295 correctly responded to the questionnaires resulting in a non-response rate of 1.7%. The mean age of the respondents was 20.20(±1.63) years. Most of the respondents, 155 (52.5%) were aged between 20 years and 22 years, single 288 (97.6%), Christians 278 (94.2%) and had monthly expenditure below GhC500, 186 (63.1%). The background characteristics of the respondents are summarized in Table 1.

Table 1: Background characteristics of the respondents

Mean age (SD) (Years)	20.20(±1.63)	(n = 295)
Variable	Frequency	Percentage
Age (years)		
<20	111	37.6
20-22	155	52.5
≥23	29	9.8
Marital status		
Never married	288	97.6
Married	7	3.4
Average expenditure (GhC)		
<500	186	63.1
500-1000	101	34.2
>1000	8	2.7
Religious status		
Christian	278	94.2
Muslim	17	5.8
Religion Denomination		
Protestant	100	35.8
Charismatic	153	54.8
Catholic	24	8.6
Jehovah's Witness	2	0.7
Islam	16	5.42

Table 2 summarizes the knowledge of respondents regarding oocyte donation. Only 153 (51.9%) of the students have heard of in-vitro fertilization (IVF). Less than half of the respondents, 120 (41%) had heard of oocyte donation and 68 (23.1%) respondents were aware of assisted reproduction and oocyte donation being practiced in Ghana. Approximately, 4.8% of respondents reported they knew a friend or relation who had been an oocyte donor before.

Table 2: Knowledge indices on oocyte donation among female students

Knowledge about oocyte donation	Yes	No
Heard about in vitro fertilization (IVF)?	153 (51.9)	142 (48.1)
Heard of oocyte (human eggs)?	120 (41.0)	173 (59.0)
Aware of assisted reproduction and oocyte (egg) donation being practiced in Ghana?	68 (23.1)	226 (76.9)
Know of a friend or relation who has donated oocyte (human eggs) before?	14 (4.8)	281 (95.3)

The main sources of information on oocyte donation were the internet (41.1%), television advertisements (24.8%) and friends (21.7%). Other sources were relatives, newspapers and the radio (Figure 1).

<INSERT FIG. 1 HERE>

Figure 1: Source of information about oocyte donation

Figure 2 illustrates self-rated knowledge of respondents regarding oocyte donation. Only 7.8% of respondents rated themselves as having a lot of knowledge about oocyte donation. Nearly half of the respondents (50.5%) rated themselves as having little knowledge. Others either reported they knew nothing (36.3%) or were not sure what oocyte donation was (5.4%). When overall knowledge about oocyte donation was assessed using specific questions, 39% of respondents demonstrated a high level of knowledge about oocyte donation.

<INSERT FIG. 2 HERE>

Figure 2: Knowledge of respondents about oocyte donation

Table 3 lists items used to assess respondents' attitude towards oocyte donation. Only 24 (8.1%) respondents indicated they will strongly support a friend to donate oocytes (referred to in the instrument as 'human eggs') and 29 (9.8%) stated they would support a friend to receive donated oocytes. Approximately 10.2% of respondents strongly agreed that oocyte donation is a good way of helping childless couples. One hundred and seven respondents (36.3%) agreed that advertising via media is good method to recruit women for oocyte donation. Although 10.2% of respondents strongly supported oocyte donors having some relationship with the receiving couples, majority of respondents valued anonymity. This was evident as 25.1% and 20% of respondents strongly agreed and agreed respectively to the statement that "Women who donate oocytes and the couple receiving should be anonymous to each other". Overall, 51.5% of respondents had a positive attitude towards oocyte donation based on the scoring system.

Table 3: Attitude of female students about oocyte donation as a form of assisted reproductive technology

	Variables	Agree	Strongly Agree	Strongly disagree	Disagree	Neutral
K1	I will support a friend to donate her oocytes (human eggs)	64 (21.7)	24 (8.1)	27 (9.2)	46 (15.6)	134 (45.4)
K2	I will support a friend to receive donated oocytes (eggs)	76 (25.8)	29 (9.8)	21 (7.1)	40 (13.6)	129 (43.7)
K3	If you are infertile, adoption should be your first choice	102 (34.6)	63 (21.4)	17 (5.8)	42 (14.24)	71 (24.07)
K4	If you cannot have children of your own, you should not have any	15 (6.1)	6 (2.0)	125 (42.4)	102 (34.6)	47 (15.9)
K5	Oocyte (human egg) Donation is a good way of helping childless couple	108 (36.6)	30 (10.2)	10 (3.4)	30 (10.2)	139 (53.2)
K6	Women who undergo IVF should be asked to donate the remaining oocytes (human eggs)	40 (13.6)	12 (4.1)	38 (12.9)	62 (21.0)	143 (48.5)
K7	Women who want to be sterilized should be asked if they want to donate oocytes (human eggs)	126 (42.7)	62 (21.0)	10 (3.4)	17 (5.8)	80 (27.1)
K8	Advertising via media such as newspapers is a good method to recruit women for oocyte (human egg) donation	107 (36.3)	36 (12.2)	12 (4.1)	45 (15.3)	95 (32.2)
K9	The women who donate oocytes (human eggs) and the couple receiving oocytes should be anonymous to each other	74 (25.1)	59 (20.0)	21 (7.1)	44 (14.9)	97 (32.9)
K10	The oocyte donor should have some relationship (family/friend) with the receiving couple	59 (20.0)	30 (10.2)	43 (14.6)	58 (19.7)	105 (35.6)
K11	Only women aged <43 years should be able to receive donated oocytes (human eggs)	31 (10.5)	13 (4.4)	56 (19.0)	71 (24.1)	124 (42.0)
K12	Women who donate their oocytes (human eggs) should be paid a large sum of money	94 (31.7)	75 (25.4)	13 (4.4)	18 (6.1)	95 (32.2)
K13	Children conceived through oocyte (human egg) donation have the right to know about their genetic origin	75 (25.4)	36 (12.2)	34 (11.5)	48 (16.3)	102 (34.6)
K14	The parents should decide whether or not they want to tell their child of his or her origin	114 (38.6)	38 (12.9)	18 (6.1)	41 (13.9)	84 (28.5)
K15	It is in the best interest of the child that he or she should never be informed of his or her genetic origin	62 (21.0)	34 (11.5)	30 (10.2)	71 (24.1)	98 (33.2)

K16	As an adult, the child should be able to find out the identity of the oocyte donor	66 (22.4)	16 (5.4)	37 (12.5)	51 (17.3)	125 (42.4)
K17	The child's relationship with his or her parents could be damaged if he or she learns of his or her genetic origin	90 (30.5)	47 (15.9)	20 (6.8)	39 (13.2)	99 (33.6)
K18	Parents should be honest with their children with regard to their genetic origin	96 (32.5)	45 (15.3)	27 (9.2)	29 9.8)	98 (33.2)

Forty-four point four percent of the respondents were willing to donate oocytes. Among respondents who expressed willingness to donate oocytes, 29.8% would do so for financial reasons, while 70.2% would do so for the purpose of helping women (altruism). Others who were unwilling to donate gave the following reasons: unacceptability by society and ethical issues (31%), fear of the side effects (20.4%) and poor knowledge about the procedure (12.4%) (Figure 3). Approximately 14.8% of unwilling respondents did not have any reasons and 10.5% of them were not comfortable with oocyte donation. About 3.7% were not interested and 3% were concerned about safety of the procedure (Figure 3).

<INSERT FIG. 3 HERE>

Figure 3: Reasons for unwillingness to donate an oocyte

Pearson's chi square test demonstrated that willingness to donate oocytes was significantly related to average monthly expenditure ($p=0.002$), attitude ($p=0.002$) and religion ($p=0.004$). Respondents with an average monthly expenditure of GhC 500-1000 were significantly more likely to donate oocytes compared to their peers who spent less than GhC 500 [AOR = 2.47, 95% CI:1.48-4.11] (Table 4). Similarly, respondents who had a positive attitude towards oocyte donation were significantly more likely to donate oocytes compared to those who had a negative attitude [AOR = 2.12, 95% CI: 1.30-3.34]. Female Muslim students were 76% less likely to donate oocytes to a couple compared to female Christian students [AOR = 0.24, 95% CI: 0.07-0.92] (Table 4).

Table 4: Factors associated with willingness to donate oocytes among respondents based on logistic regression analysis

Variables	Willingness			
	No	Yes	cOR (95% CI)	
	(n = 165)	(n = 130)		aOR (95% CI)
Age (years)				
<20	61 (37.0)	50 (38.5)	Ref	-
20-22	89 (53.9)	66 (50.8)	0.90 (0.55-1.47)	
≥23	15 (9.1)	14 (10.8)	1.13 (0.50-2.58)	
Marital Status				
Never married	159 (96.4)	129 (99.2)	Ref	-
Married	6 (3.6)	1 (0.8)	0.20 (0.02-1.78)	
Average expenditure (GhC)				
<500	116 (70.3)	70 (53.8)	Ref	Ref
500-1000	42 (25.5)	59 (45.4)	2.23 (1.42-3.81)	4.11) 2.47 (1.48-
>1000	7 (3.6)	1 (0.8)	0.27 (0.03-2.34)	-
College of Study				
Health Sciences	7 (4.2)	6 (4.6)	Ref	
Applied sciences	46 (27.9)	31 (23.9)	0.78 (0.24-2.56)	
Humanities	97 (58.8)	76 (58.5)	0.91 (0.29-2.81)	
Education	15 (9.1)	17 (13.1)	1.32 (0.36-4.81)	
Attitude				
Negative attitude	93 (56.4)	50 (38.5)	Ref	Ref
Positive attitude	72 (43.6)	80 (61.5)	2.07 (1.29-	2.12 (1.30-3.34)

3.30)				
Knowledge				
Low	102(61.8)	78 (60.0)	Ref	
High	63(38.2)	52 (40.0)	1.07 (0.63-1.72)	
Religious status				
Christian	151 (91.5)	127 (97.7)	Ref	Ref
Muslim	14(8.5)	3 (2.3)	0.25 (0.07-0.91)	0.24(0.07-0.92)
Denomination				
Protestant	49(29.70)	49(37.70)	Ref	-
Charismatic	84(50.90)	69(53.08)	0.82(0.49-1.37)	
Catholic	17(10.30)	9(6.92)	0.53(0.22-1.30)	
Jehovah's Witness	2(1.21)	0(0.00)	N/A	
Islam	13(7.88)	3(2.31)	0.23(0.06-0.86)	

Discussion

The present study investigated the knowledge and attitude of female undergraduate students regarding oocyte donation and factors associated with willingness to become an oocyte donor. Majority of the students (61%) surveyed demonstrated a low level of knowledge regarding oocyte donation. This observation is consistent with similar studies involving the general public and infertile clients [22, 23]. A study conducted among 330 college students in New York reported that only 3% of students claimed to be knowledgeable about oocyte donation and 38% reported having very little knowledge [17]. This is comparable to the findings in this study where 7.8% respondents reported they had a lot of knowledge about oocyte donation and 50% reported having very little knowledge about the subject. This dearth of knowledge may be explained in part by the lack of legislation and less favourable societal norms which shroud oocyte donation in secrecy. Nonetheless, a higher percentage of respondents were knowledgeable about oocyte donation compared to peers in the US study. It is important to recognize that although these studies are nearly a decade apart, the levels of knowledge were still low. Media advertisements have been used for donor recruitment in the United States, therefore it would have been expected that college students would have relatively more knowledge about oocyte donation. The actual practice of oocyte donation appeared to be low as only 5% of respondents in the present study knew a friend or relation who

had been an oocyte donor. On the other hand, none of the respondents in another study donated oocytes despite the widespread practice of donor recruitment among college students in the USA [20].

The primary source of information on oocyte donation was the internet, which differed from a previous study in Ohio where the television was mentioned as the major source of information [20]. In the United States, egg donation has been practiced for many years with clear guidelines and regulations. However, information on oocyte donation is not widely discussed on radio and television in Ghana, therefore most students rely on the internet for information about the procedure. Nonetheless, the present study found no association between level of knowledge and willingness to donate an oocyte. This finding supports other studies that demonstrate that the level of knowledge about oocyte donation does not appear to limit an individual's intent to donate oocytes [24-27].

According to Ajzen's Theory of Planned Behaviour, an individual's intention to perform a certain behaviour is largely influenced by his/her beliefs about the expected outcome of the behaviour as well as the worthiness of the expected outcome [28]. It further posits that the attitude of a person is often shaped by cultural normative beliefs and reinforced by religion [28]. Thus, the importance placed on oocyte donation by an individual will be largely influenced by the societal constructs of third-party involvement in reproduction and religious views about the concept. The present study revealed that 52% of female students studied showed a positive attitude towards oocyte donation. This affirms earlier studies which showed that about 50-90% of non-patient respondents exhibit a positive attitude towards oocyte donation [20-22,29-31]. In contrast, a few studies in Africa have reported poor attitude towards egg donation [12,32]. A potential explanation for the positive attitude reported in the present study could be a higher level of education which might have influenced them to take a less conservative stance oocyte donation than might be expected from the general population. It is not certain whether women with relatively less exposure to western education might have a similar attitude. A comparative study could elucidate with a larger sample size. Another probable explanation for the positive attitude, in spite of the low level of knowledge about oocyte donation, could be the worthiness of the expected outcome as posited in Ajzen's theory.

Anonymity in oocyte donation is the phenomenon where the identity of the oocyte donor is not revealed to the recipient and the offspring. In the UK for instance, the Human Fertility and Embryology Authority (HFEA), the body that regulates the practice of assisted reproduction in the United Kingdom, passed a law in 2005 that makes it mandatory for donors to disclose their identity. Following the passage of this law, 17% of non-patient women surveyed considered donating an oocyte as opposed to nearly 34% who demonstrated a positive attitude prior to the removal of anonymity in the same group [16,33,34]. Counterintuitively, similar studies in Sweden revealed that a greater proportion of participants studied preferred a non-anonymous donation to an anonymous donation [21,35]. In the present study, majority of respondents supported an anonymous oocyte donation (strongly agreed=25%; agreed=20%). Further exploration of the wider public's stance on anonymity is necessary to inform practice. Finally, this study demonstrated that students who showed a positive attitude towards oocyte donation were more willing to donate oocytes compared to their counterparts with a negative attitude which is consistent with literature.

The high proportion of respondents who were willing to donate an oocyte obtained in this study could be due to a simplistic view of oocyte donation. This is based on Svanberg's assertion that college students tend to hold a more simplistic view on oocyte donation than older individuals [21].

Consistent with earlier studies, the main motivation to donate an oocyte in the present study was a desire to assist an infertile couple as well as financial reward [17,36,37]. Various studies have cited financial compensation and altruism as the two most common factors that motivate potential egg donors to donate [36]. Majority of potential donors in most studies cite altruism as their major motivation which is consistent with the present study where 70% of students would donate oocytes to help an infertile couple [17,37]. This desire to assist an infertile couple by oocyte donation is probably linked to traditional values that African place on fertility. This has been demonstrated by certain sociocultural practices aimed at helping an infertile relative. Some of these practices include child gift, adoption, and heterosexual woman to woman marriages [12]. Although the role of traditional values was not explored in the present study, it can be considered in future studies on this subject.

Among the socio-demographic factors under investigation, religion and monthly expenditure of GhC500-1000 per month had a significant effect. Religion has been associated with willingness to donate oocytes in previous studies, with Christians generally more likely to demonstrate an intention to donate oocytes compared to Muslims [24,31]. The present study found that Muslim students were less willing to donate an egg to a couple which is consistent with literature. It is believed that Islamic laws forbid third party assisted conception and it is less well accepted [22,38]. Apart from the desire to help an infertile couple, financial motivation influenced willingness to be an oocyte donor. Tertiary level education imposes financial demands on students, therefore it is expected that financial compensation would be an important consideration in the decision about oocyte donation. Other factors investigated such as age, programme of study and marital status did not have any association with willingness to donate oocytes. However, previous studies have reported that age and marital status were positively associated with willingness to donate oocytes [39,40]. It is possible that the smaller sample size studied could be the reason why similar findings were not observed in this study.

Based on the key findings in the study, recommendations were proposed to healthcare providers, academia and religious leaders. Healthcare providers involved in fertility treatment should extend and intensify education regarding oocyte donation to the general public, taking into cognizance major sources of information reported herein. Community engagement through focus group discussions can help to motivate people towards oocyte donation as well as highlight concerns that need to be addressed. Qualitative studies can be conducted in collaboration with academia to explore in more depth potential barriers and facilitators of oocyte donation. Oocyte donation may require a broad discussion among religious bodies in collaboration with health care institutions. This will provide holistic information to guide intent and choices about oocyte donation to relieve the plight of and provide support to infertile couples.

This study had some limitations. No standardized tool was available to the authors for assessing the level of knowledge of the respondents about oocyte donation. Though the method used to assess knowledge was adapted from other studies, the lack of uniformity and standardization makes it difficult to compare effectively across studies. Future efforts may need to be directed at designing and testing to generate a standardized tool. The results herein may not reflect attributes in the general population, rather those of a specific group of donors, therefore local studies targeting various donor groups in assisted reproduction are urgently required.

Conclusion

The present study demonstrated that knowledge about egg donation as a form of ART among female undergraduate students was low. The proportion of students willing to donate oocytes was higher than reported elsewhere. A good attitude and financial motivation were associated with willingness to donate oocytes. Religion also had a significant effect which was consistent with earlier studies. Recommendations include targeted and public education to address identified gaps in knowledge and involvement of religious bodies, healthcare providers and academia in efforts to improve the plight of infertile couples.

Abbreviations

ART Assisted Reproductive Technology

GHS-ERC Ghana Health Service Ethical Review Committee

HFEA Human Fertilization and Embryology Authority

IVF In-vitro fertilization

Declarations

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Authors' contributions

PAM conceptualized the study, collected data and drafted the first manuscript. MA and RAN analyzed the data and contributed to manuscript writing. RAK contributed to drafting and review of the manuscript. EAU participated in the proposal development, contributed to manuscript writing and reviewed the manuscript. All authors read and approved the final manuscript.

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Availability of data and materials

The dataset used and analyzed in the present study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that they have no conflict of interest.

Ethics Approval and Consent to Participate

Ethical approval for this study was sought from the Ghana Health Service Ethical Review Committee (GHS-ERC034/03/18). Approval was also obtained from the Dean of Students and the Hall Administrators of the halls selected for the study.

Consent for publication

Consent was obtained from the participants who responded to the questionnaire to report data in aggregate form in any publication originating from this research.

References

1. Lemoine ME, Ravitsky V. Toward a public health approach to infertility: The ethical dimensions of infertility prevention. *Public Health Ethics*. 2013 Nov 1;6(3):287-301.
2. Vander Borgh M, Wyns C. Fertility and infertility: Definition and epidemiology. *Clinical biochemistry*. 2018 Dec 1; 62:2-10.
3. Ombelet W. Reproductive healthcare systems should include accessible infertility diagnosis and treatment: An important challenge for resource-poor countries. *International Journal of Gynecology & Obstetrics*. 2009 Aug;106(2):168-71.
4. Boivin J, Bunting L, Collins JA, Nygren KG. International estimates of infertility prevalence and treatment-seeking: potential need and demand for infertility medical care. *Human reproduction*. 2007 Jun 1;22(6):1506-12.
5. Donkor ES, Sandall J. The impact of perceived stigma and mediating social factors on infertility-related stress among women seeking infertility treatment in Southern Ghana. *Social science & medicine*. 2007 Oct 1;65(8):1683-94.
6. Geelhoed DW, Nayembil D, Asare K, Schagen van Leeuwen JH, Van Roosmalen J. Infertility in rural Ghana. *International Journal of Gynecology & Obstetrics*. 2002 Nov;79(2):137-42.

7. Naab F, Brown R, Heidrich S. Psychosocial health of infertile Ghanaian women and their infertility beliefs. *Journal of Nursing Scholarship*. 2013 Jun;45(2):132-40.
8. Oti-Boadi M, Oppong Asante K. Psychological health and religious coping of Ghanaian women with infertility. *Biopsychosoc Med* 2017; 11:20.
9. Fledderjohann JJ. 'Zero is not good for me': implications of infertility in Ghana. *Human Reproduction*. 2012 May 1;27(5):1383-90.
10. Gerrits T. Assisted reproductive technologies in Ghana: transnational undertakings, local practices and 'more affordable'IVF. *Reproductive biomedicine & society online*. 2016 Jun 1;2:32-8.
11. Klein J, Sauer MV. Assessing fertility in women of advanced reproductive age. *American journal of obstetrics and gynecology*. 2001 Sep 1;185(3):758-70.
12. Tangwa GB. Third party assisted conception: an African perspective. *Theoretical medicine and bioethics*. 2008 Sep 1;29(5):297-306.
13. Vayena E, Rowe PJ, Griffin PD. Current practices and controversies in assisted reproduction: report of a meeting on medical, ethical and social aspects of assisted reproduction, held at WHO Headquarters in Geneva, Switzerland. World Health Organization; 2002.
14. Ahuja KK, Simons EG, Mostyn BJ, Bowen-Simpkins P. An assessment of the motives and morals of egg share donors: policy of 'payments' to egg donors requires a fair review. *Human reproduction* (Oxford, England). 1998 Oct 1;13(10):2671-8.
15. Kalfoglou AL, Gittelsohn J. A qualitative follow-up study of women's experiences with oocyte donation. *Human Reproduction*. 2000 Apr 1;15(4):798-805.
16. Purewal S, van den Akker OB. Attitudes and intentions towards volunteer oocyte donation. *Reproductive biomedicine online*. 2009 Jan 1;19: 19-26.
17. Stevens JB, Hayes C. Perceptions regarding oocyte donation in a group of female college students. *MCN: The American Journal of Maternal/Child Nursing*. 2010 Jan 1;35(1):40-6.
18. Jones RE, Lopez KH. *Reproductive Aging. Human Reproductive Biology*. 4th London: Academic Press; 2014.
19. Heng BC. The advent of international 'mail-order'egg donation. *BJOG: An International Journal of Obstetrics & Gynaecology*. 2006 Nov;113(11):1225-7.
20. Bernsen S. Exploring Attitudes and Awareness of College Women toward Egg Donation (Doctoral dissertation, The Ohio State University).

21. Svanberg AS, Lampic C, Bergh T, Lundkvist Ö. Public opinion regarding oocyte donation in Sweden. *Human Reproduction*. 2003 May 1;18(5):1107-14.
22. Isikoglu M, Senol Y, Berkkanoglu M, Ozgur K, Donmez L, Stones-Abbasi A. Public opinion regarding oocyte donation in Turkey: first data from a secular population among the Islamic world. *Human Reproduction*. 2006 Jan 1;21(1):318-23.
23. Hudson N, Culley L, Rapport F, Johnson M, Bharadwaj A. "Public" perceptions of gamete donation: a research review. *Public Understanding of Science*. 2009 Jan;18(1):61-77.
24. Chliaoutakis JE. A relationship between traditionally motivated patterns and gamete donation and surrogacy in urban areas of Greece. *Human Reproduction*. 2002 Aug 1;17(8):2187-91.
26. Culley L, Hudson N, Johnson MR, Rapport F, Katbamna S. 'I know about one treatment where they keep the egg somewhere': British South Asian community understandings of infertility and its treatment. *Diversity in Health & Social Care*. 2007 Jun 1;4(2).
27. Edwards J. Incorporating incest: gamete, body and relation in assisted conception. *Journal of the Royal Anthropological Institute*. 2004 Dec;10(4):755-74.
28. Ajzen I. The theory of planned behavior. *Organizational behavior and human decision processes*. 1991 Dec 1;50(2):179-211.
29. Lessor R, Reitz K, Balmaceda J, Asch R. A survey of public attitudes toward oocyte donation between sisters. *Human Reproduction*. 1990 Oct 1;5(7):889-92.
30. Murray C, Golombok S. Oocyte and semen donation: a survey of UK licensed centres. *Human Reproduction*. 2000 Oct 1;15(10):2133-9.
31. Khalili M, Isikoglu M, & Ghasemi M. No Title. *Eubios Journal of Asian and International Bioethics*. 2006;16(3);66–70.
32. Gwandure C. Discordant perspectives on girl fertility and egg donation in an African context. *Journal of Human Ecology*. 2013 Jun 1;42(3):211-21.
33. Brett S, Sacranie RR, Thomas GE, Rajkhowa R. Can we improve recruitment of oocyte donors with loss of donor anonymity? A hospital-based survey. *Human Fertility*. 2008 Jan 1;11(2):101-7.
34. Purewal S, van den Akker OB. Systematic review of oocyte donation: investigating attitudes, motivations and experiences. *Human Reproduction Update*. 2009 Sep 1;15(5):499-515
35. Westlander G, Janson P, Tangfors U, & Bergh H. O-239. Attitudes of different women's groups in Sweden to oocyte donation and fetus/cadaver research. *Human Reproduction*. 1997; 12(Suppl_2);118–118. https://doi.org/10.1093/humrep/12.Suppl_2.118.

36. Gezinski LB, Karandikar S, Carter J, White M. Exploring motivations, awareness of side effects, and attitudes among potential egg donors. *Health & social work*. 2016 May 1;41(2):75-83.

37. Ahmadi A, Bamdad S. Assisted reproductive technologies and the Iranian community attitude towards infertility. *Human Fertility*. 2017 Jul 3;20(3):204-11.

38. Baykal B, Korkmaz C, Ceyhan ST, Goktolga U, & Baser I. Opinions of infertile Turkish women on gamete donation and gestational surrogacy. *Fertility and Sterility*. 2008; 89(4):817–822.
<https://doi.org/10.1016/j.fertnstert.2007.04.022>.

39. Pennings G, De Mouzon J, Shenfield F, Ferraretti AP, Mardesic T, Ruiz A, Goossens V. Socio-demographic and fertility-related characteristics and motivations of oocyte donors in eleven European countries. *Human Reproduction*. 2014 May 1;29(5):1076-89.

40. Purewal S, Van Den Akker OB. British women's attitudes towards oocyte donation: ethnic differences and altruism. *Journal of Reproductive and Infant Psychology* 2005 Aug 1 (Vol. 23, No. 3, pp. 283-284). 4 Park Square, Milton Park, Abingdon OX14 4rn, Oxfordshire, England: Routledge Journals, Taylor & Francis Ltd.

Figures

Figure 1

Source of information about oocyte donation

Figure 2

Knowledge of respondents about oocyte donation

Figure 3

Reasons for unwillingness to donate an oocyte