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Revelations of epidemic threat:
Factors informing religious leaders about HIV/AIDS epidemic severity in rural Malawi

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An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
in partial fulfillment of the requirements for the degree of
Master of Public Health
in Global Epidemiology
2015

Abstract

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Religious leaders in Sub-Saharan Africa (SSA) play a central, influential role in the health and wellbeing of communities they serve. Among other functions, leaders are particularly knowledgeable as key informants for health research on community attitudes, worries, and behaviors regarding disease epidemics. They are uniquely exposed to information from their congregations and communities that informs their perceptions, which can play a role in their responses. The objective of this study was to quantitatively assess the effect that different sources of information (within and outside of the religious community) and individual characteristics have on a religious leader's perception of high HIV/AIDS epidemic severity.

Data come from 187 religious leaders interviewed through the 2005 Malawi Religion Project, and identified via hypernetwork sampling from a list of congregational affiliations of 3,243 adults in the 2004 Malawi Diffusion and Ideational Change Project (MDICP) cohort. Bivariate descriptive analyses and multivariate logistic regression models were performed to identify associations between information sources and leader assessments of HIV/AIDS epidemic severity.

After controlling for congregation size, district, and education, leaders who had discussed HIV/AIDS with other leaders were only 36% as likely to perceive high epidemic severity as leaders who had not (OR= 0.36; 95% CI: 0.16, 0.79). Each additional adult death they observed generated a 40% increase in the odds of perceiving the epidemic as severe (OR=1.40; 95% CI: 1.00, 1.97). Among leaders without secondary education, having frequent discussions with members resulted in the leader being almost four times as likely to perceive high epidemic severity (OR= 3.80; 95% CI: 1.24, 12.28). Religious leaders were more likely to report high epidemic severity in southern Balaka compared with those in northern Rumphi (OR= 3.19; 95% CI: 1.28, 7.94), mirroring epidemiological trends in prevalence. In the presence of religious affiliation, the effect of observed adult deaths on assessing high epidemic severity was reduced.

These findings highlight specific observations and sources that religious leaders in SSA use to assess the severity and impact of HIV/AIDS in their communities, particularly through communication with other religious leaders and their members. Perceiving high epidemic threat is associated with participation in HIV/AIDS prevention activities.

Key Words: HIV/AIDS, epidemic severity, religious leaders, key informants

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ACKNOWLEDGMENTS

First, I would like to thank Dr. Ellen Idler for her exceptional mentorship, guidance, and expertise during this process. I would also like to thank Dr. Jenny Trinitapoli for being so approachable and willing to share her research data and field knowledge about the Malawi Religion Project.

I feel very fortunate to have had the opportunity to participate in the MPH Global Epidemiology program at Emory University, which has been such a supportive environment from the very beginning. I must also recognize my undergraduate professors and mentors at the University of Louisville, who helped to prepare me for graduate studies and research.

Finally, I would like to acknowledge the religious leaders that participated in the Malawi Religion Project and provided this fascinating data. I hope this research contributes to the literature in a way that enhances the roles that leaders have in the HIV/AIDS epidemic and leads to a better understanding of the role of religion in public health.

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CHAPTER I:

BACKGROUND/LITERATURE REVIEW

Introduction: Religion and AIDS in Africa

The HIV/AIDS epidemic in sub-Saharan Africa (SSA) has been one of the most pressing public health crises in recent decades, with the area accounting for 75% of all AIDS-related deaths in 2012 (1). It is critical for the global public health community to understand the complexities of the epidemic's context in SSA, to implement evidence-based programs, and to appreciate and encourage both formal and informal efforts made by local leaders to successfully curb the disease. Various governing bodies and secular health NGOs have issued formal reports on the underutilized potential of religious leaders in the fight against the HIV/AIDS epidemic. Some have even implemented programs and developed curriculum aimed at educating religious leaders about HIV/AIDS and increasing their involvement in prevention strategies (2).

However, the role of religion in public health has historically been misunderstood and religious institutions are often portrayed in the literature and in practice as barriers to health interventions, particularly those focusing on sexual and reproductive ethics (3, 4). Other recent examples of religion as a barrier to health include the disruption of polio vaccination efforts in Nigeria and the identification of traditional burial practices as a source of Ebola transmission in West Africa. (5, 6). Nevertheless, to focus solely on the instances where religious values conflict with public health goals is a disservice to the opportunities when the two sectors can align their efforts for a common interest; collaboratively harnessing the power of religious institutions and networks through social capital, control, and support to improve population health (3).

As a central building block for cultural and social identity, religion is an influential authority in SSA and is a relevant force to explore when considering how HIV/AIDS is interpreted, discussed, and encountered, especially by lay persons. Among other functions, religious leaders often serve as "opinion leaders" of a community and therefore have the power to influence individuals when they are appreciated as trustworthy, credible sources of information (7). However, there is a need to further involve religious leaders as significant community and authoritative stakeholders in efforts to positively address the HIV/AIDS epidemic. In order to achieve this, it is essential to develop more empirical research and gather evidence regarding the HIV/AIDS-related activities of religious leaders, what informs and motivates them to engage in the epidemic, and the relevance of their involvement for health outcomes (8).

Religion and AIDS in Context: Malawi

The Republic of Malawi is located in the southeastern region of SSA, with an estimated population of over 17 million with around 80% classified as being rural (8). Over a third of its gross domestic product is based in agriculture, primarily the exportation of tobacco. The nation receives substantial monetary assistance through the World Bank, the International Monetary Fund, and individual donors, while it struggles to provide adequate education, transportation, and healthcare infrastructure (9).

Malawi in particular is an example of a country with high HIV prevalence, although it is important to note a steady decline in prevalence from its peak at 16.4% in 1999, to 12% in 2004 and then 10.8% in 2012 (10, 11). Like in most other countries in SSA, around 90% of new HIV infections are spread through heterosexual contact (12).

Vertical transmission from mother to child is another important transmission route to consider in prevention strategies, since around 30% of children born to HIV positive mothers are eventually infected either during pregnancy, exposure through the birth canal, and/or breastfeeding. In 2004, the HIV/AIDS prevalence in Malawi was nine times higher among women than men within the 15 to 19 age group, and over three times higher among women than men within the 20 to 24 age group (13). Possible explanations for this trend in SSA include women tending to have relationships earlier in life with older men and having a greater susceptibility to contracting the disease (14).

In an effort to study social influences on health behaviors and perceptions over time in rural areas of Malawi, a longitudinal cohort study was set up in 1998 between the University of Pennsylvania and the University of Malawi called the Malawi Diffusion and Ideational Change Project (MDICP). It has since expanded its study focus to a variety of topics and changed its name to the Malawi Longitudinal Study of Families and Health (MLSFH). Various studies have utilized these data to explore research questions ranging from the role of social networks in HIV/AIDS risk perceptions to contraception decisions (15). In 2004, biomarker data were collected from the respondents to estimate HIV prevalence in the study population. Looking at the study sample by region, the HIV prevalence differs in magnitude from northern Rumphi (5.7%), to central Mchinji (9.1%), to southern Balaka (10.6%) (Table 1). These estimates are lower than what was found in the 2004 Demographic Health Survey conducted in Malawi, but this can be attributed to the fact that the MDICP sample is representative of the rural population, not urban centers (16).

Around 83% of the population in Malawi consider themselves to be of the Christian faith, with 13% identifying with the Muslim faith, most of whom share the Sunni tradition. The largest concentration of Muslims in Malawi is in the southern region, along the shore of Lake Malawi, close to Balaka district (17). Between religious groups in Malawi, there is little variability in the prevalence of HIV. In the MDICP, the average HIV prevalence across all religious affiliations was about 7%, with the exception of New Mission Protestants which was about 4% (i.e. those of the 7th Day Adventist and Jehovah's Witness faiths). The deviation observed among New Mission Protestants could be because of more rigorous observation and enforcement of behavioral restrictions and other social control methods (4).

Religion serves as a very influential institution in Malawi and, consequently, for the HIV/AIDS epidemic, which served as the basis for the implementation of a sister study: the Malawi Religion Project (MRP). The MRP is a cross-sectional, mixed methods data collection project that was implemented in 2005 to investigate the role of religion and religious networks in the HIV/AIDS epidemic. Participants include religious leaders from a random sample of established congregations (n=187) representing three rural regions in Malawi: northern Rumphi (n=68), central Mchinji (n=54), and southern Balaka (n=65). Congregations for the MRP were selected via "hypernetwork sampling," or random selection from a list of organizational affiliations previously reported by 3,243 adults that had served as respondents in Wave III of the MDICP. A religious leader, someone identified as an authority figure within a congregation, was selected from each of the reported organizational affiliations for a structured interview. The interviews were

guided by a 12-page questionnaire that covered six major topical areas: 1) respondent-level background and demographic characteristics; 2) congregational-level background and demographic characteristics; 3) what religious texts tell us about the HIV/AIDS crisis; 4) the types of congregational activities enabling leader-member interaction on AIDS-related issues; 5) estimates of the impact of AIDS on the congregation; and 6) AIDS-related attitudes and behaviors (8).

Religious Interpretations of Disease and Stigma in SSA

Biomedical understandings of HIV/AIDS don't always translate well into the explanatory frameworks used by people in SSA, which often have a very spiritual component. This is not to say that they ignore scientific logic or are not knowledgeable about the problem. Rather, nonwestern disease etiologies often aim to unite the ideas of proximate causes and ultimate causes, the former pertaining more to the "how" and the latter addressing the "why" of getting sick. To further complicate things, HIV/AIDS is quite unique from other ailments experienced in this part of the world, considering its long latency period, low probability of transmission, and intrinsic associations via intimate social networks (4). International approaches to disseminate information must take local worldviews into consideration, and realize that strictly biomedical approaches are not always well received (18).

Interestingly, some have argued for the incorporation of religious imagery and symbolism in HIV prevention strategies at both the individual and structural levels. For example, Loue advocates for the integration of the Islamic concepts of *jihad* (also understood as an internal struggle against one's weaknesses or even self-defense against

oppressive or aggressive external forces) with the Theory of Reasoned Action as a way for Muslims to examine their individual behaviors (ex. abstaining from extramarital sex) and patrol the behaviors of others (ex. *jihad* against partner violence) (19). In Papua New Guinea, Kelly describes the use of the theological notion that the body of Christ is bound to the bodies of individual Christians when discussing the duties of Christians to help those afflicted by HIV/AIDS, in contrast to "AIDS as moral punishment" theories (20). Regrettably, not all ideas are compatible. For example, HIV prevention programming that tries to promote condoms might be perceived as disrespectful to local beliefs surrounding African pronatalism and the sacredness of fertility (4).

Another well researched consequence of differences in interpretation of disease is stigma, or a negative attitude residing within a social structure that stems from some moral ideal. Stigma is particularly important to be aware of when researching HIV/AIDS, which is often thought to reflect divine judgement against sexual sin (4). Madru describes stigma against diseases like HIV/AIDS as a "phenomenon contingent on relationship." Once a stigmatizing attitude permeates a group of people, it can hinder the programs available that provide support and aid to those already infected and community interventions that could potentially decrease the susceptibility of those uninfected (21). When considering the presence of HIV/AIDS-related stigma in an area with high epidemic severity like SSA, the idea of the "contact hypothesis" comes into play, particularly that contact between the infected and the presumed uninfected eventually places individuals in caregiving settings and exposes them to deaths and the suffering of their peers. MDICP data from 2004 show that 65% of rural Malawians agreed that the

majority in their village are “comfortable” around a person who has AIDS (4). It is through this same type of exposure to caregiving and death that might influence religious leaders to perceive epidemic threat, even those initially with stigmatizing “divine judgement” concepts of HIV/AIDS.

Unfortunately, the HIV/AIDS epidemic is but one of many problems faced in Malawi and in SSA in general. One study showed that when asked about their worries, Malawians on average gave higher priority to problems other than AIDS, suggesting that other issues are perceived as being more “immediately relevant ” to daily life. Table 2, taken from the same assessment by Dionne et al. on AIDS exceptionalism in Malawi, demonstrates that in 2008 respondents ranked HIV/AIDS services as the lowest priority after clean water, agricultural development, other health services, and education. Despite these low priority scores, in 2009 HIV/AIDS services in Malawi received the highest monetary development assistance compared to the other problems, at over $153 million. The authors suggest a series of potential explanations for why would there be such a difference between the goals of the international aid community and Malawians, one example being that perhaps the people of Malawi believed that AIDS was already being addressed more effectively than other pressing issues (22). Regardless, it is important to remember that the way people understand and prioritize problems ultimately influences the way they respond to them.

Religious Leaders and Health Outcomes

The public health community is interested in the measurable extent to which their messages and interventions actually influence the health behaviors of individuals. So it

would be important, then, to also understand the influences of messages made by institutions outside formal health sectors, especially in the religious sector because it is so influential. Unfortunately, communications can be in conflict with one another (4). For example, disagreements about condom social marketing, or the promotion of condoms using commercial advertising techniques, in Mozambique resulted in the propagation of contradictions in HIV prevention messages and clashes between Pentecostal leaders and health workers (23). Aggregate-level analyses on religious variation of the HIV/AIDS epidemic can give the impression of stark differences between generalized groups, but the evidence suggests that there are often more differences within a given affiliation than between, and that congregational-level responses to sexual health issues, such as HIV, often result from multiple levels of negotiation and the local context (4, 24). Religious leaders serve as "opinion leaders" and "central people" in the social framework of their local communities, and therefore are in an advantaged position to disseminate health-related messages within their social networks. Local leaders tend to be more influential than international or regional-level leaders, and this gives rise to the variety that is observed in attitudes and endorsed behaviors (7). Within this variation, influences of religious leaders' health messages have also been shown to reduce risk behaviors and there is a growing interest in analyzing the protective potential that religion has on health outcomes through social networks, social support, and social capital (3).

In Malawi, religious leaders engage in a variety of activities regarding the HIV/AIDS epidemic. For example, they can leverage their moral authority in the community to make theological cases for divorce in situations where adultery puts the

spouse at high risk, and even promote the de-stigmatization of participation in HIV testing and counseling programs (25). A cross-sectional study in Nigeria assessing knowledge, attitudes, and practices of religious leaders reported that 76.5% of their respondents claimed to use their leadership position in the community to educate their congregation on some form of HIV/AIDS prevention (26). Nonetheless, do these activities actually make a difference in health outcomes of the community? In one cross-sectional study conducted in Malawi, less knowledge about HIV infection among leaders of faith-based organizations was significantly, statistically associated with the prevalence of more risky behaviors among organization members (27). Using data from the MDICP and MRP, Trinitapoli also discovered in Malawi that self-reported adherence to the ABCs of HIV prevention (abstinence, being faithful, and condom use) was associated with having a clergy member that frequently gave sermons about HIV/AIDS, monitored sexual behavior, and privately advised condoms (28). The evidence suggests that the HIV/AIDS-related activities of religious leaders influence the behaviors and decisions of individual congregation members, so it would be important to understand what informs leaders about the nature of the HIV/AIDS issue in their communities and what motivates them to act.

Epidemic Severity Assessments

In Malawi, Trinitapoli found evidence that the leaders with members who voiced their HIV/AIDS-related concerns tended to hold more frequent sermons on HIV/AIDS (OR=1.58, $p<0.001$) (25). In Madagascar, recommendations made by religious leaders to use condoms were positively associated with the leader knowing someone at high risk for

HIV (OR=16.2, 95% CI: 3.2-80.2) and knowing about a center that administers anti-retroviral therapy (OR=2.6, 95% CI: 1.4-4.8) (29). In Sri Lanka, leaders who scored higher on validated HIV/AIDS knowledge scores were more likely to preach about risk behaviors (AOR=4.07, 95% CI: 2.27-7.28) (30). In all three studies, leaders were motivated to respond to the epidemic after witnessing its impact on the community, through increased contact with the infected and with concerned congregation members. The perception of threat (combining notions of severity and susceptibility) is an important component of many theoretical frameworks like the Health Belief Model and the Extended Parallel Process Model, which aim to understand the mechanisms behind the ways that information about health and disease is received, processed, understood, and used by individuals (31, 32).

Another framework, the Social Amplification of Risk, pays particular attention to the role of opinion leaders, like religious leaders, that first receive a signal about a potential threat, interpret it, attach value to it, and then engage in behavior that may activate secondary impacts within the social network (33). Relating these ideas back to the HIV/AIDS epidemic in SSA, the religious leaders will respond as individuals to the epidemic in the ways they believe to be efficacious, but there are processes that precede the decision to act which involve the perception of epidemic severity (Figure 1). Although religious leaders are individuals, they maintain unique social roles in their communities that have implications for both how they receive and disseminate information and attitudes. Taking information learned from the theoretical frameworks mentioned above, particularly about the importance of the perception of threat (individual

or communal) as a motivator for action, we can begin to conceptualize the potential impact that religious leaders as individual decision-makers have on their communities. In one assessment of an entire community's readiness for HIV prevention programs in rural Bangladesh, the perception of HIV/AIDS as a problem by individual community leaders was identified as a vital component in stage one of readiness, referred to as "vulnerability" (34).

Potential Factors Informing Epidemic Severity Assessments

Compared to other persons in power (ex. members of parliament, government ministry official, etc.), religious leaders are some of the most trusted figures in SSA societies and are sought after for help and advice on important life issues (4). They are in a position that offers them a unique perspective about what is going in within their communities, which enables them to develop accurate perceptions of the severity of disease epidemics. Potential factors that inform them about the severity of the HIV/AIDS epidemic in particular could include discussions with members via counseling sessions, discussions with other clergy members on how to address HIV/AIDS in their sermons, and attending HIV/AIDS workshops offered by NGOs and Ministry of Health officials. They also are very likely to witness the mortality resulting from widespread diseases and hardship because of their participation in funerals and their spiritual consolation of loved ones. Of course, to each epidemic severity assessment, each individual leader might bring with them an idiosyncratic set of ideologies and beliefs, acquired through experience and structured affiliations (such as a religious ideology, attitudes regarding HIV/AIDS stigma, and apocalyptic fears of the "end times").

High Epidemic Severity as a Call to Action

Given that a religious leader perceives HIV/AIDS to be a true threat to the community through various information channels, the next step in the process towards engaging in a particular HIV/AIDS response is the evaluation of its efficacy (Figure 1) (32). Trinitapoli explored the various AIDS-related activities of religious leaders, including preaching about sexual morality, preaching about HIV/AIDS, advising divorce in high-risk marital situations, promoting condoms, and promoting HIV testing and counseling (25). Furthermore, a qualitative comparative analysis on the MRP data showed that leaders often participate in a combination of responses with varying degrees of four major dimensions: moral, biomedical, faith healing, and pragmatic. The most common approach to HIV/AIDS prevention among religious leaders in rural Malawi is one focusing solely on the moral dimensions, such as preaching about sexual morality in sermons and encouraging early marriage. The dominance of this approach can be attributed primarily to the weighted concentration among New Mission Protestant leaders with over 60% adhering to a moral dimension-focused prevention strategy. Although selected strategies did tend to vary across religious traditions, Trinitapoli and Weinreb point out that the other religious affiliation groups (ex. Catholic, Pentecostal, Muslim, etc.) were quite heterogeneous in terms of the approaches of the leaders (4). Understanding what leads a religious leader to pursue one response (or combination of responses) over another is certainly of interest. However, it is also important to note the processes prior to deciding to adopt a particular strategy, including the detection of high epidemic threat in the community. This raises the question: do specific information

sources (within and outside of the religious community) or individual characteristics have an effect on the likelihood that a religious leader perceives high HIV/AIDS epidemic severity?

Purpose of Study

The aim of my study was to quantitatively expand upon previous studies about the impact of religious leaders on HIV/AIDS prevention in SSA, by identifying information sources unique to leaders that ultimately inform their assessments of epidemic severity. The literature lacks published data that pinpoint the factors that influence religious leaders in SSA to perceive high or low epidemic threat of HIV/AIDS. If the goal is to maximize the potential of local leaders on the ground in SSA to respond to the epidemic, it would be important to understand some of the contextual and motivating factors that lead religious leaders to even recognize HIV/AIDS as a problem in the first place. Using survey data collected in 2005 from religious leaders living in and serving rural Malawi communities, I explore exposures coming from within the community (ex. funerals, counseling members, etc.), coming from outside of the community (ex. HIV/AIDS workshops, talking with other leaders, etc.), in addition to characteristics such as HIV/AIDS-related stigmas (e.g. views AIDS as a deserved punishment, etc.) and religious affiliation.

Literature Review Tables/Figures

Table 1. HIV Prevalence of MDICP and DHS Study Populations, Malawi, 2004.

District	MDICP (2004)* Total HIV + (%)	DHS (2004)** Total HIV + (%)
Rumphi (north)	5.7	8.1
Mchinji (central)	9.1	6.5++
Balaka (south)	10.6	17.6

*Prevelance from the 2004 Wave 3 Sample of the Malawi Diffusion and Ideational Change Project.

**Prevalence from the 2004 Sample of the Malawi Demographic Health Survey.

++ Very high refusal rates in sample from Mchinji (ex. less than 40% of survey respondents in Lilongwe were tested).

Source: Reniers & Tfaily 2008 (16)

Table 2. Average scores of villagers' policy rankings and related donor aid allocations, Malawi, 2004.

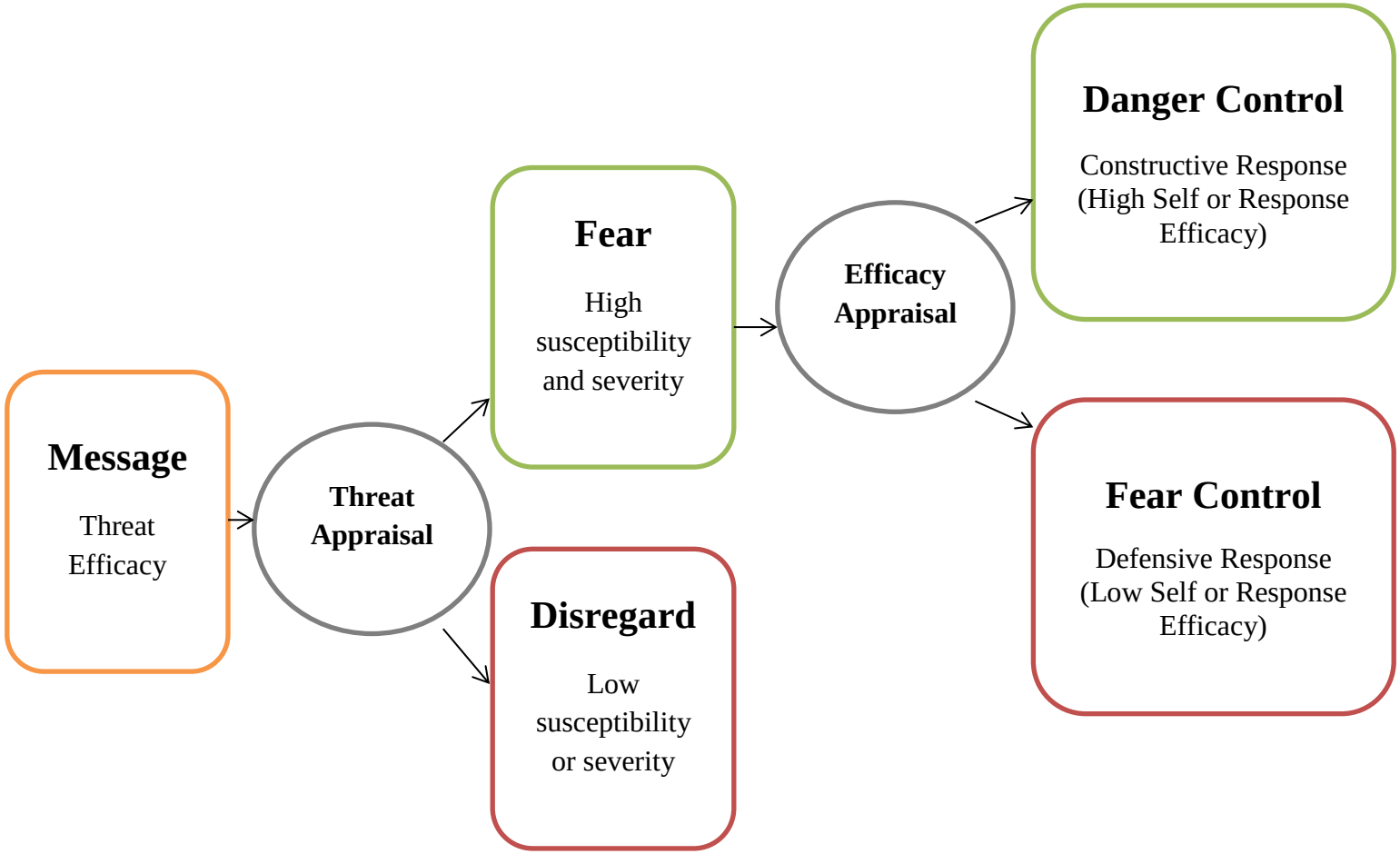
	MLSFH (2008)*	**IDSO (2009)****
Policy Priority	Average policy priority score (1=highest, 5=lowest)	Official development assistance to Malawi, (in millions USD)
Clean water	2.0	4.92
Agricultural development	2.6	10.18
Health services	2.9	93.05
Education	3.6	69.08
HIV/AIDS services	3.8	153.16

*Responses from the 2008 Sample of the Malawi Longitudinal Study of Families and Health.

**Statistics from International Development Statistics Online.

Source: Dionne, Gerland, & Watkins 2013 (22)

Figure 1. Diagram of the Extended Parallel Process Model (EPPM)



Source: Adapted from Witte 1992 (32)

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CHAPTER II:

MANUSCRIPT (PEER-REVIEWED JOURNAL ARTICLE STYLE)

Revelations of epidemic threat:

Factors informing religious leaders about HIV/AIDS epidemic severity in rural Malawi

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ABSTRACT

Religious leaders in Sub-Saharan Africa (SSA) play a central, influential role in the health and wellbeing of communities they serve. Among other functions, leaders are particularly knowledgeable as key informants for health research on community attitudes, worries, and behaviors regarding disease epidemics. They are uniquely exposed to information from their congregations and communities that informs their perceptions, which can play a role in their responses. The objective of this study was to quantitatively assess the effect that different sources of information (within and outside of the religious community) and individual characteristics have on a religious leader's perception of high HIV/AIDS epidemic severity.

Data come from 187 religious leaders interviewed through the 2005 Malawi Religion Project, and identified via hypernetwork sampling from a list of congregational affiliations of 3,243 adults in the 2004 Malawi Diffusion and Ideational Change Project (MDICP) cohort. Bivariate descriptive analyses and multivariate logistic regression models were performed to identify associations between information sources and leader assessments of HIV/AIDS epidemic severity.

After controlling for congregation size, district, and education, leaders who had discussed HIV/AIDS with other leaders were only 36% as likely to perceive high epidemic severity as leaders who had not (OR= 0.36; 95% CI: 0.16, 0.79). Each additional adult death they observed generated a 40% increase in the odds of perceiving the epidemic as severe (OR=1.40; 95% CI: 1.00, 1.97). Among leaders without secondary education, having frequent discussions with members resulted in the leader being almost four times as likely to perceive high epidemic severity (OR= 3.80; 95% CI: 1.24, 12.28). Religious leaders were more likely to report high epidemic severity in southern Balaka compared with those in northern Rumphi (OR= 3.19; 95% CI: 1.28, 7.94), mirroring epidemiological trends in prevalence. In the presence of religious affiliation, the effect of observed adult deaths on assessing high epidemic severity was reduced.

These findings highlight specific observations and sources that religious leaders in SSA use to assess the severity and impact of HIV/AIDS in their communities, particularly through communication with other religious leaders and their members. Perceiving high epidemic threat is associated with participation in HIV/AIDS prevention activities.

Key Words: HIV/AIDS, epidemic severity, religious leaders, key informants

INTRODUCTION

The HIV/AIDS epidemic in sub-Saharan Africa (SSA) has been one of the most pressing public health crises in recent decades, with the area accounting for 75% of worldwide AIDS-related deaths in 2008 (1). The nation of Malawi in particular is an example of a country with high HIV prevalence, although it is important to note a steady decline in prevalence from its peak at 16.4% in 1999, to 12% in 2004 and then dropping to 10.8% in 2012 (2, 3). As a central building block for cultural and social identity, religion is an influential authority in SSA and is a relevant force to explore when considering how HIV/AIDS is interpreted, discussed, and encountered, especially by lay persons (4). Religious leaders often serve as "opinion leaders" of a community and therefore have the power to influence individuals when they are appreciated as trustworthy, credible sources of information (5).

Historically, studies of the relationship between religion and public health often portrayed religious institutions as barriers to health interventions, particularly those focusing on sexual and reproductive ethics (4). For example, disagreements about condom social marketing in Mozambique resulted in the propagation of contradictions in HIV prevention messages and clashes between Pentecostal leaders and the public health community (6). Aggregate-level analyses on religious variation of the HIV/AIDS epidemic can give the impression of stark differences between generalized groups, but the evidence suggests that there are often more differences within a given affiliation than between, and that congregational-level responses to sexual health issues, such as HIV, often result from multiple levels of negotiation and the local context (4, 7). Within this

variation, influences can also be quite positive and there is a growing interest in analyzing the protective potential that religion has on health outcomes through social networks, social support, and social capital (8).

Through interviews with Christian and Muslim religious leaders in Malawi, Lindgren et al. concluded that leaders' increased knowledge of HIV/AIDS and non-stigmatizing attitudes significantly predicted a reduction in risk behaviors of congregation members (9). Trinitapoli also discovered in Malawi that self-reported adherence to the ABCs of HIV prevention (abstinence, being faithful, and condom use) were associated with having a clergy member that frequently gave sermons about HIV/AIDS, monitored sexual behavior, and privately advised condoms (10). The evidence suggests that the HIV/AIDS-related activities of religious leaders influence the behaviors and decisions of individual congregation members, so it would be important to understand what informs leaders about the nature of the HIV/AIDS issue in their communities and what motivates them to act.

In Malawi, Trinitapoli found evidence that the leaders with members who voiced their HIV/AIDS-related concerns tended to hold more frequent sermons on HIV/AIDS (11). In Madagascar, recommendations made by religious leaders to use condoms were positively associated with the leader knowing someone at high risk for HIV (OR=16.2, 95% CI: 3.2-80.2) (12). In both studies, leaders were motivated to respond to the epidemic after witnessing its impact on the community, through increased contact with the infected and with concerned congregation members. The perception of threat (combining notions of severity and susceptibility) is an important component of

theoretical frameworks like the Health Belief Model and the Extended Parallel Process Model, which aim to understand the mechanisms behind the ways that information about health and disease is received, processed, understood, and used by individuals (13, 14).

Another framework, the Social Amplification of Risk, pays particular attention to the role of opinion leaders, like religious leaders, that first receive a signal about a potential threat, interpret it, attach value to it, and then engage in behavior that may activate secondary impacts within the social network (15). Although religious leaders are individuals, they maintain unique social roles in their communities that have implications for both how they receive and disseminate information and attitudes. Taking information learned from the theoretical frameworks mentioned above, particularly about the importance of the perception of threat (individual or communal) as a motivator for action, we can begin to conceptualize the potential impact that religious leaders as individual decision-makers have on their communities. In an assessment of community readiness for HIV prevention programs in rural Bangladesh, the perception of HIV/AIDS as a problem by community leaders was a vital component in stage one of readiness, referred to as "vulnerability" (16). Ultimately, religious leaders will respond to the epidemic in the ways they believe to be efficacious, but there are processes that precede the decision to act which involve the perception of epidemic severity. There are no published data that focus on the specific factors that influence how religious leaders in SSA perceive the epidemic severity.

Religious leaders play a central role in SSA communities. According to the World Values Survey, the region has over 70% of the population attending weekly religious

services (17). Leaders become engaged in community health interventions and message dissemination, and can also serve as key informants on community perceptions, worries, and behaviors related to HIV/AIDS. The aim of my study was to quantitatively expand upon previous studies about the impact of religious leaders on HIV/AIDS prevention, by identifying information sources unique to leaders that ultimately inform their assessments of epidemic severity. Specifically, I explore exposures coming from within the community (ex. funerals, counseling members, etc.), outside of the community (ex. HIV/AIDS workshops, talking with other leaders, etc.), HIV/AIDS-related stigmas (ex. views AIDS as a deserved punishment), and religious affiliation using survey data collected in 2005 from religious leaders of all faith traditions living in and serving rural Malawi communities.

METHODS

Data Source and Study Population

The Malawi Religion Project (MRP) is a cross-sectional, mixed methods data collection project that was implemented in 2005 to investigate the role of religion and religious networks in the HIV/AIDS epidemic. Participants include religious leaders from a random sample of established congregations (n=187) representing three rural regions in Malawi: northern Rumphi (n=68), central Mchinji (n=54), and southern Balaka (n=65). Congregations for the MRP were selected via "hypernetwork sampling," or random selection from a list of organizational affiliations previously reported by 3,243 adults. They had served as respondents in Wave III of a sister cohort study known as the Malawi Diffusion and Ideational Change Project (MDICP) which investigates the effects of HIV/AIDS on families (Figure 1). A religious leader, someone identified as an authority figure within a congregation, was selected from each of the reported organizational affiliations for a structured interview. In situations where the congregations had multiple religious leaders, only one leader was selected per congregation based on longest tenure to prevent redundant representations in analyses. The analytic sample also excluded "laypersons" who were temporarily serving as de facto leaders (18).

For this study, only quantitative data collected from the MRP was used. Structured interviews were guided by a 12-page questionnaire that covered six major topical areas: 1) respondent-level background and demographic characteristics; 2) congregational-level background and demographic characteristics; 3) what religious texts tell us about the HIV/AIDS crisis; 4) the types of congregational activities enabling

leader-member interaction on AIDS-related issues; 5) estimates of the impact of AIDS on the congregation; and 6) AIDS-related attitudes and behaviors. Institutional Review Board exemption was granted by Emory University for secondary data analysis of the de-identified dataset.

Outcome Variable of Interest

The primary outcome of interest considered in this study represented the religious leader's assessment of the severity of the HIV/AIDS epidemic in their congregation. As defined by Witte, perception of severity refers to an individual's beliefs about the seriousness or magnitude of a given threat (14). For the purposes of this study, the perception of HIV/AIDS epidemic severity was operationalized as a leader's response when asked to rank "how big of a problem is AIDS currently" compared to other problems the congregation faces using the following categories: "not a problem at all, somewhat of a problem, a big problem, or the single biggest problem." For purposes of analysis, a dichotomous variable was created to represent low-epidemic severity assessment (combining responses "not a problem at all" and "somewhat of a problem") and high-epidemic severity assessment (combining "a big problem" and "the single biggest problem"). Justification for this categorization was based on accounting for potential differences in the language used during the interviewing process and varying interpretations of adjectives describing the degrees of severity, as well as some alternative categorizations resulting in very low frequencies.

Predictor Variables of Interest

Four types of information sources and characteristics were considered as predictors for religious leaders' assessment of epidemic severity: 1) information gathered from within the community; 2) from outside the community; 3) individual and community stigma; and 4) religious affiliation.

Information gathered from within the community included a measure of the frequency with which members of the congregation came to talk to the leader about their HIV/AIDS-related worries, measured categorically as "never, seldom, about monthly, almost every week, and every week." For analysis, this predictor was dichotomized into frequent discussion of AIDS-related worries (1 = more than "about monthly") and infrequent discussion (0 = "never" or "seldom"). A second predictor coming from within the community was exposure to funerals, since religious leaders often participate in those ceremonies. This was operationalized as the continuous number of adult deaths witnessed in the past month, which was potentially confounded by two measures: congregation size (continuous) and if HIV/AIDS infected persons had joined the congregation after receiving a positive diagnosis (dichotomous).

Information from outside the community included whether or not the leader had discussed HIV/AIDS with other religious leaders, participated with other congregations within the past year, and participated in an HIV/AIDS workshop. All three variables were measured dichotomously as "yes" or "no" during the interviews and were used as such in analysis.

HIV/AIDS-related stigma was assessed as a dichotomous measure for both individual leaders and the overall congregation. Leaders were first asked whether or not they believed that AIDS was a deserved punishment. Then, they were asked the same question but of the beliefs of their congregation members in general.

Responses regarding the religious affiliation of the leader were grouped into six major categories based on similar ideology and practices of religious traditions: 1) Catholic, 2) Muslim, 3) Pentecostal, 4) Traditional Mission Protestant (ex. Anglican, Baptist, and Presbyterian), 5) New Mission Protestant (ex. Church of Christ, Jehovah's Witness, and Seventh Day Adventist), and 6) African Independent Churches (i.e. African-led religious groups that historically broke off from Mission Protestant churches over the desire to integrate more traditional African cultural practices) (4).

Socio-demographic Variables of Interest

Other variables of interest included the sex, age, and educational level of the leader. The sex of each respondent was dichotomously recorded as male or female. Age was later calculated by subtracting the year of self-reported birth by the respondent from the year of the interview. Educational level was determined first by asking the respondent if he or she attended school, then asking the respondent to clarify the grade-level they reached. The Malawi educational system is divided into primary (grades 1 to 8), secondary (grades 9 to 12), and tertiary (university or specialty training) levels (19). Responses for leader education level were dichotomized into having some secondary education or not. Finally, the geographic location of the congregation was also considered (Rumphi, Mchinji, or Balaka) and whether or not the congregation was considered

"isolated" (defined as never being visited by a church authority, missionary, or government official). It is important to note the difference in HIV prevalence across the original MDICP sample, which increased from northern Rumphi (5.7%), central Mchinji (9.1%), and southern Balaka (10.6%) (20).

Data Analysis

All analyses for the study were carried out in SAS 9.4. The characteristics of the religious leaders overall were summarized with frequencies and means with standard deviations. I divided the religious leaders sample by how big a problem they perceived AIDS to be (i.e. low and high epidemic severity), and performed a bivariate comparison of two groups using ANOVA for continuous variables and the chi-square test for categorical ones. The same method was applied in describing the distribution of the defined exposures and their associations with high epidemic severity assessments.

Directed acyclic graphs were first used to identify potential confounders and explore variable relationships. Unadjusted bivariate logistic regression models were used to understand the influence of all variables of interest, including confounders, on the final outcome of epidemic severity assessment. Variables were assessed for specification of exposures, interaction terms, and confounders (using the standard backwards elimination approach). Next, I constructed multivariate logistic regression models for the outcome, incorporating the selected exposures and potential confounders and effect modifiers. The final model was also examined for the presence of collinearity, using a previously published SAS macro (21), and influential observations. Adjusted odds ratios and their 95% confidence intervals were calculated for the exposures of interests.

Lastly, unadjusted bivariate logistic models were constructed for exploratory purposes to visualize the potential association of perceiving high epidemic severity and engagement in HIV/AIDS-related activities. Activities of interest included dichotomous measures of: 1) frequently discussing HIV/AIDS in sermons (more than once per month); 2) frequently discussing sexual morality in sermons (more than once per month); 3) privately advising members to get tested for HIV; 4) privately advising divorce in high-risk marriages; and 5) privately advising members to use condoms.

RESULTS

Descriptive Analyses

Of the 187 religious leaders surveyed for the Malawi Religion Project and described in Table 1, over 95% of respondents were male and only 29% had achieved at least some secondary education. Respondents resided in rural communities from one of three districts in Malawi: Rumphi in the north (36%), Mchinji in the central region (29%), and Balaka in the south (35%). The average age of the religious leaders was 47 years and they led congregations with an average regular attendance of 38 adult members, with a highest reported congregation size of 370 adult members. The affiliated religious tradition of each leader was categorized into six major distinctions, the most frequent being Mission Protestant (21%), African Independent Congress (20%), and New Mission Protestant (18%).

Bivariate Analyses

Bivariate analyses were conducted on the above socio-demographic variables in relation to the leader's assessment of the HIV/AIDS epidemic in the community, using ANOVA for age and congregation size and the chi-square test for the remaining attributes. Reporting high epidemic severity was statistically significantly associated with regional district, in a trend consistent with epidemiological descriptions of HIV prevalence increasing going from north to south (20). 79% of the leaders living in southern Balaka reported high epidemic severity, followed by central Mchinji (59%), and northern Rumphi with the lowest proportion (49%).

Categorized religious affiliation was also statistically significantly associated with reporting high epidemic severity, with only 35% of New Mission Protestant leaders reporting high epidemic severity compared with 91% of Muslim leaders. In exploratory analyses not shown, a chi-square test between categorical religious affiliation and district revealed a strong statistical association (p-value < 0.001). To visualize the association between religion and geography in relation to perceived epidemic severity, I graphed the percentage of leaders reporting high epidemic severity by religious affiliation and regional concentration (Figure 2). The proportion of leaders reporting high epidemic severity varied by religious affiliation. However, there was a strong correlation between religion and geography in relation to increasing epidemic severity. As the proportion of a given religious affiliation in the center and the south increased (where there are notably higher prevalence rates of HIV), the proportion of leaders reporting high epidemic severity was also higher. Not having achieved at least some secondary education and leading larger congregations were also associated with reporting high epidemic severity, although these differences were not statistically significant. Leader's age, leader's sex, and a congregation's status of being isolated were not meaningfully different across the epidemic severity levels. District, religious affiliation, and potentially congregation size and leader's education were found to be much more important characteristics for religious leaders' assessment of the severity of the local HIV/AIDS epidemic.

Next, as shown in Table 2, bivariate analyses were conducted between the outcome of reported epidemic severity and the independent variables of interest, representing sources of information from outside of the community, from within the

community, and HIV/AIDS-related stigmas. From inside the community, observing more adult deaths within the past month (p-value = 0.002) and having members who voiced their HIV/AIDS-related concerns at least monthly (p-value = 0.01) were statistically significantly associated with perceiving the epidemic as severe. In contrast, from outside of the community, having discussed HIV/AIDS with other religious leaders was statistically significantly associated with perceiving low epidemic severity (p-value = 0.02). Attending an HIV/AIDS workshop, having people join the congregation after HIV/AIDS diagnosis, participating in other congregations, and stigma-associated beliefs were not associated with leaders' perceptions. However, it is interesting to note that over 76% of the total study sample believed that HIV/AIDS was a deserved punishment, indicating a high prevalence of stigma. Exposure to adult deaths and conversations with members and other religious leaders appeared to be most relevant to how leaders perceive the severity of the epidemic.

Bivariate logistic regression generated unadjusted odds ratios for the predictors of interest looking at socio-demographic characteristics of the leader and congregation, information sources outside of the community, inside of the community, stigma, and religious affiliation. Across socio-demographic characteristics, the likelihood of reporting high epidemic severity was almost 4 times higher when the leader lived in southern Balaka (OR=3.86; 95% CI: 1.81, 8.25), compared to those living in northern Rumphi. With borderline statistical significance, the likelihood of reporting high epidemic severity was only 56% as likely among leaders who attended at least some secondary school compared to those that did not (OR=0.56; 95% CI: 0.29, 1.06). Leader age and

congregation size were not meaningful predictors. From outside of the community, reporting high epidemic severity was only 48% as likely among leaders who discussed HIV/AIDS with other religious leaders, compared to those who did not discuss (OR=0.48; 95% CI: 0.25, 0.91). From within the community, the likelihood of reporting high epidemic severity was increased by 53% with each additional adult death observed (OR=1.53; 95% CI: 1.16, 2.03) and over twice as likely among leaders who were approached frequently by members wanting to share their HIV/AIDS-related concerns (OR=2.46; 95% CI: 1.29, 4.70), compared to leaders whose members didn't.

For the association between religious affiliation and reporting high epidemic severity, I used Mission Protestant as the referent group based on its large size and comparable distribution across all three districts (Figure 2). The odds of perceiving the epidemic as severe were the lowest among north-concentrated New Mission Protestants (OR=0.23; 95% CI: 0.09, 0.62) and Pentecostals (OR=0.38; 95% CI: 0.14, 1.00) and highest among south-concentrated Muslims (OR=4.29; 95% CI: 0.86, 21.29) as compared to the more centrally distributed Mission Protestants. Leader age, congregation size, stigma, and the other sources of information were again not meaningful predictors of reporting high epidemic severity.

Multivariate Analyses

Multivariate logistic regression was conducted looking simultaneously at the exposures to adult deaths, talking frequently about HIV/AIDS concerns with members, and talking with other religious leaders (Model 1, Table 4). Leaders who had discussed HIV/AIDS with other leaders were only 38% as likely to perceive high epidemic severity

as leaders who had not (OR= 0.38; 95% CI: 0.18, 0.79). Each additional adult death in the congregation generated a 46% increase in the odds of perceiving the epidemic as severe (OR=1.46; 95% CI: 1.07, 2.00). Leaders who talked with their members at least monthly about HIV/AIDS were 2.5 times as likely to report high epidemic severity compared to those who did not (OR=2.53; 95% CI: 1.13, 5.64).

After controlling for congregation size and education, the effects of witnessing adult deaths and talking about HIV/AIDS with other religious leaders remained consistent (Model 2, Table 4). However, I identified a borderline significant interaction term between education level (having some secondary education or not) and talking frequently with members about HIV/AIDS (p-value = 0.07). Due to limitations in sample size, the potential effect modification of educational attainment was pursued further and assessed using contrast statements in SAS PROC LOGISTIC. Among leaders who attended secondary school, having frequent discussions with members did not statistically, significantly increase the likelihood of reporting high epidemic severity (OR= 0.91; 95% CI: 0.25, 3.26). However, among leaders without secondary education, having frequent discussions with members resulted in the leader being over four times as likely to perceive high epidemic severity (OR= 4.08; 95% CI: 1.41, 11.74). After controlling for regional district in addition to congregation size and education, the effects of the three exposures of interest remained relatively the same in magnitude, direction, and statistical significance (Model 3, Table 4). Religious leaders were over three times as likely to report high epidemic severity in the southern district of Balaka compared those living in the northern district of Rumphi, highlighting the established epidemiologic trend

of higher HIV/AIDS prevalence in Malawi going from north to south (OR= 3.19; 95% CI: 1.28, 7.94).

Religious affiliation had a statistically significant effect on perceived epidemic severity, even in the presence of the three exposures and after controlling for congregation size and education (Model 4, Table 4). New Mission Protestants stood out from other religious categories, being the least likely to report high epidemic severity when compared to the more centrally distributed Mission Protestant referent group (OR= 0.27; 95% CI: 0.09, 0.83). In Model 4, the likelihood of reporting high epidemic severity was still greater among leaders who did not discuss HIV/AIDS with other religious leaders and leaders with no secondary education whose members came to them at least monthly with their HIV/AIDS-related concerns (Model 4, Table 4). However, the previously statistically significant effect of each additional adult death within the last month was weakened after controlling for religious affiliation (OR= 1.22; 95% CI: 0.86, 1.72). When regional district was controlled for alongside religious affiliation in Model 5, the effect of being New Mission Protestant on reporting high epidemic severity was reduced (OR= 0.34; 95% CI: 0.11, 1.09) (Table 4). A SAS macro was unable to detect the presence of significant collinearity between the district and religious affiliation variables, but it is likely that the sample size was not sufficient for this. No influential observations were identified in the dataset.

Exposure to adult deaths, talking with other religious leaders about HIV/AIDS, and talking frequently about HIV/AIDS concerns with members remained important predictors of epidemic severity. Discussing HIV/AIDS with members frequently only had

a statistically significant effect on perceiving high epidemic severity among leaders who had not obtained at least some secondary education. In the presence of religious affiliation, the effect of the number of adult deaths within the past month on assessing high epidemic severity was reduced. I observed strong correlations between regional district and religious affiliation in terms of perceiving high epidemic severity. The variables explored in the analyses above indicate that there are identifiable characteristics and sources of information that are associated with a religious leader perceiving epidemic threat.

Exploratory Analyses: Outcome as Predictor

Finally, I made an exploratory examination of religious leader's involvement in five HIV/AIDS-related prevention activities and their association with perceptions of epidemic severity (Table 5). When the epidemic was perceived as severe, leaders were over three times as likely to frequently mention HIV/AIDS in sermons (OR= 3.21; 95% CI: 1.42, 7.29), which was the most common activity among leaders (84.5%). The least common activity was privately advising the use of condoms (26.9%), but even so, the likelihood of recommending them was increased by two-fold when the leader reported high epidemic severity compared to low (OR= 2.14; 95% CI: 1.05, 4.40). Additionally, the leader was also over twice as likely to privately advise divorce in high-risk marriages when the epidemic was severe compared to not severe (OR= 2.19; 95% CI: 1.12, 4.30). Perceiving high epidemic severity was not a statistically significant predictor for frequently mentioning sexual morality in sermons and privately recommending an HIV

test, but was quite meaningful for the public discussion of HIV/AIDS and the private promotion of condom use and divorce.

DISCUSSION

An exploration of potential exposures unique to religious leaders demonstrated that the likelihood of reporting high HIV/AIDS epidemic severity was increased when the leader engaged in frequent discussions with members about AIDS-related concerns (but only among leaders that had not achieved some secondary education, which describes the majority). Leaders were increasingly more likely to report high epidemic severity with each additional adult death observed within the last month. In contrast, when the leader discussed HIV/AIDS with other religious leaders, they were more likely to perceive lower levels of epidemic severity. Even after controlling for education level, congregation size, district, and religious affiliation, frequent discussions with members (among leaders without secondary education) and with other religious leaders maintained the magnitude and significance of association, but the effect of number of adult deaths was slightly reduced. District was highly correlated with religious affiliation due to the variation in its regional distribution, but there was still a borderline significant effect of being New Mission Protestant on reporting lower epidemic severity even when region was held constant. Our study also introduces the notion that when leaders receive specific information indicating a high level of threat (e.g. deaths, concerns of members) they are more likely to perceive the HIV/AIDS epidemic as highly severe, which can then increase the likelihood of recommending condoms, referencing HIV/AIDS in sermons, and even advising divorce in high-risk marriages.

In this study, what are the implications for causality between being exposed to various sources of information and a leader's perception of epidemic severity? After all,

the data come from a cross-sectional survey. I would argue that the perception of epidemic severity was assessed at the time of the interview, whereas the religious leader was asked to retroactively reflect on past contacts, frequency of discussions, and previously observed deaths that occurred prior to the interview. For these reasons, we might assume some temporal sequence of the exposure to information sources existing before the leader's assessment of epidemic severity. However, it is quite possible that some of these relationships are cyclical, or perhaps feedback exists between the actions of a religious leader and the actions of their members. For example, the leader may be compelled to initiate public sermons and AIDS-related activities in the midst of a severe epidemic, creating a more inviting environment for members to then approach the leader with their AIDS-related concerns, which further informs the leader about the epidemic severity. According to Trinitapoli and Weinreb, there is strong evidence to suggest that just as religion affects AIDS, AIDS has begun to affect religion itself (4).

Information from Outside the Community

One of the strongest predictors for reporting high epidemic severity was not having discussed HIV/AIDS with other religious leaders, even after the consideration of congregation size, religious affiliation, district, and leader education. In other words, receiving or sharing information with other leaders about the AIDS problem decreased the likelihood of perceiving HIV/AIDS as a big problem in their own community. Talking with other leaders may give a basis for social comparisons about the HIV/AIDS epidemic. Discussion with other leaders may also reinforce pre-existing stigmas against AIDS, leading to lower perceived epidemic severity and susceptibility of the

congregation. Although it is possible that leaders who did not already feel stigmatized by the high rates of HIV in their congregations were more likely to discuss the issue with other leaders. As mentioned above, the temporality of cause and effect becomes problematic, as does the possibility of speaking with other leaders about HIV/AIDS being a mediator for an unmeasured predictor. For example, having less contact and discussions with leaders might be indicative of isolation. Isolation often leads to diminished social networks and less access to social capital/support: things which would otherwise be protective against a worsening epidemic because of the resources available to address it. Is the HIV/AIDS epidemic already less severe in congregations who have strong contact with other congregations? Table 1 failed to identify an association between an "isolated congregation" and high epidemic severity, but the way the MRP defines it (i.e. never visited by a church authority, missionary, or government) doesn't account for other, more local network ties that might be at play.

Information from Within the Community

Among religious leaders who talked frequently to their members about AIDS, those with less education were more likely to report high epidemic severity as compared to those with more. One possible explanation for this is that highly educated religious leaders might have more access to formal information sources on the HIV/AIDS epidemic (newspapers, ministry of health reports, etc.), whereas less educated religious leaders rely more heavily on informal discussion for their knowledge about the epidemic. Higher education may also denote a greater understanding of the epidemic and more confidence in ways to contain it (hence, a less severe and more optimistic perception).

Additionally, as an indicator of social status, the higher education of a religious leader may serve as a barrier for less educated congregation members to approach them about AIDS-related concerns. Even if they are participating in local funerals, they would have limited exposure to how HIV/AIDS might be affecting the daily lives of their more religiously devout community members. Although not statistically significant, unadjusted odds ratios in Table 3 show that reporting high epidemic severity was only half as likely among all leaders with at least some secondary education. However, to further evaluate this we would need to bring in multilevel data about the educational attainment of individual congregation members to justifiably identify social distance as a potential barrier to understanding the real impact of the epidemic on the community through this form of conversation.

Witnessing increased adult deaths in the community significantly predicted the perception of high epidemic severity in the model until religious affiliation was accounted for. However, there are two issues with the measurement of community deaths and its analysis that may have weakened the effect. First, we are using a measure of general adult death, and not death specifically attributed to HIV/AIDS. Deaths are likely occurring from ailments other than AIDS in this population, so the burden of AIDS death alone is not accurately depicted here. However, it is still a good proxy given the known prevalence of AIDS in Malawi and the problem with sifting through confirmed and suspected cases, which are likely to be underreported anyway due to misdiagnosis and stigma. Secondly, the sufficiency of the sample size is compromised after breaking the

data down into six different categories for religious affiliation and using the number of deaths measured only within the previous month.

Religious Affiliation and District

I found that district was highly associated with the level of assessed epidemic severity, not surprisingly, because of increasing HIV prevalence going from north to south. Religion was also discovered to be associated with district, primarily because of the variation in geographic distribution of affiliations (ex. Muslims being concentrated in the south) (Figure 2). However, previous evidence suggests that district alone might not fully explain why the majority of New Mission Protestant leaders (e.g. 7th Day Adventists, Jehovah's Witnesses, and Church of Christ) reported lower epidemic severity. The data from Malawi already show that HIV prevalence, on average, is actually lowest in those religious communities compared to other religious affiliations because of more rigorous observation and enforcement of behavioral restrictions and other social control methods (4). However, even with the exception of New Mission Protestants, the data continue to support the notion that affiliation alone does not determine the trajectories of thought and action of a leader, and that localized contextual factors are more important.

Perceiving Epidemic Severity as a Motivator for Action

The study also took a very brief, exploratory look at the potential effect of perceiving high epidemic severity on leader's participation in selected HIV prevention activities, given the positive findings in previous studies (9-12). The unadjusted logistic models suggest that perceiving high epidemic severity encourages the promotion of

condoms and divorce in high-risk marriages by two-fold, and frequent sermons about HIV/AIDS by over 3-fold. However, the Health Belief Model and other frameworks recognize that the perception of threat alone is not sufficient to make the decision to partake in a particular prevention activity (13, 14). In fact, from a cross-sectional study considering barriers to condom use for individuals in rural Benin, Hounton et al. concluded that prevention strategies based solely on increasing knowledge and amplifying perceived risk were not sufficient to improve their use. Without perceived efficacy, the failure to use condoms increased by almost 10-fold (22). So although high epidemic threat perception is an important element in the equation to engage religious leaders, the choice they make regarding which strategies to participate in and advocate relies heavily on their perceived efficacy and acceptance, which might not always mirror what the public health community wants. The promotion of condoms, for example, was still quite low by religious leaders in this population in 2005, and even if a leader was motivated to combat HIV/AIDS because he or she perceived it as a threat, the selected mode of action would have needed to be viewed as an efficacious solution for that individual and the community they serve (Table 5). Trinitapoli found that there is variation in the AIDS-related activities of religious leaders, and the strategies they provide that are still helpful but may arrive in a more nontraditional format, such as encouraging divorce in high-risk marriages (10).

Strengths and Limitations

This study addresses a gap in the literature because it examined how factors that are unique to religious leaders in their position in the community affect their informed

decisions to perceive the HIV/AIDS epidemic as a threat. These notions then compliment the findings of other studies on the effects of leader choice in prevention strategies on the risk behaviors of individuals. The use of quantitative data was an important strength of this study. Limitations that could be addressed in future studies include expanding the sample size to be able to sufficiently explore observations stratified by religious affiliation, and following the cohort of religious leaders over time to establish the temporality of effects of information sources on changing epidemic severity perception.

Another important limitation of the study is that the data come from interviews in 2005 and might not reflect other time periods. The effects of the exposures explored may change over time in changing circumstances. Looking at overall prevalence data for the entire country, the peak was up to 16% in 1999 and by 2004 it was down to 12%, so there were already some prevention advances in the country by the time this wave of data collection occurred. In other words, the exposures of interest had strong effects on perceiving the epidemic as severe even after the peak of the national epidemic. However, it is hard to know when HIV/AIDS actually started being a large problem in some of the more rural communities, although it would have arguably been a little later since the general epidemiologic trend of HIV/AIDS starts out in urban centers and then eventually diffuses to the more rural areas. Therefore, it would be important to explore if there is a threshold for when these exposures are more relevant. For example, would they have more impact after the epidemic has been around enough to cause observable "damage" in the community? Subsequently, what happens when other more immediate problems take precedence in the minds of the leaders, like access to clean water and food shortages?

Future studies looking at trends over time in the presence of shifting circumstances would be needed to address these limitations.

Conclusion

The key to effective partnerships between religion and public health is consolidating the common goals of both (i.e. to promote a healthy, thriving community) in a manner that is considerate and pragmatic (8). This notion may not always be in the forefront of discussion, but there are times when it is essential. In fact, we can refer to recent examples of the health community's struggle to prevent Ebola transmission via burial practices while at the same time offering respectful alternatives to religious communities (23). For HIV/AIDS, a colossal burden disproportionately affecting the people living in SSA, it would be irresponsible to ignore the power and influence of religious leaders.

Taken in context with those from previous studies, these findings suggest that religious leaders in SSA serve as key informants on the severity and impact of the HIV/AIDS epidemic and there are specific observations and sources that they base their assessments on. They communicate with their members and other religious leaders about the consequences of the HIV/AIDS epidemic. As active participants in community burial practices, they witness and are shaped by the deaths of community members. These sources provide religious leaders with a very unique perspective of the effects that illness and disease has on their congregations and communities. Moreover, the evidence suggests that religious leaders observe the severity of disease epidemics in a manner that, on average, closely mirrors established epidemiological trends. Public health practitioners

should recognize and consider religious leaders as partners for both gathering information on disease epidemics and for disseminating and implementing programs and interventions.

DRAFT MANUSCRIPT TABLES & FIGURES

Figure 1. Malawi Religion Project Study Population Description

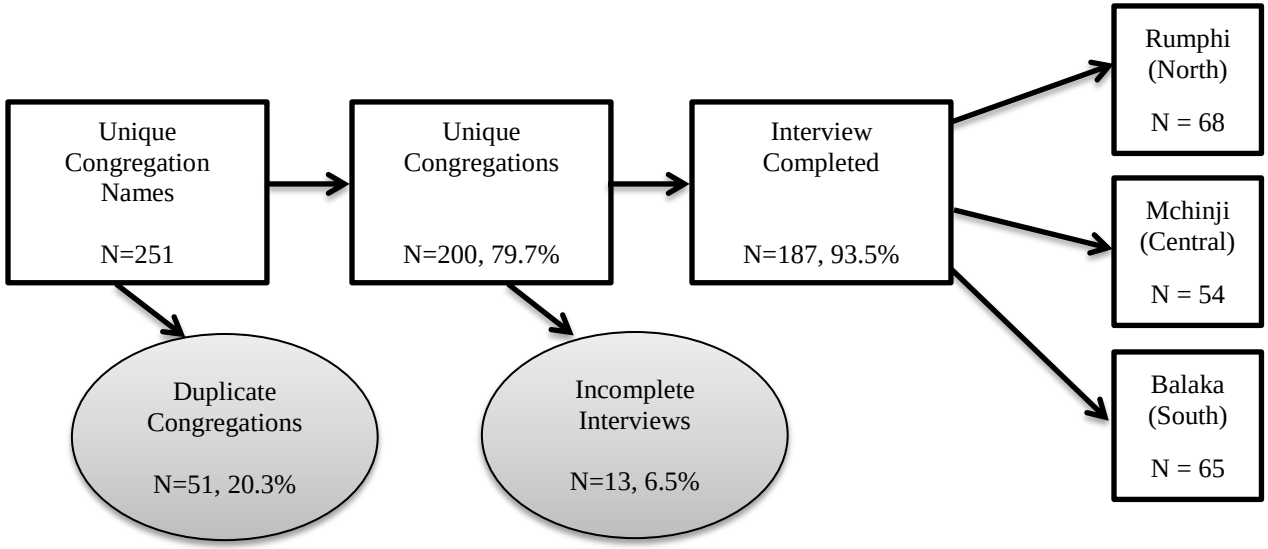

Table 1. Characteristics of Rural Malawi Religious Leaders (n=187) from Cross-sectional Surveys, 2005

Compared with other problems facing your congregation, how big of a problem is AIDS currently?

Characteristics	**Total**	***Low Epidemic Severity***	***High Epidemic Severity***	**p-value***
	n (%), mean [SD]	*n (row %), mean [SD]*	*n (row %), mean [SD]*	
N	187	71 (38.2)	115 (61.8)	
Male	178 (95.2)	68 (38.4)	109 (61.2)	0.76
Age of leader (in years), (range: 18-81, median: 47)	47 [13.3]	46 [13.7]	49 [12.9]	0.21
Leader achieved at least some secondary education	54 (28.9)	26 (48.2)	28 (51.9)	0.07
Religion				
New Mission Protestant	34 (18.2)	22 (64.7)	12 (35.3)	<0.001
Pentecostal	32 (17.1)	17 (53.1)	15 (46.9)	
African Independent Congress	38 (20.3)	13 (34.2)	25 (65.8)	
Mission Protestant	40 (21.4)	12 (30.0)	28 (70.0)	
Catholic	21 (11.2)	5 (25.0)	15 (75.0)	
Muslim	22 (11.8)	2 (9.1)	20 (90.9)	
Size of Congregation, (range: 1-370, median: 20)	38 [53.0]	29 [30.8]	42 [61.9]	0.09
Isolated congregation**	44 (23.5)	16 (36.4)	28 (63.6)	0.78
District				
Rumphi (north)	68 (36.4)	35 (51.5)	33 (48.5)	0.002
Mchinji (center)	54 (28.9)	22 (41.5)	31 (58.5)	
Balaka (south)	65 (34.8)	14 (21.5)	51 (78.5)	

*P-values from Chi-Square for categorical variables and ANOVA for continuous variables.

**Isolated congregation: defined as never visited by a church authority, missionary, or government official.

Table 2. Bivariate associations between sources of information and religious leaders' assessments of HIV epidemic severity, in Rural Malawi, 2005.

Compared with other problems facing your congregation, how big of a problem is AIDS currently?

Sources of Information	Total		*Low epidemic severity*		*High Epidemic Severity*		p-value*
	n (%), mean [SD]		*n (row %), mean [SD]*		*n (row %), mean [SD]*		
N	187		71	(38.2)	115	(61.8)	
Outside of the Community							
Attended an HIV/AIDS workshop	87	(47.0)	30	(34.5)	57	(65.5)	0.35
Have discussed HIV/AIDS with other religious leaders	98	(56.3)	44	(44.9)	54	(55.1)	0.02
Have participated with other congregations within past year	77	(41.4)	23	(30.3)	53	(69.7)	0.08
Inside of the Community							
No. of adults who have died within past month** , (range: 0-15, median: 1)	1.2	[1.9]	0.6	[1.0]	1.5	[2.2]	0.002
People of congregation talk about HIV/AIDS with leader at least every month	131	(70.8)	42	(32.1)	89	(67.9)	0.01
People have joined congregation after HIV/AIDS diagnosis	68	(36.4)	24	(35.3)	44	(64.7)	0.54
HIV/AIDS-related Stigma							
Congregation feels that HIV/AIDS is a deserved punishment	131	(72.4)	47	(36.2)	83	(63.9)	0.63
Leader feels that HIV/AIDS is a deserved punishment	140	(76.1)	52	(37.4)	87	(62.6)	0.68

*P-values from Chi-Square for categorical variables and ANOVA for continuous variables.

**Number of adult congregation members who have died within the past month.

Table 3. Unadjusted odds ratios predicting religious leaders' assessment of HIV/AIDS epidemic severity in their congregation (n=187), in Rural Malawi, 2005.

Variables	Unadjusted Odds Ratio	95% Confidence Interval	p-value
Socio-demographic			
Age of leader	1.02	[0.99 - 1.04]	0.21
Leader attended at least some secondary school	0.56	[0.29 - 1.06]	0.07
Congregation size (number of adult members)	1.01	[1.00 - 1.01]	0.11
District			
Rumphi (north) (ref)	1.00	-	-
Mchinji (center)	1.49	[0.72 - 3.08]	0.28
Balaka (south)	3.86	[1.81 - 8.25]	<0.001
Outside of the Community			
Attended an HIV/AIDS workshop	1.33	[0.73 - 2.43]	0.35
Have discussed HIV/AIDS with other leaders	0.48	[0.25 - 0.91]	0.02
Have participated with other congregations within past year	1.75	[0.94 - 3.24]	0.08
Inside of the Community			
No. of adults who have died within past month*	1.53	[1.16 - 2.03]	0.003
People of congregation talk at least monthly about HIV/AIDS with leader	2.46	[1.29 - 4.70]	0.01
People have joined congregation after HIV/AIDS diagnosis	1.21	[0.65 - 2.25]	0.54
HIV/AIDS-related Stigma			
Congregation feels that HIV/AIDS is a deserved punishment	1.18	[0.60 - 2.30]	0.63
Leader feels that HIV/AIDS is a deserved punishment	1.16	[0.58 - 2.31]	0.68
Religious Affiliation			
New Mission Protestant	0.23	[0.09 - 0.62]	0.004
Pentecostal	0.38	[0.14 - 1.00]	0.05
African Independent Congress	0.82	[0.34 - 2.14]	0.69
Misson Protestant (ref)	1.00	-	-
Catholic	1.29	[0.38 - 4.34]	0.69
Muslim	4.29	[0.86 - 21.29]	0.08

*Number of adult congregation members who have died within the past month.

Figure 2. Percent of Congregation Leaders Reporting High Epidemic Severity by Regional Distribution of Religious Affiliation (n=187), Malawi, 2005

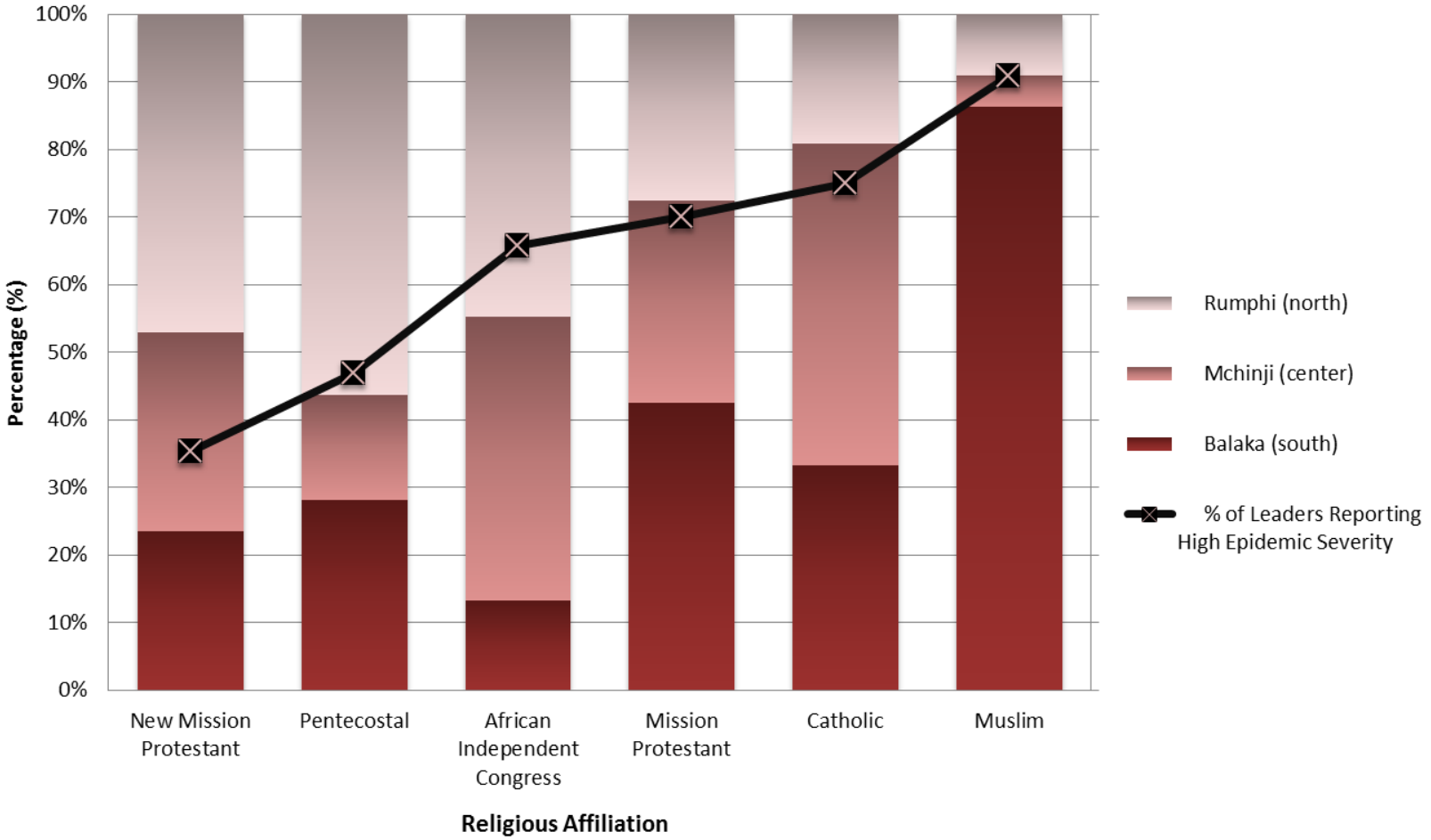

Table 4. Adjusted odds ratios predicting religious leaders' assessment of HIV/AIDS epidemic severity in their congregation (n=187), in Rural Malawi, 2005.

	MODEL 1			MODEL 2			MODEL 3			MODEL 4			MODEL 5		
	3 Exposures			Model 1 + education + congregation size			Model 2 + District			Model 2 + Religion			Model 2 + Religion + District		
Variables	Adjusted Odds Ratio	95% Confidence Interval	p-value	Adjusted Odds Ratio	95% Confidence Interval	p-value	Adjusted Odds Ratio	95% Confidence Interval	p-value	Adjusted Odds Ratio	95% Confidence Interval	p-value	Adjusted Odds Ratio	95% Confidence Interval	p-value
Outside of the Community															
Have discussed HIV/AIDS with other leaders	0.38	[0.18 - 0.79]	0.01	0.34	[0.16 - 0.74]	0.01	0.36	[0.16 - 0.79]	0.01	0.39	[0.18 - 0.89]	0.02	0.40	[0.18 - 0.92]	0.03
Inside of the Community															
No. of adults who have died within past month	1.46	[1.07 - 2.00]	0.02	1.40	[1.01 - 1.93]	0.04	1.40	[1.00 - 1.97]	0.05	1.19	[0.85- 1.65]	0.31	1.22	[0.86 - 1.72]	0.26
People of congregation talk at least monthly about HIV/AIDS with leader	2.53	[1.13 - 5.64]	0.02												
(see Interaction Terms below:)															
…leader attended secondary school				0.91	[0.25 - 3.26]	0.89	0.86	[0.24 - 3.15]	0.82	0.73	[0.19 - 2.85]	0.65	0.71	[0.18 - 2.81]	0.62
…leader did not attend secondary school				4.08	[1.41 - 11.74]	0.01	4.31	[1.43 - 12.96]	0.01	3.88	[1.24 - 12.07]	0.02	3.90	[1.24 - 12.28]	0.02
Religious Affiliation															
New Mission Protestant										0.27	[0.09 - 0.83]	0.02	0.34	(0.11 - 1.09)	0.07
Pentecostal										0.40	[0.13 - 1.20]	0.10	0.44	(0.14 - 1.41)	0.17
African Independent Congress										1.03	[0.34 - 3.11]	0.97	1.34	(0.44 - 4.42)	0.62
Misson Protestant (ref)										1.00	-	-	1.00	-	-
Catholic										1.80	[0.44 - 7.32]	0.41	1.92	(0.46 - 8.04)	0.37
Muslim										4.68	[0.48 - 45.30]	0.18	4.67	(0.43 - 50.32)	0.20
Socio-demographic															
Leader attended secondary school				1.61	(0.41 - 6.26)	0.49	2.29	(0.56 - 9.34)	0.25	1.74	(0.40 - 7.45)	0.46	2.22	(0.50 - 9.85)	0.29
Congregation size (number of adult members)				1.00	(0.99 - 1.01)	0.59	1.00	(0.99 - 1.01)	0.73	1.00	[0.99 - 1.01]	0.59	1.00	[0.99 - 1.01]	0.65
District															
Rumphi (north) (ref)							1.00	-	-				1.00	-	-
Mchinji (center)							1.30	[0.51 - 3.28]	0.59				1.09	[0.40 - 2.97]	0.86
Balaka (south)							3.19	[1.28 - 7.94]	0.01				2.58	[0.96 - 6.95]	0.06
Interaction Terms:															
Members talk about HIV/AIDS with leader X Education of leader*				0.22	(0.04 - 1.15)	0.07	0.20	[0.04 - 1.08]	0.06	0.20	[0.3 - 1.10]	0.06	0.18	[0.03 - 1.07]	0.06

*Interaction term between "People of congregation talk at least monthly about HIV/AIDS with leader" and "Leader attended at least some secondary school."

Table 5. Unadjusted odds ratios predicting religious leaders' involvement in HIV/AIDS prevention activities based on their assessments of epidemic severity in their congregation (n=187), in rural Malawi, 2005.

Religious Leader Activities	Total, n (%)	Unadjusted Odds Ratio*	Confidence Interval	p-value
Frequently talks about HIV/AIDS in sermons	158 (84.5)	3.21	[1.42 - 7.29]	0.01
Frequently talks about sexual morality in sermons	154 (82.8)	0.96	[0.44 -2.10]	0.91
Privately advises members to get tested for HIV	124 (66.7)	1.60	[0.86 - 3.00]	0.14
Privately advises divorce in high-risk marriages	60 (32.4)	2.19	[1.12 - 4.30]	0.02
Privately advises members to use condoms	50 (26.9)	2.14	[1.05 - 4.40]	0.04

*Logistic regression with epidemic severity as the dependent variable and prevention activities as independent variables.

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CHAPTER III:

SUMMARY, PUBLIC HEALTH IMPLICATIONS, POSSIBLE FUTURE DIRECTIONS

Summary

Using data collected from the Malawi Religion Project, I have explored the possible mechanisms leading to religious leaders' awareness of epidemic severity as a meaningful motivator to respond to the burden of disease and engage prevention strategies. Exposure to adult deaths, talking with other religious leaders about HIV/AIDS, and talking frequently about HIV/AIDS concerns with members remained important predictors of epidemic severity. Discussing HIV/AIDS with members frequently only had a statistically significant effect on perceiving high epidemic severity among leaders who had not obtained at least some secondary education. In the presence of religious affiliation, the effect of the number of adult deaths within the past month on assessing high epidemic severity was reduced. I observed strong correlations between regional district and religious affiliation in terms of perceiving high epidemic severity. The variables explored in the analyses above indicate that there are identifiable characteristics and sources of information that are associated with a religious leader perceiving epidemic threat.

Public Health Implications

Scholars have called for an increased awareness of the role that religion plays in the promotion of healthy behaviors and decision-making (1). Religion has been identified as an influential authority in SSA and is a relevant force to explore when considering how HIV/AIDS is interpreted, discussed, and encountered, especially by lay persons. Such influences are often facilitated and even directed by religious leaders, particularly those present in the local context. Religious leaders will respond as individuals to the

epidemic in the ways they believe to be efficacious, but there are processes that precede the decision to act which involve the perception of epidemic severity (2). Understanding the more informal, localized factors that may influence a leader's perception of epidemic threat could lead to more efficient recruitment strategies targeted at getting religious leaders actively involved in ways that are aligned with the goals of the public health community.

Possible Future Directions

In order to address this study's limitation regarding the temporality of exposures and outcome, one could design a longitudinal study that looks at the perceptions of epidemic severity changing over time in relation to the potential exposures of interest. Additionally, the study could then explore the changing levels of leader participation in HIV/AIDS-related prevention activities resulting from perceived epidemic severity. This would establish more evidence for understanding the way that information on the extent of epidemic severity is collected, how that information influences a religious leader's awareness, and how that awareness motivates action.

There is unique potential to link the congregation-level Malawi Religion Project dataset with the individual-level Malawi Diffusion and Ideational Change Project. By using multi-level modeling, we could then take a closer look at the relationships between individuals and their leaders. For instance, when there is a large difference in educational attainment levels, is communication about HIV/AIDS between the two hindered? Do the epidemic severity assessments of individuals of a congregation mimic the assessments of the leaders? How do other congregational activities, like faith-healing, affect the

likelihood that members will come to discuss HIV/AIDS-related concerns with the leader? Various other research questions could be explored by utilizing multi-level analysis in this dataset, and by applying the same methodological framework to other countries in SSA.

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APPENDICES

Table 1. Comparisons of Selected Characteristics of Cross-sectional Studies Reporting Religious Leader Impacts on and Responses to HIV/AIDS.

Study	Study Type	Population	Endpoint	n	Results
Asekun-Olarinmaye et al. 2013	Cross-sectional	Nigerian religious leaders from eight religious denominations	KAP of religious leaders on prevention of HIV/AIDS and care of PLWHA[1] in Ibadan, Nigeria	336	76.5% used position as medium to educate congregation about prevention
Kanda et al. 2012	Cross-sectional	Theravada Buddhist, Hindu, Muslim and Roman Catholic leaders in Sri Lanka	Knowledge and willingness to become community advocates of HIV/AIDS prevention	327	Those who scored higher on knowledge score were more likely to preach about behavioural issues (AOR=4.07, 95% CI:2.27-7.28)
Lindgren et al. 2013	Cross-sectional	Christian and Muslim faith-based organization leaders in Malawi (and members)	Leaders' knowledge of infection predicted members' risk-taking behaviors	45	Less leader knowledge of infection was associated with more risk-taking behaviors on the part of the members (p=.003)
Rakotoniana et al. 2014	Cross-sectional	Religious leaders in Madagascar	Recommendations by religious leaders for condom use and other preventive strategies	231	Condom use recommendations were positively associated with knowing a person at risk (OR=16.2, 95%CI 3.2-80.2), knowing of an ART center (OR=2.6, 95%CI 1.4-4.8), and receiving info about HIV at school (OR=2.6, 95% 1.2-5.6).
Trinitapoli 2011	Cross-sectional	Congregation leaders in rural Malawi	Key predictors of the types of HIV/AIDS prevention strategies promoted	187	Discussions with members about AIDS is the most consistent predictor of preaching about it (OR=1.58, p<.001).
Umar et al. 2012	Cross-sectional	Religious leaders in Sokoto, North Western Nigeria	Knowledge of HIV/AIDS and Routine demand for mandatory premarital HIV testing	158	49% had adequate knowledge of HIV/AIDS, with Christian clerics having better knowledge compared to Muslim clerics (P<0.0001)

[1] Persons living with HIV/AIDS

Table 2. Regional Distribution of Religious Affiliation of Rural Malawi Religious

Characteristics	Total		**Number of Adult Deaths in the Last Month, mean [SD]**		p-value*
N	179		1.2	[1.9]	
Religion, n (%)					
New Mission Protestant	34	(19.0)	0.4	[0.9]	<0.001
Pentecostal	30	(16.7)	0.4	[0.9]	
African Independent Congress	38	(21.2)	1.5	[1.4]	
Mission Protestant	39	(21.8)	1.1	[1.5]	
Catholic	20	(11.2)	1.4	[1.3]	
Muslim	18	(10.1)	2.9	[4.1]	

*P-values from ANOVA test.

Table 3. Regional Distribution of Religious Affiliation of Rural Malawi Religious

Characteristics	Total		**Number of Adult Deaths in the Last Month, mean [SD]**		p-value*
N	179		1.2	[1.9]	
District, n (%)					
Rumphi (north)	66	(36.9)	0.7	[1.0]	0.08
Mchinji (central)	53	(29.6)	1.4	[1.7]	
Balaka (south)	60	(33.5)	1.4	[2.6]	

*P-values from ANOVA test.

Table 4. Regional Distribution of Religious Affiliation of Rural Malawi Religious Leaders (n=187) from Cross-sectional Surveys, 2005

		District, n(row %)						
Characteristics	Total	Rumphi (north)		Mchinji (center)		Balaka (south)		p-value*
N	187	68	(36.4)	54	(28.9)	65	(34.8)	
Religion, n (%)								
New Mission Protestant	34 (18.2)	16	(47.1)	10	(29.4)	8	(23.5)	<0.001
Pentecostal	32 (17.1)	18	(56.3)	5	(15.6)	9	(28.1)	
African Independent Congress	38 (20.3)	17	(44.7)	16	(42.1)	5	(13.2)	
Mission Protestant	40 (21.4)	11	(27.5)	12	(30.0)	17	(42.5)	
Catholic	21 (11.2)	4	(19.1)	10	(47.6)	7	(33.3)	
Muslim	22 (11.8)	2	(9.1)	1	(4.6)	19	(86.4)	

*P-values from Chi-Square test for categorical variables.