

# The Role of Sources and Types of Health Information in Shaping Health Literacy in Cervical Cancer Screening Among African Immigrant Women: A Mixed-Methods Study

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## ABSTRACT

**Background:** Health literacy is a strong determinant of health outcomes among immigrants. How sources and types of health information influence health literacy in the context of cervical cancer screening among African immigrant women remains unknown. **Objective:** This study was undertaken to explore how various sources and types of health information influence information sharing and health literacy in the context of cervical cancer screening among African immigrant women. **Methods:** Using a mixed-methods approach, a convenience sample of African immigrant women ( $N = 167$ ) completed study surveys followed by semi-structured individual phone interviews with a purposive sub-sample ( $n = 20$ ) of survey participants. The relationship between sources and types of health information and health literacy was assessed using multivariate logistic regression. Emergent themes were identified in the qualitative interviews using content analysis. Qualitative and quantitative data were merged to describe differences and similarities in African immigrant women's experiences and display of health literacy by different sources and types of health information. **Key Results:** Health care providers (78%), women friends (46%), and internet (45%) were the most common sources of health information used by African immigrant women, followed by women relatives (32%), television (22%), social media (17%), and church (16%). Content analysis revealed that the health care provider was rated as the most credible source; personal experiences of family and friends made health information more relatable; and church was the least endorsed source. Health information presented verbally (adjusted odds ratio of 5.51,  $p = .01$ ) was associated with higher health literacy even after controlling for covariates. Most African immigrant women had health information presented in verbal form (80%), with pictures (43%) being the least popular type of health information. **Conclusions:** Study findings suggest that verbal communication is associated with health literacy in the context of cervical cancer screening among African immigrant women. Health interventions that use peer educators (women friends and family) and incorporate verbal communication may be a more effective strategy in promoting positive cervical cancer health behaviors among African immigrant women. [HLRP: Health Literacy Research and Practice. 2021;5(2):e96-e108.]

**Plain Language Summary:** For this mixed-methods study, a convenience sample of African immigrant women ( $N = 167$ ) completed study surveys followed by semi-structured individual phone interviews with a purposive sub-sample ( $n = 20$ ) of the survey participants. Study findings show a strong association between verbal communication and health literacy in the context of cervical cancer screening among African immigrant women.

In the United States, health disparities persist among ethnic/racial minority and immigrant groups, and the African immigrant population is identified as one of the most vulnerable immigrant groups (Adegboyega & Hatcher, 2016; Institute of Medicine, 2009; Kindig et al., 2004;

Venters & Gany, 2011). As of 2015, there are more than 2 million African immigrants residing in the U.S., and this number is expected to increase about 10-fold in the next decade (Anderson, 2017). The majority (56%) of African immigrants migrated to the U.S. from Nigeria, Ethiopia,

Ghana, Kenya, and South Africa, countries where English is spoken as an official language (Anderson, 2017; Zong & Batalova, 2017). Compared to other fast-growing immigrant groups (e.g., Hispanic, Korean, Chinese, Filipino) in the U.S., African immigrants tend to be younger, more proficient in English, and have higher educational and economic (income and employment) attainments (Zong & Batalova, 2017). Yet, studies show that African immigrants report inadequate use of health services and poor health outcomes compared to other immigrant groups. For example, African immigrant women have lower Pap testing rates (26%-48%) (Forney-Gorman & Kozhimannil, 2016; Samuel et al., 2009) compared to the rates (52%-70%) reported among Asian immigrants (Korean, Vietnamese, Cambodian) (Samuel et al., 2009; Shim et al., 2017). African immigrants also report higher cardiovascular disease prevalence (28%) than is reported among Hispanic (12%-20%) and Asian (9%-21%) immigrants (Commodore-Mensah et al., 2018; Fang et al., 2018; Leigh et al., 2016). Addressing the health disparities faced by African immigrants, a steadily increasing (yet vulnerable) immigrant ethnic/racial population in the U.S. is a significant public health and research priority (National Institutes of Health, 2015).

Low health literacy is a primary contributor to health disparities (Institute of Medicine, 2009; Kindig et al., 2004; Lee et al., 2015). Health literacy is defined as person's ability to "obtain, process, understand and use basic health information and services to make appropriate health decisions" (Kindig et al., 2004). Based on past studies, the definition of health literacy can be expanded to include the skills and abilities needed to engage in ongoing dialogue with families, community members, and health care providers to inform health decisions and improve health behaviors (Kendir & Breton, 2020; Sørensen et al., 2012; Zarcadoolas et al., 2003). Among

immigrant populations in the U.S, low health literacy has been associated with the under-use of appropriate health services as well as poor health outcomes. For instance, Hispanic and Chinese immigrants with lower health literacy reported lower rates of cancer screening, lower physical activity, higher rates of depression, and poorer quality of life compared to those with higher health literacy levels (Boom et al., 2018; Garbers & Chiasson, 2004; Guntzviller et al., 2017; Lee et al., 2015; Sentell et al., 2015; Wang et al., 2013). High health literacy levels are shown to improve people's ability to evaluate the quality of health information, apply health-related instructions to inform health behaviors, and communicate effectively with health care providers (Diviani et al., 2015, 2016; Harrington & Valerio, 2014; Kripalani et al., 2010; Redmond et al., 2010; Sistani et al., 2013). It is evident that having higher literacy levels empowers people to maintain good health (Baker, 2006; Kindig et al., 2004; ). Therefore, improving health literacy levels of African immigrants could be a critical step in addressing the health disparities evident in this population.

Sociodemographic factors and certain characteristics of health information have been examined in relation to health literacy (Baker, 2006; Kindig et al., 2004). Previous studies on immigrant and ethnic/racial minority groups have focused primarily on the sociodemographic (i.e., age, income, education, English proficiency, and access to medical care) determinants of health literacy (Kindig et al., 2004). For example, lower health literacy levels are reported among older Korean immigrants, Hispanic and Chinese immigrants with low English proficiency (Lee & Choi, 2012; Sentell et al., 2015), and African Americans with low income and limited access to primary care (Lee & Choi, 2012; Osborn, Cavanaugh, et al., 2011; Osborn, Paasche-Orlow et al., 2011). The literature is scarce, and it is not completely clear how characteristics of health information influence health literacy. Yet, available research

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*Grant: J. C. received a grant (F31CA221096) from the National Cancer Institute during the conduct of this study.*

*Disclosure: The authors have no relevant financial relationships to disclose.*

*Received: January 14, 2020; Accepted: July 1, 2020.*

*doi:10.3928/24748307-20210322-01*

seems to suggest that certain characteristics (e.g., sources and types) of health information may also influence where African immigrants seek health information, the significance they assign to the health information received, and how they respond to recommendations for health behavior modifications (Kindig et al., 2004; Simmelink et al., 2013). For example, women friends and family served as a main source of health communication and information for African women in relevance to their knowledge about HIV and screening behaviors (Juma et al., 2018; Wolf & Bond, 2002). As for types of health communication, verbal exchange has been a prominent form among African women, which is consistent with traditional African cultures where health knowledge, beliefs, and practices are passed down through generations and shared among social networks through speeches, songs, and folktales (Finnegan, 2007; Hinyard & Kreuter, 2007).

These prior studies suggest a culturally relevant pathway through which we could better understand the interplay between sources and types of health information and health literacy among African immigrants, a population that is burdened by poor health outcomes. Therefore, the purpose of this mixed-methods study was to explore how various sources and types of health information influence information sharing and health literacy in the context of cervical cancer screening among African immigrant women. For the purpose of this study, sources of health information were defined as the interpersonal relationships made through social ties, and the mass media communication strategies that influence health behaviors and health beliefs, and it also included family, relatives, friends, church, television/radio, internet, social media, and physician/health care provider (Perry & Pescosolido, 2015; Redmond et al., 2010). Types of health information were defined as the communication strategies for disseminating health information with the aim of influencing health beliefs and behaviors, and included verbal, written text, and pictures (Redmond et al., 2010). Finally, health literacy was conceptualized as a multi-dimensional concept to include a person's familiarity with and understanding of basic medical terms, and how that enhances their ability to navigate the health care system for preventive health services such as cancer screening (Han et al., 2014, 2019).

## METHODS

### Study Design

The data used for this analysis came from an explanatory mixed-methods study designed to examine how health literacy and cultural and psychosocial (cancer knowledge, self-efficacy, decisional balance) factors in-

fluence the Pap testing behaviors of African immigrant women (Cudjoe et al., 2020). The quantitative strand of the study provided a general understanding of the statistical relationships among sources and types of health information and health literacy. The qualitative strand then provided an in-depth understanding of the quantitative data by explaining the various sources and types of health information African immigrant women use to inform their health behaviors. Finally, the quantitative and qualitative data were integrated to explain how health literacy differs by African immigrant women's sources and types of health information to help us better understand the interplay between the characteristics of health information and health literacy (Creswell & Clark, 2011).

### Sampling

A convenience sample of 167 African immigrant women was recruited using two main approaches: online and in-person surveys via Qualtrics, a web-based survey tool. The sample size calculation for this study is reported elsewhere (Cudjoe et al., 2020). Briefly, potential study participants were approached at various African immigrant churches and community organizations. The online survey included a copy of The Johns Hopkins Medicine institutional review board (IRB)-approved oral consent script and an eligibility self-screener. The online survey was limited to people who could complete the survey on their own with no assistance from the research team. Participants were eligible to enroll in this study if there were female, age 21 to 65 years, self-identified as African immigrants, had no history of hysterectomy, could read and write English, and resided in the U.S. Our previous study showed that using both in-person and online recruitment strategies helped to maximize the recruitment catchment and diversity (i.e., African nationality) of study participants (Cudjoe et al., 2019). For the qualitative phase of the study, we purposively sampled African immigrant women from the larger quantitative study, using 75th percentile health literacy scores as the cutoff (high/low), history of Pap testing (yes/no), demographic characteristics (age, educational attainment, and English proficiency). Participants ( $n = 20$ ) were interviewed until data saturation was indicated by no new emergent themes.

### Procedures

All study procedures were approved by The Johns Hopkins Medicine IRB. Data collection occurred between November 2017 and December 2018. For participants who completed the in-person survey, oral informed consents

were obtained by trained bilingual research assistants at study sites. The in-person survey completers received a link to the online survey and were encouraged to share it with other African immigrant women within their social networks. The link was also disseminated using WhatsApp, a social media and communication platform commonly used within the African immigrant community. The online survey included a copy of the IRB-approved oral consent script and an eligibility self-screener. All study participants received a \$5 gift card after survey completion. Gift cards were mailed to those who completed the survey online. Because study participants were recruited from all over the U.S., we conducted one-on-one interviews exclusively on the phone; interviews lasted approximately 30 minutes on average. Each individual phone interview was recorded and transcribed verbatim. Individual phone interview participants received an additional \$5.

### Quantitative Measures

**Sociodemographic characteristics.** A questionnaire designed for the purpose of this study was used to collect quantitative data on individual characteristics known to be related to health literacy levels. The information collected included age (21-65 years), education level (less than college, college educated), access to primary care (yes/no). Income was assessed with the question: "Can you give an estimate of the annual household income?" and participants were categorized as low or high based on sample median. English proficiency was measured with the questions, "(1) How well do you speak in English? (2) Can you converse in English? (3) Can you speak over the phone in English? (4) Can you read English newspapers? (5) How well can you interact at the hospital without the assistance of translators? and (6) Do you need help reading instructions or pamphlets you receive from the doctor or pharmacist?" The first five items were scored on a 4-point Likert scale and the last item was scored on a 5-point Likert scale. Higher scores indicated higher English proficiency.

**Sources and types of health information.** Types of health information were measured with the question: "How is women's health information often presented to you?" (verbal/written text/pictures/other), with participants given the option to mark all that apply. Sources of health information were measured with the question: "From whom or where do you most likely get advice about women's health?" (women family/relatives, women friends, pastor/church, TV/radio, internet, social media, physician/health care practitioner, and other), with participants given the option to mark all that apply.

**Health literacy.** The Assessment of Health Literacy-Cancer (AHL-C) (Han et al., 2014) was used to measure participants' health literacy (i.e., familiarity and navigational ability) in the context of cervical cancer screening. The AHL-C has evidence of reliability and validity (Han et al., 2014). Higher total scores indicated higher health literacy levels. The internal consistency (Cronbach's alpha) for the navigation and familiarity sub-scales in the original validation sample were 0.92 and 0.96, respectively, and 0.86 and 0.98, respectively, in our study sample.

### Qualitative Measure

**Interview guide.** For the qualitative phase of the study, in-depth data were collected using a semi-structured interview guide (Table A).

### ANALYSIS

All quantitative analyses were performed using Stata 14 software. Descriptive statistics such as frequencies and percentages were calculated for all categorical variables, and means with standard deviations were reported for continuous variables. To examine the relationship between sources and types of health information and health literacy, we created dummy variables (yes/no) for participants who used or did not use the various sources and types of health information. For health literacy, participants were categorized as high and low using 75th percentile scores as the cutoff. We used multivariable logistic regression to test the relationship between sources and types of health information and health literacy. We controlled for age, education, income, English proficiency, and health care access as covariates (Kindig et al., 2004) and considered statistical significance if  $p < .05$ . The qualitative data were analyzed using inductive coding and qualitative content analysis (Hsieh & Shannon, 2005; Patton, 2002). After reading each transcript multiple times, four coders conducted initial coding independently. The coders then categorized the initial codes and grouped them into emerging themes. The study team discussed all emergent themes and finalized on themes and sub-themes after all discrepancies were addressed. Throughout the coding process, reflexivity was maintained through written memos. The study team enhanced the transferability of findings, by providing a thorough description of study findings using verbatim transcripts and relevant quotes. Trustworthiness was also achieved through research team discussions, along with audit trail documentation (Creswell, 2012; Morse, 2015). In the final phase, we integrated results from the quantitative and qualitative analyses by jointly displaying main sources and types of health information using the

TABLE 1

### Sample Characteristics for the Quantitative Phase of the Study (N = 167)

Characteristic	Overall
Age, years	
Mean (SD)	40.9 (12.25)
Range	22-65
Income (n, %)	
Low	84 (50)
High	83 (50)
Education (n, %)	
Less than college	53 (32)
College educated	114 (68)
Access to primary care (n, %)	
Yes	123 (74)
No	44 (26)
Sources of health information (n, %) <sup>a</sup>	
Health care provider	131 (78)
Women friends	76 (46)
Internet	76 (45)
Female family	53 (32)
Television/radio	36 (22)
Social media	28 (17)
Church	26 (16)
Types of health information (n, %) <sup>a</sup>	
Verbal	134 (80)
Written text	108 (66)
Pictures	72 (43)
Health literacy (n, %)	
Low	79 (47)
High	88 (53)

Note. English proficiency mean score was 22.69, with standard deviation of 3.86.

<sup>a</sup>Amount may exceed 167 or 100% because participants marked all options that applied.

themes that emerged from the qualitative analysis with the results from quantitative, bivariate, and multivariate logistic analyses.

## RESULTS

### Sample Characteristics

A total of 167 African immigrant women participated in the survey. The description of study participants who completed the study survey in-person and online has been previously reported (Cudjoe et al., 2019). Sample characteristics for the quantitative phase of the study are reported in

TABLE 2

### Characteristics of Participants Interviewed for Qualitative Phase of the Study (N = 20)

Characteristic	High Health Literacy (n = 15)	Low Health Literacy (n = 5)
Age, years		
Mean (SD)	37.3 (10.29)	45.4 (15.37)
Range	24-61	26-63
Education, n		
<High school	1	2
High school graduate	-	2
Vocational school	1	1
College	13	-
English proficiency, n		
Low	-	2
High	15	3

**Table 1.** Participants' ages ranged from 22 to 65 years, and the average age (standard deviation [SD]) of study participants was 40.90 years (12.25). Most participants (68%) were college educated and had access to primary care (74%). The average SD English proficiency score was 22.69 (3.86), indicating a high overall English proficiency. Eighty-eight participants (53%) had high health literacy levels, and 47% (n = 79) had low health literacy levels. **Table 2** summarizes the characteristics of a subset of 20 participants who were interviewed for the qualitative phase of the study. Of the 20 African immigrant women who were interviewed, 15 had high health literacy levels and 5 had low health literacy levels. In general, the characteristics of the subsample were similar to those of the survey sample.

### Sources of Health Information

**Table 3** and **Table 4** describe integrated data from the quantitative and qualitative analyses. Using health care providers as a health information source was most frequently endorsed by African immigrant women (78%) and was significantly associated with high health literacy only at the bivariate level (odds ratio [OR] = 2.76, p = .01). Using the church as a source of health information received the lowest endorsement rate (16%) by African immigrant women, but was significantly associated with health literacy (OR = 0.42, p = .049), although only at the bivariate level. Women friends/family, the internet, television/radio, and social media were also identified as main sources of health information (46%,



TABLE 3

### How Sources of Health Information Influence Information Sharing and Health Literacy Among African Immigrant Women

Information source (%)	Unadjusted OR (p value)	Adjusted OR <sup>a</sup> (p value)	Quote(s)
Health care providers are a main and reliable source of health information			
Health care provider (78)			
No	Ref	Ref	"One that I found useful was actually the physician... I asked her if I was eligible for Gardasil to prevent HPV. So, I asked her about it, and she explained it so well. She also told me that at the time, I wasn't eligible because I was older than 26. Great information. I feel like if I had looked at the information on Google it wouldn't be the same. She presented the information to me because it related to me." (college educated, age 27 years, high health literacy)
Yes	2.76 (.039)	2.51 (.069)	
Personal experiences of women family members and friends			
Friends (46)			
No	Ref	Ref	"Sometimes I feel sources from friends are a little more credible. Especially when someone has been through it or knows somebody that has been through it." (college educated, age 27 years, high health literacy)
Yes	0.90 (.757)	1.17 (.785)	
Family (32)			
No	Ref	Ref	"I remember when I was going through severe pain due to my menstrual cycle, and I went to the hospital... the only thing that can make this pain go is having a birth control pill. As I was taking it, I had this kind of different feelings, different signs, so I was like, what's going on. Then when I asked to my siblings, they were like, oh they know people like that who was taking that kind of medication... this kind of result you get which was the same thing I was getting" (high school graduate, age 28 years, low health literacy)
Yes	0.68 (.208)	0.85 (.759)	
Internet, television, and social media as health information sources			
Internet (45)			
No	Ref	Ref	"... I am not a person who watches TV but when I watch TV, I want to look for things like health... those types of things. That's where I get my health information from" (vocational school, age 57 years, low health literacy)
Yes	1.62 (.124)	0.63 (.330)	
Television (22)			
No	Ref	Ref	"I am a technology person. I read a lot of social media like Facebook... When I'm feeling something, I make sure I read to keep me informed about health" (college educated, age 31 years, high health literacy)
Yes	0.72 (.991)	1.45 (.544)	
Social media (17)			
No	Ref	Ref	"YouTube, the recent one I got from YouTube was that on this blood pressure, I saw one... I forgot the man's name; he was talking about the blood pressure medication. He said we should not only depend on medication because it has side effects. What he said was that we should also look at the natural plants. That we can be taking so that it helps to at least, it helps in our body" (less than high school education, age 63 years, low health literacy)
Yes	1.04 (.916)	1.63 (.453)	

TABLE 3 (continued)

**How Sources of Health Information Influence Information Sharing and Health Literacy Among African Immigrant Women**

Information source (%)	Unadjusted OR (p value)	Adjusted OR <sup>a</sup> (p value)	Quote(s)
Church community			
Church (16)			
No	Ref	Ref	"When it comes to church, the church gathers them [African immigrant women] around... I feel like it's hard to get our people to do things unless it's after church they are already there... People don't really share that they have any cancer because of the negative connotation. You have to find that out for yourself and even that they don't go into details. They just tell you to remember them in prayers. We hardly...well, in my opinion it's a hush hush. We don't share such information...they don't even give you the chance to even talk about it" (college educated, age 40 years, high health literacy)
Yes	0.42 (.049)	0.66 (.582)	

Note. OR = odds ratio. Ref = reference.

<sup>a</sup>Controlled for age, income, education, English proficiency, access to primary care.

45%, 32%, 22%, and 17%, respectively) but bore no significant associations with health literacy levels.

**Health care providers are a main and reliable source of health information.** African immigrant women who received health information from health care providers were almost 3 times more likely to have higher health literacy levels than those who did not use health care providers as a health information source (OR = 2.76,  $p = .01$ ), but the relationship became non-significant after controlling for covariates. Throughout the narratives, participants in both the high and low health literacy groups revealed that they get health information primarily from health care providers. The participants went further to describe how the knowledge and expertise of health care providers made them a more credible source of health information than other sources such as the internet or people in their network.

**Church community.** Aside from the church (16%) being the least endorsed source of health information, African immigrant women who sought health information from the church were 58% less likely to have higher health literacy than those who did not use the church as a health information source (OR = 0.42,  $p < .05$ ), although only at the bivariate level. Interview participants stated that although the church provides social support for African immigrant women, diseases such as cancer are highly stigmatized within the African immigrant community and are often not discussed in the church.

**Personal experiences of women family members and friends.** African immigrant women, regardless of their health literacy levels, sought a wide array of health information (e.g., Pap testing, fertility, contraceptive use, disease symptoms) from women in their social circles. Some participants reported that hearing about their women family and friends' past experiences made the health information they received more relatable. Other participants stated that they sought health information from women family and friends because it was more convenient and it gave them the opportunity to openly discuss their female health concerns.

**Internet, television, and social media as health information sources.** The multivariate analyses showed no significant associations among the internet, television, and social media as health information sources and African immigrant women's health literacy. The qualitative interviews also supported the trend and showed that use of these sources was not limited to a particular health literacy group, although younger women tended to talk more about social media and older women focused their discussion on television and the internet (mostly YouTube).

**Types of Health Information**

Verbally transmitted health information was the most frequently used type of health information (80%) among African immigrant women and was also significantly as-

TABLE 4

## How Types of Health Information Influence Information Sharing and Health Literacy Among African Immigrant Women

Information type (%)	Unadjusted OR (p value)	Adjusted OR <sup>a</sup> (p value)	Quote(s)
Verbal exchange is related to high cervical cancer screening health literacy			
Verbal (80)			
No	Ref	Ref	"Sometimes in our female groups we always have health talks and how to take care of the home. We usually have people come and give us a talk on topics they feel are important" (college educated, age 54 years, high health literacy)
Yes	2.29 (.039)	5.51 (.005)	"Back home because of the level of education, a lot of things are presented to women in form of songs when they come from the clinic. When women come to the clinic, they sing your song, so they stick with them. And then help them remember those things... Here, you are not allowed to have that kind of support. Back home, experience is good. Those who go to the hospital, apart from the medication, they have support... Create a peer group and have friends to create the peer group to go out there... Make sure that people get screening like you want them to get. You use peer groups who are not experts like you. Support the women group. Because here, a lot of people have the opportunity more than those back home. So, you have to be able to stretch arms to those people that really need this kind of help. Information is very important. Once people are informed, it can do a lot." (vocational school, age 57 years, low health literacy)
Health information presented in written and picture forms			
Written (66)			
No	Ref	Ref	"They have a lot of pamphlets, and a lot of books about it in their offices. They gave me one of it to read" (college educated, age 31 years, high health literacy)
Yes	2.96 (.001)	2.51 (.091)	"I didn't know what they talk about, but I tell them that I will sign anything they tell me to sign. That time I did not understand English, so I did not know what the doctor talk about... if they show you picture, you can compare to what they tell you. If they just tell you, you can't understand. If they show me the picture, then I know part of the body the doctor is talking about" (less than high school education, age 53 years, low health literacy)
Pictures (43)			
No	Ref	Ref	
Yes	0.72 (.985)	0.72 (.569)	

Note. OR = odds ratio. Ref = reference.  
<sup>a</sup>Controlled for age, income, education, English proficiency, access to primary care.



sociated with higher health literacy levels (OR = 2.29,  $p = .039$ ). African immigrant women who received health information verbally were 5 times more likely to report higher health literacy levels than those who did not receive health information in verbal form, even after controlling for covariates (adjusted OR = 5.51,  $p = .01$ ). Having health information presented in written form or using visual aids (pictures and videos) were rated as the second and third most frequently used types of health information (66% and 43%), respectively, despite their nonsignificant associations with health literacy (Table 4).

**Verbal exchange is related to high cervical cancer screening health literacy.** Verbal exchange was a prominent form of health information noted in the sample of African immigrant women. In addition to the majority of survey participants indicating that they primarily received health information in verbal form, when asked about preferable means of health information delivery, most African immigrant women with high health literacy stated that they liked to receive health information through verbal exchange.

Some participants also described the success of previous health programs within African immigrant communities and suggested that future interventions that target African immigrant women incorporate verbal communication.

**Health information presented in written and picture forms.** Having health information presented in written text (66%) was associated with almost a 3 times likelihood of higher health literacy (OR = 2.96,  $p < .01$ ), but the relationship was no longer significant when we controlled for covariates. Using visual aids (43%) to present health information was not associated with health literacy. Throughout the qualitative narratives, participants with high health literacy mentioned that they often had information presented to them in written form (i.e., pamphlets, journals, magazines), whereas participants with low health literacy identified low English proficiency as a barrier to effective provider-patient communication and suggested that health information be presented using visual aids (i.e., pictures, videos).

## DISCUSSION

Using a mixed-methods design, we performed a secondary analysis of data to explore how various sources (family, relatives, church, television/radio, internet, social media, and health care provider) and types (verbal, written text, pictures) of health information may be related to health literacy in the context of cervical cancer screening among African immigrant women living in the U.S. Past studies have focused primarily on the association between sociodemographic factors and health literacy levels in relation to cervical cancer screen-

ing, and have mostly included Chinese and Hispanic immigrants (Boom et al., 2018; Garbers & Chiasson, 2004; Lee & Choi, 2012; Sentell et al., 2015).

Results from the study survey showed that African immigrant women primarily sought health information from health care providers, women friends/relatives, and the internet. However, we found no significant associations between the various sources of health information (i.e., women family/friends, pastor/church, television/radio, internet, social media, physician/health care practitioner) and health literacy in the context of cervical cancer screening after controlling for all covariates. The qualitative interviews revealed that African immigrant women, regardless of their health literacy levels, rated health care providers as the most credible health information source, corroborating findings from a national report that showed Hispanic immigrants preferred health information from health care providers compared to other sources (radio, television, internet) (Livingston et al., 2008). The qualitative interviews also revealed that hearing about the past experiences of other women made the health information they received more relatable. The results support the need to inform providers on culturally appropriate and effective ways to engage African immigrant women in a health care setting. Future studies that aim to improve reproductive health behaviors, such as breast and cervical cancer screening among African immigrant women in the U.S., should also focus on improving communication and information sharing within participants' social networks (women friends/family). Peer education positively influenced Ghanaian and South African women's likelihood of changing a health behavior because of the cultural similarities that exist between the peer educator and recipient of the health information (Hill et al., 2007; Wolf & Bond, 2002).

Churches provide social support and a sense of social cohesion for many immigrant communities, but only a small proportion (16%) of our study participants reported that they received health information from the church (Ezeanolue et al., 2015; Wamai et al., 2012). Our quantitative survey results also showed that using the church as a health information source was negatively associated with African immigrant women's health literacy in relation to cancer screening. In the qualitative interviews, participants revealed that cancer is stigmatized within African immigrant communities, and cancer screening is not openly discussed at church or other social gatherings. Similar findings were reported in two South African studies where clergy reported that they did not offer other health-related information such as HIV prevention and reproductive programs to their congregation due to the fear and stigma associated with these health topics (Eriksson et al., 2010; Van Dyk, 2017). Future church-based interventions designed

to improve African immigrant women's health literacy and cancer screening behaviors should also address the stigma and fatalistic beliefs surrounding cancer (Ghebre et al., 2015; Raymond et al., 2014).

In our study, African immigrant women who had health information presented to them in verbal form were 5 times more likely to report higher health literacy levels in relation to cervical cancer screening. A possible explanation might be that African immigrant women who receive health information through verbal exchange have a greater likelihood to understand, retain, and use that knowledge to make appropriate health decisions. A similar finding was noted in a study of African American and Hispanic adults, in whom people with high health literacy were more likely to process (i.e., remember) health information they verbally discussed with health care providers (Harrington & Valerio, 2014). The majority of our study participants were originally from West Africa and East Africa, where cultures are traditionally oral and most cultural beliefs and health information are shared through verbal exchange (Simmelink et al., 2013). When presenting health materials to a culturally unique population such as African immigrants, it is important to ensure that the information is presented in a culturally relevant manner so it captures the attention and addresses the health needs of the population (Ford et al., 2005; Hill et al., 2007). Our findings suggest that health literacy-focused interventions that use verbal exchange strategies to communicate health information would be culturally appropriate and have the potential to improve health literacy among African immigrant women.

In our study, nearly one-half of African immigrant women in the sample reported using the internet (45%) to address their health needs. Use of social media (17%) was less frequent but the qualitative interviews further revealed that regardless of health literacy levels, younger African immigrant women used social media to communicate and disseminate women's health information (cancer screening, fertility, diet, and exercise) within their social networks. The internet and social media are new yet rapidly diffusing information retrieval and communication platforms, particularly among immigrants (Chen, 2010). Previous studies have shown that most adults in the U.S., regardless of their health literacy levels, looked for health information on the internet and on social media (Chen, 2010; Fox & Duggan, 2013; Zucco et al., 2018). Our findings suggest that disseminating health information online via internet and social media could be a potentially effective strategy to address the health needs of African immigrant women. However, all

participants were unable to describe how they determined the quality and accuracy of online health information, indicating that African immigrant women could be at risk of encountering and acting on inaccurate and potentially harmful health information they find online. Further studies are needed to inform the development of effective strategies to improve African immigrant women's ability to critically evaluate the credibility of online health information.

## STUDY LIMITATIONS

For the quantitative phase of the study, we used a relatively small convenience sample of 167 African immigrant women who were predominantly middle-aged (mean age of 40 years), college educated (68%), and with high English proficiency (77%), which limits the generalizability of our findings. In addition, our quantitative results showed no significant associations among the various sources of health information and health literacy, suggesting that our study may have been underpowered for the multiple adjusted analyses. Most participants who completed the qualitative interviews reported high health literacy levels, so the themes derived may not be applicable to people with low health literacy in relation to cervical cancer screening. Nevertheless, this study used a mixed-methods design that allowed us to better understand the intricate interplay between various sources and types of health information and health literacy from the perspective of African immigrant women.

## CONCLUSION

Cultural beliefs and attitudes influence health literacy and are key to how people communicate, understand, and use health information (Harrington & Valerio, 2014; Kindig et al., 2004). Our primary finding that verbal information exchange is associated with health literacy in the context of cervical cancer screening among African immigrant women identifies a critical gap in health literacy knowledge and lays the foundation for examining the impact of verbal health information exchange on health outcomes among culturally and linguistically diverse immigrant populations in the U.S. Future research to gain a better understanding of the role of verbal information exchange on health literacy levels may allow for effective provider-patient communication, particularly among African immigrant women whose cultural tradition also promotes health information exchange through verbal communication. Future research should focus on the development of culturally appropriate internet and social media-based interventions to address the health behaviors and health needs of

African immigrant women, and it should further explore the impact of multimodal communication (i.e., verbal, written text, pictures) on the health literacy levels of African immigrant women.

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TABLE A

**Interview Guide**

Topic Area	Question
Sources of health information	Where do you usually get women's health information? Do you think the source of the information determines its usefulness? Does the usefulness of the information change if you get it from a doctor, women family/friend, pastor/head of women's ministries, daughter? Tell me more. Tell me about a recent encounter with your doctor where you found the information useful. Can you share that information with me? (If there is no recent doctor encounter, then ask about most recent encounter with women family/friends, daughter, pastor, church community) where they received women's health information) If you had any questions about your health, who would you talk to, and why?
Type of health information	Describe a women's reproductive health message that you found useful. How was the message presented to you? Who presented the information to you? Why did you find it useful? If you had the chance to teach other women about cervical cancer, what would you tell them? What about a Pap test? Probe: What will be the best way to educate other women in your social circles? How should the information be presented?