

# Knowledge, Attitudes, and Practices Regarding Prenatal Screening and Diagnosis among Healthcare Professionals in Tanzania: An Online Cross-Sectional Study

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### ABSTRACT

**Background:** Prenatal screening and diagnosis are important aspects of obstetric practice that aims at identifying fetal abnormalities and thus help to improve the health of mothers and their newborns. In Tanzania, factors that include low levels of awareness, inadequate infrastructure, and non-adherence to guidelines are some of the barriers that pose a challenge to the ideal implementation of these practices. The study below aims to assess healthcare professionals' knowledge, attitudes and practice (KAP) on prenatal screening and diagnosis in Tanzania to determine the gaps and possibilities for policy recommendations.

**Methods:** A cross-sectional study was conducted to gather data from healthcare professionals involved in antenatal care, including obstetricians, gynecologists and general practitioners. Participants were selected from both the urban and rural health facilities and stratified sampling was used. A self-administered questionnaire was used to measure knowledge of screening techniques, perception towards prenatal screening and the extent of its application. Descriptive statistics were used to analyze the data collected and SPSS version 27 was used for data analysis.

**Results:** Of the 470 participants, 95.7% agreed with the necessity of prenatal screening and 86.2% of them agreed with the integration of screening in prenatal care. However, there were poor results in terms of knowledge especially with regard to the advanced screening methods, and only 11.7% of the respondents knew the genetic limitations of prenatal screening. Despite the correct attitudes towards screening, the practice was not consistent and only 13.8% of the participants followed the set guidelines. Another problem was failure to refer for genetic counselling after a positive screening test result.

**Conclusion:** This paper reveals major gaps in knowledge and practice of prenatal screening among health care givers in Tanzania. Lack of training, ethical dilemmas and scarcity of resources were determined as the main barriers. Based on the findings of this study, it is recommended that educational campaigns be designed to increase the awareness of healthcare professionals, guidelines for management of screening results should be developed and established, and cultural sensitivity should be incorporated into training programs for healthcare workers.

### List of Abbreviations

KAP : Knowledge, Attitudes, and Practices  
OB-GYN : Obstetrics and Gynecology  
AGOTA : Association of Gynaecologists and  
Obstetricians of Tanzania  
CVS : Chorionic Villus Sampling

NIPT : Non-invasive Prenatal Testing  
MMed : Master of Medicine  
MD : Doctor of Medicine  
PhD : Doctor of Philosophy  
CME : Continuing Medical Education

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SPSS : Statistical Package for the Social Sciences

**Keywords:** Prenatal Screening, Healthcare Professionals, Knowledge, Attitudes, Practices (KAP), Prenatal Diagnosis

### Introduction

Prenatal screening and diagnosis are essential parts of obstetric practice and aim to identify fetal abnormalities and inform clinical management to improve maternal and neonatal results. Prenatal screening entails noninvasive tests such as maternal serum screening and ultrasonography, which evaluate the risk of chromosomal or structural abnormalities. In contrast, prenatal diagnosis uses invasive methods, such as CVS and amniocentesis, to determine fetal abnormalities in high-risk patients. These procedures help in informing expectant parents and health care givers.

Importantly, prenatal screening and diagnosis are now used globally in the detection and management of congenital anomalies. However, in Tanzania, factors such as a low level of awareness, insufficient health facilities, and noncompliance with the set guidelines are some of the factors that pose a challenge in the optimal implementation of these practices [1]. The World Health Organization (WHO) estimated that congenital anomalies were the cause of approximately 3.32% of total deaths in Tanzania in the year 2020 [2]. Previous studies have indicated that a lack of knowledge and proper implementation of prenatal screening and diagnosis may lead to delayed diagnosis of fetal abnormalities with adverse neonatal outcomes and high maternal morbidity and mortality [3,4].

This study aims to explore the knowledge, attitudes and practices of health care givers on the topic of prenatal screening and diagnosis with the aim of enhancing maternal and neonatal health. Healthcare providers are at the forefront of providing prenatal care services, providing information to parents, and encouraging them to adhere to the established guidelines. However, gaps in knowledge and practice may lead to poor prenatal care services [5,6].

Several factors can be mentioned regarding the KAP of healthcare providers in relation to prenatal screening and diagnosis. These include religious beliefs, cultural beliefs, ethical issues, the availability of resources, and organizational policies. Previous studies have also established that continuing professional development is necessary to fill the knowledge gap and establish standards of prenatal care [5]. However, it is also important to understand the attitudes of healthcare professionals toward prenatal screening to identify their possible prejudices and prepossessions, which may affect patient education and decision making. Thus, through identifying these gaps, healthcare institutions can enhance adherence to best practices and patient-provider communication and therefore positively affect maternal and neonatal health outcomes.

Existing studies show that the knowledge of healthcare professionals on the issue of prenatal screening and diagnosis is different in various settings. A previous study established that many obstetricians had inadequate information on screening procedures for Down's syndrome and, therefore, provided

ineffectual practices [7]. For example, one study reported that even though health care providers had a correct impression of preconception care, the awareness and application of prenatal screening was still mediocre [8].

In Tanzania, for example, owing to limited access to training programs and continuing medical education, obstetricians and midwives lack knowledge. On the basis of the literature, many healthcare workers are aware of standard screening methods such as ultrasound and serum markers however, they lack knowledge of advanced diagnostic methods such as genetic testing [9]. This knowledge gap suggests the need for specific educational efforts to increase the capacity of healthcare workers in prenatal screening and diagnosis.

Healthcare professionals' attitudes are affected by ethical, religious and personal factors. Research by Yeniçeri et al. revealed that healthcare professionals who have been trained in a structured way for prenatal screening are more favorable for the use of prenatal screening [10]. On the other hand, those who have not been exposed to such training may lack confidence in recommending screening tests to patients.

Another study conducted in Pakistan explained the cultural and religious attitudes of healthcare professionals toward prenatal diagnosis [11]. Some providers have raised concerns about the ethical issues of screening for conditions that may lead to pregnancy termination. Similarly, two other studies discussed ethical concerns with respect to noninvasive prenatal testing, including the potential for sex selection and the stress that such tests may pose to expectant parents [12,13].

In Tanzania, there is a large discrepancy in the perceptions of health care givers toward prenatal screening and diagnosis. While some professionals understand the importance of early identification and management, others have doubts due to patients' rejection of the intervention and scarce resources. These attitudinal barriers can be reduced through culturally appropriate training interventions that promote the adoption and uptake of prenatal screening practices.

Healthcare professionals' practices in relation to prenatal screening and diagnosis are still uneven. One study revealed that group education sessions increased healthcare professionals' capacity to educate clients on available prenatal screening options [14]. However, in another study, the researchers established that many of the providers were hesitant in explaining complex genetic screening outcomes to the expectant parents [15].

In Tanzania, compliance with screening guidelines is poor because of constraints such as a lack of equipment, a lack of personnel, and financial constraints. In their study, Munim et al. reported that many health care providers in low-resource settings rely on ultrasound to assess the fetus and do not employ other screening methods [16]. Furthermore, in another study, the researchers identified time constraints, the absence of guidelines, and inadequate patient education as the major challenges to prenatal screening [17].

The following recommendations are made with the aim of enhancing the practices of healthcare professionals: increased

training, easily accessible clinical guidelines, and integration of prenatal screening into antenatal care. Thus, healthcare systems can argue that by closing these gaps, expectant mothers will receive prenatal care that is comprehensive and evidence-based.

This study also revealed that the knowledge, attitudes and practices of health care givers are key determinants of the efficacy of prenatal screening and diagnosis in Tanzania. From the literature review, it is evident that there are deficiencies in the knowledge and application of screening techniques by health care givers as well as perceptions of these services. These challenges can be met through education, policy changes, and enhancing health care facilities to improve the quality of prenatal care and therefore the health of mothers and newborn babies. Importantly, further work should be done to determine the effectiveness of training programs and to identify ways to eliminate barriers to the use of prenatal screening and diagnosis in Tanzania.

## Study Design and Methodology

### Study Design and Study Population

This study employed a cross-sectional survey design to assess the knowledge, attitudes, and practices (KAP) of healthcare professionals regarding prenatal screening and diagnosis in Tanzania. The study targeted healthcare providers, including obstetricians, gynecologists, and general practitioners involved in antenatal care. The participants were drawn from both urban and rural healthcare facilities to ensure that a representative sample of professionals was engaged in prenatal screening and diagnosis.

### Sampling Methods

A combination of purposive and stratified sampling methods was used to select participants. The primary source of participants was the Association of Gynecologists and Obstetricians of Tanzania (AGOTA) database, which includes approximately 300 registered members actively practicing in the field. Additionally, online professional platforms and hospital-based contacts were used to recruit more respondents, ensuring diversity in practice settings. The inclusion criteria required participants to be actively involved in obstetric and gynecological care, while general medical officers not engaged in prenatal screening and diagnosis were excluded.

### Sample size Calculation

The size of the total sample of this study was calculated via Cochran's formula for the sample size calculation with a 95% confidence level and a 5% margin of error. With the population of 2,434 general doctors in Tanzania and 300 OBGYN doctors in the AGOTA database, finite population correction was used. The calculated sample sizes were 332 for general doctors and 169 for OBGYN doctors, which yielded a total sample size of 501 participants. (Attached in Appendix 2 of the supplementary materials)

### Validation of the Questionnaire

The questionnaire used in this study was developed on the basis of literature and previously validated KAP assessment tools. A panel of three senior obstetricians and gynecologists reviewed the questionnaire for content validity, ensuring that

the items effectively measured the intended constructs. The feedback from them informed minor modifications to improve comprehensibility and relevance.

### Data collection Instrument

A structured, self-administered questionnaire was used to collect data from the participants. The questionnaire consisted of four main sections:

- **Demographic Information:** This information included age, sex, years of experience, level of education, and type of healthcare facility.
- **Knowledge assessment:** This assessment focused on understanding prenatal screening methods, diagnostic techniques, and guidelines.
- **Attitude Assessment:** Explored perceptions, ethical considerations, and willingness to recommend screening services.
- **Practice Assessment:** Evaluated the implementation of prenatal screening procedures, adherence to protocols, and patient counseling practices.

### Procedure

Following approval by the Southern Medical University Ethics Committee, the Google form survey link was distributed electronically via email and professional WhatsApp groups together with a cover letter and informed consent. The return of the completed survey was deemed consent to participate. The reminder text messages and emails were sent to all the doctors 8 weeks after the survey was given.

### Outcome Measures

The study assessed three primary outcomes:

- **Knowledge about Prenatal Screening and Diagnosis:** Measured through multiple-choice and true/false questions regarding the indications, techniques, and interpretation of screening and diagnostic procedures.
- **Attitude Toward prenatal screening and diagnosis:** A Likert scale was used to assess healthcare professionals' support, ethical considerations, and perceived importance of prenatal screening.
- **Practice of Prenatal Screening and Diagnosis:** Assessed through self-reported adherence to guidelines, frequency of recommending screening tests, and utilization of available diagnostic services.

### Statistical Analysis

The collected data were analyzed via SPSS (Statistical Package for the Social Sciences) version 27. Descriptive statistics, including means, frequencies, and standard deviations, were used to summarize participant demographics and KAP scores.

By utilizing a structured methodology and robust analytical approach, this study aimed to provide valuable insights into the current state of prenatal screening and diagnosis among healthcare professionals in Tanzania, highlighting areas for improvement in training and policy implementation.

### Patient and Public Involvement

No patients or the public were involved in the design, conduct, reporting or dissemination plans of this research.

**Results**

**Descriptive Demographic Analysis.**

The total number of participants was 470, including OB-GYN specialists, residents, and consultants. From these, 280 participants were recruited from the AGOTA database, and the remaining 190 were general doctors and residents through online social media platforms. Table 1 below shows the distribution of the professional titles of the participants.

**Table 1: Distribution of Participants by Professional Title**

Professional Title	Number (n)	Percentage (%)
OB-GYN Specialist	155	33.0
OB-GYN Resident	142	30.2
OB-GYN Consultant	125	26.6
General Doctor	48	10.2
Total	470	100.0

**Table 2: Distribution of Participants by Level of Specialty**

	MBA	MD	MMed	Mph	PHD	Postgraduate Diploma/Certificate	Subspecialty (Fellowship)	TOTAL
Number (n)	5	150	255	5	20	10	25	470
Percentage (%)	1.1	31.9	54.3	1.1	4.3	2.1	5.3	100

In terms of geographical distribution, 88.3% (n=415) of the participants practiced in urban areas, and only 10.4% (n=49) were from rural areas. This concentration in urban areas may indicate inequalities in the availability of prenatal screening and diagnostic services. In terms of employment settings, 48.3% (n=227) of the participants were in private practice, 37.2% (n=175) were in public hospitals, and 6.4% (n=30) were in nonprofit organizations. The remaining 2.1% (n=10) were not currently practicing.

**Analysis of the Knowledge Scoring**

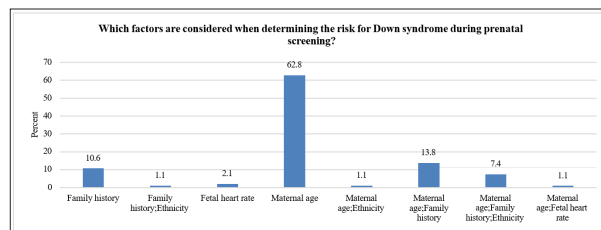
The knowledge scoring analysis revealed that healthcare professionals demonstrated a generally good understanding of prenatal screening practices, with the mean knowledge score averaging 16 out of a possible 23 points. The least difficult knowledge question was the type of standard imaging technique used in prenatal care, and all the participants were correct; however, only 11.7% of the participants were new in that prenatal screening was performed on the fetus for chromosomal abnormalities and not for other genetic diseases. This indicates a relatively positive grasp of essential aspects surrounding prenatal care, although significant gaps remain in certain areas, particularly concerning broader genetic conditions.

One critical area of inquiry involves professionals' responses to specific knowledge questions regarding prenatal screening. The participants correctly identified ultrasound as the imaging technique most commonly used during prenatal care, reflecting strong foundational knowledge. Additionally, a considerable percentage (89.4%) recognized the purpose of chorionic villus sampling (CVS) as a method to analyze fetal chromosomes, indicating an awareness of its role in detecting chromosomal abnormalities at early stages of pregnancy.

In terms of sex, 61.7% of the participants were male (n=290), and 38.3% were female (n=180). This difference is probably due to the general gender patterns in the medical profession, especially in the surgical and specialist disciplines. The most common age group was 30–34 years, followed by 17.0% (n=80) in the 35–39 years bracket and 14.9% (n=70) in the 40–44 years bracket. The lowest percentage of professionals were young professionals aged 25–29 years (9.6%, n=45), and the oldest professionals were 55 years and above (5.1%, n=24).

The participants' educational levels were as follows: Most had an MMed degree (54.3%, n=255), followed by an MD degree (31.9%, n=150). Other qualifications included PhDs (4.3%, n=20) and different postgraduate diplomas or certificates (2.1%, n=10). Twenty-five participants (5.3%) had held fellowships in a subspecialty (Table 2).

Additionally, the question regarding the factors considered when determining the risk for Down syndrome during prenatal screening had a correct response rate of 62.8% for maternal age. While this indicates some awareness, it also highlights that many participants may not fully grasp the multifaceted nature of risk assessment, which includes family history and ethnicity, among other factors. (see in figure 1 below).



**Figure 1: Factors that are Considered When Determining the Risk for Down Syndrome During Prenatal Screening**

Overall, while the foundational knowledge regarding specific prenatal screening methods is solid, the analysis reveals a concerning gap in understanding the comprehensive implications of prenatal screening practices. This suggests a need for targeted educational interventions to enhance healthcare professionals' grasp of the wider aspects surrounding prenatal diagnostics and risk assessments.

**Attitude Scoring Analysis.**

The attitude scoring analysis revealed good agreement among healthcare professionals regarding the importance of prenatal screening. A very high proportion of the respondents (95.7%) agreed that screening and prenatal diagnosis are very important in the management of healthcare for expectant parents.

Furthermore, 86.2% of the respondents favored prenatal screening as a part of routine prenatal care for all pregnant women as it is shown in Table 3.

**Table 3: Healthcare Professionals' views on Prenatal Screening**

Question	Response	Number (n)	Percentage (%)
Should prenatal screening be promoted to all pregnant individuals?	Yes	405	86.2
	No	65	13.8
Do you believe prenatal screening is crucial for expectant parents?	Yes	450	95.7
	No	10	2.1
	Maybe	10	2.1

However, there are some concerns regarding the emotional effects of prenatal screening. Some 68.1% of healthcare professionals in this study argued that screening may cause undue anxiety to expectant parents, revealing a critical understanding of the benefits and drawbacks of the process.

The results also revealed that medical history was the greatest factor that encouraged healthcare professionals to recommend prenatal screening to patients, and 48.9% of them used it as a key factor. Additionally, 67.0% (315) of the professionals recommended pregnancy termination in cases of severe congenital malformations (Table 4), indicating an active approach to the management of potential health issues irrespective of cultural or religious perceptions. The survey also revealed that professionals have a very good ability to recommend measures that would be better for the unborn child in their recommendations, although the opinion is divided on whether this should be done at the expense of the pregnant individual's preferences.

**Table 4: Healthcare Professionals' views on Prenatal Screening**

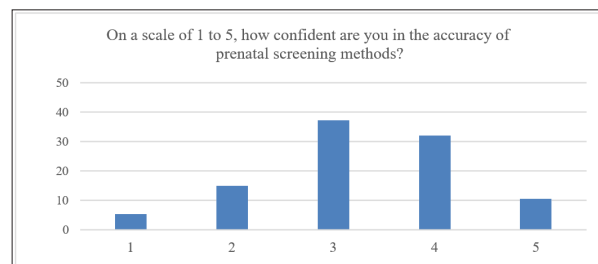
Qn: Would you recommend Pregnancy termination to your clients due to severe congenital malformations diagnosed?		
	Frequency (n)	Percent (%)
Maybe	120	25.5
No	35	7.4
Yes	315	67.0
Total	470	100.0

The study also underscores challenges in communicating prenatal screening information to patients from diverse backgrounds, highlighting barriers such as cultural differences, religious beliefs, and language limitations. These challenges emphasize the need for healthcare providers to develop effective, culturally sensitive communication strategies to ensure equitable access to prenatal care information.

**Practices Scoring Analysis**

The practice scoring analysis revealed a variety of approaches used by health care professionals in the area of prenatal screening. The most frequently suggested approach is first-trimester ultrasound; 86.0% of the participants selected it as the primary screening tool. Other important methods include noninvasive prenatal testing (NIPT), employed by 9.8% of the participants, and maternal serum screening, chosen by 4.2% of the participants. The use of several screening techniques during the first and second trimesters was also observed, which indicates an attempt to increase the sensitivity of the screening and to provide complete prenatal care. However, the results also show that the choice of screening methods is driven by the availability of methods, cost and ease of implementation, which may prevent healthcare professionals from being able to provide the most current techniques.

Although these screening methods are used quite frequently, their level of trust is not very high, as shown in the figure 2. Although 37.2% of the respondents had a moderate level of confidence, 31.9% had a high level of confidence, which indicates that the majority of the practitioners have faith in the tests that they employ. However, 5.3% reported low confidence, which indicates that some professionals may have doubts about the accuracy and efficacy of the current prenatal screening technologies. This lack of confidence could be ascribed to the absence of standardized national recommendations or restricted exposure to the most recent developments in prenatal screening during training.



**Figure 2: Confidence in the Accuracy of Prenatal Screening Methods**

With respect to referrals for genetic consulting after a positive screening, the practice is rather inconsistent. Another 24.5% of the respondents never referred patients to genetic counseling, whereas 28.7% did so only sometimes. Nevertheless, only 13.8% are likely to make referrals every time. This suggests that different practices exist as to when genetic counseling is required and when it is not and therefore presents an opportunity for enhancement in the quality of care of the patient. The same phenomenon is observed with respect to advise on diagnostic testing, including amniocentesis and chorionic villus sampling. Approximately 25.5% of the respondents never suggested diagnostic testing, and 34.0% did so infrequently. This conservative attitude toward these procedures may be explained by the dangers involved, the side effects of the procedures, or the fact that such services are expensive and not easily accessible through healthcare facilities.

Another area of concern is compliance with the established prenatal screening guidelines. Only 13.8% of the respondents

reported always practicing according to the guidelines, whereas 23.4% opted once in a while. The lack of conformity in adherence indicates that the practice is based on the guidelines or protocols of the institution or hospital, as there are no national guidelines for prenatal screening in Tanzania. This absence of standardized guidelines may lead to practice variations; therefore, the quality and equity of prenatal care may be affected.

Ethical issues are important in prenatal screening, and the survey results show that health care professionals have adhered to ethical principles. A very high percentage (37.2%) of the respondents agreed that they always respect the patient's right to choose and make an informed decision, whereas 41.5% always respect the patient's rights to confidentiality and privacy when dealing with screening outcomes. However, in regard to ethical issues in prenatal screening, only 30.9% of the respondents said that they always act professionally, which shows that there is a need for more explicit ethical direction and education in this area.

### Discussion

The study results offer perspectives on how healthcare workers in Tanzania view and handle screening and diagnosis practices. They noted areas of improvement needed to make prenatal care services more efficient.

The breakdown of participants, in terms of demographics, indicates the presence of OB-GYN experts, such as specialists in the field, resident students in training and consultants. Together, this constituted 89.8% of the participants. This mix ensures that the conclusions drawn from the study are rooted in insights provided by individuals directly engaged in care in the antenatal clinic. Furthermore, a predominant share of the participants were men (61.7%), which might reflect the gender imbalance within the medical field that is particularly noticeable in the specialized and surgical sectors, even though other studies have shown a proper balance of gender in the OB-GYN field. In areas where there are specialists and limited resources compared with urban regions where most professionals are concentrated (88%), there are worries about the accessibility of prenatal care services and how this accessibility could affect the health outcomes of both mothers and babies [1-19].

The research findings show that healthcare workers have knowledge about prenatal screening but lack a clear understanding of broader genetic screening topics. An average score of 16 out of 23 indicates a level of awareness; however, only 11.7% of participants are aware that prenatal screening mainly identifies chromosomal abnormalities rather than other genetic disorders [14-21]. This indicates a crucial area for enhancement. Previous studies support the idea that gaps in healthcare providers' knowledge can lead to misunderstandings and false information about screening [22-24].

One notable discovery highlighted in the research was the consensus that ultrasound is the imaging method used in prenatal care. This finding was further supported by studies emphasizing the utilization of ultrasonography in practice [25]. Nonetheless, a knowledge gap was observed regarding Down syndrome risk assessment; 62.8% of participants correctly identified age as a

significant factor. This indicates a need for education on risk factors such as genetic history and ethnicity [7-26].

The study revealed that almost all participants (95.7%) recognized its value for parents and that 86.2% were in favor of making it a routine part of care, aligning with the acknowledgment among healthcare providers regarding the advantages of early fetal evaluation [27]. However, the consequences of screening expressed by 68.1% of the respondents shed light on the complexities tied to testing [28]. Past studies indicate that higher levels of anxiety after screening highlight the importance of providing adequate counseling and emotional support services [22-29].

One interesting point in this research is the cultural aspects related to terminating pregnancies when faced with congenital abnormalities. Notably, 67% of healthcare providers would consider recommending termination in cases as a way to manage health effectively. This proactive stance highlights the importance of autonomy and parental decision making. The varying responses from healthcare professionals highlight how cultural backgrounds and personal beliefs can greatly impact choices, as seen in studies on ethics in reproductive health [30-32].

Although there is generally a perception and understanding of screening procedures among people, there are noticeable inconsistencies in how screening procedures are implemented in practice. The use of first trimester ultrasound stands out as the screening approach at 86%, which is in line with global recommendations supporting early ultrasound evaluations [27]. However, the adoption rates of screening techniques such as noninvasive prenatal testing (NIPT) are limited. Maternal serum screening (approximately 4%) hints at obstacles linked to expenses, accessibility and the need for proper training. This pattern aligns with research suggesting that constraints on resources in middle-income nations impede the implementation of more advanced screening methods [6-9].

The results also revealed that only 13.8% of the participants in the present study consistently referred patients for counseling after a positive screening outcome was identified; approximately 24.5% never did so. This inconsistency highlights the absence of guidelines for referrals as a major obstacle to providing the best possible prenatal care [33]. Doctors may be hesitant to recommend tests such as amniocentesis and chorionic villus sampling because of concerns about risks or limited access. This cautious approach is reflected in the rates of recommendations for these tests [34].

One key discovery from this research highlights the varying levels of compliance with screening recommendations among participants in the study group. A total of 13.2% of the participants consistently adhered to the set guidelines, and 22.9% occasionally followed them. The lack of guidelines for prenatal screening in Tanzania likely contributes to this inconsistency, underscoring the importance of standardized procedures to ensure fair and evidence-based healthcare practices. Research has demonstrated that adhering to guidelines for screening can increase detection rates and patient outcomes [1-13].

Ethical dilemmas continue to play a role in screening, as healthcare providers recognize the crucial aspects of obtaining informed consent and maintaining patient privacy and professional ethics standards in their practice. However, the data indicate that 30.0% of the respondents consistently upheld ethical standards, indicating the need for enhanced ethical education and training. A similar issue has been highlighted in studies stressing the importance of incorporating bioethics education into training programs to enhance ethical decision-making processes in prenatal healthcare [35].

The communication of prenatal screening information presents a hurdle in healthcare settings because of factors such as language disparities and cultural diversity as well as religious convictions that pose challenges and underscore the importance of culturally sensitive healthcare practices. Studies indicate that tailored communication methods based on cultural considerations can enhance patient comprehension and decision making concerning prenatal screening [36]. It is crucial to introduce training initiatives for healthcare providers to improve their skills in communicating genetic details for better patient-centered care.

The results of this research offer insights for healthcare policies and clinical procedures in Tanzania. First, establishing and enforcing screening guidelines to promote consistency in services is crucial. Second, including courses in training programs for healthcare professionals can address knowledge discrepancies related to genetic screening practices and ethical issues. Finally, enhancing the availability of screening tools, such as NIPT, and improving pathways for counseling are key measures to enhance prenatal care services.

Moreover, it is important to explore ways to address the gender gap in the healthcare industry by encouraging women to join specialized areas. It is also crucial to prioritize improving care services in regions since the current focus on urban areas might cause healthcare imbalances. Finally, fostering teamwork among obstetricians, genetic counsellors and primary healthcare professionals can improve this approach to managing prenatal screening results.

### Limitations

This study has two main limitations: selection bias and nonresponse bias. The use of the AGOTA database and online recruitment may have resulted in geographical bias, since the participants were mainly from urban areas and had access to internet and professional networks, with rural areas being underrepresented (only 9.8% of participants were from rural regions). This may limit the generalizability of the findings, especially with respect to prenatal screening practices in rural healthcare contexts. Furthermore, voluntary online-based participation may have introduced nonresponse bias, with the individuals who chose to participate being significantly different from those who did not, thereby distorting the results. Factors such as internet access, time, or lack of interest in the topic may have affected participation rates, especially in rural areas. To reduce these biases, future studies could exclude direct contact or financial incentives to increase representativeness and response rates via mixed-method approaches.

### Conclusion and Recommendation

This research emphasizes the outlook and beliefs of healthcare workers in Tanzania toward prenatal screening while highlighting important deficiencies in implementation methods and ethical practices as well as adherence to guidelines concerning it. Taking steps to address these shortcomings through specific training programs, the creation of policies and distribution of resources will play a role in enhancing the quality of prenatal screening services in the nation. Further studies should delve into the viewpoints of mothers regarding screening to supplement these discoveries and offer deeper insight into prenatal healthcare in Tanzania.

With the findings from the study, the following recommendations are made to improve prenatal screening and diagnosis in Tanzania: strengthening training and capacity-building programs – organizing selective CME meetings to increase the knowledge and skills of healthcare professionals in prenatal screening and diagnosis. These programs should include new developments, ethical dilemmas, and general guidelines. Integrating cultural and social sensitization into medical training – Creating educational programs that are relevant to the culture, religion and social organization of healthcare professionals' attitudes. These factors should be incorporated into medical education to shift the focus of prenatal care to patients.

### Declarations

#### Ethics Approval and Consent to Participate

All participants gave informed consent, and the Southern Medical University Ethics Committee's approval was received before data collection began. The consent was obtained before the participants joined the study. Implied consent was obtained when the survey was conducted online and when returning the completed questionnaire was considered as implied consent. Anonymizing responses was maintained as confidential.

#### Consent for Publication

Not applicable

#### Availability of Data and Materials

The data underlying this study will be made available upon reasonable request to the corresponding author. In addition, we are committed to ensuring the confidentiality and ethical storage of the data, but also to facilitating its access for verification and further research to contribute to the body of knowledge in this field.

#### Competing Interests

The authors declare that they have no competing interests

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#### Authors' Contributions

CGM: Was responsible in the conceptualization and designing of the study, data collection, performed initial analysis, and drafted

the first manuscript. JA: Contributed through proofreading the manuscript, refining the data analysis report and providing critical revisions for the research report. All authors have reviewed and approved the final manuscript. MY and CPH are the corresponding authors of this study.

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### Disclaimer

All the views and opinions expressed in this article are only those of the author(s) and do not necessarily represent the viewing or voting policy or position of any institution, organization or other agency associated with this article. The author(s) owns the full responsibility for the content, data, accuracy and interpretation of the data presented in this article. No conflicts of interest are declared.

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