

Informing equitable access to cervical cancer screening in rural Sénégal: a cross-sectional study of uptake determinants

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Abstract

Background: Equitable access to women's health services, including cancer prevention programs, is lacking in many countries. Sénégal ranks 17th in the world in the age-standardized incidence rate of cervical cancer. The Kédougou region is located in the southeastern corner of Sénégal and has many structural barriers to preventive care, including economic disadvantage, a low literacy rate, and a shortage of healthcare workers. The goal of this study was to investigate the barriers and facilitators of cervical cancer screening uptake in this region.

Methods: We conducted a cross-sectional survey of 158 participants, 101 women and 57 men (ages 30 - 59) across nine non-probability-sampled communities located throughout three districts in the Kédougou region of Sénégal from October 2018 through January 2019. We collected demographic information and data on health service utilization, cervical cancer knowledge, and experience of cervical cancer screening. Associations were tested using the Fisher's Exact test statistic.

Results: The majority of our study population speaks one or both of the prevalent local languages, Malinké (62.7%) and Pulaar (59.5%), with fewer Wolof (26.6%) and French (31%) speakers. Among the women in our sample, 84.2% had never been screened for cervical cancer. Among men, 78.9% stated that they have the final say at home regarding healthcare decisions. In contrast, only 16.0% of women made their own healthcare decisions. For those who speak Malinké, 48.0% received services in another language. We found significant gender differences between women and men in the knowledge that a woman is at risk if she has multiple sexual partners ($p = 0.010$) and that a woman is at increased risk if her partner has multiple sexual partners ($p < 0.001$).

Conclusions: This study demonstrates the critical need to overcome both clinical and informational barriers, as well as structural barriers, to ensure the implementation and sustainment of an equitable health service. In this highly underdeveloped region where workforce challenges are extraordinary, innovative solutions are needed to address these underlying social determinants of health while simultaneously improving quality of care at the point of service.

Trial registration: This study is registered on clinicaltrials.gov with the Clinical Trials Study Identifier: NCT03540069

Background

Equitable access to women's health services including cancer prevention programs is lacking in many countries. Sénégal ranks 17th in the world in the age-standardized incidence rate of cervical cancer.^{1,2} Furthermore, while data indicating the prevalence of cervical cancer in rural regions are not available,³ human papillomavirus prevalence⁴ and the cervical cancer burden⁵ in urban areas of Sénégal is high. The estimated participation rate for cervical cancer screening in Sénégal is very low (6.9% of all women ages 18 to 69), and it is especially low in rural areas, contributing to disparity across contexts.⁴ As such, cervical cancer is one indicator of larger health system problems including poor access to care and the lack of culturally competent communication between provider and patient - factors that disproportionately affect poor women.⁶ Two of the top five World Health Organization priorities in cancer control and prevention research are to: 1) reduce access barriers to the diagnosis of curable cancers and 2) apply cancer prevention strategies in the context of local culture and resources.⁷ When detected at an early stage, invasive cervical cancer is one of the most successfully treated cancers. Thus, improving access to early detection will result in meaningful impact. Indeed, the five year cervical cancer survival rate ranges from 60–70% in most countries.⁸ Furthermore, technological innovation and efficacy testing of health service interventions including screening programs^{9,10} have led to clear recommendations for improving cancer control.^{11,12} However, the implementation of evidence-based cervical cancer screening programs is slow and often not contextualized. Understanding barriers & facilitators is fundamental to understanding what makes a service acceptable and sustainable.

Cervical Cancer Screening Program Implementation

In 2010, a partnership was formed between the Kédougou Medical Region in Southeastern Sénégal; the Institute of Health and Development at Cheikh Anta Diop University, Dakar, Sénégal; Peace Corps Sénégal; and the University of Illinois at Chicago. The stated overarching goal of this partnership is to achieve health equity by improving community access to quality primary healthcare services. By identifying local priorities and health service gaps, Kédougou health leaders and workers established that the aims of the partnership are to: 1) improve access to quality cervical cancer prevention services by strengthening the healthcare workforce and delivery systems in the Kédougou region and 2) inform the development and implementation of cervical cancer prevention programs in other rural regions of Sénégal.

Since 2010, the partnership has implemented and advanced a cervical cancer screening program. Partners have implemented a technical approach that is affordable and effective in low-resource settings: visual inspection of the cervix with acetic acid.^{13,14} In 2014 the partnership conducted a mass cervical cancer screening campaign in the Kédougou region. Community health workers provided information and education through individual and group sensitizations and radio broadcasts prior to the campaign using World Health Organization endorsed materials.¹⁵ A cross-sectional survey with regional representative sampling through a three stage cluster process with probability proportional to the number of women across 38 villages in the Kédougou region revealed that only 38% of women were aware of cervical cancer, highlighting awareness as a major barrier. The mean age was relatively young (35.7) for the total sample; only 13.8% of women were ages 40 to 44, and 10.3% were ages 45 to 50. Only 509, or 5% of eligible women targeted through a mass campaign that year, were screened and only 10% were 45 years or older.¹⁶ The highest risk women, therefore, were the ones least likely to seek screening services. Despite a robust educational campaign that focused only on cervical cancer and screening service-related knowledge, screening rates through this focused effort were suboptimal. Follow-up screening rates in study sites and throughout the rest of Kédougou in the absence of a targeted campaign have continued to remain very low.

The goal of the study reported in this manuscript was to expand on our current research by investigating the determinants of cervical cancer screening uptake in this region by identifying barriers and facilitators of service uptake. These cross-sectional baseline data are being utilized in ongoing research funded by the

National Institutes of Health to inform the adaptation of a context-specific peer education behavioral intervention through women's groups to improve screening uptake. Research supports the effectiveness of peer education and support in increasing cervical cancer screening rates^{17,18} but, prior to our work, no cervical cancer screening peer education program specific to the rural Sénégal context existed. These data inform our study objective to strengthen the implementation of a cervical cancer screening service in a decentralized, low-resource area of Sénégal recently naïve to any cancer screening programs by investigating the barriers and facilitators of initial uptake and developing and adapting a peer education health promotion intervention to diverse and dynamic contexts to achieve sustained utilization.

Study Context

The Kédougou region is located in the southeastern corner of Sénégal, bordering Mali and Guinea. Kédougou (16,800 km²) has an estimated population of 178,269 in 2018, representing about 1% of the population of Sénégal.¹⁹ The region is economically disadvantaged, with 61.3% of households categorized at the most impoverished level in Sénégal, and only 1.3% of the households on par with the richest households in Sénégal. In this region, women are much more likely to be unemployed than men (46.4% and 8.3% respectively). Moreover, the French literacy rate in this region was estimated to be 30.2% in 2013, with lower levels in rural areas. The school attendance rate is 44%²⁰ and there is a shortage of healthcare workers. In 2018, there were 11 physicians (including a single gynecologist), 48 midwives, 32 registered nurses, 6 technicians, and 1 social worker providing care for the entire region.^{20,21} Therefore, there are considerable challenges to achieving health equity in this region as compared to other more developed areas of Sénégal.

Methods

We conducted a cross-sectional survey of 158 participants, 101 women and 57 men (ages 30–59) across nine non-probability-sampled communities (two rural and one semi-urban from each district, across three districts) in the Kédougou region of Sénégal from October 2018 through January 2019. We collected demographic information and data on health service utilization, cervical cancer knowledge, and experience of cervical cancer screening through interviewer-administered surveys. The surveys were administered to one woman and one man per 10 randomly selected households and five women per women's group within each community. Survey interviews were conducted in the participants' choice of language: French, Malinké, or Pulaar. Participants were eligible for inclusion in the study if they were between 30–59 years old and were female, or were a male living with a female who was able to seek cervical cancer prevention services from a health facility in the Kédougou region of Sénégal. Individuals who were outside the target age-range were not eligible for participation.

Site Selection and Recruitment

The region of Kédougou is divided into three medical districts: Kédougou, Saraya, and Salémata. Each of these health districts has a single health center in the district capital and multiple health posts in the surrounding rural communities. We selected nine sites in the Kédougou Medical Region through non-probability sampling, including one health center and two rural health posts from each of the three districts comprising the region. In the Kédougou District, we selected the Dalaba health post (population accessing this health post = 5995), Bandafassi (7189), and Dindéfello (9370). In the Salémata District, we selected the Salémata Health Center (7278) and the health posts of Dar Salaam (3084) and Dakately (3037). In the Saraya District, we selected the Saraya Health Center (5890) and the posts of Nafadji (3759) and Khossanto (3471). Each of the nine sites was mapped through OpenStreetMaps.²² Printable maps were created (using FieldPapers²³) to illustrate structures (assumed to be households), roads, and rivers in each site. Maps were divided into four sectors with approximately the same number of structures in each quadrant. Structures were numbered and Google's random number generator was used to determine the starting point. Counting in increments of the limiting factor, each chosen structure was marked and recorded. This ensured a relatively even distribution of structures selected throughout each site. Twenty structures per site (n = 180) were selected and visited in order to assess for eligibility. Potential participants were recruited using the approved recruitment script. Households were selected if there were both an eligible woman and man who agreed to participate. An additional five women per site were recruited from existing women's groups in order to strengthen the assessment at the community level.

Development of Documents

The questionnaire included closed-ended, quantitative questions seeking information regarding demographics, health service utilization, cervical cancer risk factors, cervical cancer knowledge, and indicators related to cervical cancer screening experience. The questionnaires were first created in English, translated into French and the local languages of Jahanké/Malinké and Pula Fuuta (a dialect of Fula/Pulaar), and then back-translated for accuracy by certified Sénégalaise translators. Questionnaires were field tested for comprehension prior to the initiation of the study. All IRB- approved documents including study overview, recruitment scripts, and the informed consent were available in French, Malinké, and Pulaar.

Consent and Data Collection

All research assistant data collectors participated in a three-day training on the project protocol, including data collection methodology facilitated by the lead investigator prior to field testing the instrument. After final institutional review board approval, research assistants attended an additional three-day training to review all data collection procedures. The study research assistants read the informed consent aloud, in the participants' preferred language, and participants reviewed and signed the approved informed consent short form, written in French. In cases where the participant did not read French, a trusted contact was requested by the participant to witness the informed consent process, observe the signature of the participant, and then sign as a witness. After participants were consented, data collection was conducted immediately with a female research assistant collecting data from women and a male research assistant collecting data from men. All data collection activities were performed in a private setting. Data collection interviews occurred in the preferred language of the participant. All responses were recorded on hard copy interview forms with the name of the participant being the only item recorded on the final page. All data collection instruments were immediately handed over to the lead research assistant, who recorded the participant's name on the participant code book, placed

a unique identifier on page one of the data collection instrument, removed and destroyed the final page of each instrument, scanned all documents, and transmitted them through a secure portal to a research assistant in the United States.

Data Analysis

Data were double-entered into an electronic spreadsheet by two research assistants, compared, approved and subsequently cleaned by the principal investigator. Bivariate analyses were conducted to assess 1) behavioral and clinical risk factors associated with cervical cancer screening in our population, 2) gender differences in health service barriers and utilization as well as cervical cancer knowledge, 3) language provision by preferred language for Malinké speakers, and 4) differences in the experience of being screened for cervical cancer within our sample. Associations were tested using the Fisher's Exact test statistic (by way of the Two- Stage Fisher's Exact Test using RStudio version 1.2.1578 through the Dplyr and Arsenal packages).

The Conduct of Responsible Research and Partnership

The University of Illinois at Chicago has an ongoing partnership affiliation agreement with the Institute of Health and Development at the University Cheikh Anta Diop and with the Medical Region of Kédougou. This partnership uses a participatory approach ensuring that all activities are well-aligned with the expressed priorities of the local health system. This study was approved through the University of Illinois at Chicago and Sénégal University Cheikh Anta Diop research ethics committees. The Medical Region of Kédougou, the three health districts, and participating health posts granted researchers permission through signed letters of support to implement and conduct the data collection activities. Each investigator and U.S. based research assistant received the Collaborative Institutional Training Initiative training certification prior to conducting the research.²⁴ All local research assistants were trained in research ethics through a locally approved ethics of human research training program.

Results

We surveyed 101 women and 57 men between December 2018 and February 2019. The mean age of participants was 41.6 years with the mean age of men (44.1 years) being slightly higher than the mean age of women (40.2 years, $p = 0.006$). There were significant gender differences in educational level ($p < 0.001$). Among those surveyed, 97% of all women and 76.8% of all men had no more than a primary education, while 25.7% of women and 10.3% of men had no education at all. No women in our sample attended more than two years of secondary school, while 8.9% of men were educated beyond two years of secondary school, and an additional 7.1% had at least some university education. The majority of participants (92.1% of women and 94.7% of men) were married, and among all women, 51.5% were in a polygamous household as related to significant gender differences in marital status ($p = 0.004$). The majority of our study population spoke one or both prevalent local languages, Malinké (62.7%) and Pulaar (59.5%). As is characteristic for the region, there are fewer Wolof (26.6%) and French (31%) speakers in our sample. It should be noted that there are significantly more male Wolof (36.8%) than female Wolof (20.8%) speakers ($p = 0.039$) as well as male French (45.6%) than female French (22.8%) speakers ($p = 0.004$). Among the women in our sample, 84.2% have never been screened for cervical cancer, 13.9% have been screened one time, and 2.0% have been screened multiple times (Table 1).

The mean age of women who were screened in our study is 42.4 years, with a range of 32 to 54 years. The mean age of the reported initiation of sexual activity among our study population overall was 16.7 years old, and the mean age of first pregnancy was 17.8 years. The mean number of lifetime births among women was 4.6. None of the women in our study sample were current smokers, 22.8% had a history of sexually transmitted infections, and 67.3% had no history of using oral contraceptives. We found significant differences by screening status in two categories. Women who were screened had a higher number of lifetime births ($p = 0.016$) and were more likely to report a history of a sexually transmitted infection (STI) ($p = 0.047$) (Table 2).

We found significant gender differences for certain health service utilization barriers and facilitators, including adequate support for duties when not able to work ($p = 0.003$), healthcare provider gender ($p < 0.001$), comfort with healthcare provider ($p = 0.007$), avoidance of healthcare due to cost ($p = 0.044$), use of personal funds to pay for healthcare ($p < 0.001$), spouse assistance with healthcare costs ($p < 0.001$), personal final say at home for healthcare decisions ($p < 0.001$), and spousal healthcare decision power ($p < 0.001$). A large portion of the study population (92.6%) stated that they have enough time to take care of their healthcare needs. The large majority of both women (88.7%) and men (100%) feel comfortable with their healthcare provider. Both women (35.0%) and men (51.8%) stated that at some point they have avoided going to the health facility because they could not afford the cost. Over half (52.0%) of the women use their own limited funds, while 30.0% are dependent on their spouse to pay for the healthcare. Among men, 78.9% stated that they have the final say at home regarding healthcare decisions. In contrast, only 16.0% of women reported making their own healthcare decisions, with 72% stating that their spouse made all the healthcare decisions. Of note, while there is not a significant gender difference, 18.8% of all participants stated that they had a negative experience at the health facility at some point when receiving care in Sénégal (Table 3).

When analyzing the language used in the healthcare setting with Malinké speakers, we identified several significant findings. There are differences between Malinké speakers and non-Malinké speakers in whether health services have been conducted in Malinké ($p < 0.001$), Wolof ($p = 0.006$), or French ($p < 0.001$). For those that speak Malinké, 48.0% received services in another language. Only 52.0% of Malinké speakers in our sample stated that they sometimes receive care in Malinké, 44.9% have received care at some point in Wolof, and 54.1% have at some point received care in French. Among participants, 34.4% did not receive any language interpretive services (formal or informal) (Table 4).

Concerning knowledge about cervical cancer, we found significant gender differences between women and men in the knowledge that a woman is at risk if she has multiple sexual partners ($p = 0.010$), a woman is at increased risk if her partner has multiple sexual partners ($p < 0.001$), smoking increases the risk of cervical cancer ($p = 0.008$), intrauterine devices (IUDs) offer a protective benefit against cervical cancer, ($p = 0.006$), oral contraceptive pills increase the risk of cervical cancer ($p = 0.012$), and that screening continues to be recommended for women after menopause ($p < 0.001$). About one third (31.6%) of the study population was unaware of cervical cancer at the time of this survey, equally split among the genders (31.7% of women and 31.6% of men). Likewise, only 52.2% of our study population was aware of the cervical cancer screening test. However, 94.8% of all respondents correctly stated (27.7% Agree and 67.1% Strongly Agree) that it is important for a woman to get screened for cervical cancer even if she has no symptoms. In addition, 87.8% of women either agreed

(33.7%) or strongly agreed (54.1%) that a woman is more likely to get cervical cancer if she has had multiple sexual partners, whereas 67.9% of men either agreed (28.6%) or strongly agreed (39.3%) that a woman is more likely to get cervical cancer if she has had multiple sexual partners. When asked about the sexual behavior of men, 90.9% of women either agreed (28.3%) or strongly agreed (62.6%) that a woman is more likely to get cervical cancer if her husband has had multiple sexual partners, while only 37.5% of men either strongly agreed to this statement. Among women, 30.3% were undecided, 10.1% disagreed, and 9.1% strongly disagreed that a woman is less likely to get cervical cancer if she uses an IUD. Concerning the oral contraceptive pill, 24.5% of women were undecided, 13.3% disagreed, and 9.2% strongly disagreed that it increases the risk of cervical cancer. A large number of women are unaware that cervical cancer screening is recommended after menopause (8.1% are undecided, 44.4% disagree, and 12.1% strongly disagree). Men, as well, are largely unaware of this recommendation, with 32.7% being undecided, 18.2% disagree, and 25.5% strongly disagree. Among all respondents, a considerable number agreed (37.8%) or strongly agreed (51.9%) that If cervical cancer is found early, it can be cured (Table 5).

Among the women in our sample, 84.2% of women had never been screened for cervical cancer, with 14% having been screened a single time, while 2% had had multiple screenings. Only three women have been screened within the last 2 years. Among all women who have been screened, 75% strongly agree that they are satisfied with the screening and 50.0% strongly agree that the test was comfortable. In addition, 66.7% strongly agree that there was a lengthy wait time for screening, while 83.3% strongly agree that they received adequate orientation to the screening exam (Table 6).

Discussion

The principal objective of this study was to investigate the determinants of cervical cancer screening uptake in the Kedougou region of Sénégal to inform the adaptation of a context-specific peer education behavioral intervention through women's groups to improve screening uptake. We have identified several notable knowledge gaps that are being addressed through the developed educational curriculum. We will measure the impact of the educational program on uptake of the screening service post-intervention. However, current data analysis suggests the importance of social determinants (gender, socioeconomic status, and language of communication), as well as quality of care at the primary healthcare level, as factors requiring additional research.

Risk Factors and Knowledge

Among the cervical cancer behavioral and clinical risk factors that we measured (Table 2), we found a significant difference between non-screened and screened women in the number of lifetime births and history of sexually transmitted infections. There are some knowledge gaps regarding cervical cancer among both genders in our sample. However, it is interesting to note that there is widespread agreement concerning the importance of screening for prevention, before the development of signs or symptoms of cancer. Women are more knowledgeable about the risks associated with multiple sexual partners, including the risk associated with their spouse having more sexual partners. Both women and men need a stronger understanding of cervical cancer risk among older women, indicated by the measure stating that screening is recommended after menopause, with women being somewhat more aware of the risk with advancing age. Given that a prior study in this region indicated that older women are less likely to seek cervical cancer screening, this is a notable knowledge gap.¹⁶ Increased cervical cancer education is needed, including strategies and messages targeted to each gender.

Healthcare utilization

A considerable number of health service utilization barriers are a reality in this very rural area. In a region that is economically disadvantaged, where educational opportunities are very limited, especially for women, and where men are the principal decision-makers concerning healthcare utilization, there are numerous barriers for a woman to seek needed healthcare. While costs are relatively minimal (around US\$ 1 per consultation), the actual or perceived financial burden may contribute to the avoidance of healthcare due to cost, as evidenced by our data. The perceived costs of cervical cancer screening may be an additional burden that this study has not fully explored. Anecdotally, people in this region have expressed concern about potential travel and treatment expenses that may be associated with a cancer diagnosis. This perceived cost burden is especially problematic for women, given that some women have little to no control over household finances. Over 50% of the women in our sample need to use their own limited personal funds, given their being largely financially dependent on their husbands. Furthermore, while women (55.0%) are more likely than men (29.8%) to state that they have adequate support from others to assist with their daily work and responsibilities, this still leaves 45.0% of women with minimal opportunity to free themselves to seek needed care.

Language

Because Kedougou is a highly disadvantaged region with a very low educational level, Sénégal is not able to train enough healthcare professionals originating from this region in order to fill the required positions. Therefore, clinicians from the economic centers (who tend to be Wolof and French speakers) are posted to Kedougou (where the principal spoken languages are Malinké and Pulaar) through the public health service for a three to five year stint. Given that Kedougou is a hardship region with a poor educational system and few economic opportunities, many of these professionals move here without their families. They are posted to the region without any prior language or cultural training and, given the social challenges, often leave the region before they have been able to develop adequate language skills. However, in this rural region, local languages are the preferred language of communication. The large majority of our study population speaks either Malinké or Pulaar, with relatively few Wolof and French speakers. As such, the language in which clinical care is conducted is a critical indicator to the quality of care in the region and, unfortunately, is a significant barrier to receiving high quality care for many in this region. This barrier likely impedes the ability of the clinicians to educate patients on health services that may be available, including cervical cancer prevention services. In addition, as shown by our data, women are especially disempowered to seek the information and care that they may desire.

Quality

Even though most women who received the screening test were satisfied with the exam, the experiential indicators suggest that there is room for improvement in the quality of the service that is being provided. Of the women screened, 16.7% strongly disagreed that the test was comfortable. Our data do not suggest a

correlation between comfort and recommendation, however, we should be cautious in this conclusion given the low numbers of women screened within the study population. Most women did report having been adequately oriented to the exam, but we are wary of interpreting this as an indicator of high quality given the concerning data regarding translation at the point of care as described above. Concerns for quality of care are reinforced by evidence that 16.3% of women and 23.2% of men stated that they had been treated badly at some point when receiving care in Sénégal. Quality of care challenges are likely to discourage utilization of the health service.

Limitations

There were some limitations in the methodology used to recruit households within each site. Every structure on the map was assumed to be a household and was thus included in the count, as specific household information was not provided. In reality, this was not the case - some structures were businesses, vacant, or not present. When encountering this scenario, we progressed to the next marked structure on the list. In addition, the satellite images used to create the maps on OpenStreetMaps may have been outdated. For example, Khossanto has rapidly expanded within a short amount of time due to gold mining. Thus, newer structures were not shown on the map we had and were, therefore, not included in the count. For a few of the villages (Kedougou and Bandafassi in particular), there are nearby sites that may be considered either a separate village that falls within the health posts' treatment area or an actual part of the health post village, depending on who is asked. These communities are assumed to seek care at the health posts in the communities we surveyed, but they were not included in our methodology because 1) they have yet to be mapped and 2) it is unclear on whether they are a neighborhood or a village. In some cases, data collection was attempted separately from the recruitment and consent process. This may have resulted in the inability to collect data from some of the selected households due to the participant being away during the day(s) that the research assistant was present. Finally, we must use caution in interpreting these results, given the low numbers of women within our study sample who have been screened for cervical cancer. We will follow the trend of these indicators over time as women are exposed to the peer education program.

Conclusions

In a region where women are not educated, not literate, have no or little monetary resources and cannot make their own health care decisions it is very difficult to have them participate in their own preventive health care. These are major impediments that cannot be solved in the short-term, however, our goal is to identify the means of empowering women to reduce their risk of cancer within this context. Our study shows that in order to implement and sustain an equitable cervical cancer screening health service in this rural region, there are several quality indicators that need to be addressed. There are multiple barriers, including perceptions of cost, that will need to be confronted to ensure health service utilization. Women's inability to make their own healthcare decisions and to leave their work at home in order to seek healthcare are included among the barriers that need to be addressed. It is important, as well, to ensure that sensitization efforts target men to encourage shared decision making. This study also highlights the need to research and address the indication that many individuals have had negative experiences within the health system. The language barrier is considerable, and necessitates not only ensuring that providers speak the local language, but that educational materials and informational sessions are provided in the language of choice of the recipient. These efforts may begin to stem the challenges of ensuring high quality communication at the point of care and within the community. In addition, we will need to ensure that clinicians are well trained in the manner of providing comfortable care to address the identified barrier of an uncomfortable speculum exam.

This study has indicated that there are not only clinical and informational barriers that we will need to overcome to ensure the implementation and sustainment of an equitable health service, but structural barriers as well. In this region that is highly underdeveloped and where workforce challenges are extraordinary, innovative solutions are needed to address underlying social determinants of health while at the same time improving quality of care at the point of service.

Declarations

Ethics approval and consent to participate

This study was approved through the University of Illinois at Chicago (UIC2016-0947) and Sénégal University Cheikh Anta Diop (SEN17/75) research ethics committees. Written informed consent was acquired from each participant prior to initiation of data collection.

Consent for publication

Not applicable

Availability of data and materials

All data generated or analysed during this study are included in this published article [and its supplementary information files].

Competing interests

The authors declare that they have no competing interests

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Authors' contributions

All authors contributed to the conception and design of the study (JAD, HT, CEP, ZC, YN, AAK, JSS, MF) or to the acquisition, analysis and interpretation of data (EH, ELVL, ELDJ, TW, AF,), and drafted the manuscript (JAD, CEP, TW) or revised it critically for content (HT, EH, ELVL, ELDJ, ZC, YN, AAK, AF, JSS, MF). All authors read and approved the final manuscript.

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Tables

Table 1: Demographics by gender

	Female (N=101)	Male (N=57)	Total (N=158)	p value
Age in years				0.006
Mean (SD)	40.168 (8.631)	44.140 (8.355)	41.601 (8.718)	
Range	30.000 - 59.000	30.000 - 59.000	30.000 - 59.000	
Education level				< 0.001
None	26 (25.7%)	5 (8.9%)	31 (19.7%)	
Quranic School	35 (34.7%)	21 (37.5%)	56 (35.7%)	
Primary education	37 (36.6%)	17 (30.4%)	54 (34.4%)	
Secondary school through university	3 (3.0%)	13 (23.2%)	16 (10.2%)	
Marital status				0.073
Single, divorced, separated, or widowed	8 (7.9%)	3 (5.3%)	11 (7.0%)	
Married (monogamous household)	41 (40.6%)	34 (59.6%)	75 (47.5%)	
Married (polygamous household)	52 (51.5%)	20 (35.1%)	72 (45.6%)	
Malinké speaker				0.733
No	39 (38.6%)	20 (35.1%)	59 (37.3%)	
Yes	62 (61.4%)	37 (64.9%)	99 (62.7%)	
Pulaar speaker				0.019
No	48 (47.5%)	16 (28.1%)	64 (40.5%)	
Yes	53 (52.5%)	41 (71.9%)	94 (59.5%)	
Wolof speaker				0.039
No	80 (79.2%)	36 (63.2%)	116 (73.4%)	
Yes	21 (20.8%)	21 (36.8%)	42 (26.6%)	
French speaker				0.004
No	78 (77.2%)	31 (54.4%)	109 (69.0%)	
Yes	23 (22.8%)	26 (45.6%)	49 (31.0%)	
Screened for cervical cancer				
Never screened	85 (84.2%)	0	85 (84.2%)	
One time only	14 (13.9%)	0	14 (13.9%)	
More than one time	2 (2.0%)	0	2 (2.0%)	

Table 2: Behavioral and Clinical Risk Factors associated with cervical cancer screening in our population

	Never screened (N=85)	Screened (N=16)	Total (N=101)	p value
SDz_Age				0.254
Mean (SD)	39.7 (9.020)	42.4 (5.876)	40.2 (8.631)	
Range	30.0 - 59.0	32.0 - 54.0	30.0 - 59.0	
Age of initiation of sexual activity				0.708
Mean (SD)	16.716 (2.273)	16.462 (2.145)	16.678 (2.244)	
Range	11.000 - 25.000	13.000 - 22.000	11.000 - 25.000	
Age of first pregnancy				0.114
Mean (SD)	17.645 (2.711)	18.812 (2.373)	17.848 (2.681)	
Range	11.000 - 26.000	15.000 - 23.000	11.000 - 26.000	
Number of lifetime births				0.016
Mean (SD)	4.398 (2.072)	5.750 (1.653)	4.616 (2.064)	
Range	0.000 - 10.000	3.000 - 8.000	0.000 - 10.000	
Smoking history				0.158
I have smoked in the past-but I no longer smoke	0 (0.0%)	1 (6.2%)	1 (1.0%)	
No-I have never smoked	85 (100.0%)	15 (93.8%)	100 (99.0%)	
Sexually transmitted infection history				0.047
No	69 (81.2%)	9 (56.2%)	78 (77.2%)	
Yes	16 (18.8%)	7 (43.8%)	23 (22.8%)	
Oral contraceptive use history				0.146
No	60 (70.6%)	8 (50.0%)	68 (67.3%)	
Yes	25 (29.4%)	8 (50.0%)	33 (32.7%)	

Table 3: Health service utilization determinants by gender

	Female (N=101)	Male (N=57)	Total (N=158)	p value
I have time to take care of my health				0.105
No	4 (4.3%)	7 (12.3%)	11 (7.4%)	
Yes	88 (95.7%)	50 (87.7%)	138 (92.6%)	
I have help to maintain my duties when I cannot work				0.003
No	45 (45.0%)	40 (70.2%)	85 (54.1%)	
Yes	55 (55.0%)	17 (29.8%)	72 (45.9%)	
Healthcare provider gender				< 0.001
Female	23 (26.1%)	0 (0.0%)	23 (16.1%)	
Male	65 (73.9%)	55 (100.0%)	120 (83.9%)	
I am comfortable with my healthcare provider				0.007
No	11 (11.3%)	0 (0.0%)	11 (7.2%)	
Yes	86 (88.7%)	56 (100.0%)	142 (92.8%)	
I have avoided seeking healthcare due to cost				0.044
No	65 (65.0%)	27 (48.2%)	92 (59.0%)	
Yes	35 (35.0%)	29 (51.8%)	64 (41.0%)	
I use personal funds to pay for my healthcare				< 0.001
No	48 (48.0%)	4 (7.0%)	52 (33.1%)	
Yes	52 (52.0%)	53 (93.0%)	105 (66.9%)	
My spouse provides funds for my healthcare expenses				< 0.001
No	70 (70.0%)	57 (100.0%)	127 (80.9%)	
Yes	30 (30.0%)	0 (0.0%)	30 (19.1%)	
I have the final say at home regarding my healthcare decisions				< 0.001
No	84 (84.0%)	12 (21.1%)	96 (61.1%)	
Yes	16 (16.0%)	45 (78.9%)	61 (38.9%)	
My spouse has the final say at home regarding my healthcare decisions				< 0.001
No	28 (28.0%)	52 (91.2%)	80 (51.0%)	
Yes	72 (72.0%)	5 (8.8%)	77 (49.0%)	
I have been treated badly in past at a Sénégal health facility				0.294
No	82 (83.7%)	43 (76.8%)	125 (81.2%)	

Table 4: Language of health service provision by Malinké preferred speaker

	Malinké Speaker (N=99)	Malinké non-speaker (N=59)	Total (N=158)	p value
Care has been conducted in Malinké				< 0.001
No	47 (48.0%)	58 (100.0%)	105 (67.3%)	
Yes	51 (52.0%)	0 (0.0%)	51 (32.7%)	
Care has been conducted in Wolof				0.006
No	54 (55.1%)	45 (77.6%)	99 (63.5%)	
Yes	44 (44.9%)	13 (22.4%)	57 (36.5%)	
Care has been conducted in French				< 0.001
No	45 (45.9%)	49 (84.5%)	94 (60.3%)	
Yes	53 (54.1%)	9 (15.5%)	62 (39.7%)	
Client received interpretation				0.724
No	34 (35.8%)	18 (32.1%)	52 (34.4%)	
Yes	61 (64.2%)	38 (67.9%)	99 (65.6%)	

Table 5: Cervical cancer knowledge by gender

	Female (N=101)	Male (N=57)	Total (N=158)	p value
Aware of cervical cancer				1.000
No	32 (31.7%)	18 (31.6%)	50 (31.6%)	
Yes	69 (68.3%)	39 (68.4%)	108 (68.4%)	
Aware of cervical cancer screening test				0.619
No	46 (46.0%)	29 (50.9%)	75 (47.8%)	
Yes	54 (54.0%)	28 (49.1%)	82 (52.2%)	
Screening is important even without symptoms				0.268
Strongly Disagree	1 (1.0%)	1 (1.8%)	2 (1.3%)	
Disagree	1 (1.0%)	2 (3.5%)	3 (1.9%)	
Undecided	2 (2.0%)	1 (1.8%)	3 (1.9%)	
Agree	32 (32.7%)	11 (19.3%)	43 (27.7%)	
Strongly Agree	62 (63.3%)	42 (73.7%)	104 (67.1%)	
A woman is at increased risk if she has multiple sexual partners				0.010
Strongly Disagree	1 (1.0%)	3 (5.4%)	4 (2.6%)	
Disagree	6 (6.1%)	3 (5.4%)	9 (5.8%)	
Undecided	5 (5.1%)	12 (21.4%)	17 (11.0%)	
Agree	33 (33.7%)	16 (28.6%)	49 (31.8%)	
Strongly Agree	53 (54.1%)	22 (39.3%)	75 (48.7%)	
A woman is at increased risk if her husband has multiple sexual partners				< 0.001
Strongly Disagree	2 (2.0%)	1 (1.8%)	3 (1.9%)	
Disagree	3 (3.0%)	1 (1.8%)	4 (2.6%)	
Undecided	4 (4.0%)	12 (21.4%)	16 (10.3%)	
Agree	28 (28.3%)	21 (37.5%)	49 (31.6%)	
Strongly Agree	62 (62.6%)	21 (37.5%)	83 (53.5%)	
Smoking increases the risk of cervical cancer				0.008
Strongly Disagree	3 (3.1%)	3 (5.4%)	6 (3.9%)	
Disagree	18 (18.4%)	3 (5.4%)	21 (13.6%)	
Undecided	13 (13.3%)	16 (28.6%)	29 (18.8%)	
Agree	32 (32.7%)	24 (42.9%)	56 (36.4%)	

Strongly Agree	32 (32.7%)	10 (17.9%)	42 (27.3%)	
IUDs offer a protective benefit against cervical cancer				0.006
Strongly Disagree	9 (9.1%)	3 (5.5%)	12 (7.8%)	
Disagree	10 (10.1%)	5 (9.1%)	15 (9.7%)	
Undecided	30 (30.3%)	32 (58.2%)	62 (40.3%)	
Agree	27 (27.3%)	12 (21.8%)	39 (25.3%)	
Strongly Agree	23 (23.2%)	3 (5.5%)	26 (16.9%)	
OCPs increase cervical cancer risk				0.012
Strongly Disagree	9 (9.2%)	4 (7.1%)	13 (8.4%)	
Disagree	13 (13.3%)	7 (12.5%)	20 (13.0%)	
Undecided	24 (24.5%)	27 (48.2%)	51 (33.1%)	
Agree	27 (27.6%)	14 (25.0%)	41 (26.6%)	
Strongly Agree	25 (25.5%)	4 (7.1%)	29 (18.8%)	
Screening is recommended after menopause				< 0.001
Strongly Disagree	12 (12.1%)	14 (25.5%)	26 (16.9%)	
Disagree	44 (44.4%)	10 (18.2%)	54 (35.1%)	
Undecided	8 (8.1%)	18 (32.7%)	26 (16.9%)	
Agree	9 (9.1%)	9 (16.4%)	18 (11.7%)	
Strongly Agree	26 (26.3%)	4 (7.3%)	30 (19.5%)	
Early screening benefits prevention				0.816
Strongly Disagree	1 (1.0%)	1 (1.8%)	2 (1.3%)	
Disagree	7 (7.1%)	2 (3.5%)	9 (5.8%)	
Undecided	4 (4.0%)	1 (1.8%)	5 (3.2%)	
Agree	37 (37.4%)	22 (38.6%)	59 (37.8%)	
Strongly Agree	50 (50.5%)	31 (54.4%)	81 (51.9%)	

Table 6: Experience of cervical cancer screening among those screened in our sample

	Screened Once. (N=10)	Multiple Screenings. (N=2)	Total (N=12)	p value
Satisfied with screening				0.462
Strongly Disagree	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Disagree	1 (10.0%)	0 (0.0%)	1 (8.3%)	
Undecided	1 (10.0%)	0 (0.0%)	1 (8.3%)	
Agree	0 (0.0%)	1 (50.0%)	1 (8.3%)	
Strongly Agree	8 (80.0%)	1 (50.0%)	9 (75.0%)	
Lengthy wait for screening				0.099
Strongly Disagree	1 (10.0%)	0 (0.0%)	1 (8.3%)	
Disagree	1 (10.0%)	1 (50.0%)	2 (16.7%)	
Undecided	0 (0.0%)	1 (50.0%)	1 (8.3%)	
Agree	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Strongly Agree	8 (80.0%)	0 (0.0%)	8 (66.7%)	
Adequate orientation to screening				0.318
Strongly Disagree	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Disagree	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Undecided	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Agree	1 (10.0%)	1 (50.0%)	2 (16.7%)	
Strongly Agree	9 (90.0%)	1 (50.0%)	10 (83.3%)	
Screening test was comfortable				0.136
Strongly Disagree	2 (20.0%)	0 (0.0%)	2 (16.7%)	
Disagree	1 (10.0%)	0 (0.0%)	1 (8.3%)	
Undecided	0 (0.0%)	0 (0.0%)	0 (0.0%)	
Agree	1 (10.0%)	2 (100.0%)	3 (25.0%)	
Strongly Agree	6 (60.0%)	0 (0.0%)	6 (50.0%)	

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- 18Q04K011234DataComb.csv
- RMarkdownFileCC.pdf