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Using the Socio-ecological Model to Explain the Findings of Prevalence and Demographic Correlates of Alcoholic Beverage Consumption among Adolescents in Public Schools in Uganda

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Abstract

Introduction: Consumption of alcohol among the youth could be attributable to socio-demographic characteristics. This paper anchors on the socio-ecological model to expound on the prevalence and socio-demographic correlates of alcohol consumption among adolescents in public secondary schools. Specifically, the model was used to explore gender, religious affiliation, form or class of study, social media use, friendships, and involvement in places of entertainment as possible predictors of alcohol consumption.

Method: We employed a cross-sectional survey with quantitative methods. The sample comprised 1819 participants, yielding a 91.8% response rate. Males were relatively more numerous (59.3%), and the mean age was 17.3 (SD = 1.9). Bivariate and multivariate logistic regressions were employed to deduce the association of selected demographics with the consumption of beer, wine, and spirits.

Results: The prevalence of alcohol consumption was generally high. Multivariate logistic regression showed a significant gender difference in the consumption of beer and spirits. Females had lower odds of consuming beer and spirits. Students in the Muslim and Pentecostal dominions were less likely to consume beer, wine, and spirits than their Roman Catholic and Anglican counterparts. Students in the Roman Catholic dominion had higher odds of consuming any type of alcohol compared to other religions. Loving to be in places of entertainment and the use of social media significantly predicted the consumption of beer, wine, and spirits.

Conclusion: At the multivariate level, some socio-ecological factors could account for differential alcohol consumption among the students. Individual student-level factors such as gender and the institutional factor of religion could explain alcohol consumption among the students. Specifically, gender and religion were significantly associated with alcohol consumption. It is recommended that ecological differences and “gendered models” are considered as part of the interventions for in-school youth drinking.

Keywords: Prevalence, Ecological model, Socio-demographic correlates, Alcohol consumption, Adolescent students, Uganda.

1. Background

There has been a reported, inextricable connection between people's behaviours and their environment. Therefore, macro and micro-ecological phenomena influence behaviours, including alcohol consumption among diverse groups and populations (Gruenewald, Remer, & LaScala, 2014; Sudhinaraset, Wigglesworth, & Takeuchi, 2016). Consequently, environmental and personal behaviours that influence alcohol consumption could be contextualized in terms of the social ecological model. Indeed and in the context of this study, the model accounts for multiple correlates associated with alcohol consumption among the youth. Urie Bronfenbrenner coined the ecological model in 1974 to explain the role of familial and other "social contacts" in child development (McLeod, 2023). Since then, the model has been expanded and used by scholars from different disciplines in examining multitudes of behaviours among populations of interest. The model, for example, could be employed in examining social media use among the youth (McLeod, 2023) and alcohol consumption (Agwu et al., 2018; Bogg & Finn, 2009). For this paper, alcohol consumption means the use of beverages containing alcohol as an ingredient (Surujlal & Keyser, 2014). Alcoholic beverages in this case were taken to mean Beers, Wines, and Spirits.

Previous studies have used the social ecological model in examining decisions and behaviours of diverse groups of people. Hickey, Harrison, and Sumsion (2012), for example, used the model in explaining career choices of nursing students. Other studies applied the model in examining alcohol consumption, although mainly among adult populations and without clear regard for the microsystems such as religion and gender as primary contexts for alcohol consumption. Two studies, for example, applied the model in examining alcohol consumption-related decision-making (Bogg & Finn, 2009) and in assessing the relationships of demographic and personality characteristics (Gruenewald, Remer, & LaScala, 2013). Another study adopted the model in explaining harmful alcohol consumption in Delta State, Nigeria (Agwu, Okoye, Ebimgbo, Agbawodikeizu, & Ijeoma, 2018). The Gruenewald, Remer, and LaScala (2013) study that considered demographic characteristics, as the present study did, was unable to single out adolescents as a point of focus. Yet, adolescence as a developmental period is one stage most likely to be influenced by the human ecological systems into alcohol consumption and other maladaptive behaviours. Based on the ecological model, we asked: what are the socio-demographic correlates of consumption of alcoholic beverages among adolescents in public secondary schools in Uganda?

As earlier typified, this paper anchors on the social ecological model to explore the prevalence and ecological correlates (such as religion, gender, use of social media technology, and level of learning) of alcohol consumption among adolescents. The social ecological model is reliable in explaining complex behaviours such as alcohol consumption. The paper considers a social ecological discourse as it manifests the various levels with which adolescents interact and

potentially influence their drinking behaviours. For instance, the microsystem of the ecological model could explain variables such as gender, involvement in places of entertainment, use of social media, friendship dynamics, and level of studying against alcohol consumption.

While measures such as brief interventions have been in place to address youth drinking, less is known about the application of contemporary theoretical frameworks in remedying alcohol use among the youth in schools in developing countries. Possibly, the social ecological model would serve as an addition to the available options for advocacy against youth drinking and better prioritize demographic antecedents in the prevention of alcohol consumption.

The ecological spaces notwithstanding, alcohol consumption is identified as responsible for the estimated increase in the global disease burden (Natasha et al., 2016; Osman et al., 2016). Consequently, alcohol consumption, especially among the youth, remains one of the key health concerns (Abbo et al., 2016; Atilola et al., 2014; Beck, Caldeira, Vincent, & Arria, 2012; Manyike et al., 2016; Natasha et al., 2016; Swahn, Palmier, Benegas-Segarra & Sinson, 2013). Moreover, alcohol consumption is hazardous at the most formative stage of adolescence (Cheloti & Gathumbi, 2016; Manyike et al., 2016).

Often, in the context of a developing country like Uganda, alcohol consumption has resulted in hazardous and negative outcomes, including increased road traffic injuries, erosion of socio-cultural norms, involvement in risky sexual behaviours, premature death, poor health, interpersonal violence, and self-harm (Kalema & Vanderplasschen, 2015; Swahn, Palmier, & Kasirye, 2013; Tumwesigye, Atuyambe, & Kobusingye, 2016). In the face of the negative outcomes of alcohol consumption among adolescents, there is no known study using the socio-ecological model to examine alcohol consumption among adolescents in Uganda. Moreover, as Kabwama et al. (2016) contend, all previous studies involving alcohol consumption were conducted on a small scale. According to the report on alcohol consumption in Uganda by Young, Empowered, and Healthy [YEAH] (2007), there is hardly any large-scale empirical data regarding the types of alcohol consumed among the youth in schools in Uganda. The YEAH (2007) report further acknowledges the several surveys, anecdotal evidence, and estimations from key experts that provide a proxy indication of the level of alcohol consumption among Ugandan youth. However, the report above only captures drinking behaviours among the general youth population. Data on youth in schools was earnestly lacking. Therefore, this study allows us to gain an understanding of the “socio-ecological” variables predicting alcohol consumption among the youth in schools and potentially informs future interventions using social ecological theories among remedies to alcohol consumption in educational institutions.

Moreover, Tumwesigye et al. (2013) and Swahn, Haberlen, Palmier, & Kasirye (2014) studied alcohol consumption among the youth but only considered vulnerable groups like those living in slums and fish landing sites. Other studies (e.g., Hahn et al., 2014; John-Langba, Ezeh, Guiella, Kumi-Kyereme, & Neema, 2006; Kabwama et al., 2016; Kalema, Vindevogel, Baguma, Derluyn, & Vanderplasschen, 2015; Naamara & Muhwezi, 2014) were conducted among the general population. Notably, Abbo et al. (2016) considered demographic correlates of alcohol consumption among secondary school students. However, their study considered only two districts – Kampala and Gulu. Therefore, using the social ecological theory to explain the consumption of alcoholic beverages among the youth in public schools was necessary.

The present study is anchored on a socio-ecological model to explore the prevalence and identify protective and risky demographic correlates of alcohol consumption among secondary school adolescents. The socio-ecological model posits

that individual and environmental variables account for alcohol consumption (Gruenewald et al., 2014) among students. The model comprises five layers within which interaction occurs – the microsystem, mesosystem, exosystem, macrosystem, and chronosystem. The fifth layer may not be applicable in examining correlates of alcohol consumption with cross-sectional data. Therefore, this study is anchored on the first four layers of the ecological model. The concern here is that alcohol consumption among the youth is manifold to the extent of drawing from social and environmental influences. To that end, correlates of alcohol consumption among students mirror individual, interpersonal, institutional, communal, and societal echelons.

Particularly, for the interaction between individual students, the first and second levels seem relevant in examining alcohol consumption among students. Issues of age, gender, religious affiliation and practices, and the way these antecedents interact with students' socio-economic and neighbourhood spaces contribute greatly to expounding alcohol consumption among students (Connell, Gilreath, Aklin, & Brex, 2014; Hickey et al., 2012). Therefore, in the context of the socio-ecological model, this paper underscores students' age, gender, religious affiliation, and friendship, involvement in places of entertainment, use of social media, and form of students' classes as possible correlates of alcohol consumption among students. By and large, characteristics of students serve as a basis for adducing differences among alcohol consumers (Bliss, 2007; Manu, Maluleke, & Mbuyiselo, 2016; Surujlal & Keyser, 2014).

Regarding prevalence, and as previously noted, alcohol is the leading substance of abuse among adolescents in Uganda. In fact, in a small-scale study, Abbo et al. (2016) found that the most common substance used among students in Kampala and Gulu districts was alcohol (23.3%). The WHO Global School-based Student Health Survey (GSHS) reports that 12.8% of the students in Uganda had at least one alcoholic drink on one or more days during the past 30 days (YEAH, 2007). However, the survey lacked pinpointing ecological correlates of consumption of the different types of alcohol. Other studies (e.g., Atilola et al., 2014; Egbuonu, Egbuonu, & Effiong, 2015; Odejide, 2006; John-Langba et al., 2006; Onya & Flisher, 2008; Othieno & Ofulla, 2009) point to the prevalence of alcohol consumption as superseding the use of other psychoactive substances in schools among developed and developing countries. For instance, alcohol consumption is highly prevalent among students in the United States (Beck et al., 2012; Conway et al., 2013). In a study conducted by Fuhr, Fleischmann, Riley, Kann, & Poznyak (2013), current alcohol consumption was highest compared to current and lifetime drug use. In their study regarding alcohol consumption and treatment-seeking behaviour among young people in Sydney, Australia, Lea, Reynolds, and De-Wit (2013) found that 83% of their participants consumed alcohol (Wills, Pokhrel, Morehouse, & Fenster, 2011). Crooke et al. (2013) discovered that 43.7% of the adolescents were light drinkers, 16.9% were intermediate drinkers, while 39.4% were heavy drinkers. The same study further reports that 61.0% of the adolescents had at least one night drinking experience, 22.0% had intermediate drinking experience, and 46.3% reported one heavy drinking experience.

In addition to the prevalence reported above, students' characteristics form a significant component of protective or risk factors for alcohol consumption (Beck et al., 2012; Handren, Donaldson, & Crano, 2016). Kabwama et al. (2016) identified that, regionally, Ugandans from the central and western regions were more likely to be medium to high drinkers compared to their counterparts in the eastern region. However, according to Tumwesigye, Kasirye, and Nansubuga (2009),

differences in drinking contexts were mainly attributable to social interactions – especially among different social classes. In a study to review psychosocial risk factors for alcohol consumption, Donovan (2004) reports that only two studies examined age as a predictor of alcohol use initiation. In a comparable context, Rodham, Hawton, Evans, and Weatherall (2005) found clear gender differences in alcohol consumption among adolescents – more males than females reported drinking. The studies recorded above, however, were lacking in consideration of adolescents in secondary schools. Likewise, most studies in Africa and beyond only consider age and gender as the correlates influencing alcohol consumption among adolescents. Key and informative demographic areas like students' level of study and religious background are not accounted for by previous studies (Oman, Tolma, Vesely, & Aspy, 2013; Pengpid & Pelzer, 2013).

Largely, religious inclination and faith tend to influence youths' decisions to consume or not consume alcohol (Al-Ansari, Day, Thow, & Conigrave, 2016). Church attendance in childhood is presumably protective against the early onset of alcohol consumption and the later development of alcohol-related problems (Mason & Windle, 2015; Porche, Fortuna, Wachholtz, & Stone, 2015). Moreover, evidence is available that youths who identify themselves as being strongly committed to particular faiths are less likely to consume alcohol (Marsiglia, Ayers, & Hoffman, 2012).

In the study to establish grade differences in alcohol consumption, Lakew et al. (2014) found significant findings, although the results were non-significant in multivariate models. Further evidence shows that weekly alcohol consumers in the US constituted about one-seventh of drinkers in the 9th grade but one-fourth in the 11th grade (Austin & Skager, 2011; Austin, Skager, Bailey & Bates, 2007).

In echo with Ahlström and Österberg (2004), most studies regarding alcohol consumption among adolescents are situated in developed economies. As earlier recounted, most studies in Uganda (e.g., Hahn et al., 2014; Kalema et al., 2015; Namaara & Muhwezi, 2014; Swahn, Palmier & Kasirye, 2014) do not consider much about the ecological spaces of alcohol consumption among students in schools. Moreover, most of the studies regarding drinking contexts in Uganda consider the general adult population, without much regard to the most formative stage of adolescence. Before the results of the present study, further research dealing with ecological correlates of alcohol consumption in schools was necessary to inform practice regarding alcohol use prevention among students. Outcomes of this study potentially support ecologically framed, youth-tailored, participatory policy initiation and adoption. The social ecological model, in particular, considers antecedents of alcohol consumption and supports understanding of socio-ecological variables for future theoretical interventions.

2. Methodology

2.1. Settings and description of the study sample

This paper employs the social ecological model in reporting on a technique of a large study that was conducted in 2013 and 2014 involving adolescents in public secondary schools in Uganda. The social ecological model was used to explore the socio-ecological variables described under measures, which predict alcohol consumption among a sample of

adolescents in public schools in Uganda. This study was instituted to examine ecological phenomena after a considerable number of Ugandan-based reports (e.g., Abbo et al., 2016; John-Langba, 2006) underscored alcohol consumption for psychosocial challenges among adolescents in schools.

The present paper considers a sample from four geographical regions, namely: Northern, Western, Central, and Eastern Uganda. Notably, Uganda is an amalgam of multi-tribal and multi-cultural societies. The present study premises on an understanding that each of the regions is a unique locality, with atypical socio-cultural settings. With that in mind, students in their respective regions show diversity in alcohol consumption in relation to demographic attributes. Diversity in students' backgrounds and school dynamics is the primary basis for our anticipation of the association between select socio-demographic correlates and alcohol consumption.

The secondary school system in Uganda consists of three distinct categories. In the first category are schools founded by religious entities and aided by either the founding bodies or the Government on behalf of those entities. In the second category are schools founded and run by individual private investors. The third category, the schools regarded in the study as "public secondary schools," were purposely considered and drawn from Uganda's capital city, Kampala, and ten other major towns. The schools considered by the present study were owned and managed by the government. This category of schools was considered based on a number of their unique characteristics. For instance, the schools were historically established to provide affordable education to urban poor children. As such, they were located in the periphery of major towns across Uganda. Further, students in these schools were mainly non-residents. That implies that students in those schools constantly and freely interact with the rest of the society, where alcoholic beverages are mainly found. Most of the students involved in this study were adolescents, with an age range of 13 to 20. All students above the age of 20 were hence regarded as emerging adults. Although the mention of emerging adults for a study in schools sounds odd, clarification needs to be made that the status of most public schools in Uganda considers a universalised education system. The school system allows students beyond school age, mainly from poor families, to access free education. Therefore, finding students well above the age of 20 in Ugandan schools is not surprising.

2.2. Design

This was a cross – sectional study. A cross – sectional design enabled collection of large dataset at a single moment in time. Further, with this design, we were able to consider many attributes of students at ago. Quantitative techniques were used for data collection and analysis. Quantitative techniques were used to generate objective and more generalizable results. The technique of using quantitative tools and randomized processes removed bias from the dataset of the study and ensured reliable observations. Further, a quantitative approach enabled statistical generalization of our findings to the entire population of students in public schools.

2.3. Measures

Participants completed a self-administered questionnaire. The instrument was administered in classrooms or other convenient places within the schools. The instrument contained items to capture students' demographics, including region

of origin and age as control variables, gender, religious affiliation and religiousness, love for places of entertainment, frequency of use of social media, number of friends, and class/form of study. Gender was classified into the usual categories of males and females. Students were required to select '1' for Male and '2' for Female. Religious affiliation is grouped around the common categories of Roman Catholics ('1'), Anglicans ('2'), Muslims ('3'), Pentecostals ('4'), Seventh Day Adventists ('5'), and Other ('6'). The class of study was labelled 'Senior 2', 'Senior 3', 'Senior 4', 'Senior 5', and 'Senior 6'. Affiliation to a particular religious denomination is often contested as not being a measure of one's faith or "religiousness", probably because children are often inaugurated into religions at an early age without partaking in the decisions. To that end, this study sought to measure students' "religiousness" as a separate variable. Religiousness was tested in three categories: 1 'Very', 2 'Somewhat', and 3 'Not' religious. Love for being in places of entertainment was categorised as 1 'Yes' and 2 'No'. Use of social media was assessed in three categories: 1 'Often', 2 'Occasionally', and 3 'Not'. The number of friends was considered as 1 'Two or more', 2 'Only one', and 3 'None'. Variables like gender, religiousness, class of study, involvement in places of entertainment, and use of social media were considered to be at the micro-level of the ecological model. Other variables, like the number of friends, were considered as being at other levels of the ecological model.

Alcohol consumption was measured using items carefully constructed following guidelines by the United Nations Office on Drugs and Crime [UNODC] (2003) on conducting school surveys on drug abuse. Specifically, students were asked whether they had consumed each of the alcohol-related substances (beers, spirits, and wines) in the previous 12 months. For instance, students were asked: for the previous 12 months, how frequently have you taken beers (e.g., Bell, Tusker, Nile, Guinness, etc.)? The initial items regarding alcohol consumption were based on a Likert scale carrying five responses, namely: 1 = never, 2 = rarely, 3 = sometimes, 4 = often, and 5 = very often. Responses to each of the items were transformed into a binary scale: response category 1 was dummied to denote "No" or "never used," and the other categories of 2, 3, 4, and 5 were dummied to denote "Yes" or "ever used." That was done to generate a response pattern suitable for the computation of prevalence rates and to compare alcohol consumers and non-consumers. The items were written in simple language to improve interpretability among students from different classes and schools. Names of local brews of alcohol in different regions of Uganda were included in the questionnaire as synonyms for respective items, based on data provided by the National Care Centre. For instance, local names for spirits were given as *enguli/waragi/kasese*. Names of locally made alcohol were included to improve the validity of the responses generated. During the analyses, alcohol consumption items were dummied to consider students who consumed one or more types of alcohol – 'polyalcohol consumption'.

2.4. Sample Selection

Part of the sample and sampling technique described in this paper is reported elsewhere (e.g., Rukundo, Ayebare, Kibanja, & Steffens, 2020). Nevertheless, the sampling strategy was thought out and coined after consideration of the distribution of public schools across the geographical space. To that end, the sample was obtained by first clustering schools within their respective regions. Thirteen schools were purposively and then proportionately sampled, three from each of the northern, western, and central regions. Four schools were sampled from the eastern region. Purposive

sampling considered only co-educational, urban schools. Proportionate sampling was used to strike a balance between Kampala city, which had many schools (about six), and other towns that had one school each. The sampled schools emerged from Kampala city and the following towns: Entebbe in the central region; Jinja, Mbale, Soroti, and Tororo in the eastern region; Gulu, Moyo, and Arua in the northern region; Fort Portal, Kabale, and Mbarara in the western region. The number of students in all schools was obtained using proportionate sampling. The overall sample was obtained using Leslie's (2002) method of sample size determination. Samples from their respective classes (senior two to senior six) were obtained using simple random sampling – each student present in the classroom was given a number, and then the numbers were selected at random. A total of 1,982 participants were sampled to participate in answering the questionnaire. However, 1,819 returned the completed questionnaires, making a response rate of 91.8%. Data collection took place mainly in classrooms. However, in some circumstances, other places, e.g., school compounds and laboratories, were used to avoid the distraction of school activities.

2.5. Inclusion and Exclusion Criteria

All students in senior two and above present at the time of data collection were eligible for the study. Students absent from school at the point of data collection were excluded from the study. The study items asked about the experience of alcohol consumption within the previous 12 months of secondary school life. Therefore, senior one students were excluded from the study.

2.6. Data Analysis

Data were first entered into IBM Statistical Package for the Social Sciences (SPSS), version 20.0, and then exported to STATA version 15.0 for analysis. Missing values were excluded using list-wise deletion. Descriptive data were summarized and categorized in terms of frequencies and weighted percentages to correct for sampling errors. The weighting of data was based on students' region of origin and age as a clustering variable. The prevalence of consumption of the different types of alcohol was explored using descriptive statistics. Percentages were used to report the prevalence of consumption of Beers, Wines, and Spirits. The statistical significance of the proportions of alcohol consumers was examined using chi-square p-values (Bohnert et al., 2010; Conway et al., 2013). Descriptive statistics of the study sample are presented in Table 1. Analyses were set at a 5% confidence interval. Associations of the students' socio-demographics with the consumption of Beers, Wines, and Spirits were explored using bivariable and multivariable logistic regressions. All covariates were entered into the multivariate model, as they were all plausible correlates of alcohol consumption. The models were adjusted for students' age and region of origin. Part of the technique and data reported in this paper have been previously considered elsewhere.

3. Results

This paper anchors on the socio-ecological model to expound on the prevalence and demographic correlates of consumption of alcohol among adolescents in public secondary schools. Bivariable and multivariable logistic regression

models testing associations between socio-demographic variables and consumption of beers, wines, and spirits among students are reported in Tables 2, 3, and 4, respectively.

Table 1. Descriptive results of select socio-demographics

Region (N= 1784)	**n**	**%**	**Class (N = 1730)**	**n**	**%**
Central	446	25.0	Senior Two	351	20.3
Eastern	546	30.6	Senior Three	374	21.6
Northern	417	23.4	Senior Four	325	18.8
Western	375	21.0	Senior Five	357	20.6
Religious Affiliation (N = 1774)			Senior Six	323	18.7
Catholic	618	34.8	**Gender (N = 1778)**		
Anglican	681	38.2	Male	1054	59.3
Muslim	181	10.1	Female	724	40.7
Pentecostal	247	13.8			
Seventh Day Adventist	18	1.0			
Other	29	1.6			
Age (N = 1633): Range = 13; Mean Age = 17.3; Standard Deviation = 1.9; Variance = 3.9					

N = Total Number of Subjects; n = Number of Valid Cases.

Among the participants included in the analyses, the majority were males (59.28%), had 2 or more friends (93.13%), liked visiting places of entertainment (71.25%), and were very religious (54.95%, Table 1). The overall prevalence of the consumption of beer was 27.93%.

Table 2. Descriptive results and chi-square test of independence showing associations between select demographic correlates and consumption of beers, wines, and spirits

Predictor Variables		Consumption of Beers					Consumption of Wines					Consumption of Spirits				
		Yes(%)		No (%)		P	Yes (%)		No (%)		p	Yes(%)		No(%)		p
General percentage of consumers/non-consumers		**494**	**27.9**	**1275**	**72.1**		**663**	**37.6**	**1102**	**62.4**		**318**	**18.1**	**1441**	**81.9**	
Region	Western	110	(30.2)	254	(69.8)	0.002**	140	38.6	223	61.4	0.000***	76	21.1	284	78.9	0.000***
	Northern	136	(32.8)	279	(67.2)		171	41.3	243	58.7		89	21.5	325	78.5	
	Eastern	121	(22.2)	424	(77.8)		162	29.8	382	70.2		75	13.8	467	86.2	
	Central	127	(28.5)	318	(71.5)		190	42.8	254	57.8		78	17.6	365	82.4	
Age (years)	21<	10	(30.3)	23	(69.7)	0.158	9	28.1	23	71.9	0.276	7	22.6	24	77.4	0.034*
	16-20	369	(28.08)	945	(71.9)		495	37.8	816	62.2		239	18.2	1073	81.8	
	15 >	61	(22.5)	210	(77.5)		92	33.8	180	66.2		32	11.9	236	88.1	
Class of study	S2	87	(25.2)	258	(74.8)	0.237	125	35.9	223	64.1	0.591	53	15.5	290	84.5	0.085
	S3	103	(27.8)	267	(72.2)		135	36.6	234	63.8		55	14.9	313	85.1	
	S4	81	(25.2)	241	(74.8)		120	37.2	203	62.8		56	17.3	267	82.7	
	S5	113	(31.8)	242	(68.2)		145	41.3	206	58.7		72	20.6	278	79.4	
	S6	95	(29.4)	228	(70.6)		125	38.9	196	61.1		69	21.5	252	78.5	
Sex	Male	340	(32.5)	706	(67.5)	0.000***	404	38.7	640	61.3	0.266	221	21.2	819	78.8	0.000***
	Female	152	(21.2)	565	(78.8)		258	36.1	457	63.9		96	13.5	617	86.5	
Religious Affiliation	Catholic	215	(35.3)	394	(64.7)	0.000***	271	44.6	337	55.4	0.000***	140	23.1	467	76.9	0.000***
	Anglican	194	(28.7)	483	(71.3)		281	41.6	394	58.4		120	17.9	551	82.1	
	Muslim	34	(18.9)	146	(81.1)		34	18.9	146	**81.1**		23	12.8	157	87.2	
	Pentecostal	33	(13.4)	213	(86.6)		53	21.5	193	**78.5**		22	9.0	223	91.0	
	SDA	5	(27.8)	13	(72.2)		8	44.4	10	55.6		4	22.2	14	77.8	
	Others	9	(31.0)	20	(69.0)		11	39.3	17	60.7		6	21.4	22	78.6	

***Chi-square statistic significant at p < .001; **chi-square statistic significant at p < .01; *chi-square statistic significant at p < .05.*

According to the information in Table 2, the overall prevalence of beer consumption was 27.93%. The independent socio-demographic determinants of beer consumption were gender, religious affiliation, religiousness, and liking places of entertainment. The likelihood of beer consumption was 0.7 times lower among females compared to males (AOR = 0.7, 95%CI: 0.51-0.88, $p < .01$). Compared to adolescents of Roman Catholic affiliation, there was a lower likelihood of consumption among students from the Anglican and other denominations (AOR = 0.8, 95%CI: 0.57-0.99, $p < .05$); Muslims (AOR = 0.4, 95%CI: 0.27-0.69, $p = 0.001$); Pentecostals (AOR = 0.4, 95%CI: 0.22-0.56,$p < .001$). Moreover, a

lower extent of religiousness (somewhat [AOR = 1.6, 95%CI: 1.27-2.12, p < 0.001] and not religious [AOR = 2.5, 95%CI: 1.25-4.99, p < .01]) was associated with a higher likelihood of beer consumption. Additionally, students who identified as loving places of entertainment were two-fold more involved in beer consumption (AOR = 2.0, 95%CI: 1.52-2.83, $p < .001$).

Regarding the consumption of wines, it was established that the overall prevalence of wine consumption was 37.56%. The independent socio-demographic determinants of wine consumption were religious affiliation, loving places of entertainment, and use of social media. Students of Roman Catholic religious affiliation had a higher likelihood of wine consumption compared to Muslims (AOR = 0.2, 95%CI: 0.14-0.37, $p = 0.001$) and Pentecostals (AOR = 0.3, 95%CI: 0.23-0.52, $p < 0.001$). In addition, a lower extent of religiosity was associated with a higher likelihood of wine consumption (somewhat [AOR = 1.4, 95%CI: 1.10-1.77, p < .01]; not religious [AOR = 2.8, 95%CI: 1.46-5.58, $p < .01$]). Additionally, students who loved being in places of entertainment were two-fold more involved in wine consumption (AOR = 1.9, 95%CI: 1.52-2.83, $p = 0.001$). However, students who often used social media were 1.6 times more likely to be involved in wine consumption compared to those who did not (AOR = 1.6, 95%CI: 1.16-2.15, p < .01).

Table 3. Results of bivariate and multivariate logistic regression models

Predictor Variables		Consumers of Beers			Consumers of Wines			Consumers of Spirits		
		Yes	UOR(95%CI)	AOR(95%CI)	Yes	UOR(95%CI)	AOR(95%CI)	Yes	UOR(95%CI)	AOR(95%CI)
Age (years)	21and above[R]	61(22.5)	1.0	1.0	92(33.8)	1.0	1.0	32(11.9)	1.0	1.0
	16-20	358(27.9)	0.9(0.42-1.91)	1.1(0.49-2.31)	487(38.1)	1.6(0.71-3.38)	1.6(0.74-3.61)	233(18.2)	0.8(0.33-1.79)	1.0(0.41-2.38)
	15and below	21(31.8)	0.7(0.30-1.48)	1.0(0.40-2.27)	17(26.2)	1.3(0.58-2.94)	1.4(0.61-3.20)	13(20.3)	0.5(0.19-1.17)	0.8(0.29-2.17)
Class of study	S2[R]	87(25.2)	1.0	1.0	125(35.9)	**1.0**	**1.0**	53(15.5)	1.0	1.0
	S3	103(27.8)	1.1(0.82-1.60)	1.1(0.76-1.62)	135(36.6)	1.0(0.76-1.40)	_____	55(14.9)	1.0(0.64-1.45)	1.0(0.61-1.55)
	S4	81(25.2)	1.0(0.70-1.41)	1.0(0.63-1.48)	120(37.2)	1.1(0.77-1.44)	_____	56(17.3)	1.1(0.76-1.73)	1.2(0.71-1.93)
	S5	113(31.8)	1.4(**1.00-1.93**)*	1.3(0.89-2.02)	145(41.3)	1.3(0.93-1.70**)**	_____	72(20.6)	1.4(0.96-2.10)	1.4(0.88-2.33)
	S6	95(29.4)	1.2(0.88-1.74)	1.2(0.78-1.81)	125(38.9)	1.1(0.83-1.56)	_____	69(21.5)	**1.5(1.01 - 2.23)***	1.4(0.88-.2.38)
Sex	Male	340(32.5)	1.0	1.0	404(38.7)	1.0	1.0	221(21.2)	**1.0**	**1.0**
	Female[R]	152(21.2)	**0.6(0.45-0.70)*****	**0.6(0.49-0.80)*****	258(36.1)	0.9(0.73-1.09)	1.0(0.78-1.20)	96(13.5)	**0.6(0.44-0.75)****	**0.7(0.51-0.90)****
Religious Affiliation	Catholic	215(35.3)	1.0	1.0	271(44.6)	1.0	1.0	140(23.1)	1.0	1.0
	Anglican	194(28.7)	0.7**(0.58-0.93)***	0.8(0.61-1.01)	281(41.6)	0.9(0.71-1.11)	0.9(0.73-1.16)	120(17.9)	**0.7(0.55-0.95)***	0.8(0.56-1.02)
	Muslim	34(18.9)	**0.4(0.28-0.64)*****	0.4(**0.28-0.68)*****	34(18.9)	**0.3(0.19-0.43)*****	**0.3(0.17-0.42)*****	23(12.8)	**0.5(0.30-0.89)****	**0.5(0.31-0.87)***
	Pentecostal	33(13.4)	**0.3(0.19-042)*****	0.3(**0.20-0.49)*****	53(21.5)	**0.3(0.24-0.48)*****	0.3(**0.22-0.47)*****	22(9.0)	**0.3(0.20-0.58)*****	**0.4(0.21-.59)*****
	SDA	5(27.8)	0.7(0.25-2.00)	0.7(0.24-1.97)	8(44.4)	1.0(0.39-2.56)	0.9(0.38-2.51)	4(22.2)	1.0(0.31-2.94)	1.0(0.31-3.04)
	Others	9(31.0)	0.8(0.37-1.84	0.8(0.32-2.00	11(39.3)	0.8(0.37-1.75)	0.7(0.29-1.73)	6(21.4)	0.9(0.36-2.29)	1.0(0.35-2.71)

*Reference category; ***Significance at p < 0.001; **Significance at p < .01; * significance at p < 0.05; UOD: Unadjusted Odds Ratio; AOR: Adjusted Odds Ratio. Note: Models were adjusted for students' region of origin.*

The prevalence of consumption of spirits was 18.08%. The socio-demographic correlates of consumption of spirits were gender, religious affiliation, religiosity, love of being in places of entertainment, and use of social media. The likelihood of consumption of spirits was 0.7 times lower among females compared to males (AOR = 0.7, 95% CI: 0.52-0.99, p < .05). Compared to students from the Roman Catholic affiliation, there was a lower likelihood of consumption of spirits among students affiliated with other denominations (Anglican, AOR = 0.7, 95% CI: 0.50-0.97, $p < .05$; Muslims, AOR = 0.5, 95% CI: 0.28-0.87, $p < .05$; Pentecostal, AOR = 0.4, 95% CI: 0.22-0.69,$p = 0.001$). Moreover, a lower extent of religiousness was associated with a higher likelihood of consumption of spirits (Somewhat Religious, AOR = 1.8, 95% CI: 1.34-2.49, $p < 0.001$; Not Religious, AOR = 4.0, 95% CI: 1.97-8.49, $p < 0.001$). Additionally, students who liked being in places of entertainment were more than two-fold more involved in the consumption of spirits (AOR = 2.2, 95% CI: 1.50-3.30, p <

0.001). Regarding the use of social media, students who often used media were 1.6 times more likely to be involved in the consumption of spirits compared to those who did not (AOR = 1.6, 95% CI: 1.09-2.40, $p < .05$).

After excluding the non-consumers, it was found that students who consumed more than two types of alcohol were 85.38%. The socio-demographic correlates of polyalcohol type consumption were religious affiliation, religiousness, and use of social media. Compared to students from the Roman Catholic affiliation, there was a higher likelihood of polyalcohol type consumption among other religions (Anglican, AOR = 1.5, 95% CI: 1.08-2.19, p < .05; Muslims, AOR = 2.9, 95% CI: 1.51-5.57, p = 0.001; Others, AOR = 5.9, 95% CI: 2.92-11.88, p < 0.001). Moreover, a lower religiousness was associated with a lower likelihood of polyalcohol type consumption (Somewhat, AOR = 0.7, 95% CI: 0.47-0.91, p < .05; Not religious, AOR = 0.5, 95% CI: 0.16-1.30). Additionally, students who often used social media were less likely to be involved in polyalcohol type consumption (AOR = 0.6, 95% CI: 0.38-0.94, p < .05).

4. Discussion

The aim of this paper is to use the socio-ecological model to expound on the prevalence and socio-demographic correlates of alcohol consumption among school adolescents. Percentages and logistic regressions were used in achieving the study objective. In the results, consumption of wines and beers was higher compared to the use of spirits. The findings may not be surprising, as the students considered in this study were largely in urban and day schools. Moreover, alcohol is readily available to Ugandan youth, both in local brews and industrially (Kafuko & Bukuluki, 2008; Kalema et al., 2015). Following the abundance of different types of alcohol, the WHO GSHS survey among students in Uganda approximates that 12.8% of the students had at least one alcoholic drink on one or more days during the past 30 days (YEAH, 2007). Thus, the rate was expected to be a little higher in a study conducted a decade later.

Probably, the result that consumption of alcoholic beverages was high could imply that students get access to high-density alcohol outlets in their localities, which sell both regulated and unregulated beverages. Production of locally made alcohol in Uganda is practically not regulated, as many youths turn to alcohol consumption. It has previously been reported that many homesteads ferment and distil local brands from the abundant fruits (YEAH, 2007).

The variations in religious affiliation and students' alcohol consumption come after a fair body of literature relating religion and alcohol consumption among the youth. For instance, previous studies show that religious inclination and particular faiths tend to influence youths' decisions to consume or not consume alcohol (Al-Ansari, Day, Thow, & Conigrave, 2016; Sinha et al., 2007). Accordingly, studies show that attendance at church during childhood was protective against early onset of alcohol consumption. Church attendance further protects the youths against later development of alcohol-related problems (Mason & Windle, 2015; Porche, Fortuna, Wachholtz, & Stone, 2015). Consequently, youths who self-identified as having strong commitment to particular faiths were evidently less likely to consume alcohol (Marsiglia, Ayers, & Hoffman, 2012).

Alternatively, students could be accessing alcohol through cultural rituals and ceremonies. Consumption of church wine, for example, is well ritualized among Christian faithful, and often, alcohol is integrated into religious ceremonies (Luczak et

al., 2014). Notably, the findings could be located in the socio-ecological theory of alcohol use. According to the theory, individual students' behaviours interact with the institutions where the adolescents belong (Connell et al., Hickey et al., 2012; Tholen et al., 2020). Churches and their ritualized ceremonies may not be the exception.

All the same, the present study's findings on the prevalence of alcohol consumption are supported by similar studies elsewhere. Accordingly, alcohol is the most consumed substance among adolescents in developing countries (Newton, Harvard, & Teesson, 2011; Sanhueza, Delva, Bares, & Grogan-Kaylor, 2013), and in highly developed countries (Anderson, Ramo, Cummins, & Brown, 2009; Fuhr et al., 2013). In the neighbourhood of Uganda – Kenya, Othieno & Ofulla (2009) support the present study's results – reporting that alcohol consumption among students was most prevalent. Similar studies predict that alcohol consumption among adolescents is higher than the consumption of other drugs (Beck et al., 2012; Fuhr et al., 2013).

The results regarding socio-demographic correlates of alcohol consumption were significant at both the individual and institutional ecological levels. Adjusted logistic regression models show significant gender differences in the consumption of beers and spirits, but not in the consumption of wines. In addition, males had higher odds of consuming beers and spirits. Gender differences in alcohol consumption have been reported previously. Rodham et al. (2005) found that more males than females reported drinking. Hahn et al. (2014) also found significant gender differences in current hazardous and non-hazardous drinking. Male students were more likely than females to report drinking, although only by a relatively small margin (O'Malley et al., 1998). Kabwama et al. (2016) found that in comparison with their female counterparts, males were more likely to be medium and high alcohol consumers. The findings regarding gender could be explained based on socioecological theory. At the nucleus of the socioecological model, students' micro-characteristics, including gender, define differences between males and females and between individuals of a particular gender as well. Moreover, the model seems to account for the way the microsystem nurtures different genders, hence the difference in the consumption of alcoholic beverages. However, the present study's findings contradict those of Wu et al. (2014) in their study to establish correlates of protective motivation theory to adolescents' drug use intention.

Nevertheless, the present study's results affirm previous studies in revealing that being male was a risk factor for alcohol consumption (Lorant et al., 2013; Osman et al., 2016; Swahn et al., 2013). The female gender, on the other hand, was protective against alcohol consumption (Hahn et al., 2014; Lorant et al., 2013; Manyike et al., 2016; Osman et al., 2016; Swahn et al., 2013). Relatedly, Manyike et al. (2016) found that male students were about six times more likely to use psychoactive substances than females. In fact, Manyike and colleagues pointed out that the male gender and living in hostels were associated with alcohol consumption. The present study, however, significantly differs from the preceding report, as we did not consider living in a hostel as a risk or protective factor. The differentials in gender could be attributable to the first level of the ecological model. For instance, differential parenting, interpersonal, and institutional norms might nurture drinking more in males than in females.

Further differentials in significant findings were found in the exploration of religious affiliation and religiousness with regard to alcohol consumption. In terms of the social ecological model of alcohol consumption, religion, as an institution and part of the mesosystem, predicts or protects students against alcohol consumption. It explains the interaction between the

innermost of a student and the factors in the surroundings related to alcohol consumption. On the other hand, religiousness is reflected in the “inner self” of the students and represents core values that protect against or promote alcohol consumption. Institutional ecological factors compare with Vantamay (2009). The study found that students in Muslim and Pentecostal dominions were less likely to consume beers, wines, and spirits than their Catholic and Anglican counterparts. Roman Catholics, in particular, had higher odds of alcohol consumption than any other religion. The result that Roman Catholics were more likely to consume alcohol than other religions conforms to common practices and previous literature.

Practically, some religions, such as Pentecostals, unequivocally loathe the consumption of alcohol among their faithful. To the end of the Islamic faith, the consumption of alcohol is strictly taboo. Islam is generally considered to have strong proscriptive norms against the consumption of all types of alcohol (Sinha et al., 2014). The Roman Catholic Church, on the other hand, neither condemns nor discourages alcohol consumption among the faithful (Sinha et al., 2014). That could be the reason why, compared to other religions, more students who identified with the dominion were more likely to consume alcohol than students could. Indeed, evidence shows that youth who prescribe to the Roman Catholic dominion are at a greater risk of falling victim to alcohol abuse and associated problems (Engs, 2004).

On the other hand, belonging to the Muslim dominion is protective against alcohol consumption (Al-Ansari et al., 2016; Hahn et al., 2014; Kalema, Vanderplasschen, Vindevogel, & Derluyn, 2016). Furthermore, Stafström and Agardh (2012), in their study to assess socio-economic determinants of alcohol consumption among Ugandan university students, found that being a Muslim was negatively associated with alcohol consumption. However, Stafström and Agardh (2012) made a rare observation that male Muslims were at a significant risk of engaging in monthly heavy episodic drinking, an observation the present study was unable to adduce.

Loving to be in places of entertainment and using social media significantly predicted alcohol consumption. In terms of the socio-ecological model, the two correlates explained alcohol consumption at the level of interaction between the students and the exosystemic environment. Indeed, activity in places of entertainment could be accompanied by alcohol consumption and other social behaviours. Therefore, it is likely that those adolescents who love such places could be drinkers as well. Moreover, students who go to places of entertainment have high chances of meeting their peers who influence them towards drinking. In addition, it could be possible that students who use social media interface with alcohol-related messages that stimulate students’ drinking, as several studies (e.g., Moreno & Whitehill, 2014; Winpenny, Marteau, & Nolte, 2014) have suggested. Generally, the socio-ecological model explicates the significant study results in terms of the variables in the immediate and extant student environment.

4.1. Limitations

Like many other surveys, the present study does not go without setbacks. In the first instance, the study relies on self-reported experiences from students. We recommend that future studies use more detailed measures of alcohol consumption among students in public schools, such as quantities of consumed types of alcohol and frequency of alcohol misuse. As Hahn et al. (2014) asserted, self-reported results could have suffered from under-reporting. The possibility of

under-reporting becomes prominent in the investigation of a controversial subject like alcohol consumption. Second, a cross-sectional study of this type falls short of causal comparison of correlates of alcohol consumption. Causal inferences would have been best to inform policy in adolescent health and social well-being.

For the present study, some of the dynamics of the socio-ecological model, such as familial influence were not given attention, due to the nature of the dataset. Hitherto the influence of the family dynamics, such as family type, family structure, psychosocial family environment and family socio-economic status could be predictive of alcohol consumption among young people.

Further in using the socio-ecological model for this study, the influence of peers and groups were partly studied. The frequency of meetings with friends for example and consumption of peers could have been significantly associated. We recommend that future studies explore such factors in sufficient detail.

4.2. Conclusions

The social ecological theory could account for the correlates of alcohol consumption among students. Individual student-level factors and institutional factors expound on alcohol consumption among the students. Specifically, gender, religion, religiousness, loving to be in places of entertainment, and use of social media significantly predicted alcohol consumption among students. Gender-specific and religious-related interventions could mitigate alcohol consumption among students.

4.3. Implications

Significant study findings on the consumption of different types of alcohol bear educational and adolescent mental health implications. The results may demand benchmarking ecologically specific advocacy against alcohol consumption in schools. In comparison with the socio-ecological model, the study results imply that the alcohol industry could include not only the producers of alcohol but also a large network of distributors, wholesalers, bars, and advertisers (Babor & Robaina, 2013). Therefore, interventions for in-school youth drinking may need to be developed by benchmarking with and involving institutions at different levels of the ecological model, such as religious institutions, healthcare services, media, and village councils. Moreover, “gendered models” could be explored to have some gender-specific messages that bring out the negative consequences of youth drinking. Further, the gender-specific messages could focus on the differential effects of drinking among girls and boys.

Statements and Declarations

Ethical Approval and Consent to Participate

Permission to conduct the present study was duly obtained from the then Mbarara University of Science and Technology Institutional Review Committee (now Research Ethics Committee, REC), approval number 05/05-13. The Uganda

National Council ratified institutional approval for Science and Technology, under number SS 3423, and the office of the President of the Republic of Uganda (number ADM 154/212/01). At data collection, students' consent was obtained using the approved Institutional Review Committee consent form version number 13. For students under the age of 18, their respective school Head Teachers provided consent on behalf of their parents.

Competing Interests

We declare no competing interests regarding the authorship of this research and the content reported herein.

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Authors' Contributions

AR conceived the study idea, collected and analysed the data, and wrote the manuscript for publication. GK guided the writing of the concept, data collection and analysis. She participated in the writing of the manuscript. AM participated in writing the discussion of results and reviewed the final manuscript.

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