Adolescent religiosity and attitudes to HIV and AIDS in Ghana

Kofi Nyame Amoako-Agyeman

Abstract
This study investigated the relationships between adolescent religiosity and attitudes to HIV/AIDS based on two major techniques of analysis, factor and regression analysis towards informing preventive school education strategies. Using cross-sectional data of 448 adolescents in junior high school, the study incorporated survey in a self-administered questionnaire and sought to identify underlying factors that affect pupils’ responses, delineate the pattern of relationships between variables and select models which best explain and predict relationships among variables. A seven-factor solution described the ‘attitude’ construct including abstinence and protection, and six for ‘religiosity’. The results showed relatively high levels of religiosity and a preference for private religiosity as opposed to organisational religiosity. The regression analysis produced significant relationships between factors of attitudes to HIV/AIDS and of religiosity. Adolescent with very high private religiosity are more likely to abstain from sex but less likely to use condoms once they initiate: protection is inversely related to religiosity. The findings suggest that religious-based adolescent interventions should focus on intrinsic religiosity. Additionally, increasing HIV prevention information and incorporating culturally relevant and socially acceptable values might lend support to improved adolescent school-based HIV/AIDS prevention programmes.

Keywords: adolescent, attitudes, religiosity, HIV/AIDS, prevention, protection, Ghana

Introduction/background
Despite reported lowering prevalence rates and the number of new infections globally (UNAIDS/WHO 2009) coupled with reported breakthrough of HIV vaccines of 31% protective effect (BBC 2009), HIV is still a threat to children’s rights in sub-Saharan Africa and a major obstacle to the achievement of universal basic education (World Bank 2002). Studies from Africa show that children between the ages of 5 and 14, described as the ‘Window of Hope’, have the lowest HIV infection prevalence (Kelly 2000), yet Sub-Saharan Africa, remains heavily affected, accounting for 67% of all infected people.

Many young people still lack accurate, complete information on how to avoid HIV exposure including Ghana, categorised as generalised HIV epidemic where the national prevalence has been on

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a downward trend from 3.6% in 2003, 2.7% in 2005 to 1.9% in 2007 (UNAIDS 2008). Ghana’s AIDS Commission (GAC 2008) acknowledges that though awareness levels of HIV is almost universal (98%) this has not yet translated into comprehensive knowledge and appropriate behaviour because people have a low perception of the risk of infection. Specific knowledge of HIV prevention and misconceptions about HIV/AIDS that propagate stigma and discrimination against infected people has varied over the years (Ghana Demographic and Health Survey (GDHS) 2003). Reports indicate a daily record of 70 new infections, about 23% of deaths in the Eastern Region due to HIV/AIDS in 2008; over 2,300 children under 15 died of AIDS-related diseases in 2007 and young people still have doubts about the prevalence of AIDS and therefore do not consciously protect themselves (GNA 2008a, 2008b, 2009, 2008c). Risk factors mostly cited as predictors of prevalent HIV and barriers to prevention include decreasing age of sexual debut, higher number of sexual partners and lack of condom use, lack of awareness and the coming of age of HIV-positive children (CDC 2008).

Adolescents are known as a population at risk of HIV infection (Eng & Butler 1997) because they consider themselves, immune from infection, exploring their sexual identities and often are experimenting; their behaviour tends to be impulsive and greatly influenced by peer pressure, often feel invulnerable and have trouble seeing long-term consequences (Liontos 1989).

Prevention education is recognised as the primary means of decreasing the rate of new HIV infections (Gallant & Maticka-Tyndale 2004) and the quest for improved educational approaches is still a challenge. The goal and essence of education is to prevent infection, reduce stigma and discrimination, change peoples’ attitudes towards HIV/AIDS and infected persons and the adoption of lifestyles that will not predispose people to infection (CDC 2008). AIDS is first and foremost a consequence of behaviour (Fishbein 2000) but Ajzen (2001) suggests focussing on changing attitudes since we cannot sometimes directly influence behaviour (Tyndale 2004) and the quest for improved educational approaches include decreasing age of sexual debut, higher number of sexual partners and lack of condom use, lack of awareness and the coming of age of HIV-positive children (CDC 2008).

Religion has been identified as a major social institution with pervasive effects on various aspects of people’s lives, attitudes and behaviours. ... important in helping understanding the behaviour of individuals or groups, who professes it (Ryan, Rigby & King 1993). Mbiti (1989) underscores Africans religiosity as the strongest element in traditional background, exerting probably the greatest influence upon their thinking and living; it cannot be ignored in an attempt to understand African behaviour. Ghana’s diverse culture has greatly been influenced by ethnic groupings, Christianity and Islam with a strong community and family life systems as parents pass on old traditions to younger ones.

However sexual issues considered a taboo subject as in many African societies are mostly exclude. A general change in the socialisation process of adolescents in sub-Saharan Africa has been observed from being based on family, both nuclear and extended, and society, to being based on school, church/mosque, and the media (Awusabo-Asare & Anarfi 1999). Religion is a set or organised system of beliefs and practices shared by a group of people. Billy and associates (1994) define religiosity, as a composite, including measures of frequency of praying, church attendance, and personal importance of religion. In this study religiosity indicates, strength of religious faith rather than belief of a denomination or affiliation (Nicholas & Durrheim 1995). The concept of religiosity is best treated as a multi-dimensional phenomenon (Cornwall, Albrecht, Cunningham & Pitcher 1986) yet there is no consensus as to which components of religiosity are most protective. Cornwall et al. (1986) six dimensions of religiosity, is theoretically derived by a cross-classification of two constructs: the modes of religiosity (personal versus institutional) and the components of religiosity (belief, commitment, and behaviour) (Allport & Ross 1967). Allport’s ‘intrinsic–extrinsic’ religious orientation model remains the most influential approach in psychological studies of religion in the USA (Nielsen 2000). The ‘intrinsic’ are more concerned with moral standards, discipline, greater sense of responsibility and consistency (Donahue 1985), but the ‘extrinsic’ uses religion to protect the self, gain social standing... (Ryan et al. 1993). Whilst the ‘intrinsic’ is more self-motivated and tend to have internal locus of control, the ‘extrinsic’ is more likely to be dogmatic, authoritarian, less self-directed, less internal locus of control...; is characterised by outward observance (Wiebe & Fleck 1980).

Several scholars have pointed out that religion has emerged as a potent social force in both private and public life in Ghana (Kirby 1997; Yirenkyi 2000). Gallup International Millennium Worldwide Survey (2000) found Ghanaians highly religious: 97% indicate God is very important in their lives; more than 90% belong to a religious denomination and 82% attend regular religious service. The types of religious organisations continue to change (Assimeng 1986), along the mainstream traditional Christian denominations, that include African syncretic, faith healing groups, Charismatic, Evangelical and Pentecostal churches have emerged (Yirenkyi 1999).

Agadjanian (2001) stresses, church participation in Africa may create an environment for social exposure and interaction to new ideas, which could influence HIV prevention. However many individuals may become victims of abuse as some leaders take advantage and pretend to provide solutions. Cases of sexual abuse in some religious organisations are reported.
Though religious values are the source of moral proscriptions for many individuals and the teachings, likely to play a role in the formation of individual attitudes, values and decisions (Lehrer 2004; Thornton & Camburn 1989), religious doctrine and spiritual teachings can create barriers to HIV prevention. Significant is the debate between abstinence-only and comprehensive safer sex education where opinions differ. Also, people with HIV may avoid church services due to prejudices: the perception that infection is the consequence of leading a ‘bad life’ and opposition by some religious leaders to the use of condoms to prevent HIV infection (Anane 1999). Awusabo-Asare and Anarfi (1999) cite Christian fundamentalism in the school system, an obstacle to the discussion of HIV prevention strategies due to the tendency to defer to God for solutions and attitudes of ‘predestined to happen’ or ‘punishment or act of God’ responses to problems.

Research interest and literature abound on religiosity (Assimeng 1989; Kirby 1997; Yirenkyi 2000) and religious beliefs and norms may be salient, yet few studies have examined the impact of religion on AIDS-preventive behaviour (Takyi 2003). This study thus investigated the significance of adolescent religiosity and its relationship with attitudes to HIV/AIDS. The objective was to identify the strength of religion as a source of influence in their attitudes with a goal of commenting on future preventive HIV/AIDS education strategies in Junior High Schools in Ghana. Based on a survey in a self-administered questionnaire, this study sought to answer the following questions: what is the scope and pattern of adolescents’ religiosity and knowledge of HIV/AIDS? What are adolescents’ attitudes towards HIV/AIDS? What is the nature of relationship between adolescents’ religiosity and attitudes towards HIV/AIDS and what are the most significant predictors?

**Methodology: study design and setting**

The study was based on a case study of a mixed public school, a Junior High School (JHS) in Obuasi, a municipal capital town of the Ashanti Region, synonymous with gold mining: the Anglo-Gold Ashanti Company which contributes significantly to the national economy. The area is characterised by a high population density estimated at 205,000 (GSS 2002), a 4% annual growth rate, high unemployment and cost of living, predominantly male workforce attracting a large number of commercial sex workers (UNICEF 2002). Obuasi has a history of a high HIV incidence; once with the highest rate and still a major HIV ‘hotspot’ one of the 23 urban sites among the general 40 sentinel sites strategically identified by the National AIDS Control Programme. HIV prevalence was 6.0 in 2002, to 3.4 in 2004, increased from 3.6 in 2006 (UNAIDS 2008) to 5% (GNA 2008b).

The selection of the town and the school was purposive based on ‘the researcher’s judgement as to typicality or interest’ (Robson 2002). In purposive selection, particular settings, persons, or events are deliberately selected for the important information they can provide that cannot be gotten as well from other choices (Maxwell 2005). The JHS was chosen because the characteristics of the school satisfied the purpose and criteria set: it is not an unusual school and has no one particular feeding primary school but structured to enrol pupils from various primary (6) schools, towns, suburbs and communities in the Obuasi municipality. Eligibility and enrolment is based on satisfactory performance in a common entrance examination among pupils from several primary schools. The process of enrolment enables a representation of more pupils of diverse backgrounds: age, tribal, religious and locality to join the JHS population, normally, can be representative of schools in Obuasi municipality and in Ghana as a whole.

The JHS had a total school population of 705 pupils and the school, JHS one to three, is made up of 11 classes: JHS 1 and 2, four classes each (A, B, C and D) and three classes (A, B and C) for JHS 3. The study was conducted with all pupils in only JHS two and three involving seven whole classes totalling 448 pupils because HIV/AIDS is not a topic taught as a class lesson in JHS one. The selection of the JHS allowed the researcher gain access to data (sample size) that best address the research questions and appropriate for the techniques for analysis. Comrey and Lee (1992) recommend that for a ‘good’ factor analysis solution a data set should contain at least 300 cases. Also the setting helped the researcher to collect a greater quantity of data at one location in a good time (Teddie & Yu 2007). Whilst this certainly restricts the sample to a specific population and may give a distorted view in terms of the whole country, my concern was mostly focused on what was possible to achieve in the relatively ‘privileged’ urban sector (Barnett, de Koning & Francis 1995).

As a research strategy which focuses on understanding the dynamics present within single settings, Yin (1984) suggests that case studies are appropriate where the objective is to study contemporary events, and where it is not necessary to control behavioural events or variables. Stake (1994) maintains that a case is an integrated system with patterns of behaviour . . .; each case study is a concentrated inquiry into a single case (p. 237). The study relied chiefly on self-administered questionnaire of 448 pupils mostly aged between 13 and 16. In addition the researcher was allowed access to the school to informally interact with pupils and teachers, and also observe trends of some activities. Prior to the study, the researcher was granted permission (ethical approval) by the directors of the Ghana Education Service: national and Obuasi district respectively, in addition to teachers’ and parental consent. The respondents were also informed about the purpose of the study, assured of confidentiality, anonymity and their right to withdraw at any point, adding, that the data will not be publicly identifiable. Two major techniques, Factor and Regression Analysis were used to identify underlying factors that describe the data, and the selection, of models which best explain and predict relationships among variables.

**Instruments**

The instruments used for the study of Attitudes, Belief and Knowledge after reviewing literature were the Assessment Instruments for Measuring Students Outcomes Grades 7-12, by the Centers for Disease Control and Prevention (CDC 1992, 2005) and IOX Assessment Associates. These instruments were developed to assess and support knowledge and attitudes that frequently serve as instructional targets of HIV prevention education. They

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originally, benefited substantially from five different review boards including panels of HIV evaluation experts comprising a number of field-testing and revisions to confirm that directions, items, and vocabulary were age-appropriate and to ascertain content validity (CDC 2005). Such review by expert panel is considered a valid method to ascertain an instrument’s content (Aday 1996). Kirby, Short, Collins, Rugg, Kolbe, Howard, et al. (1994) instrument for an HIV intervention evaluation relied on qualitative reviews by a panel of HIV professionals which yielded valid and reliable results. In addition, this study drew on peer review and reflexivity which are among the strategies Johnson (1997) recommends to promote research validity. Further, the instruments were chosen based on their appropriateness after conducting two pilot surveys among JHS pupils at different schools in Ghana. They also benefited from the input of health professional at Kumasi Health Education Unit and School Health Education regional officers. The subject matter of the assessment instruments is consistent with the syllabus which serves as instructional targets of HIV education in Junior High Schools in Ghana and is theoretically important in preventing the transmission of HIV.

A 25-item instrument (based on five dimensions) attempted to identify attitudinal dimensions related to HIV-risk behaviours (Attitudes) and a 10-item instrument, attitudes toward people living with HIV/AIDS (Beliefs); a 15-item instrument with measurement focus on HIV/AIDS knowledge and confidence levels of knowledge related to HIV-risk behaviours. Also a 14-item measure befitting the level of the respondents was drawn from commonly used assessments such as frequency of attendance at religious services, importance of religion (Miller & Gur 2002; Rostosky, Wilcox, Wright & Randall 2004) and the private-public dimensions of religiosity along the lines of the intrinsic-extrinsic orientations (Gorsuch & McPherson 1989). Reliable sources consulted include those used in studies in Africa and US (Fetzer Institute 1999; Odimegwu 2005) and consistent with the 10-item Santa Clara Strength of Religious Faith Questionnaire (Plante & Boccaccini 1997).

Results and analysis

Demographic information

The JHS had a total school population of 705 pupils made up of 11 classes: JHS 1 and 2, four classes each (A, B, C and D) and three classes (A, B and C) for JHS 3. The study was conducted with all pupils in JHS two and three involving seven whole classes totalling 448 pupils. JHS one was not included because HIV/AIDS is not a topic taught as a class lesson in that year group. The survey instruments totalling 71 items were put together and administered at one go one class after another in a classroom environment in the presence of the researcher and a teacher. The background information included, were gender, age, tribe and religion. There were a total of 17 tribes involved with the dominant being Akan, who are the indigenous and also form the majority, generally in Ghana (Table 1). All respondents indicated they are religious: religion is important to them, belonging to one of the three main religions in Ghana: Christianity (93.1%), Islam (6.5%) and African Traditional Religion (indigenous) (0.4%). About 67.6% (272) Christians noted their affiliated

| Tribe (ethnicity) | Total % | F | F% | M | M% | Christian | F | M | Muslim | F | M | Traditional | F | M |
|------------------|---------|---|----|---|----|-----------|---|---|--------|---|---|------------|---|---|
| Akan             | 364     | 196| 43.8| 168| 37.5| 193       | 163| 3  | 5      | 0 | 0 |            | 0 | 0 |
| Dagarti          | 19      | 10 | 2.2 | 9  | 2.0 | 9         | 8  | 1  | 0      | 0 | 0 |            | 0 | 0 |
| Dagomba          | 3       | 0  | 0.0 | 3  | 0.7 | 0         | 2  | 0  | 1      | 0 | 0 |            | 0 | 0 |
| Ewe              | 15      | 9  | 2.0 | 6  | 1.3 | 9         | 5  | 0  | 0      | 0 | 0 |            | 0 | 0 |
| Frafra           | 5       | 2  | 0.4 | 3  | 0.7 | 2         | 1  | 0  | 0      | 0 | 0 |            | 0 | 0 |
| Fulani           | 1       | 1  | 0.2 | 1  | 0.2 | 0         | 0  | 0  | 0      | 0 | 0 |            | 0 | 0 |
| Ga               | 7       | 3  | 0.7 | 4  | 0.9 | 3         | 4  | 0  | 0      | 0 | 0 |            | 0 | 0 |
| Gonja            | 1       | 0  | 0.0 | 1  | 0.2 | 0         | 0  | 0  | 0      | 0 | 0 |            | 0 | 0 |
| Grushi           | 2       | 0  | 0.0 | 2  | 0.4 | 0         | 2  | 0  | 0      | 0 | 0 |            | 0 | 0 |
| Hausa            | 11      | 7  | 1.6 | 4  | 0.9 | 0         | 7  | 4  | 0      | 0 | 0 |            | 0 | 0 |
| Kotokorri        | 1       | 0  | 0.0 | 1  | 0.2 | 0         | 0  | 0  | 1      | 0 | 0 |            | 0 | 0 |
| Krobo            | 1       | 0  | 0.2 | 0  | 0.0 | 1         | 0  | 0  | 0      | 0 | 0 |            | 0 | 0 |
| Kusasi           | 2       | 0  | 0.0 | 2  | 0.4 | 0         | 2  | 0  | 0      | 0 | 0 |            | 0 | 0 |
| Moussi           | 1       | 0  | 0.2 | 0  | 0.0 | 0         | 0  | 0  | 0      | 0 | 0 |            | 0 | 0 |
| Nzema            | 13      | 7  | 1.6 | 6  | 1.3 | 7         | 5  | 0  | 1      | 0 | 0 |            | 0 | 0 |
| Sisala           | 1       | 0  | 0.0 | 1  | 0.2 | 0         | 0  | 0  | 1      | 0 | 0 |            | 0 | 0 |
| Talensi          | 1       | 0  | 0.2 | 0  | 0.0 | 1         | 0  | 0  | 0      | 0 | 0 |            | 0 | 0 |
| Total            | 448     | 237| 52.9| 211| 47.1| 225       | 192| 12 | 17     | 0 | 2 |            | 0 | 0 |
denominations, altogether, numbered 55. In all cases respondents and their parents belonged to the same religious affiliation.

The data generated was subjected to statistical analysis looking at variables and their relational potentials using R (R Development Core Team 2009). As multi-dimensional constructs, exploratory factor analysis (FA) was run on the four constructs followed by regression analysis. Among the research aims of applying FA were to: determine the underlying factors that affect pupils’ responses, delineate interrelationships between variables, reduce masses of data to a parsimonious subset required to ‘explain’ the pattern of relationships in the data and test hypothesis and theories. The choice of the number of components/factors was justified based on eigenvalue greater than 1.0 based on the Kaiser (1960) criterion, in line with theoretical expectations, scree plot and uniqueness.

In addition was the measure by the Kaiser–Meier–Olkin statistics, sampling adequacy which predicts data are likely to factor well, based on correlation and partial correlation (Hutcheson & Sofroniou 1999) and Bartlett’s test of sphericity which tests the hypothesis that, the correlation matrix is an identity matrix. FA was based on promax due to theoretical considerations about the nature of the factors and whether a degree of correlation between them might be expected (Hutcheson & Sofroniou 1999).

Eventually, the amount of variance in the sample which is accounted for and the number of interpretable factors, contributed to the basis to determine the optimum number of factors selection which were subjectively labelled. A seven-factor solution, six of which (‘condom use’ splits into two) are consistent with the five dimension of CDC (2005), was selected for ‘Attitudes’ and two for ‘Beliefs’ (Attitudes towards people with HIV/AIDS). In addition a six-factor solution best described ‘Religiosity’ (Table 2) but no factors were identified on the knowledge construct. Out of the six religiosity factors, only one suggests an institutional/public mode of religiosity (involvement) and the rest, non-organisational/private mode, generally subjective.

The analysis of HIV knowledge, primarily, was descriptive statistics mostly based on analysis of individual items of the measures to ascertain their scope to help identify those content areas that may require targeted instruction or have more or less prominence: analysis showed two variables based on two scoring methods, knowledge and confidence in knowledge, which are, included in the regression analysis to identify their relationship with other variables. Generally, all statements received at least some incorrect responses. A third of the statements mostly about the mode of transmission and prevention by abstinence recorded the highest level of correct responses ranging from 70% to 80%.

Another one-third which mostly illustrates misconceptions about HIV transmission and testing had correct scores between 60% and 67%. Those between 40% and 50% correct were mainly about misconceptions about condoms and protection. A major worrying result was that 50% indicated confidence that ‘you can’t get AIDS if you have sex only once or twice without a condom’. This seems to suggest a low perception of the risk of infection, a major worry which has the potential to endanger the sexually active and make them vulnerable to infections and other dangers. Also, 72% were confident that ‘people infected with HIV are usually very thin and sickly’. This is notable, since it could lead to targeting people with similar characteristics in communities where people with HIV/AIDS are stigmatised, thus, defeating a major goal of HIV education: to reduce stigma and discrimination (AVERT 2009, 2008).

The results in general, show awareness is high but some knowledge gaps still exist, corroborating previous findings of high awareness levels, almost universal (up to 98%), but yet to translate into comprehensive knowledge and appropriate behaviour because people have low perception of the risk of infection (GAC 2008). It has been reported that School Health Education Programme (SHEP) has assisted in raising awareness levels (up to 93%) amongst pupils but low levels of knowledge about the various sources of infection persist (Fayorsey 2002). One must be cautious not to attribute the results in this study, solely on the effort of SHEP since respondents are affected by other influences such as the media. AVERT (2009, 2008) stress that many people are dangerously ignorant about the virus, with surveys around the world showing alarmingly low levels of awareness and understanding about HIV.

**Regression analysis**

Various literatures argue that religion and religiosity may discourage risky behaviour and therefore serve as a barrier to HIV infection (Green 2003; Takyi 2003) yet it has been largely ignored in understanding adolescent health outcomes (Wallace & Williams 1997). When attention is given, ‘the choices of measures employed, the methods of modelling religious variables and the skills with which coefficients of religious effects are interpreted often fall short’ yet significant influences of religion often can be documented despite poor measurement (Regnerus, Smith & Frisch 2003). Regression analysis was therefore used to determine relationships between pupils’ religiosity and attitudes: to model response variables and derive a model which contains only those variables that are important for predicting a response variable of interest and test specific hypotheses.

The analyses address how knowledge, religiosity, age and gender could predict the response variables of interest and test specific hypotheses about the sample data. Thus, the factors of **Attitudes**

| Table 2. Factors generated (after factor analysis) |
|-----------------------------------------------|
| **Attitudes** | **Attitudes (beliefs)** | **Religiosity** |
| Drugs inject | Tolerance | Attachment |
| Teen abstinence | Acceptance | Involvement |
| HIV threat | | Cognitive |
| Protection | | Coping |
| Peer pressure | | Intensity |
| Responsibility | | Confidence (in scripture) |
| Using condom | | |
were modelled using all-subset regression in R (R Development Core Team 2009) and the highest Adjusted R-squared values. Through a process of statistical permutations, the best models are identified in an all-subsets plot which provides a means to subject all variables into predictable mode. The aim of these analyses was to identify which selection of variables best represent the response variables and obtain estimates for these effects.

Burnham and Anderson (2004) suggest three general principles to guide model-based inference: simplicity and parsimony, multiple working hypotheses and strength of evidence. Table 3 shows variables (factors) entered in for the regression analysis. Whilst the attitudinal factors constitute the response variables, the rest, are explanatory.

The selection procedures and the relationships between the response and explanatory factors were confirmed through the selection procedures based on BIC which allows for the comparison of all possible submodels. BIC is more stringent, usually motivated by the mathematical context of nested models including a true model simpler than the most general model in the set. Models, by definition, are only approximations to unknown reality or truth... (Burnham & Anderson 2004) but clustered around the ‘best’ model will be a set of alternatives almost as good and not statistically distinguishable (McCullagh & Nelder 1989). The model with the largest adjusted $R^2$ based on both BIC and adjusted $R^2$ statistic plot were considered. There were many models that could be made from the available data but in order to give some structure and limit the statistical output only those models with the most predictive power and of theoretical interest were described: models of teen abstinence, tolerance and protection (Table 4). These are consistent with the goal, essence and workable approaches in HIV education known to help someone eliminate or reduce the risk of becoming infected by abstinence, using condoms for protection and, reducing discrimination and stigma (AVERT 2009, 2008).

A linear regression model involving all variables was computed as additional selection procedure for verification followed by regression diagnostics and effect plots. Regression diagnostics refer to the general class of techniques for detecting problems in regression with either the model or the data set; ascertain how well models resemble the data actually observed and the effect of each case on estimation (Weisberg 1985). Effect plots/displays are tabular or more often graphical summaries of statistical models (Fox 2003), simply describe the relationships in the models... illustrate the effect sizes and allow estimates to be made for specific combinations of variables (Hutcheson & Mou-tinho 2008; McCullagh & Nelder 1989).

### Table 3. Summary of all variables entered in for regression analysis

| Attitudes          | Knowledge                  | Religionity       | Others       |
|--------------------|----------------------------|-------------------|--------------|
| Drugs inject       | Confidence in knowledge    | Attachment        | Gender       |
| Teen abstinence    | Knowledge                  | Involvement       | Age          |
| HIV threat         | Cognitive                  | Coping            |              |
| Protection         | Intensity                  | Confidence        |              |
| Peer pressure      |                            | (in scripture)    |              |
| Responsibility     |                            |                   |              |
| Using condom       |                            |                   |              |
| Tolerance (belief) |                            |                   |              |
| Acceptance (belief)|                            |                   |              |

### Table 4. Adjusted $R^2$ values of response variables

| Respective attitudinal (response) variables | Highest adjusted $R^2$ |
|---------------------------------------------|------------------------|
| 1 Teen abstinence                           | 0.20                   |
| 2 Tolerance                                 | 0.14                   |
| 3 Protection                                | 0.06                   |
| 4 Acceptance                                | 0.05                   |
| 5 Drugs inject                              | 0.04                   |
| 6 Peer pressure                             | 0.03                   |
| 7 Responsibility                            | 0.02                   |
| 8 Using condoms                             | 0.02                   |
| 9 HIV threat                                | 0.02                   |

Discussion

The result, generally, is comparable to earlier studies that religion is important to all respondents and remains important in Ghana. The findings of Fayorsey (2002) in a key baseline study in selected schools in Ghana showed 95% Christians, 2.8% Moslems; 0.5% traditionalist and others 1.7%. The 2000 population census showed 69% Christians, 15.6% Muslims, 8.5% Traditionalists and 6.9% others (GSS 2002). One unanticipated finding was the number of denominations involved, which surprisingly, numbered 55 for the 67.6% of respondents who indicated their denominations, majority of which are Pentecostal independent churches which do not belong to any of the mainstream traditional Christian denominations therefore making it difficult to categorise them into a formal taxonomy. The reason for the multiplicity of denominations is not clear but can be likened to Meyer’s (1995) observation, that the increasing popularity of spiritual and Pentecostal churches in contemporary society is related to their ability to provide assistance for a range of illnesses. Similarly, Assimeng (1986) suggested that this growing popularity of ‘new’ Christian groups is due to the often involvement of the use of ‘healing’ and ‘salvation’, which seems to appeal to the needs of an impoverished population dissatisfied with their current socioeconomic condition reflecting the growing disenchantment with the monotony of the old denominations and with the liturgy and beliefs of the mainstream churches.

In an environment where God is central to most lives (Anane 1999; Meyer 1995), the practice of religion a major social norm and most intense, differences in religiosity, is not easily accounted for. These initial results were not enough to determine any kind of relationships. In line with Bergin (1991) and Ryan et al. (1993)
this study also identifies with the statement 'if one is religious, it matters how one is religious’ (p. 594). Consequently, the modelling of the three response variables (teen abstinence, tolerance and protection) was done and showed varied relationships between each of the response variables and other variables including religiosity.

In the selection procedure of the models, all variables were laid at the horizontal axis and their respective values and significance at the vertical axis (also bic of individual models). A number of models were shown and each row is a model which contains different number of parameters. The choice of the best model depends on a good balance of the number of parameters and how useful information they convey. The overall level of religiosity was relatively high and contributes significantly to the prediction of attitudes modelled below; relationships mostly, between private religiosity. The prediction interval of each of the predictors was calculated based on 25% (lower) and 75% (upper) values of their numerical summaries, respectively in R (R Development Core Team 2009); the focus primarily was the confidence interval for group mean and the gender effect.

**Predicting teen abstinence**

The modelling of Teen abstinence (Fig. 1) shows that it has a statistically significant relationship with religiosity factors. Comparing all possible models, the first two with the highest score (at the apex) are considered the most significant. These are distinguished from the rest. The second model was chosen as the best fitting because it includes gender, a variable of theoretical interest, together with attachment, confidence, coping and intensity (all private religiosity variables).

Model1: Teen abstinence = \( \alpha + \beta_1 \text{Attachment} + \beta_2 \text{Confidence} + \beta_3 \text{Coping} + \beta_4 \text{Intensity} + \beta_5 \text{Gender} \).

Table 5 shows the parameters and their significance. The adjusted \( R^2 \), 0.1882 explains about 19% of the variance.

![Fig. 1. Best model: teen abstinence.](image)

The regression equation for the model (Table 5) shows:

Teen abstinence = 0.10 + 0.46attachment + 0.28*confidence + 0.17*coping + 0.25*intensity + −0.21*Gender[T.M].

These partial regression coefficients identify the effect that each explanatory variable has on teen abstinence independent of other variables in the model (it identifies the unique contribution made by the explanatory variable in predicting teen abstinence) (Hutcheson & Moutinho 2008); represent the average change in teen abstinence that is expected to result from a change of one unit in that explanatory variables when all other variables are held constant. For each unit increase in attachment, confidence, coping and intensity, teen abstinence also increases but decreases with males. For example, for each unit rise in attachment, teen abstinence increases by an average of 0.46 (46%) whilst each unit rise in confidence in scripture leads to an increase of an average of 0.28 (28%) in teen abstinence. Further, teen abstinence increases by an average of 0.17 (17%) for each unit rise in coping and 0.25 (25%) for each unit rise in intensity. However, compared to girls, boys are 21% lower in terms of abstinence. *** indicate the most significant whilst and * indicate the least predictor of teen abstinence further explained by the effect plots below.

The diagnostic graphs below (Fig. 2, similar to those of models of Tolerance and Protection) showed that the data have not seriously violated the regression assumptions tested and suggest a linear relationship.

The residuals showed no obvious pattern when plotted against the predicted values; the residuals, roughly normally distributed. The cook’s distance showed no extreme and no unusual outliers but relatively well spread and do not lie far from the majority of observations. Fitted values are around zero and no systematic variation. Hutcheson and Sofroniou (1999) recommend a cut-off point calculated from the equation: cut-off = \( 4/n – p \) (where \( p \) is the number of model parameters including the intercept, and \( n \) is the number of cases). This is to see if the observation makes a significant difference to the fit of the model. The cut-off line occurs at \( 4/(448 – 6) = 0.010 \) and about 16 cases are seen that may
significantly alter the model fit. The pattern of outliers does not indicate extreme outliers; neither does it give cause for concern because 5% above the line was expected.

**Effect plots**

The effect of each of the explanatory variable (predictor) in the 'final model' on the response variable is displayed in Fig. 3. The vertical axis is labelled Teen Abstinence, the response variable (the scale of response) and the horizontal axis shows individual explanatory variable. The effect displays show size and direction; as a predictor increases, the response also increases. The approach goes a long way towards clarifying the fit of the model and simplifying their interpretation. All the religious factors (predictors) have effect on *teen abstinence* and show a linear relationship with the response variable but with varying degrees of effect. The strongest predictor is ‘Attachment’ at the top left panel and the weakest, ‘Coping’ at the bottom left. Attachment thus becomes the single biggest effect on teen abstinence, hence the major predictor.

Attachment theorists (Kirkpatrick 1997) have likened God to an attachment figure and individual's relationship with God considered as an attachment relationship. The theory suggests that people who experience a secure connection with God should also experience greater comfort in stressful situations and greater strength and confidence in everyday life. Attachment behaviour is designed to get children into a close, protective relationship with their attachment figures whenever they experience anxiety and the availability and responsiveness of an attachment figure, serves alternately as a haven and as a secure base . . . (Kirkpatrick 1997).

The ‘rug plot’ (one-dimensional scatterplot) at the bottom of each graph shows the distribution of the corresponding predictor. The broken lines give point-wise 95-percent confidence intervals.
(envelopes) around the fitted values (effects) (Fox & Hong 2009). The confidence interval are indicated by the upper broken lines and the lower broken lines and between them the fit. People in high attachment have the highest probability to abstain whilst people in low attachment irrespective of what happens to other predictors (positive or negative) may not abstain. At the highest level of all the predictors corresponding distribution of religious predictors, is however sparse as shown in the one-dimensional ‘rug plot’: an indication that only those who attain a high level of religiosity are likely to abstain. A lower level of private religiosity means that a teenager may not abstain from sex. It is interesting to compare these results with an experimental abstinence programme without a moralistic tone reported to delay young teenagers from having sex in US study (Guardian News and Media Limited 2010). Assignments to help 662 black children, see drawbacks to sexual activity at their age (around 12), included, listing the ‘pros’ and ‘cons’ themselves. They found their ‘cons’ to sexual activity far outnumbered the ‘pros’. The results whilst lending support for the plausibility of abstinence could be problematic as children grow and overcome these fears: sustaining their position.

Kabiru and Ezeh (2007), found 85% of Ghanaian male respondents aged 15–19 years reported no previous sexual activity similar to the findings of Fayorsey (2002) in Ghanaian study. They made recommendations endorsing abstinence until marriage as a preferred mode for HIV prevention and to serve as the basis ‘to spearhead the drive toward abstinence and restore pride in virginity’ (p. 16). However, Awusabo-Asare, Abane and Kumi-Kyereme (2004) consider virginity, which is an honour to the family of the female and a way to gain the respect of the family of the would-be husband, as double sexual standard for males and females, whereby parents expected only daughters to be virgins. Bersamin, Walker, Waiters, Fisher and Grube (2005) findings raise questions about the effectiveness of formal virginity pledges in preventing adolescent sexual behaviour but found informal pledge strongly and negatively associated with sexual intercourse.

Gender effect
Fig. 4 depicts the relationship between teen abstinence and gender showing teen abstinence is lower for males. Also in Table 5 the coefficient $-0.21$ for Gender means boys are $21\%$ lower than girls for each unit rise. Girls have higher values than boys and therefore likely to be more religious than boys and are more likely to abstain than boys. On average, girls are ‘more religious’ than boys, and more likely to attend services weekly and to report that religion is ‘very important’ to them (Regnerus et al. 2003).

The more one perceives that one can (i.e. has the necessary skills and abilities to) perform the behaviour, even in the face of specific barriers or obstacles, the stronger will be one’s self-efficacy with respect to performing the behaviour (Fishbein 2000). However it is acknowledged that there is practical difference between what people believe and what they do when confronted with different environment. Influences on ‘youth current beliefs’ versus ‘future intimate behaviours’, especially, when they leave home for secondary school, outside daily scrutiny of parents, religious leaders and other social influences may be altered. For instance Regnerus (2007) notes that religious approaches to sexual issues that rely heavily on promoting abstinence until marriage may be problematic; adolescents who maintain that sex should be saved for marriage sometimes behave otherwise.

Predicting tolerance
The second model Tolerance (Fig. 5) was based on comparing all possible submodels. The fourth model, which also is a good fit, was considered the best model which provides some theoretical

![Gender effect: teen abstinence.](image)

![Best model: tolerance.](image)

| Estimate | Std. error | t-Value | Pr(>|t|) |
|----------|------------|---------|----------|
| (Intercept) $-1.91$ | 0.27 | $-7.11$ | $4.69\times10^{-12}$ |
| Attachment $0.08$ | 0.03 | 2.55 | $0.01105^{*}$ |
| Confidence in scripture $0.12$ | 0.05 | 2.62 | 0.00917** |
| Confidence in HIV knowledge $0.04$ | 0.00 | 7.17 | $3.07\times10^{-12}$*** |
| Involvement $0.08$ | 0.04 | 2.158 | 0.03144* |

Notes: Multiple $R^2$: 0.1422, adjusted $R^2$: 0.1345. F-statistic: 18.37 on 4 and 443 DF; p-value: 5.646e$^-1$.
interest. Tolerance had relationship with attachment, confidence (in scripture), involvement and confidence in knowledge.

Model 2: Tolerance = α + β₁ Attachment + β₂ Confidence + β₃ ConfKnowledge + β₄ Involvement.

Table 6 shows the parameters and their significance. The adjusted $R^2$, 0.1345 explains about 13.5% of the variance.

The regression equation for the model (Table 6) shows:

$$\text{Tolerance} = -1.91 + 0.08*\text{attachment} + 0.12*\text{confidence} + 0.04*\text{confKnowledge} + 0.08*\text{involvement}.$$

The regression parameters of each of the explanatory variables represent the average change in tolerance that is expected to result from a change of one unit in that explanatory variables when all other variables are held constant. For example, for each unit rise in attachment, tolerance increases by an average of 0.08 (8%) whilst each unit rise in confidence in scripture leads to an increase of an average of 0.12 (12%) in tolerance. However, tolerance increases by an average of 0.04 (4%) for each unit rise in confidence in HIV knowledge and 0.08 (08%) for each unit rise in involvement. *** indicate the most significant followed by ** whilst * indicate the least predictor of tolerance. These are further explained by the effect plots below. These partial regression coefficients identify the effect that each explanatory variable has on tolerance independent of other variables in the model (Hutcheson & Moutinho 2008:30). In the diagnostics (Fig. 6), the cut-off line occurs at 4/(448 – 5) = 0.010 and about 18 cases are seen that may significantly alter the model fit. The pattern of outliers does not indicate extreme outliers; neither does it give cause for concern because 5% above the line was expected.

![Fig. 6. Diagnostic graphs: tolerance.](image)

![Fig. 7. Effect plots of predictors of tolerance.](image)
Tolerance was best predicted by three religiosity factors: attachment, confidence (in scripture) and involvement, and confidence in HIV knowledge: they constitute the final model, where both private and public religiosity, combine to predict an outcome. Attachment and confidence (in scriptures) are both private religiosity, whilst involvement is a public religiosity. Individuals who attend religious services frequently and who value religion in their lives are probably more likely than others to develop sexual attitudes and behaviour that are consistent with their religious doctrines (Odimegwu 2005).

The effect of each of the explanatory variable in the ‘final model’ on the response variable is displayed in Fig. 7. The vertical axis is labelled Tolerance, the response variable and the horizontal axis shows individual explanatory variable. In general, tolerance increases as all the predictors also increase but confidence in HIV knowledge is the highest predictor of tolerance. Pupils with higher confidence in their HIV knowledge are more likely to tolerate people infected with HIV.

**Predicting protection (with condoms)**

Protection is the third response variable with the most predictive model. Fig. 8 shows the presentation of all variables in the selection procedure. Comparing all possible submodels, the first three models at the apex are the most significant and best-fitting but the third, more of theoretical interest.

**Model3:** Protection = α + β₁Attachment + β₂ConfKnowledge + β₃Coping.

Table 7 shows the parameters and their significance. The adjusted $R^2$, 0.05926 explains about 6% of the variance.

The regression equation for the model (Table 7) shows:

$$\text{Protection} = -1.74 + -0.09\text{attachment} + 0.03\text{confKnowledge} + -0.11\text{coping}.$$  

The regression parameters of each of the explanatory variables represent the average change in protection that is expected to result from a change of one unit in that explanatory variables when all other variables are held constant. These partial regression coefficients identify the effect that each explanatory variable has on protection independent of other variables in the model (it identifies the unique contribution made by the explanatory variable in predicting protection) (Hutcheson & Moutinho 2008). For example, for each unit rise in attachment, protection reduces by an average of 0.09 (9%) whilst each unit rise in confidence in HIV knowledge leads to an increase of an average of 0.03 (3%) in protection. However, protection decreases by an average of 0.11 (11%) for each unit rise in coping. *** indicate the most significant followed by ** whilst * indicate the least predictor of protection. These are further explained by the effect plots below. In the diagnostics (Fig. 9), the cut-off line occurs at 4/(448−4) = 0.010 and about 19 cases are seen that may significantly alter the model fit but does not give cause for concern because 5% above the line was expected.

In the effect display (Fig. 10), the vertical axis is labelled protection (with condoms), the response variable and the horizontal axis shows individual explanatory variable, the predictor. Protection (condom use) was best predicted by two religious factors, attachment and coping, and confidence in HIV knowledge.

The relationship shows, as attachment and coping increase, protection decreases; the relationship is inversely related. Protection however increases with increasing confidence in HIV knowledge, the highest predictor. Protection is negatively related to religiosity therefore highly religious people are not likely to use condom. Addai (1999) found religion to be a significant predictor of contraceptive use. Some religious groups view any discussions about condoms as implying a support of pre-marital and extramarital sex; it is likely that they may not talk about condoms in their discussions about AIDS (Takyi 2003).

![Fig. 8. Best model: protection.](image-url)
The findings support the beneficial effects of school-based interventions with improved environment. Major gaps in HIV/AIDS knowledge support the view that knowledge levels are not yet universal; a comprehensive and systematic approach is important to ensure that people are continuously educated and updated; also to address signs suggesting stigmatisation or discrimination of infected people. Consistent with prior studies (Odimegwu 2005; Regnerus et al. 2003), findings in this study indicate that religiosity may represent an important protective factor, supporting the assumption that adolescents who strongly identify with religious teachings and traditions are less likely to engage in HIV risk-related behaviours. A flipside to the protective effect of religion supports other findings that religious individuals who are sexually active are less likely to report ‘safe sex’ practices like condom use (Bearman & Brückner 2001).

As a multi-dimensional construct, certain dimensions of religiosity were more prominent and influential than others. Attachment (to God) was the only religiosity factor found to have relationship with all the attitudinal factors; a dimension known to have been generally ignored in empirical research on religiosity. Attachment (to God), noted as the highest form of religiosity, is also an intrinsic religiosity, where the individual has a daily spiritual experience and personal relationship with God (Fetzer Institute 1999). Whilst attachment is part of all the models, its contribution is

**Conclusion**

The findings support the beneficial effects of school-based interventions with improved environment. Major gaps in HIV/AIDS knowledge support the view that knowledge levels are not yet universal; a comprehensive and systematic approach is important to ensure that people are continuously educated and updated; also to address signs suggesting stigmatisation or discrimination of infected people. Consistent with prior studies (Odimegwu 2005; Regnerus et al. 2003), findings in this study indicate that religiosity may represent an important protective factor, supporting the assumption that adolescents who strongly identify with religious teachings and traditions are less likely to engage in HIV risk-related behaviours. A flipside to the protective effect of religion supports other findings that religious individuals who are sexually active are less likely to report ‘safe sex’ practices like condom use (Bearman & Brückner 2001).

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positive towards 
teen abstinence as the major predictor and tolerance (to infected people) but negative towards protection (by condom). Those with high attachment are less likely to use condoms once they do initiate sex. The major predictor of tolerance and protection was confidence in HIV knowledge. Pupils with higher confidence in their HIV knowledge, are more likely to tolerate people who have HIV/AIDS and also more likely to use condoms in sexual activities.

The preference for private (personal) religiosity as against public (organisational) mode; intrinsic instead of extrinsic religiosity seems to be the most telling finding to emerge from this study, therefore suggesting that religious-based adolescent interventions should focus on intrinsic religiosity. These preferences also suggest a higher sense of value and moral-based motivations are related to drawing strength and stability from the highest form of religiosity (in themselves), where the adolescent has a personal relationship with God. Related to this, are the findings of Leonard and Scott-Jones (2010) study among high school students, in the USA, that the frequency of religiosity ratings, increased from the external and public to the internal and private components.

The findings suggest a relationship between theories of attitudes, beliefs and behaviour. Taken together, a role for religiosity is suggested with the potential to promote positive attitudes and behaviour in health-based problems, including HIV. However it cannot be guaranteed as a ‘magic wand’ to solve all related problems. The evidence does not support the prospect of attaining abstinence for all. Whilst all respondents may be religious, levels of religiosity vary. Some religious people may abstain but not all religious people will. It is also not certain what pupils do or will do in spite of their convictions, especially when they progress to boarding schools after JHS, away from scrutiny of parents or religious groups. The complexity of adolescent sexual behaviour raises a major concern; any personal and cultural inhibitions, therefore need to be reconsidered.

Whilst upholding attitudes which support abstaining, a lot more needs to be done to strengthen alternative approaches to ensure protection for all. Potential conflict between abstinence and condoms as methods of preventing HIV transmission needs addressing.

Among the limitations of this study includes the use of a cross-sectional research design, capturing only respondents’ views at one moment which may not allow for complete understanding of effects of time in adolescent development on religiosity and attitudes. Also, there can be no claims for generalisation of conclusions. The effects of tribal differences and Christian denomination were not considered due to their multiplicity, thus limiting our understanding of the complexity of the relationships.

Implications for practitioners

The evidence from this study suggests that religiosity is an important constituent in the life of the Ghanaian adolescent which could generate positive effects on their attitudes to HIV: an implication for policy, theory and methodology. Policy makers could consider religion (spirituality) as part of health promotion intervention design, especially the current HIV/AIDS prevention activities and other behaviour-based problems. Developing and implementing effective HIV education strategy is a challenge which policy makers constantly face. What is culturally acceptable to a community is vital to any successful implementation. Since the results suggest that religiosity has some influence in attitudes and consequently lifestyle, identifying its effects among target audiences could serve a useful purpose. Incorporating reasons adolescents give for not engaging in sexual intercourse and in other behaviour-based health problems could provide an important direction and heighten effectiveness in interventions. It may also be beneficial to redefine and prop up the role of religious leaders and institutions in prevention programmes to offer them a well-informed ‘voice’ to reach their members. Finally, equipping Teachers continuously is crucial due to their role in school-based education. This may help bring about improved knowledge base and understanding of students.

References

Aday, L.A. (1996). Designing and Conducting Health Surveys: A Comprehensive Guide (2nd ed.). San Francisco, CA: Jossey-Bass Publishers.
Addai, I. (1999). Does religion matter in contraceptive use among Ghanaian women? Review of Religious Research, 40, 259 – 277.
Agadjanian, V. (2001). Religion, social milieu and contraceptive revolution. Population Studies, 55, 135 – 148.
Ajzen, I. (2001). Nature and operation of attitudes. Annual Review of Psychology, 52, 27 – 58.
Allport, G.W. & Ross, J.M. (1967). Personal religious orientation and prejudice. Journal of Personality and Social Psychology, 5, 532 – 543.
Anane, M. (1999). Religion, men and HIV/AIDS in Ghana. In M. Foreman (Ed.), AIDS and Men: Taking Risks or Taking Responsibility (pp. 81 – 94), London, Panos Institute.
Assimeng, M. (1986). Saints and Social Structures. Tema, Ghana Publishing Corporation.
Assimeng, M. (1989). Religion and Social Change in West Africa. Accra, Ghana, University Press.
AVERT (AVERTing HIV and AIDS). (2009, 2008). International HIV & AIDS charity. UK. http://www.avert.org/hiv-types.htm; http://www.avert.org/aidseducation.htm
Awusu-abare, K., Abane, A.M., & Kumi-Kyereme, A. (2004). Adolescent Sexual and Reproductive Health in Ghana: A Synthesis of Research Evidence. New York, The Alan Guttmacher Institute, Occasional Report No. 13.
Awusu-abare, K., & Anarth, J. (1999). Rethinking the circumstances of condoming the first sexual experience in the era of AIDS in Ghana. In G.O. Orubuloye, John C. Caldwell, & James P. M. Ntozi (Eds.), The Continuing HIV/AIDS Epidemic in Africa: Responses and Coping Strategies (pp. 9 – 18), Canberra, Australian National University.
Barnett, E., de Koning, K. & Francis, B. (1995). Health and HIV/AIDS Education in Primary and Secondary Schools in Africa and Asia, Overseas Development Administration, Education Resource Group, Serial No. 14, Liverpool, England.
BBC (British Broadcasting Corporation). (2009). HIV Vaccine Reduces Infection. http://news.bbc.co.uk/1/hi/8272113.stm (Accessed 10 November 2009).
Bearman, P.S. & Brückner, H. (2001). Promising the future: virginity pledges and first intercourse. American Journal of Sociology, 106, 859 – 912.
Bergin, A.E. (1991). Values and religious issues in psychotherapy and mental health. American Psychologist, 46(4), 394 – 403.
Bersamin, M.M., Walker, S.,Waiters, E.D., Fisher, D.A., & Grube, J.W. (2005). Promising to wait: virginity pledges and adolescent sexual behaviour. Journal of Adolescent Health, 36, 428 – 436.
Billy, J.O.G., Brewster, K.L., Williams, R., & Grady, W.R. (1994). Contextual effects on the sexual behaviour of adolescent women. Journal of Marriage and the Family, 56, 387 – 404.
Burrillah, K.P. & Anderson, D.R. (2004). Multimodel inference: understanding AIC and BIC in model selection. Sociological Methods and Research (SMR), 33, 261 – 304.
CDC (Centers for Disease Control and Prevention). (1992). Assessment Instruments for Measuring Student Outcome, Grades 7-12. Booklet 6. Division of Adolescent and School Health, NCCDPHP.
CDC (Centers for Disease Control and Prevention). (2005). The Handbook for Evaluating HIV Education. US, CDC.
CDC (Centers for Disease Control and Prevention). (2008). HIV/AIDS among Youth, CDC. USA, CDC.
Comrey, A.L. & Lee, H.B. (1992). A First Course in Factor Analysis (2nd ed.). Hilldale, NJ, Lawrence Erlbaum Associates, Inc., Publishers.
Cornwall, M., Albrecht, S.L., Cunningham, P.H., & Pitcher, B.L. (1986). The dimensions of religiosity: a conceptual model with an empirical test. Review of Religious Research, 27(3), 226–244.
Cowan, F.M. (2002). Adolescent reproductive health interventions, adolescent sexual health. Sexually Transmitted Infections, 78, 315–318.
Donahue, M.J. (1985). Intrinsic and extrinsic religiosity: review and meta-analysis. Journal of Personality and Social Psychology, 48, 400–419.
Eng, T.R. & Butler, W.T. (1997). The Hidden Epidemic: Confronting Sexually Transmitted Diseases. Washington, DC, National Academy Press.
Fayose, C. (2002). Knowledge Attitude And Practice (KAP) on HIV/AIDS Amongst Students, Teachers and Parents in Selected Schools in Ghana, Key Baseline Findings, University of Ghana, SHAPE Project/World Education/ Ghana.
Fetter Institute. (1999). Brief Multidimensional Measurement of Religiousness/Spirituality for Use in Health Research: A Report of the Fetter Insti-
tute/National Institute on Aging Working Group, USA.
Fishbein, M. (2000). The role of theory in HIV prevention. AIDS Care, 12(3), 273–278.
Fox, J. (2003). Effect displays in R for generalised linear models. Journal of Statistical Software, 8(15), 1–27.
Fox, J. & Hong, I. (2009). Effect displays in R for multinomial and propor-
tional-odds logit models: extensions to the effects package. Journal of Statistical Software, American Statistical Association, 32(1), 1–24.
GAC (Ghana AIDS Commission). (2008). National Report on the Progress of the United Nations General Assembly Special Session (UNGASS): Declaration of Commitment on HIV/AIDS, Ghana AIDS Commission. http://data.unaids.org/pub/Report/2008/ghana_2008_country_progress_report_en.pdf (Accessed 9 July 2009).
Gallant, M. & Maticka-Tyndale, E. (2004). School-based HIV prevention pro-
grames for African youth. Social Science and Medicine, 58, 1337–1351.
Gallup International Millennium Worldwide Survey (2000). Religion in the World at the End of the Millennium. USA, Gallup International Institute.
Ghana Demographic and Health Survey. (2003). Claverton, Maryland, GSS and NIMR.
GNA (Ghana News Agency). (2008a). Over 2,000 children die from AIDS in 2007. Modern Ghana, Ghana, Jul 2. (Dr. Akwei Addo). http://www.modernghana.com/news/172562/over-2000-children-die-from-aids-in-2007.html (Accessed 10 December 2008).
GNA (Ghana News Agency). (2008b). Ghana’s AIDS Prevalence Drops, but no Compacency, GhanaWeb, August 5 (Prof. Sakiy Awuku Amoa). http://www.ghanaweb.com/GhanaHomePage/NewsArticle/Article?ID=147930 (Accessed 29 November 2008).
GNA (Ghana News Agency). (2008c). 70 AIDS Cases Reported Daily (Prof. F. F. Sai). GhanaWeb, December. http://www.ghanaweb.com/GhanaHomePage/NewsArticle/Article?ID=153952 (Accessed 11 February 2009).
GNA (Ghana News Agency). (2009). HIV/AIDS Deaths in Eastern Region, GhanaWeb. May 17. http://www.ghanaweb.com/GhanaHomePage/NewsArticle/Article?ID=162242.
Gorsuch, R.L. & McPherson, S.E. (1989). Intrinsic/extrinsic measurement: I/E-
ness/Spirituality for Use in Health Research: A Report of the Fetzer Insti-
tute/National Institute on Aging Working Group, USA.
Kirby, J. (1997). White, red and black: colour classification and illness manage-
ment in Northern Ghana. Social Science and Medicine, 44, 215–230.
Kirby, D., Short, L., Collins, J., Rugg, D., Kolbe, L., Howard, M., et al. (1994). School based programmes to decrease sexual risk behaviours: a review of effec-
tiveness. Public Health Report, 109, 339–360.
Kirkpatrick, L.A. (1997). An attachment-theory approach to the psychology of religion. In B. Spilka & D.N. Mcintosh (Eds.), The Psychology of Religion: Theoretical Approaches (pp. 114–133). Boulder, CO, Westview.
Lehre, E.L. (2004). Religion as a determinant of economic and demographic
behaviour in the USA. Population and Development Review, 30(4), 707–726.
Leonard, K.C. & Scott-Jones, D. (2010). A belief-behaviour gap? Exploring reli-
giosity and sexual activity among high school seniors. Journal of Adolescent Research, 25(4), 578–600.
Liontos, L.B. (1989). AIDS/HIV Education, ERIC (The Educational Resources Information Center) Digest Series Number EA 38, ERIC Clearinghouse on Edu-
cational Management Eugene OR. http://www.eric.ed.gov/PDFS/EJ309564.pdf.
Lowernson, P.R., Ireland, M., & Resnick, M.D. (2004). Primary and secondary
sexual abstinence in high school students. Journal of Adolescent Health, 34, 209–215.
Maxwell, J.A. (2005). Qualitative Research Design: An interactive approach
(2nd ed.). Thousand Oaks, CA, Sage.
Mbiti, J.S. (1989). African Religions and Philosophy (2nd ed.). Halley Court, Jordan Hill, Oxford, Heinemann Educational Publishers.
McCullagh, P. & Nelder, I. (1989). Generalised Linear Models (2nd ed.). London, Chapman & Hall.
Meyer, B. (1995). Delivered from the powers of darkness: confessions of satanic
riches in Christian Ghana. Africa, 65(2), 237–255.
Miller, L. & Gur, M. (2002). Religiosity and sexual responsibility in adoles-
cent girls. Journal of Adolescent Health, 31, 401–406.
Nicholas, L. & Durheim, K. (1995). Religiosity, AIDS, and sexuality knowl-
dge, attitudes, beliefs, and practices of black South African first-year univer-
sity students. Psychological Reports, 77, 1328–1330.
Nielsen, M.E. (2000). Psychology of Religion in the USA. USA, Georgia Southern University.
Odumegwu, C. (2005). Influence of religion on adolescent sexual attitudes and
behaviour among Nigerian University students: affiliation or commitment? African Journal of Reproductive Health, 9(2), 125–140.
Plante, T.G. & Boccaccini, M. (1997). The Santa Clara strength of religious
faith questionnaire. Pastoral Psychology, 45, 375–387.
R Development Core Team. (2009). R: A Language and Environment for
Statistical Computing, R Foundation for Statistical Computing, Vienna, Austria. http://www.R-project.org (Accessed 21 January 2009).
Regnerus, M. (2007). Forbidden Fruit: Sex & Religion in the Lives of Americans. USA, Oxford University Press.
Regnerus, M., Smith, C. & Fritsch, M. (2003). Religion in the Lives of American Adolescents: A Review of the Literature. A Research Report of the National Study of Youth and Religion, No 3, US.
Robson, C. (2002). Real World Research: A Resource for Social Scientists and
Practitioner-Researchers (2nd ed.). Victoria, Australia, Blackwell Publishing.
Rokach, M. (1976). Beliefs, Attitudes and Values, a Theory of Organization
and Change (2nd ed.). San Francisco, Jossey-Bass, Inc., Publishers.
Rostosky, S.S., Wilcox, B.L., Wright, M.L. C., & Randall, B. (2004). The impact of religiosity on adolescent sexual behaviour: a review of the evidence. The Researcher of Adolescent Health, 19, 677–697.
Ryan, R.M., Sigal, R., & King, K. (1993). Two types of religious internalization and their relations to orientations and mental health. Journal of Personality and Social Psychology, 65(3), 586–596.
Stake, R.E. (1994). Case studies. In Norman K. Denzin & Yvonna S. Lincoln (Eds.), Handbook of Qualitative Research (pp. 236–247). Thousand Oaks, CA, Sage Publications.
Taky, B.K. (2003). Religion and women’s health in Ghana: insights into HIV/AIDS preventive and protective behaviour. Social Science & Medicine, 56, 1221–1234.
Teddlie, C. & Yu, F. (2007). Mixed methods sampling: a typology with examples. Journal of Mixed Methods Research, 1(1), 77–100.
The Guardian (Guardian News and Media Limited). (2010). http://www.
guardian.co.uk/education/2010/feb/02/abstinence-sex-education-us-study (Accessed 3 February 2010).
Thornton, A. & Camburn, D. (1989). Religious participation and adolescent
sexual behaviour. Journal of Marriage and the Family, 51, 641–653.
Tones, K. & Green, J. (2004). Health Promotion: Planning and Strategies. London, Sage.
UNAIDS (Joint United Nations Programme on HIV/AIDS). (2008). Report on the Global AIDS Epidemic. http://data.unaids.org/pub/GlobalReport/2008/ jcr1511_gr8_executivesummary_en.pdf (Accessed 21 August 2008).
UNAIDS/WHO (Joint United Nations Programme on HIV/AIDS and World Health Organization). (2009). General information about HIV and AIDS.
UNICEF (2002). Evaluation of HIV/AIDS prevention through peer education, counselling, health care, training and urban refuges in Ghana. Evaluation and Program Planning, 25, 409–420.

Wallace, J.M., Jr. & Williams, D.R. (1997). Religion and adolescent health compromising behaviour. In J. Schulenberg & J.L. Maggs (Eds.), Health Risks and Developmental Transitions during Adolescence (pp. 444–468). New York, NY, Cambridge University Press.

Weisberg, S. (1985). Applied Linear Regression (2nd ed.). New York, John Wiley & Sons, Inc.

Wiebe, K.F. & Fleck, J.R. (1980). Personality correlates of intrinsic, extrinsic and non-religious orientations. Journal of Psychology, 105, 111–117.

World Bank (2002). Education and HIV/AIDS: A Window of Hope. Washington, DC, World Bank.

Yin, R.K. (1984). Case Study Research: Design and Methods. Newbury Park, CA, Sage.

Yirenkyi, K. (1999). Changing patterns of mainline and charismatic religiosity in Ghana. Research in the Social Scientific Study of Religion, 10, 171–189.

Yirenkyi, K. (2000). The role of Christian churches in national politics: reflections from laity and clergy in Ghana. Sociology of Religion, 61, 325–338.