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Correlates of Health Communication Preferences in a Multiethnic Population of Pregnant Women and Mothers of Young Children

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Abstract

Background: As posited in multiple health communication theories, it is vital to understand modern health communication preferences among communities in order to develop tailored interventions to reduce Infant Mortality (IM). Literature suggests that health communication inequalities play an important role in infant health knowledge gaps, thus contributing to the disparate IM rates. We sought to understand preferred methods of communication among expectant or mothers of young children of varying sociodemographics. We hypothesized that methods of communication would vary by sociodemographics.

Methods: A bilingual questionnaire, developed using community based participatory research principles was offered at pre-selected women's health agencies in the Shenandoah Valley of Virginia. Participants chose from a researched list of 22 methods of communication and also designated their "top three choices." Communication methods were compared across sociodemographics using chi-squared statistical tests.

Results: A total of 292 participants completed the questionnaire at the various sites. Participants were predominantly White (60%) or Hispanic/Latina (30%), and lived in Frederick county/Winchester city (77%). Of the 22 communication methods, the five most prevalent were: talking with a healthcare provider (91%), family or friends (85-87%), using internet (84%), and handouts/booklets (80%). Communication methods most frequently chosen as a "top three choice" were: internet (46%), talking with healthcare providers (33%), and talking with family (32%). A higher preference for talking with a healthcare provider was noted among higher income individuals (100%) compared to lower income (82%; p-value=0.0062), a higher preference for call-in hotlines among Hispanic (49%) vs. non-Hispanic women (15%; p-value<0.0001), and a higher preference for placemats at fast-food restaurants among older women (42%) compared to younger (16%, p-value=0.0361).

Conclusion: Results suggest the incorporation of multiple methods may be a practical approach to reaching different segments of the population including those identified as most vulnerable for infant mortality.

Keywords: Infant mortality; Health communication; Communication preferences; Health disparities; Healthcare providers; Internet; Social media

Introduction

Health communication

The implications of health communication in health education and outreach today have grown immensely in the past century. Health communication is a versatile and powerful tool in health outreach and ultimately behavior change. It has been noted to "increase the intended audience's knowledge and awareness of a health issue, problem, or solution; influence perceptions, beliefs, and attitudes that may change social norms; prompt action; demonstrate or illustrate healthy skills; reinforce knowledge, attitudes, or behavior; and more [1]". In the United States today, health information is readily available from a multitude of sources for many individuals, including newer methods such as social media, smart phone apps, and text messages. With the surplus of sources, communities are getting their health information from multiple places, regardless of the accuracy of that information [1]. Literature suggests that health communication inequalities, differences among social groups in accessing, seeking, processing, and using health information could play an important role in health knowledge gaps. Therefore, understanding communities' health communication preferences is a critical first step in understanding the implications of health communication, and therefore developing effective interventions.

Infant mortality

This study was inspired by the need to reduce Infant mortality (IM). IM, defined as the death of a child before his or her first birthday, is among the most commonly used markers of overall population health. Rates of IM (IMR) in the United States of America have historically been higher than a large number of developed and developing nations; in 2010, the United States had an IMR of 6.1 per 1,000 live births behind 24 European nations and that number is growing [2]. In the state of Virginia, the IMR is even higher than the national average. In 2013, Virginia documented 6.2 deaths per 1,000 births compared to the overall US at 5.96 per 1000 births [2].

Even more troubling are the disparate IMR between racial/ethnic and socio- economic groups. In Virginia, there is an especially large gap between Black and White infants (12.2 and 5.2 deaths per 1,000 births respectively) [3]. In the Lord Fairfax Health District, where the current study takes place, the gap is also present between Black and White infants (11.0 and 3.8 deaths per 1,000 live births respectively,) [3]. While causes of these disparities are questionable, literature suggests a combination of social, societal, and individual factors [4]. A common belief is that differential access for socio-economic groups to interventions, including those utilizing modern health communication methods, aimed at preventing infant deaths is one of the underlying factors affecting IM [4].

Reducing IMRs have consistently been ranked as a global public health goal. Healthy People 2020 objectives have identified the reduction of fetal and infant deaths as a national priority [5], and emphasize tackling health disparities as a mechanism for lowering the overall rates. Current literature suggests that there has been minimal progress in the reduction of these rates, and emphasizes not only a greater understanding of the factors contributing to IM but to develop methods for prevention that are strategic, inclusive and effective [5]. The current study attempts to address the minimal progress on these rates by administering an innovative research project to better understand the contributions of health communication inequalities within this domain of maternal and child health.

Health Communication, as a part of a broader Public Health domain is a relatively new field. According to the CDC, there are fewer than a dozen health communication graduate programs in the United States [1]. For this reason, health communication literature is limited, but growing. To our current knowledge, the current literature on health communication focuses on one particular communication method (i.e., internet or healthcare providers) and the influence of that one method on a specific health issue. There has not, to our knowledge, been a research study that has assessed the preferences of a variety of health communication methods for infant health and safety information specifically, with a diverse sample of women. This study is also one of the first to assess the preferences of "infant health" information versus health information broadly. Effective health communication offers an opportunity in health education to diminish the devastating disparate rates of infant mortality. This study helps fill this particular gap in the literature and paves the way for future research of this kind.

Study objective and research question

The objective of the current study was to understand communication preferences on how to receive infant health and safety information among pregnant women and mothers of young children (<5 years). We hypothesize that preferred methods of health communication would differ by sociodemographics (i.e., race/ethnicity, income, pregnancy status, marital status, and age).

Materials and Methods

Between June-July 2014, interviews were administered to pregnant women and new mothers in the Lord Fairfax Health District at multiple women's health agencies.

Convenience sampling was utilized to administer surveys at four health and human service agencies ("Our Health, Inc." Healthy Living Events, AbbaCare, Women, Infant, Children (WIC) of Lord Fairfax Health District, and Winchester OB/GYN) by trained bilingual student interviewers in either English or Spanish. These agencies were identified by Coalition to Curb Infant Mortality members as ideal locations to reach high- risk pregnant women and new mothers in the Winchester region. CCIM is an academic- community partnership based on Community-Based Participatory Research (CBPR) principles, comprised of an academic institution, Shenandoah University (SU), a local health department (Lord Fairfax Health District (LFHD) of the Virginia Department of Health (VDH), and local organizations, with a mission of reducing IM disparities.

Interviewers administered surveys in the waiting rooms of the above agencies on various weekdays throughout the two months of administration. The anonymous, interviewer-administered survey took less than five minutes to complete.

Surveys were also administered at two home visiting agencies (Healthy Families and Infant and Toddler Connection) by trained bilingual staff. Interviews were conducted in either English or Spanish during scheduled home health visits. Participants provided written informed consent prior to interview administration and the institutional review board at Shenandoah University approved this protocol.

Instrument

A10-question survey was created collaboratively by CCIM members using CBPR principles. Surveys were pilot-tested for 1 week and then revisions for clarification were made. The final interview-administered survey consisted of three eligibility questions to ensure that participants were either mothers of children under the age of five or currently pregnant and at least 15 years of age. Question 1 allowed participants to select from a pre-determined list of communication methods compiled by the coalition, as well as an option to write in any other preferred methods (Table 1). Participants were asked, "What are the best ways to give you information on all things related to infant health and safety? I will read each choice to you and you can choose either yes or no to the choices, as to which you would use?" Question 2 asked participants to select their top three communication methods out of the ones they had selected.

Apps	Social Media
Community Events	Text Messages
Free Call-In Hotlines	YouTube or Vine
Internet	Talking with Friends
Monthly Meetings	Talking with Family
Paper Handouts/Booklets	Talking with a religious or church leader
Place Mats at Fast Food Restaurants	Talking with a trusted mentor
Radio/TV Ads	Talking with a healthcare provider
Short Movies/DVDs shown in waiting rooms	

Table 1: List of Communication Methods.

Participants were asked "Out of the methods you selected, could you please tell me your top three choices of methods you would use?" and then handed a laminated sheet of paper with all the communication methods listed. Questions 3-10 were sociodemographic questions on

age, race/ethnicity, number of children in the home, and education. As an incentive for completing the survey, participants were entered into a random drawing to receive donated gift cards and items from local businesses and organizations.

Variables

All 17 communication methods were analyzed as bivariate variables (Yes/No). Top choice indicators were collected as open-ended variables and a new bivariate variable was later created for analysis. Demographic variables were analyzed as categorical variables. Race and Ethnicity were combined into one variable due to the high percentage of Hispanic/Latina women selecting "other" as a racial group and indicating "Hispanic/Latina" in the write-in section.

Data analysis

SAS Version 9.2 (SAS Institute Inc., SAS Campus Drive, Cary, North Carolina 27513) was used for data analysis. Descriptive statistics were run for all variables to provide distributions of the participants' characteristics. A two-sided significance level was set as $p<0.05$. Bivariate analysis was run in which all demographic variables, communication methods, and top choice open-ended variables were stratified by site of interview. Bivariate (chi-square) analysis was then run in which all communication methods were stratified by all demographic variables. Logistic regression was run with bivariate top choice variables to assess association with sociodemographics. Logistic regression results were not statistically significant and therefore are not included in the following results section.

Results

Descriptive statistics

A total of 292 participants completed the questionnaire at the various sites (Table 2). The survey had a 94% response rate and an 82% completion rate. The majority of individuals approached were eligible (87% eligible), and the reasons for ineligibility were primarily because women either didn't have children younger than five years old and weren't pregnant. Over a third of the participants were interviewed each at Winchester OB/GYN (38%) and WIC (36%). Participants were predominantly White (60%) or Hispanic/Latina (30%) and lived in Frederick county/Winchester city (77%). A moderate proportion were college educated (45%) and more than a third reported household income <$40,000 (39%). The majority of women was pregnant at the time of interview (69%) and had children 2 years old or younger (63%). Only a small percentage of participants were married (16%) or living with a partner (25%). Ages of participants varied between 17 and 50, but the vast majority were between 20-29 years of age (75%).

Site	**Abba Care**	**WIC/ Our Health Fair**	**Winchester OB/GYN**	**Home Health Orgs**	**Total**
	(n=32)	**(n=104)**	**(n=110)**	**(n=46)**	**(n=292)**
Characteristic	Frequency (Percent)	Frequency (Percent)	Frequency (Percent)	Frequency (Percent)	Frequency (Percent)
Interview in spanish					
Yes	1 (3.13)	35 (33.65)	16 (14.55)	15 (32.61)	67 (22.95)
No	31 (96.88)	69 (66.35)	94 (84.45)	31 (67.39)	225 (77.05)
Had kids 5 years old or Under					
Yes	19 (59.38)	98 (94.23)	63 (57.27)	46 (100.00)	226 (77.40)
No	13 (40.63)	6 (5.77)	47 (42.73)	0 (0.00)	66 (22.60)
Currently pregnant					
Yes	22 (68.75)	12 (11.53)	86 (78.18)	0 (0.00)	120 (41.10)
No	10 (31.25)	92 (88.46)	24 (21.82)	46 (100.00)	172 (58.90)
Hispanic/latina					
Yes	5 (15.63)	45 (43.27)	30 (27.52)	16 (34.78)	96 (33.10)
No	27 (84.38)	58 (55.77)	79 (72.48)	30 (65.22)	194 (66.90)
Race					
White/caucasian	21 (65.63)	50 (48.08)	74 (67.89)	29 (63.04)	174 (60.00)
Black/african American	4 (12.50)	6 (5.77)	5 (4.59)	3 (6.52)	18 (6.21)
Asian/pacific	3 (9.38)	5 (4.80)	6 (5.50)	2 (4.35)	16 (5.51)

Islander/other					
Other (specified Hispanic/latina)	4 (12.50)	42 (40.38)	24 (22.02)	12 (26.09)	82 (28.28)
County live in					
Winchester city	9 (28.13)	45 (43.27)	27 (24.77)	18 (39.13)	99 (34.14)
Frederick	17 (53.13)	55 (52.88)	37 (33.94)	15 (32.61)	124 (42.76)
Other lord fairfax Counties	5 (15.63)	3 (2.88)	16 (14.68)	12 (26.09)	36 (12.41)
West virginia Counties	1 (3.13)	0 (0.00)	29 (26.61)	1 (2.17)	31 (10.69)
Highest level of education					
8th grade or less/ Some high school	0 (0.00)	19 (18.27)	11 (10.18)	12 (26.67)	42 (14.59)
High school /ged	18 (56.25)	50 (48.07)	31 (28.70)	15 (33.33)	114 (39.58)
Some college	6 (18.75)	24 (23.08)	21 (19.44)	16 (35.56)	67 (23.26)
College graduate	8 (25.00)	10 (9.62)	45 (41.67)	2 (4.44)	65 (22.57)
Age (years)					
15-19	4 (12.50)	4 (3.8)	5 (4.5)	5 (10.9)	22 (7.53)
20-24	13 (40.63)	30 (28.85)	23 (20.91)	14 (30.43)	80 (29.79)
25-29	11 (34.38)	26 (25.00)	38 (34.55)	12 (26.09)	87 (29.79)
30+	4 (12.50)	43 (41.35)	43 (39.09)	13 (28.26)	103 (35.27)
Number of kids					
None	12 (37.50)	7 (6.80)	30 (27.52)	0 (0.00)	49 (16.96)
1	14 (43.75)	37 (35.92)	40 (36.70)	29 (64.44)	120 (41.52)
2	4 (12.50)	29 (28.16)	25 (22.94)	8 (17.78)	66 (22.84)
3 or more	2 (6.25)	30 (29.13)	14 (12.84)	8 (17.78)	54 (18.69)
Child age 2 or less?					
Yes	13 (40.63)	78 (75.73)	36 (33.03)	43 (95.56)	170 (58.82)
No	19 (59.38)	25 (24.27)	73 (66.97)	2 (4.44)	119 (41.18)
Marital status					
Single	17 (53.13)	28 (26.92)	18 (16.51)	19 (41.30)	82 (28.28)
Married	5 (15.63)	37 (35.58)	71 (65.14)	16 (34.78)	129 (44.48)
Living with Partner	8 (25.00)	28 (26.92)	18 (16.51)	10 (21.74)	64 (22.07)
Divorced/separated	2 (6.25)	10 (9.62)	2 (1.83)	1 (2.17)	15 (5.17)
Income (usd)					
< 10,000	8 (25.00)	16 (15.38)	7 (6.42)	8 (17.78)	39 (13.49)

10,000 -19,999	5 (15.63)	25 (24.04)	7 (6.42)	10 (22.22)	47 (16.26)
20,000-40,000	6 (18.75)	21 (20.19)	16 (14.67)	12 (26.67)	55 (19.03)
>40,000	3 (9.38)	6 (5.77)	53 (48.62)	5 (11.11)	67 (23.18)
Don't know/ Refused	10 (31.25)	35 (33.65)	26 (23.85)	10 (22.22)	81 (28.03)

Table 2: Demographic Characteristics of Participants by Site.

Communication methods

Overall frequency: Table 3 shows the overall frequency and percentage of selected communication methods by site of interview. Of the 17 communication methods, the five most prevalent were: talking with a healthcare provider (91%), talking with family (87%), and talking with friends (85%), internet (84%), and paper handouts/booklets (80%). Communication preferences were similar across the first three sites (Abba Care, WIC/Our Health, and Winchester OB/GYN). For example, preference of apps across the three sites was similar (65%, 64%, and 62% respectively). Those who interviewed at the home health orgs, however, had statistically significantly lower preferences of communication across all communication methods compared to the other three sites. For example, preference of talking with a healthcare provider was only 77% at home health organizations compared to the other sites, which were higher (97%, 91%, and 96%, respectively). All participants selected more than one communication method, while 92% of participants selected at least three methods from the list, if not more.

Site:	**Abba Care (n=32)**	**WIC / Our Health (n=104)**	**Winchester OB/GYN (n=110)**	**Home Health Orgs (n=46)**	**Chi-Square (p-value)**	**Total (n=290)**
Communication Method:	Frequency (Percent) YES	Frequency (Percent) YES	Frequency (Percent) YES	Frequency (Percent) YES		Frequency (Percent) YES
Apps*	24 (75.00)	71 (68.27)	73 (66.36)	17 (37.78)	16.09 (0.0011)	185 (63.57)
Community Events*	21 (65.63)	67 (64.42)	61 (55.45)	18 (40.00)	8.725 (0.0332)	167 (57.39)
Free Call-In Hotlines*	6 (18.75)	40 (38.46)	26 (23.64)	5 (11.11)	14.57 (0.0022)	77 (26.5)
Internet*	31 (96.88)	87 (83.65)	101 (91.82)	26 (57.78)	32.29 (<0.0001)	245 (84.19)
Monthly Meetings	25 (78.13)	44 (42.31)	33 (30.28)	6 (13.33)	37.30 (<0.0001)	108 (37.24)
Paper Handouts/Booklets	30 (93.75)	82 (78.85)	93 (85.32)	26 (57.78)	19.41 (0.0002)	231 (79.66)
Place Mats at Fast Food Restaurants	11 (34.38)	45 (43.27)	36 (33.03)	3 (6.67)	19.17 (0.0003)	95 (32.76)
Radio/TV Ads	21 (65.63)	67 (64.42)	68 (62.39)	15 (33.33)	14.61 (0.0022)	171 (58.97)
Short Movies/DVDs shown in waiting rooms	26 (81.25)	75 (72.12)	76 (69.72)	7 (15.56)	54.10 (<0.0001)	184 (63.45)
Social Media	24 (75.00)	76 (73.07)	82 (75.23)	20 (44.44)	16.14 (0.0011)	202 (69.66)
Text Messages	21 (65.63)	82 (78.85)	73 (66.97)	14 (31.11)	31.86 (<0.0001)	190 (65.52)
YouTube or Vine	15 (46.88)	55 (52.88)	52 (47.71)	6 (13.33)	21.21 (<0.0001)	128 (44.14)
Talking with Friends	29 (90.63)	88 (84.62)	101 (92.66)	30 (66.67)	18.14 (0.0004)	248 (85.52)
Talking with Family	30 (93.75)	93 (89.42)	101 (92.66)	29 (64.44)	25.55 (<0.0001)	253 (87.24)
Talking with a religious or church leader	26 (81.25)	60 (57.69)	61 (55.96)	14 (31.11)	19.64 (0.0002)	161 (55.52)
Talking with a trusted mentor	31 (96.88)	75 (72.12)	91 (83.49)	18 (40.00)	41.17 (<0.0001)	215 (74.14)

Talking with a healthcare provider	31 (96.88)	95 (91.35)	105 (96.33)	35 (77.78)	15.72 (0.0013)	266 (91.72)
Written in responses						
Billboards	n/a	n/a	1 (0.90)	n/a	n/c	1 (0.3)
Books	n/a	1 (0.96)	4 (3.64)	1 (2.1)	n/c	6 (2.0)
E-mails	n/a	n/a	1 (0.90)	n/a	n/c	1 (0.3)
Magazines	n/a	n/a	1 (0.90)	n/a	n/c	1 (0.3)
Mail	n/a	1 (0.96)	n/a	n/a	n/c	1 (0.3)
Newspaper	n/a	n/a	1 (0.90)	n/a	n/c	1 (0.3)
Social Workers	n/a	1 (0.96)	n/a	n/a	n/c	1 (0.3)

Table 3: Preferred Method of Communication by Site.

Top choices frequency: Table 4 shows the overall frequency and prevalence of communication method selection as a top three choice (in no particular order). Of the 17 communication methods, the five most likely to be selected as a top three choice were: internet (46%), talking with a healthcare provider (33%), talking with family (32%), social media (27%), and paper handouts (24%). All of these top three methods, with the exception of social media, were consistent with the most popular choices described above.

Communication Method	Frequency	Percent (819 total responses)	Percent (n=273 respondents)
Apps	62	7.6	22.7
Community Events	33	4.0	12.1
Free Call-In Hotlines	17	2.0	6.2
Internet	126	15.4	46.1
Monthly Meetings	20	2.4	7.3
Paper Handouts/Booklets	67	8.2	24.5
Place Mats at Fast Food Restaurants	8	1.0	2.9
Radio/TV Ads	34	4.2	12.5
Short Movies/DVDs shown in waiting rooms	18	2.2	6.6
Social Media	74	9.0	27.1
Text Messages	57	7.0	20.9
YouTube or Vine	15	1.8	5.5
Talking with Friends	61	7.4	22.3
Talking with Family	88	10.7	32.2
Talking with a religious or church leader	15	1.8	5.5
Talking with a trusted mentor	27	3.3	9.9
Talking with a healthcare provider	92	11.2	33.7
Billboards	0	0	0
Books	3	0.4	1.1
E-mails	1	0.1	0.4

Magazines	0	0	0
Mail	0	0	0
Newspaper	0	0	0
Social Workers	0	0	0
No Preference	1	0.1	0.4
TOTAL	819		

Table 4: Preferred Top Three Choices of Communication.

Communication method differences by socio-demographics

Hispanic/Latina: Table 5 shows the preference of communication methods stratified by Hispanic/Latina vs. Non-Hispanic/Latina ethnicity status. Preferences of communication methods that differed significantly by Hispanic/Latina ethnicity were: community events, free call-in hotlines, internet, placemats at fast food restaurants, radio/TV ads, social media, YouTube/vine, and talking with a healthcare provider. Hispanic/Latina women were more likely to choose community events (70%) versus non-Hispanic/Latina women (51%, p=0.0027), free call-in hotlines (49%) versus non- Hispanic/Latina women (15%, p<0.0001), fast food placemats (44%) versus non-Hispanic/Latina women (27%, p=0.0041), radio/TV ads (69%) versus non-Hispanic/Latina women (54%, p=0.016), and YouTube/Vine (60%) versus non-Hispanic/Latina women (36%, p=0.0002). Hispanic/Latina women were less likely to choose internet (73%) versus non-Hispanic/Latina women (89%, p=0.0003), social media (56%) versus non-Hispanic/Latina women (76%, p=0.0005), and talking with a healthcare provider (86%) versus non-Hispanic/Latina women (94%, p=0.02).

Hispanic/Latina:	**YES (n=96) Frequency (Percent)**	**NO (n=194) Frequency (Percent)**	**P-Value**
Communication Method			
Apps*	57 (59.38)	126 (65.28)	0.3261
Community Events*	67 (69.79)	99 (51.30)	0.0027
Free Call-In Hotlines*	47 (48.96)	30 (15.54)	<0.0001
Internet*	70 (72.92)	173 (89.64)	0.0003
Monthly Meetings	43 (44.79)	65 (33.68)	0.0659
Paper Handouts/ Booklets	71 (73.96)	160 (82.90)	0.0738
Place Mats at Fast Food Restaurants	42 (43.75)	52 (26.94)	0.0041
Radio/TV Ads	66 (68.75)	104 (53.89)	0.0156
Short Movies/DVDs shown in waiting rooms	66 (68.75)	118 (61.14)	0.2052
Social Media	54 (56.25)	147 (76.17)	0.0005
Text Messages	69 (71.88)	121 (62.69)	0.1214
YouTube or Vine	57 (59.38)	70 (36.27)	0.0002
Talking with Friends	80 (83.33)	167 (86.53)	0.4679
Talking with Family	87 (90.63)	165 (85.49)	0.2187
Talking with a religious or church leader	55 (57.29)	105 (54.40)	0.6419
Talking with a trusted mentor	69 (71.88)	146 (75.65)	0.4889
Talking with a healthcare provider	83 (86.46)	182 (94.30)	0.0229
Written In Responses			
Billboards	n/a	1 (0.5)	
Books	n/a	6 (30.0)	
E-mails	n/a	1 (0.5)	
Magazines	n/a	1 (0.5)	
Mail	1 (10.0)	n/a	
Newspaper	n/a	1 (0.5)	
Social Workers	1 (10.0)	n/a	

Table 5: Preferred Method of Communication by Hispanic/Latina.

Education: Table 6 shows the preference of communication methods stratified by highest educational status. Preferences of communication methods that differed by education were: apps, free call-in hotlines, internet, monthly meetings, paper handouts/booklets, and short waiting room movies. Those who had completed 8th grade or less or some high school were less likely to select apps (43%) versus the other education groups (completed high school, 68%, completed some college, 66%, and college graduate, 69%, p=0.02), internet (60%) versus the other education groups (completed high school, 82%, completed some college, 91%, and college graduate, 96%, p<0.0001), and paper handouts/booklets (61%) versus the other education groups (high school completion (84%), some college (82%), or college graduate (82%), p=0.012). College graduates were less likely to select free-call in hotlines (15%) versus the other education groups (8th grade/some high school (30%), completed high school (35%), completed some college (19%), p=0.012) and monthly meetings (29%) versus the other education groups (8th grade/some high school (36%), completed high school (47%), completed some college (30%), p=0.012). High School graduates (or GEDs) were more likely to select

waiting room movies (73%) versus the other education groups (some high school (55%), some college (54%), or college graduate (64%), p=0.042).

Education Level:	**8th grade or less/ Some High School**	**High School/GED**	**Some College**	**College Graduate or More**	**p-value**	**Total**
	(n=42)	**(n=114)**	**(n=67)**	**(n=65)**	**(X2 test)**	**(n=290)**
Communication Method	Frequency (Percent) YES	Frequency (Percent) YES	Frequency (Percent) YES	Frequency (Percent) YES		Frequency (Percent) YES
Apps*	18 (42.86)	76 (67.26)	44 (65.67)	45 (69.23)	0.0235	185 (63.57)
Community Events*	24 (57.14)	71 (62.83)	35 (52.24)	36 (55.38)	0.5348	167 (57.39)
Free Call-In Hotlines*	13 (30.95)	40 (35.40)	13 (19.40)	10 (15.38)	0.0124	77 (26.5)
Internet*	25 (59.52)	93 (82.30)	61 (91.04)	63 (96.92)	<0.0001	245 (84.19)
Monthly Meetings	15 (35.71)	53 (46.90)	20 (29.85)	19 (29.23)	0.0481	108 (37.24)
Paper Handouts/Booklets	26 (61.90)	95 (84.07)	55 (82.09)	54 (83.08)	0.0156	231 (79.66)
Place Mats at Fast Food Restaurants	14 (33.33)	38 (33.63)	17 (25.37)	24 (36.92)	0.5296	95 (32.76)
Radio/TV Ads	23 (54.76)	69 (61.06)	37 (55.22)	40 (61.54)	0.7829	171 (58.97)
Short Movies/DVDs shown in waiting rooms	23 (54.76)	82 (72.57)	36 (53.73)	42 (64.62)	0.042	184 (63.45)
Social Media	28 (66.67)	73 (64.60)	51 (76.12)	49 (75.38)	0.2742	202 (69.66)
Text Messages	25 (59.52)	81 (71.68)	40 (59.70)	43 (66.15)	0.3099	190 (65.52)
YouTube or Vine	18 (42.86)	57 (50.44)	26 (38.81)	25 (38.46)	0.3248	128 (44.14)
Talking with Friends	34 (80.95)	97 (85.84)	58 (86.57)	57 (87.69)	0.7948	248 (85.52)
Talking with Family	37 (88.10)	100 (88.50)	58 (86.57)	56 (86.15)	0.9645	253 (87.24)
Talking with a religious or church leader	21 (50.00)	68 (60.18)	36 (53.73)	34 (52.31)	0.6006	161 (55.52)
Talking with a trusted mentor	30 (71.43)	82 (72.57)	52 (77.61)	50 (76.92)	0.8075	215 (74.14)
Talking with a healthcare provider	38 (90.48)	105 (92.92)	58 (86.57)	63 (96.92)	0.1659	266 (91.72)
Written In Responses						
Billboards	n/a	n/a	1 (1.5)	n/a	n/a	1 (0.3)
Books	1 (2.4)	1 (0.88)	1 (1.5)	2 (3.1)	n/a	6 (2.0)
E-mails	n/a	n/a	n/a	1 (1.5)	n/c	1 (0.3)
Magazines	n/a	n/a	n/a	1 (1.5)	n/c	1 (0.3)
Mail	1 (2.4)	n/a	n/a	n/a	n/c	1 (0.3)
Newspaper	n/a	n/a	n/a	1 (1.5)	n/c	1 (0.3)
Social Workers	n/a	1 (0.88)	n/a	n/a	n/c	1 (0.3)

Table 6: Preferred Method of Communication by Education Level.

Pregnancy status: Table 7 shows the preference of communication methods stratified by pregnancy status. Preferences of communication methods that differed by pregnancy status were: apps, internet, paper handouts/booklets, waiting room movies, talking with family, talking with a mentor, and talking with a healthcare provider. Pregnant women were more likely to select apps (73%) versus non-pregnant women (57%, p=0.0038), internet (93%) versus non-pregnant women (78%, p=0.0011), paper handouts/booklets (87%) versus non-pregnant

women (75%, p=0.0149), waiting room movies (73%) versus non-pregnant women (57%, p=0.0044), talking with family (92%) versus non-pregnant women (83%, p=0.027), talking with a trusted mentor (88%) versus non-pregnant women (64%, p<0.0001), and talking with a healthcare provider (96%) versus non-pregnant women (89%, p=0.0357). Furthermore, there were no significant differences in preference of communication methods where pregnant women were less likely to select a method.

Currently Pregnant	**YES (n=120) Frequency (Percent)**	**NO (n=172) Frequency (Percent)**	**P-Value**
Communication Method			
Apps*	88 (73.33)	97 (56.73)	0.0038
Community Events*	70 (58.33)	97 (56.73)	0.7848
Free Call-In Hotlines*	25 (20.83)	52 (30.41)	0.0683
Internet*	111 (92.50)	134 (78.36)	0.0011
Monthly Meetings	51 (42.86)	57 (33.33)	0.0989
Paper Handouts/Booklets	103 (86.55)	128 (74.85)	0.0149
Place Mats at Fast Food Restaurants	40 (33.61)	55 (32.16)	0.7958
Radio/TV Ads	73 (61.34)	98 (57.31)	0.4920
Short Movies/DVDs shown in waiting rooms	87 (73.11)	97 (56.73)	0.0044
Social Media	89 (74.79)	113 (66.08)	0.1126
Text Messages	78 (65.55)	112 (65.50)	0.9931
YouTube or Vine	58 (48.74)	70 (40.94)	0.1880
Talking with Friends	107 (89.92)	141 (82.46)	0.0758
Talking with Family	110 (92.44)	143 (83.63)	0.0269
Talking with a religious or church leader	74 (62.18)	87 (50.88)	0.0566
Talking with a trusted mentor	105 (88.24)	110 (64.33)	<0.0001
Talking with a healthcare provider	114 (95.80)	152 (88.89)	0.0357
Written In Responses			
Billboards	n/a	1 (0.6)	n/c
Books	5 (4.2)	1 (0.6)	n/c
E-mails	1 (0.8)	n/a	n/c
Magazines	1 (0.8)	n/a	n/c
Mail	n/a	1 (0.6)	n/c
Newspaper	1 (0.8)	n/a	n/c
Social Workers	n/a	1 (0.6)	n/c

Table 7: Preferred Method of Communication by Pregnancy Status.

Age: Table 8 shows the preference of communication methods stratified by age. Preferences of communication methods that differed by age were: Internet, monthly meetings, and fast food restaurant placemats. Women less than 19 years of age were more likely to select internet (100%) compared to other age groups (20-24 yrs (79%), 25-29 yrs (90%), 30+yrs (82%), p=0.049) and monthly meetings (66%) compared to other age groups (20-24 yrs, 48%, 25-29 yrs, 31%, 30+ yrs, 30%, p=0.0026). Women less than 19 years of age were less likely to select fast food restaurant placemats (17%) compared to the other age groups (20-24 yrs (31%), 25-29 yrs (26%), 30+ (43%), p=0.036). Other Results Not Shown.

Age (years)	<19	20-24	25-29	30+	p-value	Total
	(n=18)	(n=80)	(n=87)	(n=103)	(X2 test)	(n=290)
Communication Method:	Frequency	Frequency	Frequency	Frequency		Frequency
	(Percent)	(Percent)	(Percent)	(Percent)		(Percent)
Apps*	16 (88.89)	53 (67.09)	54 (62.07)	60 (58.25)	0.08	185 (63.57)
Community Events*	9 (50.00)	49 (62.03)	45 (51.72)	63 (61.17)	0.4198	167 (57.39)
Free Call-In Hotlines*	2 (11.11)	22 (27.85)	18 (20.69)	35 (33.98)	0.0835	77 (26.50)
Internet*	18 (100.00)	62 (78.48)	78 (89.66)	84 (81.55)	0.0491	245 (84.19)
Monthly Meetings	12 (66.67)	38 (48.10)	27 (31.03)	31 (30.10)	0.0026	108 (37.24)
Paper Handouts/Booklets	14 (77.78)	64 (81.01)	73 (83.91)	79 (76.70)	0.6496	231 (79.66)
Place Mats at Fast Food Restaurants	3 (16.67)	24 (30.38)	23 (26.44)	44 (42.72)	0.0361	95 (32.76)
Radio/TV Ads	10 (55.56)	41 (51.90)	58 (66.67)	60 (58.25)	0.2761	171 (58.97)
Short Movies/DVDs shown in waiting rooms	11 (61.11)	53 (67.09)	55 (63.22)	65 (63.11)	0.9297	184 (63.45)
Social Media	14 (77.78)	54 (68.35)	66 (75.86)	67 (65.05)	0.3549	202 (69.66)
Text Messages	12 (66.67)	55 (69.62)	54 (62.07)	69 (66.99)	0.7754	190 (65.52)
YouTube or Vine	11 (61.11)	39 (49.37)	32 (36.78)	45 (43.69)	0.1798	128 (44.14)
Talking with Friends	13 (72.22)	70 (88.61)	74 (85.06)	90 (87.38)	0.3178	248 (85.52)
Talking with Family	16 (88.89)	72 (91.14)	77 (88.51)	87 (84.47)	0.5824	253 (87.24)
Talking with a religious or church leader	9 (50.00)	45 (55.96)	44 (50.57)	61 (59.22)	0.6326	161 (55.52)
Talking with a trusted mentor	13 (72.22)	65 (82.28)	61 (70.11)	76 (73.79)	0.3227	215 (74.14)
Talking with a healthcare provider	18 (100.00)	75 (94.94)	79 (90.80)	93 (90.29)	0.3698	266 (91.72)
Written In Responses						
Billboards	n/a	n/a	n/a	1 (0.9)	n/c	1 (0.3)
Books	n/a	1 (1.25)	1 (1.5)	1 (0.9)	n/c	6 (2.0)
E-mails	n/a	n/a	n/a	1 (0.9)	n/c	1 (0.3)
Magazines	n/a	n/a	1 (1.5)	n/a	n/c	1 (0.3)
Mail	n/a	n/a	n/a	1 (0.9)	n/c	1 (0.3)
Newspaper	n/a	n/a	n/a	1 (0.9)	n/c	1 (0.3)
Social Workers	n/a	n/a	n/a	1 (0.9)	n/c	1 (0.3)

Table 8: Preferred Method of Communication by Age.

Some highlights of the socio-demographic results not shown in Tables are described below. Communication methods that differed by other racial groups (in addition to the Hispanic/Latina differences stated above) were text messages, monthly meetings, and talking with a religious/church leader. Black/African-American women were more likely to choose text messages (94%) compared to the other racial groups (White, 60%, Asian/Pacific Islander, 44%, Hispanic/Latina, 76%, p=0.0016). Black/African-American women and Asian/Pacific Islander women were more likely to choose monthly meetings (59% and 56%, respectively) compared to the other racial groups (White, 30%, Hispanic/Latina, 44%, p=0.0014). Black/African American women were more likely to choose talking with a religious leader (88%) compared to other racial groups (White, 52%, Asian/P.I., 62%, and Hispanic/Latina, 54%, p=0.036).

Preferences of communication methods by income were very similar to the education differences described above. Differences were found in community events, free call-in hotlines, internet, monthly meetings, and social media. For example, those with income greater than $40,000 were more likely to choose internet (96%) versus the other income groups (<$10,000 (77%), $10-20,000 (72%), $20-40,000 (85%), p=0.0086).

Communication methods that differed by number of children in the home was: paper handouts/booklets, fast food placemats, YouTube/vine, talking with family, and talking with a trusted mentor. For example, women with one child in the home were more likely to choose paper handouts (86%) compared to women with no children (84%), two children (70%) or three or more children (76%, p=00.049). Women with three children or more were less likely to choose talking with family (79%) compared to women with no children (98%), one child (87%), or two children (84%, p=0.040).

Discussion

As previously mentioned, this study is the first to look at multiple health communication preferences of infant health and safety information with a socio-demographically diverse sample. Many of our findings are consistent with other literature on health communication preferences, including a high preference for health care providers and internet across socio-demographic differences. We also found consistency in that many of the less popular methods in this study (fast food restaurant placemats, call-in hotlines, and radio/TV) are becoming more outdated in society, as newer technological methods take over. Other findings are discussed below.

Preferred communication methods

In the current study, the most preferred infant health communication methods were talking with a healthcare provider, talking with family, talking with friends, internet, and paper handouts/booklets, respectively. When participants were asked to select their top three choices, those results were consistent with these aforementioned methods. Those methods were internet, talking with a healthcare provider, talking with family, social media, and paper handouts, respectively. These methods will be broadly discussed directly below. As mentioned in the above section, there were differences in preferences among socio-demographic groups, which will be discussed in the next section. Our results also suggest that the majority of individuals are using more than one method of communication. The most preferred communication methods found were consistent with prior research on health communication [6-10].

Talking with a healthcare provider and internet: Talking with a healthcare provider has been commonly cited as a preferred method for gathering health information [6-8] and has also been cited throughout literature as one of the most trusted information sources [6-8]. In particular, many women cite talking to their OB/GYN, midwife, and pediatrician as a preferred source of infant health and safety information [9]. Pregnant women, in particular have a large exposure to healthcare providers as they are frequently seen for prenatal care during pregnancy and the postpartum period. Utilizing the internet has also been ranked as the most preferred method of communication for general health information due to its easy access when compared with visiting a healthcare provider [6,8-12]. The internet has also been frequently listed as a source for infant/pregnancy related information, and is often considered trustworthy by consumers especially when information is consistent across sites [13]. Our study reinforces these findings as internet and talking with a healthcare provider respectively were ranked the top two most preferred "top three choices" of health communication for parents seeking infant health information.

Social media: Social media has been frequently mentioned as one of the newer methods of health communication; the United States use more than quadrupled from 2005-2009 alone and is still increasing [14]. Social media as a method of gathering health information is gaining popularity [8,15,16]. Social media has a unique place in health communication as it can connect individuals in a trans-dimensional sense. It is used for anonymous recovery groups, motivational support groups, and ways for individuals to track health behaviors, which can increase perceived social support and interconnectivity [17,18]. Our findings found little differences in social media use between socio-demographics, with the exception of Hispanic/Latina individuals being less likely to utilize social media. In contrast, the literature suggests that there is an equal distribution of use across race, but a higher prevalence among younger individuals [15]. Our findings are consistent, however with current literature showing that although social media is a growing mechanism for gathering health information, it is still not as prominent as utilizing the internet or a healthcare provider, but is emerging as a complementary form of information sharing [8].

Talking with family and friends: Unlike social media and the internet, which are both modern forms of communication, talking with family and friends have been historic methods of health communication. The literature suggests that individuals with closer relationships utilize their family and friends more [8]. The accuracy of information from friends and family members, however is questionable. Generations-old infant health remedies and practices may be outdated or inaccurate [19]. Literature suggests that certain infant health recommendations, for example safe sleep practices, have been updated and improved and are therefore, different than the infant health practices that generations of family members may have been practicing [19]. Due to the high prevalence of family and friends as a common source for infant health information, there may be an opportunity to prioritize incorporating family and friends in IM interventions. The literature suggests that family and friends as a source of infant health information is common, however they may not be the primary source of health information [19].

Individuals may be getting information from a practitioner or the internet, then verifying that information with family or friends. While our study did not dissect the order in which individuals gather health information from various sources, we did find that internet, healthcare providers, and family/friends are all important and preferred avenues of gathering health information.

The literature also suggests that groups of people utilize different methods of communication for different reasons. While the internet may be used to gather new information on a health topic, social media is more likely to be used sparingly, for health updates and motivation [8]. Family and friends seem to be used for a multitude of reasons, such as reinforcing information, support, and discussing concerns [8]. This study did not dissect reasons for use, but is consistent in the findings that groups of individuals are using multiple methods of communication for health information.

Socio-demographic differences

The current study did find some striking differences between health communication preferences across socio-demographic groups.

Differences by ethnicity: Hispanic/Latina women were much more likely to choose community events and less likely to choose internet, social media, and healthcare providers than non- Hispanic/Latina women. Hispanic/Latina women also emphasized family and friends in this study, as the majority of Hispanic/Latina women selected family (90%) and friends (83%) as a preferred method of health communication. Other literature has also found that Hispanic/Latina women have put a lower preference on the above listed methods, particularly social media [8,15,20]. The results found in this study reinforce literature that suggests Hispanic/Latina culturally place a high priority on community and family and this may resonate in their health information-seeking behavior [21]. Some literature suggests that Hispanic/Latina women have less access to computers and technology, and that may be one reason why they give more priority to family and community for health information gathering [20]. The literature has also suggested that a language and/or cultural barrier may contribute to the lower preference for healthcare providers [20]. These results suggest that there may be an opportunity to prioritize health communication strategies around community and family when working with Hispanic/Latina women and further support strategies for intercultural sensitivity training among healthcare providers.

Differences by education: Differences in communication preferences by education were most prominent between those who hadn't completed high school versus those who had completed high school or more. College graduates, in particular were more likely to select apps, internet, and handouts/booklets compared to those less educated. These findings are consistent with current literature that suggests this could be linked to a health literacy challenge for those less educated [8,22]. The World Health Organization defines health literacy as "cognitive and social skills which determine the motivation and ability of individuals to gain access to, understand, and use information in ways which promote and maintain good health [23,24]". Those with lower educational attainment may feel challenged gathering health information they don't understand off the internet or in apps. They may also have less access to technology, and they may not have the confidence or knowledge to effectively use that information once received [22]. It is crucial to consider health literacy when working with these populations, to make sure information is not only accessible, but easy to understand and utilize.

Differences by pregnancy status: Of the communication preferences that were significantly different between pregnant women and non-pregnant women, all were more likely to be selected by pregnant women. Those methods were apps, internet, paper handouts, and waiting room movies, talking with family, talking with a healthcare provider, and talking with a trusted mentor. This may suggest that at a time when women are pregnant, they are more likely to be searching for health information from various resources [13]. The current literature on health communication preferences on infant health information among pregnant women is scarce, however, has shown that pregnant women seem to more actively seek infant and pregnancy-related information during the early stages of their pregnancy [13]. These results may suggest that interventions geared towards pregnant women should utilize various communication methods, as pregnant women are actively seeking information from various sources. This may also suggest that pregnancy is an opportune time to educate women on other health issues as well.

Differences by age: When looking at the differences in communication preferences by age group, our study found that the majority of preferences were uniformly distributed across age groups, with the exception of internet, monthly meetings, and fast food restaurant placemats. This is inconsistent with the current literature, which suggests that many modern communication methods, such as social media and apps, are more common among younger individuals [8,15,22]. The age distribution of our study did not include a high number of women over the age of 40, which may explain the inconsistency with the literature, in part. However, it may be that the age gap is closing with these modern communication methods. There may be a much more diverse usage of these methods, as it is observed that technology use for health information, specifically internet, is increasing among older individuals [8].

Differences by race: Other notable differences were found in communication preferences across other racial groups. African-American's were much more likely to select text messages and talking with a religious leader as a preferred method of communication. This is consistent with current literature that suggests that African-Americans are much more likely to incorporate spirituality into their healthcare searching [25,26]. Literature on African-American's use of text messages is very limited, but it may be a possible area to explore in future studies. While there were no notable differences in healthcare provider utilization in our study by racial groups, there is literature to suggest that minorities may not be receiving equitable care from healthcare providers, which may contribute to health disparities in IM [11]. This reinforces an opportunity to provide intercultural training to healthcare providers for a push toward more equitable care by a preferred mechanism of health information gathering.

Limitations: The current study is limited in that the sample size is relatively small (n=292) and has a somewhat limited demographic variability (primarily White, low-income, living in Winchester/Frederick county). However, the racial/ethnic distribution is reflective of the source community (33% Hispanic, 6% Black in the study). These specific results, therefore, may be limited in their generalizability to other areas in the United States. There may have been some inconsistencies with interviewer administration among all interviewers. In particular, in Table 2, there was an unexpected distribution where communication method prevalences were somewhat lower for the participants interviewed by the home health organizations. We also did not ask participants to rank their communication preferences in order to limit participant burden and interview length. This, in turn, limited our ability to determine the usual order of usage for multiple methods of communication. Finally, we recognize that there may be some minor overlap between the methods of communication. For example, social media and apps tend to be internet-dependent. However, as interviews were interviewer-administered, interviewers were clear up front about the meaning of the methods as well as willing to take questions if there was confusion.

Implications: The current study contributes to the literature by reinforcing the findings about communication methods and their role in health education and outreach, specifically in reducing health disparities and giving new insight into a discipline not currently researched in this way before. As stated in the introduction, at the very basic level, health communication is a powerful weapon for health outreach. Prior literature has suggested that eliminating health disparities requires that public health professionals expand their use of health communication strategies in comprehensive interventions aimed at affecting individual, community, organizational, and policy

change [1]. Different socio-demographic groups utilize different communication methods and if we fail to understand these differences then it prevents these approaches from achieving their potential in reducing health disparities [27]. As discussed above, this study supports this notion that different groups are utilizing different methods.

With the ever-increasing amounts of health information becoming readily available from a variety of sources, it is vital to understand from where unique communities get their health information and why. These communication methods are the necessary pathways between educator and community. They are the tools in which health outreach and education is done. Without knowing the communication preferences of individuals, it is difficult to most effectively reach community members and effect sustainable change.

While these tools are vital to reduce health disparities, if not utilized in the best practices possible, can be detrimental to the efforts of health disparities elimination. The utilization of both healthcare providers and internet as sources of infant health information were listed as the most popular in this study, but may have their limitations. Health care providers have been criticized for giving un-equitable care to different socio- demographic groups [11,28]. In particular, one study has reported African-Americans less likely to receive information on infant health information (such as breastfeeding) compared to White women [11]. Recent literature is suggesting that new mothers often receive little or inconsistent advice from health care providers on infant care topics, such as sleep practices, breastfeeding, and immunizations and stresses the need for increased attention to content, clarity, and delivery of messages by providers [28]. The internet has been reprimanded for the diversity and inaccuracy of infant health information across sites [28,29]. Some of the information regarding infant safe sleep, for example, on the internet has been found to be inconsistent with guidelines [10]. The current study highlights a necessity to prioritize efforts around making these two sources of health information more effective, accurate, and equitable.

This study has given CCIM practitioners an opportunity to prioritize highly prevalent communication methods when reaching out to these populations in the Shenandoah Valley of Northern Virginia. Based on these results, some suggestions are that there may be an opportunity to work more closely with healthcare practitioners in the area around IM prevention strategies and intercultural training or assess accuracy of and/or create local websites in the area and make sure they are providing accurate, effective infant health information. Indeed, caution on inappropriate or misleading internet use should be disseminated to communities who use the internet for health information. As discussed, there were some communication differences observed among different socio-demographic groups, and this may provide an opportunity to create more tailored interventions within these groups of people.

This study has demonstrated the importance of assessing and understanding communication preferences among different groups within one community. The incorporation of multiple communication methods may be a more practical approach to reaching different segments of a population, including those identified as most vulnerable to IM. Once it is known what communication methods groups prefer, it is possible to develop more tailored, and thus effective interventions [30].

As the populations of racial/ethnic minority group's increase and health disparities grow larger in Virginia and the United States [31], understanding communication preferences among vulnerable groups will be a vital avenue for intervention.

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