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Disease Messaging in Churches: Implications for Health in African-American Communities

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Abstract

Using the right messaging strategies, churches can help promote behavior change. Frequencies of disease-specific messages in 21 African-American churches were compared to overall and cancer-specific mortality and morbidity rates as well as church-level variables. Disease messages were found in 1025 of 2166 items. Frequently referenced topics included cancer (n=316), mental health conditions (n=253), heart disease (n=246), and infectious diseases (n=220). Messages for lung and colorectal cancers appeared at low frequency despite high mortality rates in African-American communities. Season, church size, and denomination showed significant associations with health messages. Next steps include testing messaging strategies aimed at improving the health of churchgoing communities.

Keywords

disease prevention; African Americans; health communication

Introduction

The National Institutes of Health have highlighted HIV/AIDS, heart disease, cancer, and health education as necessary foci of efforts to reduce health disparities among racial and ethnic minority populations (National Institutes of Health, 2013). In the area of health education, over half of Americans report purposefully seeking health information outside of their doctor (Tu & Cohen, 2008). For many African Americans, the church is a trusted source for health education materials and programming (Armstrong et al., 2008; Griffith, Passmore, Smith, & Wenzel, 2012); however, little is known about the health information provided by churches and disease topics they address.

African-American churches provide guidance related to the spiritual, physical, emotional, and social needs of their congregations (Armstrong et al., 2008; Griffith et al., 2012), and the provision of health information has been noted by church leadership as an important service performed (Carter-Edwards et al., 2012; Carter-Edwards, Jallah, Goldmon, Roberson Jr, & Hoyo, 2006; Rowland & Isaac-Savage, 2013). As the mission of many churches is to serve not only congregation members but the larger community, they are important locations for community members to seek and be exposed to health information, (Baruth, Wilcox, Laken, Bopp, & Saunders, 2008; Carter-Edwards et al., 2006; Harmon, Blake, Thrasher, & Hebert, 2014; Harmon, Kim, Blake, & Hebert, 2014).

The Health Belief Model is composed of six major components: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy, which provide a framework to understand how exposure to health information can aid in behavior change (Green, Lewis, Wang, Person, & Rivers, 2004; Rosenstock, Strecher, & Becker, 1988). Church health ministries have been noted as having the potential to affect the model's constructs thus increasing awareness and action related to both disease prevention and control (Austin & Harris, 2010; Campbell et al., 2007; Campbell et al., 2004; Carter-Edwards et al., 2006). However, low exposure levels, the presence of competing messages, and provision of health messages that are not personally relevant may actually inhibit behavior change (Gordon, 2002; Wakefield, Laoken, & Hornik, 2010). Despite the importance of health messaging in African-American churches and its perceived relevance by church leaders and congregations (Carter-Edwards et al., 2012; Williams, Glanz, Kegler, & Davis Jr., 2009), few studies have measured health messaging within churches objectively (Harmon, Blake, et al., 2014; Harmon, Kim, et al., 2014), and no study has specifically evaluated the types of diseases African-American churches are targeting with their messaging. The potential impact African-American churches could have on individuals attempting to prevent or control disease raises the need to examine the messages being disseminated and whether these messages match the needs of the community served. As a first step, this study used content analysis methodology to evaluate the frequency of disease topics present in literature provided by African-American churches. This data was then compared to mortality and morbidity data to assess the potential of African-American churches to educate their constituency in a manner consistent with the disease burden of the community. Additional comparisons were made to identify church-level variables influencing the frequency and type of disease messages present. We hypothesized church-level variables (i.e. denomination, size, location, and season) would influence the type and frequency of disease messages present.

Methods

Data were collected from 21 churches that participated in three waves of a larger diet and physical activity intervention study that occurred from June 2010 to June 2013 and has previously been described (Hebert et al., 2013). All churches had predominantly African-American congregations and were from four counties surrounding Columbia, South Carolina (SC). Study procedures were approved by the Institutional Review Board at the University of South Carolina before recruitment and data collection began.

All churches completed a church questionnaire at baseline, which provided information on church location, number of members, and denomination. In addition to the questionnaire, study staff members documented all written messages within the church, both health and non-health related. Pictures were taken of posted messages and copies of all items provided to congregation members were collected. Messaging data were collected from churches at study baseline, again after completion of phase one of the intervention (approximately 6 months after baseline), and after completion of phase two of the intervention (approximately 1 year after baseline). Partial data were collected from three churches such that one church provided data at baseline and the third time point, one church only provided baseline data, and one church provided partial baseline data. Messaging data was collected for two months at each of the study data collection time points to capture the variety of church events that could potentially provide health messages. Additional details on message collection and inclusion criteria have been previously published (Harmon, Blake, et al., 2014; Harmon, Kim, et al., 2014). The dataset for this analysis included 2166 items.

Coding

A codebook was developed with definitions for disease topics as determined through a review of the literature focused on potential health disparities impacting African Americans (Centers for Disease Control and Prevention, 2011), as well as a review of a subsample of items. The codebook was revised until adequate levels of inter-rater reliability were reached. For each item, codes were either present (1) or absent (0). Multiple diseases could be coded as present; however, when the same topic was present more than once in an item, it was counted only once. When coders selected an “other” code, they provided a note on the diseases present in that item. Diseases noted in “other” categories were broken out using these notes and the most frequent topics presented (Table 1). Two students coded items and inter-rater reliability was estimated using a randomly selected double-coded sample of approximately 20% ($n = 428$) of all items coded. Cohen’s kappa was used to assess inter-rater reliability. The overall codebook had a kappa of 0.83, and kappas for each code are presented in Table 1.

Analysis

Data were analyzed using SPSS (v. 21, Armonk, NY: IBM Corp). Descriptive statistics were used to explore the frequency of codes and their range across churches. Frequency of disease topics were compared to mortality data published by the SC Department of Health and Environmental Control (SCDHEC) for African Americans in the state (South Carolina Department of Health and Environmental Control, 2010b). Morbidity data was assessed using prevalence of diseases as reported from the Behavioral Risk Factor Surveillance System (BRFSS) (Centers for Disease Control and Prevention, 2009). Cancer incidence data was assessed using the SC Community Assessment Network (South Carolina Department of Health and Environmental Control, 2009). The most current all-cause and cancer mortality data within the timeframe messaging data was collected were reports from 2010. The most current and complete morbidity and cancer incidence data were from 2009.

The dataset was first analyzed for statistically significant associations in disease topics by study wave or intervention status. As no differences were found, data were pooled for all

other analyses. Data were not normally distributed so the nonparametric Kruskal-Wallis test was used to assess if disease topics differed significantly by church location (5 miles or less, between 6-20 miles, and greater than 20 miles from the downtown area of Columbia). The Mann-Whitney test was used to assess differences by seasonality (Winter/Spring or Summer/Fall), denomination (Baptist, Methodist), and church size (350 members or less, more than 350 members). Season was assigned using the month in which data was collected from each church and then collapsed into categories that aligned with data collection time points (e.g., February 1–March 1 = Winter/Spring, August 20–October 20 = Summer/Fall). One church listed an Independent denomination and was classified with Baptist churches given the less hierarchically organized denominational structure of both Baptist and Independent denominations (Carroll, 2006). Church size categories were created on the basis of churches being small, medium, large or mega churches (Carroll, 2006); however, our dataset had only three small churches (less than 100 members) and one mega church (over 1000 members) so categories were collapsed. Given the number of topics coded, analyses of differences by church-level variables were conducted only for those topics that had both a high frequency in the dataset and were a leading cause of mortality or morbidity in the population of interest.

Results

A total of 1025 items were coded as having a disease message. These items came from a total of 20 churches as one church had no disease messaging present. Table 1 presents the most frequent disease topics, which were cancer (n= 316, 31% of disease messages), heart disease (n= 246, 24% of disease messages), infectious diseases (n=220, 22% of disease messages), other chronic diseases (n=183, 18% of disease messages), and diabetes (n=163, 16% of disease messages). In addition to chronic and infectious diseases, mental health conditions and disorders also were coded with the codebook and comprised 25% of disease messages (n=253). Within cancer messages, breast cancer was the most frequent type mentioned (n=166), for heart disease it was hypertension (n=111), and for infectious diseases it was HIV/AIDS (n=109). In the other chronic disease category, messages related to obesity (n=46) were the most frequent. Substance abuse and stress (n= 53, each) were the most frequent codes in the mental health category.

Messages ranged across churches, with every disease having at least one church with no messaging on that topic (Table 1). There was a maximum of 62 cancer messages in a single church; and there was a maximum of 45 heart disease messages, 56 infectious disease messages, 29 other chronic disease messages, and 25 diabetes messages. Mental health messages showed the largest range with a minimum of zero and a maximum of 67. The lowest numbers for a disease topic in a given church were seen with colorectal cancer, sickle cell disease, and cervical cancer (n=5, n=6, and n=7, respectively).

Messaging topics were aligned to match the disease codes presented in mortality and morbidity reports and the five most frequent topics were cancer, heart disease, diabetes, HIV/AIDS, and flu/cold (Table 2). Cancer and heart disease were the two leading causes of death among African Americans in SC (22% and 23% of deaths, respectively). Obesity was the leading cause of morbidity (prevalence of 70%) and high cholesterol was the second

most common condition (prevalence of 39%) (Table 2). Obesity and high cholesterol were frequent topics present under other chronic diseases and heart disease respectively (Table 1). Flu/cold emerged as the fifth most frequent topic, but it was not in the top five causes of morbidity or mortality.

Alignment of messages related to specific types of cancers with cancer incidence and mortality rates for African Americans in SC also were evaluated (Table 3). The analysis revealed breast (53% of cancer messages) and prostate cancer (29% of cancer messages) as the two most frequent cancer topics in the churches, which matched the two types of cancers with the highest incidence in the population (prostate 19%, breast 16%). The leading causes of cancer-related deaths were due to lung (22% of cancer deaths) and colorectal (12% of cancer deaths) cancer, which comprised a far lower percentage of cancer messages (6% and 8% of cancer messages, respectively) compared to breast and prostate cancer (Table 3).

As seen in Table 4, church size was more often associated with the frequency of top messages than other church and environmental factors. Nearly all of the disease topics included in the analysis had statistically significant differences in the frequency of messages disseminated when smaller churches were compared to larger churches. Season and denomination also were associated with differences in the frequency with which some disease topics were provided. Statistically significant differences by season were noted for cancer ($U=101$, $p=0.02$), breast cancer ($U=66.5$, $p=0.001$), and other chronic disease messages ($U=112$, $p=0.04$) with topics having more messages present in the Summer/Fall compared to the Winter/Spring. Colorectal cancer messages differed significantly by denomination ($U=17.5$, $p=0.05$), with Baptist churches having more messages than Methodist churches. While none of the results were statistically significant for church location, a trend towards fewer messages in the groups farther from the city center was seen, especially when churches were located 20 miles or more from downtown.

Discussion

Constructs of the Health Belief Model indicate exposure to health messaging in African-American churches has the potential to influence health behaviors of congregants through increases in self-efficacy, changes in perceptions of disease risk, and cues to action (Carpenter, 2010; Gordon, 2002). However, health communication research and theory have highlighted the need to consider the level of exposure, competing messages, personal relevance, and cultural context with which messages are provided so as not to increase fear without increasing an individual's ability to act (Gordon, 2002; Schiavo, 2014; Wakefield et al., 2010). This study analyzed health messages present in African-American churches for the presence of disease topics as a first step towards understanding the types of disease messages present within churches. Cancer was found to be a prominent disease topic, and factors such as church size, denomination, and season of the year were significantly associated with the frequency of topics. These findings provide guidance for working with African-American churches in an effort to more effectively present disease related messaging to congregants and the larger community churches serve.

Of the chronic and infectious disease messages found in this study, cancer was the most frequent followed by heart disease, diabetes, HIV/AIDs, and flu/cold. These high-frequency topics follow trends in health promotion programs within African-American churches targeting cancer (Campbell et al., 2004; DeHaven, Hunter, Wilder, Walton, & Berry, 2004; Luque et al., 2011), heart disease (Ruo et al., 2003; Yanek, 2001), and HIV/AIDs (Foster, Arnold, Rebchook, & Kegeles, 2011; Stewart & Dancy, 2012; Whitters, Santibanez, Dennison, & Clark, 2010). In addition, the frequencies of these topics align with the leading causes of mortality and morbidity for African Americans in SC. While our study found congruence, this might not be the case with all churches. A study of rural, African-American pastors in North Carolina noted hypertension and obesity were primary health concerns for themselves and their congregations, but none selected cancer or HIV as health concerns for their congregation even though these were possible options (Carter-Edwards et al., 2012). Efforts may be needed to help churches assess the needs of their congregation and community to ensure messaging is provided that meets the needs of the congregation as a whole and not just a subset.

Due to their social structure and history as a communication source for the community (Mamiya, 2006), churches may be very reactive to public health crises and early adopters of public health messages. The ability to quickly disperse messages from a health campaign may be why flu/cold messages were present at high enough levels to rank fifth in frequency, but were not in the top five causes of mortality. The H1N1 pandemic was documented as starting in April 2009 for SC (South Carolina Department of Health and Environmental Control, 2010a). The 2009-2010 influenza report indicated a non-traditional flu season that was marked by high rates of H1N1 throughout, compared to the usual peak in early winter and variation in the predominate flu strain from week to week (South Carolina Department of Health and Environmental Control, 2011). The pervasiveness of H1N1 and its sustained prevalence during the year immediately before data collection may have motivated the high frequency of messages related to preventing the spread of flu and colds within the churches. Such early adoption should be noted and utilized by public health agencies when disseminating disease prevention information.

Given the high frequency of cancer messages in our dataset and surveillance by the state, we were able to compare the frequency of messages related to specific types of cancers with incidence and mortality rates for African Americans in SC. Breast and prostate cancer ranked fourth and fifth respectively in causes of cancer death and both types of cancer showed high incidence rates. However, the cancer burden faced by this community also included high incidence of leukemia/lymphoma, colorectal, and lung cancers, a higher percentage of deaths from lung and colorectal cancers, and a percentage of deaths from leukemia/lymphoma that is similar to the percentages for breast and prostate cancers. Over half of the cancer messages in this dataset had a reference to breast cancer and nearly one third to prostate cancer, while colorectal and lung cancer messages were eight and six percent of cancer messages respectively. We found little messaging related specifically to leukemia/lymphoma (only 6 references in total). Bone marrow donation and references to the *Be the Match* program did make up the majority (n=29) of messages coded as donation under other chronic disease messages; however, it was still outnumbered by breast, prostate, and cervical cancer messages.

It is not clear why lung and colorectal cancer messaging was low in our sample. A significant difference was seen in colorectal cancer messaging by denomination, with Baptist churches having messages while Methodist churches did not. Bulletin inserts on a variety of cancers, including colorectal cancer, are provided to Baptist churches through the South Carolina Cancer Disparities Community Network (SCCDCN) and may have contributed to the difference seen by denomination (University of South Carolina - Cancer Prevention and Control Program, n.d.). Despite this health promotion endeavor the maximum number of colorectal cancer messages in any church was five, the lowest for any disease topic. A study of perceived barriers and benefits to colorectal cancer screening among African Americans in a faith-based setting found not having a doctor recommend screening and fear of pain were the biggest barriers while setting a good example and believing one's body is God's temple were the most frequently cited benefits (James, Campbell, & Hudson, 2002). A study of lung cancer found more late-stage cancer diagnoses as well as fatalistic views and medical mistrust among African-American and Hispanic patients (Bergamo et al., 2013). These studies combined with our findings highlight the need to include African-American churches as partners in the development of strategies and interventions aimed at the prevention and control of colorectal and lung cancers.

Also of interest was the high number of mental health messages found in this study. While we focused on chronic and infectious disease messages, mental health messages ranked second in frequency behind cancer messages and ahead of heart disease. The use of clergy and the church, in general, as resources for mental health counseling, support, and services is a growing area of interest, but little is known about current practices (Hankerson & Weissman, 2012; Pickard, Inoue, Chadiha, & Johnson, 2011; Taylor, Ellison, Chatters, Levin, & Lincoln, 2000). A review of faith-based mental health studies published between 1980 and 2009 found only eight had been conducted with African-American churches (Hankerson & Weissman, 2012). They noted substance abuse as the most common focus for these studies, which aligns with our finding of substance abuse as a common topic (n=53). We also found messages related to stress and the grief process were frequently present (n=53 and n=38, respectively). These findings point to the need for more work in this area, which is of apparent interest to churches but is not well understood by practitioners and researchers.

To assist in understanding church-level variables potentially influencing messaging frequency, we compared disease topics based on church size, season, denomination, and location. Disease topics varied most by church size. All topics showed a higher number of messages in larger compared to smaller churches, with most reaching statistical significance. While not significant, each topic showed a trend towards fewer messages in churches at greater distance from downtown Columbia, which was most pronounced for churches 20 miles or farther. Our sample size was too small to examine the interaction between size and location (e.g., small-rural versus large-urban churches); however, our findings may indicate a tendency towards smaller, more rural churches disseminating fewer disease messages than larger, more urban churches. Previous research has indicated that larger churches may have more financial resources, more time spent at the church by clergy, and more innovative church leadership (Carroll, 2006; Watson et al., 2003). Previous research has also indicated churches may serve as liaisons with medical and healthcare service providers (Hegwer,

2013; Taylor et al., 2000), and some messaging in churches may reflect promotion of health services in the area. Fewer messages in smaller churches and the most rural churches may be driven by a lack of church resources aimed at health promotion. However, it could also be an indicator of medical deserts and a lack of healthcare partners to promote or work with to provide messages. Additional work is needed to evaluate barriers for smaller and more rural churches and interventions that will aid them in meeting the health needs of their congregation and community.

We did note that cancer, breast cancer, and other chronic disease messages differed significantly by season with both having more messages in the Summer/Fall. For breast cancer, this corresponds with the occurrence of breast cancer awareness month in October (American Cancer Society, 2014). A closer inspection of the other chronic disease variable showed the association was driven by a higher number of sickle cell messages across churches in the Summer/Fall. National Sickle Cell Awareness month is September (American Society of Hematology, 2011). At least for some disease topics, providing messaging in line with the disease's awareness month appears to occur in African-American churches. Helping churches capitalize on the increased resources and attention given to diseases during awareness months may help smaller and more rural churches provide disease messaging to their congregation members.

The purpose of this analysis was to understand the types, frequency, and variables associated with African-American churches presenting messages related to disease. Given the size and complexity of the codebook needed to examine disease topics, we were not able to code for the presence of messages related to disease susceptibility, severity, and other constructs of the Health Belief Model. Future analyses should examine these constructs and whether or not their presence is limited to certain disease topics. While we collected over 2000 pieces of literature that included over a 1000 disease messages, our church number was small and limited to African-American churches in the area surrounding Columbia, SC. With a larger sample of churches, it may have been possible to see more statistically significant differences, especially in church-level variables. Despite the small number of churches in the study, this is the first analysis we have found of its kind and provides valuable information on the disease related messaging efforts being carried out in African-American churches. Future studies should build upon the methods we outlined to determine if differences exist when a larger sample of churches, non-African-American churches, and churches in other geographical locations are assessed. As our data collection was part of a larger study that did not recruit individuals with a previous history of cancer, we were unable to assess if the medical history of congregants drove any of the differences seen in topics across churches. We also did not include an assessment of health ministry leaders and their motivations in providing disease related messaging. Past research indicates these church leaders may be instrumental in the types of messages provided within the church (Carter-Edwards et al., 2012; Harmon, Blake, Armstead, & Hebert, 2013; Wilcox et al., 2007). Future work should examine how diagnoses within churches as well as the motivations of church leaders influence the types and number of messages present within churches.

Our findings indicate a willingness by African-American churches to provide disease-related messaging to their congregations. However, for health-related topics such as cancer,

individuals working in faith-based health promotion need to help churches match messaging strategies with the disease burden facing their congregation and community. Work also is needed with smaller and more rural churches to provide disease messaging relevant to their congregation members. Finally, we need to assess how messaging programs, such as the bulletin inserts provided by the SCCDCN, influence health behaviors.

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Table 1

Code Definitions, Inter-rater Reliability, Frequencies, and Ranges for Disease Topics

Topic (Cohen's Kappa)	Frequency	Range Across Churches
Cancer – Messages aimed at helping someone who has risk factors or signs/symptoms. Including prevention, screening, treatment, and medical service messages.(.91)	316	0-62
<i>Breast</i> – Use of term breast cancer or terms specific to breast cancer (e.g., mammogram, self-breast exam, genetic testing).(88)	166	0-39
<i>Prostate</i> – Use of the term prostate cancer or terms specific to prostate cancer (e.g., digital rectal exam, prostate specific antigen, genetic testing).(1)	93	0-13
<i>Cervical</i> – Use of term cervical cancer or terms specific to cervical cancer (e.g., HPV vaccinations, Pap smears).(1)	39	0-7
<i>Colorectal</i> – Use of terms colon, rectal, or colorectal cancer or terms specific to colorectal cancer (e.g., colonoscopy, sigmoidoscopy, polyps, genetic testing).(1)	25	0-5
<i>Other</i> – Messages pertaining to other cancers or cancer in general not captured by another code.(.78)	99	0-15
Heart Disease – Messages aimed at helping someone who has risk factors or signs/symptoms. Including prevention, screening, control, treatment, and medical service messages.(.85)	246	0-45
<i>Hypertension</i> – Use of the terms hypertension, high blood pressure, maintaining a healthy blood pressure or prevention/control with low sodium or other specialized diet or physical activity.(.91)	111	0-23
<i>Stroke</i> – Use of the term stroke.(.86)	36	0-8
<i>Other^a</i> – Messages pertaining to heart disease not captured by another code.(.79)	56	0-8
<i>General</i> – Messages pertaining to general information for the prevention or control of heart disease and used the terms heart disease, CVD, or coronary heart disease.	65	0-10
<i>Cholesterol</i> – Use of terms cholesterol or high cholesterol.	36	0-12
Infectious Disease – Messages aimed at helping someone who has risk factors or signs/symptoms. Including prevention, signs/symptoms, testing, control, and treatment messages.(.93)	220	0-56
<i>HIV/AIDs</i> – Use of the terms HIV or AIDS.(.91)	109	0-42
<i>Flu/Cold</i> – Use of the terms flu or cold or terms specific to prevention/reducing the spread of germs (e.g., washing hands, covering cough, flu shot).(80)	84	0-31
<i>Sexually Transmitted disease/Infections</i> – Use of the terms sexually transmitted disease (STD) or sexually transmitted infection (STI) in general or in connection to a specific disease.(1)	26	0-17
<i>Other</i> – Messages pertaining to other infectious diseases not captured by another code.(1)	35	0-9
Other Chronic Disease – Messages pertaining to a chronic disease not captured by another code.(.86)	183	0-29
<i>Kidney disease</i> – Use of the term kidney disease or terms specific to kidney disease (e.g., knowing your numbers/kidney count, family history, specialized diets).(1)	29	0-12
<i>Other^a</i> – Messages pertaining to other chronic diseases not captured by another code.(.71)	76	0-10

Topic (Cohen's Kappa)	Frequency	Range Across Churches
<i>Obesity</i> – Messages pertaining to obesity as a disease to be prevented or controlled. Not included where messages where obesity was presented as a risk factor for other diseases.	46	0-11
<i>Donation</i> – Use of the terms “Be the Match,” organ, tissue, or bone marrow donation or transplantation.	38	0-17
<i>Sickle Cell</i> – Use of the terms sick cell or sickle cell anemia.	23	0-6
Diabetes – Messages aimed at helping someone who has risk factors or signs/symptoms. Use of the terms Type 1 or Type 2 diabetes, pre-diabetes, gestational diabetes, or blood sugar in connection with prevention, control, testing, screening, or medical services messages.(.72)	163	0-25
Mental Health – Messages aimed at helping someone who has risk factors or signs/symptoms of an illness impacting their mental health. Including prevention, signs/symptoms, testing, treatment, and medical services messages.(.74)	253	0-67
<i>Substance Abuse</i> – Use of the terms substance abuse or abuse of alcohol, drugs (illegal or prescription), or both.(.66)	53	0-23
<i>Stress</i> – Use of the terms stress, worry, anxiety including stress and anxiety associated with PTSD, general anxiety disorder, and panic attacks. Terms related to caregiving stress (e.g., support, burnout) were also included.(.66)	53	0-15
<i>Grief</i> – Use of the terms grief or loss. Included messages pertaining to coping with loss due to a specific disease (e.g., cancer).(80)	38	0-15
<i>Other^a</i> – Messages pertaining to other mental health conditions or concerns not captured by another code.(.53)	80	0-19
<i>General</i> – Messages using the terms mental health or mental illnesses and pertaining to general information, organizations, resources, or awareness.	40	0-13

^aTotals do not include the items listed below, which were initially coded as “other” but due to their high frequency were separated out.

Table 2

Highest Frequency Topics Compared to Chronic and Infectious Disease Mortality and Morbidity Statistics for African Americans in South Carolina

Highest Frequency Topics (% of disease messages)	Leading Causes of Mortality in 2010 (% of deaths) ^a	Leading Causes of Morbidity in 2009 (% prevalence) ^b
Cancer (30.8%)	Heart Disease ^c (22.8%)	Obesity (70%)
Heart Disease (22.1%) ^d	Cancer (22.3%) ^e	High Cholesterol (39.2%)
Diabetes (15.9%)	Cerebrovascular Disease (6.2%) ^f	Hypertension (35%)
HIV/AIDS (10.6%)	Diabetes ^g (4.4%)	Arthritis (25.9%)
Flu/Cold (8.2%)	Kidney Disease ^h (3.6%)	Diabetes (12.9%)

^aN = 10,905 total deaths

^bBased on data from BRFSS for African Americans in SC

^cDisease of the Heart - Acute Rheumatic Fever, Chronic Rheumatic Heart Disease, Hypertensive Heart Disease, Hypertensive Heart and Renal Disease, Ischemic Heart Disease, and Other Heart Disease (I00-I09, I11, I13, I20-I51)

^dItems with messages related to just stroke (N=19) were removed from this percentage to better match mortality ICD codes

^eMalignant Neoplasms (C00-C97)

^fCerebrovascular Disease (I60-I69)

^gDiabetes Mellitus (E10-E14)

^hNephritis, Nephrotic Syndrome, and Nephrosis (N00-N07, N17-N19, N25-N27)

Table 3

Highest Frequency Cancer Topics Compared to Cancer Incidence and Mortality Statistics for African Americans in South Carolina

Highest Frequency Cancer Topics (% of cancer messages)	Highest Incidences of Cancer in 2009 (% of new cancer cases) ^a	Highest Causes of Cancer Death in 2010 (% of cancer deaths) ^b
Breast (52.5%)	Prostate (18.8%)	Lung (22.3%)
Prostate (29.4%)	Breast (16.2%) ^c	Colorectal (11.9%)
Cervical (12.3%)	Lung (13.8%)	Breast (7.9%) ^c
Colorectal (7.9%)	Colorectal (10.4%)	Prostate (7.5%)
Lung (6.0%) ^d	Leukemia/Lymphoma (4.8%)	Leukemia/Lymphoma (7.1%)

^aN=5,282 new cancer cases

^bN= 2,430 total cancer deaths

^cIncludes female and male breast cancers

^dDerived from counts in notes related to “Other Cancers”

Table 4

Disease Topic Medians, Means, and Test Statistics for Church-Level Variables

	Size ^a		Season ^b		Denomination ^c		Location ^d		χ^2_e
	Median	Mean (SD)	U ^e	Median	Mean (SD)	U	Median	Mean (SD)	
Cancer	6.0 22.0	9.8 (10.3) 23.1 (15.8)	20.0 [*]	4.0 8.0	6.0 (7.8) 10.7 (7.8)	101.0 [*]	16.0 7.0	17.7 (15.9) 10.2 (7.2)	28.5 21.0 6.0 12.0 16.3 (8.2) 19.0 (24.2) 11.0 (8.5)
Breast	3.0 9.0	4.1 (3.9) 13.4 (10.8)	13.5 [*]	1.0 5.0	2.3 (4.6) 6.4 (5.7)	66.5 [*]	6.0 7.0	8.5 (9.7) 7.6 (6.8)	37.0 7.0 4.5 5.0 9.0 (6.1) 10.5 (14.5) 4.4 (3.4)
Prostate	1.0 7.0	2.7 (4.5) 7.0 (4.2)	23.0 [*]	0 3.0	1.7 (2.9) 3.2 (3.0)	126.0	2.0 3.0	5.2 (5.2) 3.0 (3.1)	28.5 7.0 1.5 1.0 5.7 (4.0) 4.8 (6.4) 2.6 (4.2)
Colorectal	0 1.0	1.0 (1.7) 1.6 (1.8)	39.0	0 0	0.8 (1.1) 0.5 (0.8)	158.5	1.0 0	1.7 (1.8) 0 (0)	17.5 [*] 1.0 0.0 0.8 (1.8)
Heart Disease	3.0 15.0	7.7 (12.9) 17.9 (11.2)	17.0 [*]	4.0 5.0	5.5 (5.8) 7.5 (7.7)	157.5	11.0 4.0	13.6 (13.8) 8.4 (10.4)	31.0 11.0 7.5 3.0 13.6 (11.5) 16.3 (18.2) 5.2 (5.4)
Hypertension	1.0 6.0	3.4 (6.9) 8.2 (6.6)	18.0 [*]	1.0 1.0	2.8 (4.3) 3.1 (3.5)	155.5	3.0 1.0	6.3 (7.4) 3.4 (6.0)	26.0 4.0 2.0 1.0 5.9 (5.4) 7.8 (10.7) 2.2 (3.4)
Diabetes	2.0 14.0	4.8 (7.3) 12.2 (5.6)	14.0 [*]	3.0 4.0	3.2 (3.5) 5.4 (4.7)	142.5	7.0 5.0	9.1 (8.1) 5.4 (5.3)	29.0 11.0 5.5 2.0 9.7 (6.8) 9.8 (9.8) 3.40 (4.0)
Infectious Disease	2.0 8.0	6.2 (12.3) 16.9 (17.2)	21.5 [*]	1.0 4.0	5.2 (8.1) 6.4 (8.5)	134.5	3.0 7.0	11.3 (17.2) 10.2 (8.6)	26.5 8.0 8.0 2.0 10.7 (9.8) 19.7 (23.8) 1.8 (1.3)
HIV/AIDS	0 5.0	1.5 (2.7) 10.3 (13.2)	15.0 [*]	0 2.0	2.8 (5.7) 3.0 (5.6)	7.0	0 3.0	5.1 (10.8) 6.6 (7.7)	22.5 5.0 2.0 0 5.7 (6.2) 9.2 (16.4) 0.6 (1.3)
Other Chronic Disease	2.0 16.0	3.7 (6.8) 15.8 (7.8)	7.5 [*]	2.0 3.0	2.9 (3.6) 6.7 (7.1)	112.0 [*]	7.0 3.0	9.3 (9.0) 8.6 (11.7)	36.5 12.0 5.5 1.0 13.2 (10.2) 9.2 (9.0) 1.8 (1.6)
Obesity	1.0 4.0	1.6 (3.2) 3.2 (1.8)	18.0 [*]	1.0 1.0	1.2 (1.8) 1.2 (1.3)	167.0	2.0 1.0	2.5 (3.0) 1.6 (2.1)	31.0 2.0 1.5 1.0 2.6 (2.0) 3.2 (4.3) 0.8 (0.8)

^f Kruskal-Wallis test statistic^a 1st = 350 members, 2nd = 350+ members^b 1st = Winter/Spring, 2nd = Summer/Fall

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c_{1st} = Baptist, c_{2nd} = Methodist
 d_{1st} = 5 miles, d_{2nd} = 6-20 miles, d_{3rd} = >20 miles
 $e_{Mann-Whitney}$ test statistic
* p-value 0.05

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