

LONDON
SCHOOL of
HYGIENE
& TROPICAL
MEDICINE



LSHTM Research Online

Francis, JM; Grosskurth, H; Chagalucha, J; Kapiga, SH; Weiss, HA; (2014) Systematic review and meta-analysis: prevalence of alcohol use among young people in eastern Africa. *Tropical medicine & international health*, 19 (4). pp. 476-88. ISSN 1360-2276 DOI: <https://doi.org/10.1111/tmi.12267>

Downloaded from: <http://researchonline.lshtm.ac.uk/1520164/>

DOI: <https://doi.org/10.1111/tmi.12267>

Usage Guidelines:

Please refer to usage guidelines at <https://researchonline.lshtm.ac.uk/policies.html> or alternatively contact researchonline@lshtm.ac.uk.

Available under license: <http://creativecommons.org/licenses/by/2.5/>

<https://researchonline.lshtm.ac.uk>

Systematic review and meta-analysis: prevalence of alcohol use among young people in eastern Africa

Joel M. Francis^{1,2}, Heiner Grosskurth^{1,2,3}, John Chagalucha², Saidi H. Kapiga^{1,2,3} and Helen A. Weiss¹

¹ London School of Hygiene and Tropical Medicine, London, UK

² National Institute for Medical Research, Mwanza Centre, Mwanza, Tanzania

³ Mwanza Intervention Trials Unit, Mwanza, Tanzania

Abstract

OBJECTIVE Systematic review and meta-analysis of published studies of alcohol use among young people (age 15–24 years) in eastern Africa to estimate prevalence of alcohol use and determine the extent of use of standardised screening questionnaires in alcohol studies.

METHODS Five databases (MEDLINE, EMBASE, Global Health, Africa-wide, and PsycINFO) were searched for publications until 30th June 2013. Results were summarised using the guidelines on preferred reporting items for systematic reviews and meta-analyses (PRISMA) and on quality assessment using the modified quality assessment tool for systematic reviews of observational studies (QATSO). Heterogeneity was assessed using the I^2 statistic (DerSimonian-Laird).

RESULTS We identified 2785 potentially relevant studies, of which 56 were eligible for inclusion. Only two studies (4%) used the standardised Alcohol Use Disorder Identification Test (AUDIT) questionnaire, and six studies (13%) used the Cut down, Annoyed, Guilt, Eye opener (CAGE) questionnaire. The reported median prevalence of alcohol use was ever-use 52% [interquartile range (IQR): 20–58%], use in the last month 28% (IQR: 17–37%), use in the last year 26% (IQR: 22–32%), and problem drinking as defined by CAGE or AUDIT 15% (IQR: 3–36%). We observed high heterogeneity between studies, with the highest prevalence of ever use of alcohol among university students (82%; 95%CI: 79–85%) and female sex workers (66%; 95%CI: 58–74%). Current use was most prevalent among male sex workers (69%; 95%CI: 63–75%).

CONCLUSIONS Reported alcohol use and problem drinking were common among diverse groups of young people in eastern Africa, indicating the urgent need for alcohol-focused interventions in this population. Few studies have used standardised alcohol screening questionnaires. Epidemiological research to investigate alcohol-focused interventions in young people should aim to apply such questionnaires that should be validated for use in this population.

keywords alcohol use, systematic review, meta-analysis, eastern Africa, problem drinking, screening questionnaires, young people, AUDIT, CAGE

Introduction

Harmful alcohol use is a significant public health problem that often begins early in adult life. Globally, an estimated 2 billion people drink alcohol and 76 million have alcohol use disorders (AUD) (WHO 2004). The mean volume of pure alcohol consumed annually by adults globally has been estimated at about 5.0 l per capita (WHO 2004). In Africa, annual consumption of pure alcohol has been estimated to range from 4.9 to 7.1 l per capita (WHO 2004), although intake may be significantly higher because much alcohol consumption is believed to remain unrecorded (WHO 2004). Alcohol use and AUD are associated with more than 60 medical conditions and

injuries (WHO 2004; Rehm *et al.* 2006), and about 4% of global mortality and 5% of disability-adjusted life year's (DALYs) lost are attributed to alcohol use (Rehm *et al.* 2009). In the African region, it is estimated that about 2.4% of deaths and 2.1% of DALYs lost are attributed to alcohol use and AUD (Rehm *et al.* 2009). Adverse effects of alcohol use include increased risk of infectious diseases such as HIV/AIDS and TB, and chronic non-communicable diseases (NCD) (Makimoto & Higuchi 1999; Horn-Ross *et al.* 2004; WHO 2004; Ahmed *et al.* 2006; Chen *et al.* 2008; Chong *et al.* 2008; Brooks *et al.* 2009; Genkinger *et al.* 2009; Brandish & Sheron 2010; Kahl *et al.* 2010; Patra *et al.* 2010; Stroffolini *et al.* 2010), as well as intentional and unintentional

injuries, and social problems such as domestic violence, unemployment and decreased work productivity (Gmel & Rehm 2003; Fisher *et al.* 2007; Kalichman *et al.* 2007; Rehm *et al.* 2009; Zaleski *et al.* 2010; Abbey 2011; Aldridge-Gerry *et al.* 2011).

Factors associated with alcohol use include religion, personal income, education level, peer influence, having older sexual partners, stress and relatives and friends using alcohol (Smith *et al.* 1993; Othieno & Obondo 2000; Kunt-sche *et al.* 2005; Otieno & Ofulla 2009; Ndetei *et al.* 2009, 2010; Namagembe *et al.* 2010; Amemori *et al.* 2011; Atwoli *et al.* 2011). There are few data, on the patterns of use, harmful consequences of alcohol use among young people, or on the structural and individual factors that lead to the uptake and persistence of harmful alcohol use. A better understanding of the epidemiology of alcohol use among young people is therefore required to facilitate the design of effective alcohol-focused interventions in Africa in general and eastern Africa in particular.

The aim of this article is to systematically review published studies of alcohol use among young people in eastern Africa to estimate the prevalence of alcohol use and the extent of use of standardised alcohol screening questionnaires in preparation for future alcohol-focused intervention studies in this region. The specific objectives of the review were to (i) estimate the prevalence of alcohol use among specific groups of young people (15–24 years) in eastern Africa; (ii) determine the extent of use of standardised alcohol screening questionnaires [Alcohol Use Disorder Identification Test (AUDIT), Cut down, Annoyed, Guilt, Eye opener (CAGE) in identifying alcohol use and AUD in this region; (iii) assess the quality of research papers included in the review; and (iv) describe factors associated with initiation and persistence of alcohol use among young people in eastern Africa.

Methods

Search strategy

Five databases (MEDLINE, EMBASE, Global Health, Africawide-information, and PsycINFO) were searched for publications to 30th June 2013. We used the following key terms: (alcohol use OR alcohol abuse) AND (young people OR adolescent OR teenage OR youth) AND (Africa OR Tanzania OR Kenya OR Uganda OR Ethiopia OR Seychelles OR Rwanda OR Eritrea OR Burundi OR Somalia OR Somaliland OR Comoros OR South-Sudan). (see search details for each database in Appendix S1).

Titles and abstracts of all records identified were screened independently by two authors (JMF and HAW), and consensus on potential eligibility reached. Studies

were eligible if they were conducted in eastern Africa (Tanzania, Kenya, Uganda, Ethiopia, Seychelles, Rwanda, Eritrea, Burundi, Somalia, Somaliland, Comoros and South Sudan); and included prevalence of alcohol use for young people aged 15–24 years.

Guidelines on preferred reporting items for systematic reviews and meta-analyses (PRISMA) were used (Moher *et al.* 2009). There is currently an emphasis to incorporate both qualitative and quantitative evidence in the systematic reviews (Pearson 2004; Thomas *et al.* 2004). However, in this review, we focused on determining the prevalence of alcohol use, which was the main objective and therefore we did not include qualitative research papers.

Data extraction

We used a data extraction form to collect the following information from each eligible article: (i) country; (ii) year the study was conducted; (iii) year of publication; (iv) study population (the general population, secondary school students, primary school students, female sex/bar workers, men who have sex with men, health care service attendees and university students); (v) sample size; (vi) definition of alcohol use (ever use, current use, use in the last year, problem drinking); (vii) prevalence of alcohol use and AUD (problem drinking as classified by CAGE and AUDIT); (viii) factors associated with the initiation and persistence of alcohol use; (ix) alcohol use screening questionnaires applied; and (x) complications associated with alcohol use.

A descriptive quality assessment of the final papers included in the meta-analysis was conducted using the modified quality assessment tool for systematic reviews of observational studies (QATSO) (Wong *et al.* 2008). The original QATSO tool is composed of five quality categories that include external validity (sampling strategy used), reporting (response rate and objectivity of measurement), confounding factors, bias (privacy) and a final score based on the mentioned parameters. The primary outcome for this review is prevalence of alcohol use, and the reported response rate was modified to include three categories (>80%, 60–80%, <60%). The assessment of confounding was not required, as the studies did not provide adjustable information on risk factors for alcohol use. We did also not compute the overall final QATSO score based on the five quality categories.

Statistical analysis

We assessed the heterogeneity of prevalence estimates using the I^2 statistic (DerSimonian-Laird) and reported

the prevalence for studies in four groups: (i) ever use of alcohol; (ii) alcohol use in the last year, (iii) alcohol use in the last month (current use) and (iv) problem drinking as defined by CAGE and AUDIT (Ewing 1984; Dersimonian & Laird 1986).

Due to significant heterogeneity between studies, we estimated the median prevalence for each group. We also performed meta-regression to analyse the association between current alcohol use and gender, study setting, and quality assessment parameters (sampling strategy, response rate, interview modality and data collection tool used).

Results

We identified 4013 published study citations from five databases, of which 1228 were duplicates. Thus, 2785 abstracts were screened for initial eligibility to identify studies conducted in eastern Africa. We identified 696 relevant abstracts of studies conducted in eastern Africa. We conducted further screening for studies reporting on alcohol use and identified 285 abstracts for full article review. Of these 285 abstracts for full article assessment, we could not access six full articles, 11 were review articles and five were conference posters.

Thus, we reviewed 263 full-text papers and identified 56 eligible for inclusion in the review. The main reason for exclusion was that the paper did not report information on alcohol use from the target population, that is, young people aged 15–24 years, or that young people were included but we could not separate the prevalence in this age group from that in older people (Figure 1).

Of the 56 eligible studies (Table 1), five reported both current alcohol use and ever use, and one study reported current use and problem drinking and are included in each of these analyses (Zein 1988; Gedif & Eshetu 2007; Mbatia *et al.* 2009; Luchters *et al.* 2011; Kagimu *et al.* 2012; Reda *et al.* 2012). The majority of studies were cross-sectional ($n = 54$, 96%), and two were case-control studies. Almost all studies ($n = 52$, 93%) were conducted in four countries: Ethiopia ($n = 19$), Kenya ($n = 15$), Tanzania ($n = 10$) and Uganda ($n = 8$); the remaining four studies were conducted in Rwanda ($n = 2$), Seychelles ($n = 1$) and Eritrea ($n = 1$). Most studies ($n = 36$, 58%) reported current alcohol use, 17 studies reported ever use of alcohol, four studies reported alcohol use in the last year, and five studies reported problem drinking. Only two studies used the AUDIT alcohol use screening questionnaire (Mbatia *et al.* 2009; Luchters *et al.* 2011), and six used the CAGE questionnaire [one conducted among female sex workers, three among the general population and two among healthcare attenders (Alem *et al.* 1999; Kebede & Alem 1999; Ghebremichael *et al.* 2009;

Kullgren *et al.* 2009; Namagembe *et al.* 2010; Ao *et al.* 2011)]. Of 48 studies that recruited both sexes, only 13 studies (27%) reported gender-specific prevalence of alcohol use. Four studies reported on the factors for initiation and persistence of alcohol use (Otieno & Ofulla 2009; Ndetei *et al.* 2010; Amemori *et al.* 2011; Atwoli *et al.* 2011).

In general, studies were of high quality (Table 2). Most ($n = 42$, 75%) used probability-based sampling and had a response rate above 80% ($n = 33$; 58.9%). However, 17 studies did not report the response rate (Bwana 1996; Kuria 1996; Odero & Zwi 1997; Othieno & Obondo 2000; Taffa *et al.* 2002; Maru *et al.* 2003; Ayuku & Odero 2002; Hassan *et al.* 2005; Mbona & Kasirye 2005; Chande & Salum 2007; Khasakhala & Mturi 2008; Molla *et al.* 2008; Tengia-Kessy *et al.* 2010; Ndetei *et al.* 2010; Ao *et al.* 2011; Atwoli *et al.* 2011; Regassa & Kedir 2011). Two-thirds of the studies employed a face-to-face interviewing approach, and a third of studies used self-administered questionnaires; however, all but two studies used self-reported alcohol use. The remaining studies used the alcohol breathalyser (Odero & Zwi 1997; Ayuku & Odero 2002).

Ever use of alcohol

Figure 2 shows the prevalence of reported ever use of alcohol by population groups, including female sex workers, street children, primary school students, secondary school students, general population and university students. Prevalence of reported ever use was highest in the studies among university students [median = 70% interquartile range (IQR): 52–82%] and female sex workers (66%; 95%CI 58–74%). The median prevalence in the four studies among secondary school students was 37% (IQR: 23–56%), although the range was wide, with one study from rural Kenya (Ndetei *et al.* 2010) reporting a prevalence of only 5%. Prevalence was lower among the primary school students (28%; 95%CI: 26–30%), general populations (median = 32%, IQR 17–56%), and among street children 14% (95%CI: 4–24%). Three studies reported gender-specific prevalence of ever-used alcohol; the prevalence was high among females in primary school (36% *vs* 23%) and street children (21% *vs* 11%) and high in male university students (53% *vs* 50%). There was significant heterogeneity based on I^2 statistics in all subgroups, and therefore, we do not report pooled prevalence.

Use of alcohol in the past 12 months

Four studies reported the prevalence of alcohol use in the last 12 months. These showed similar levels as found for

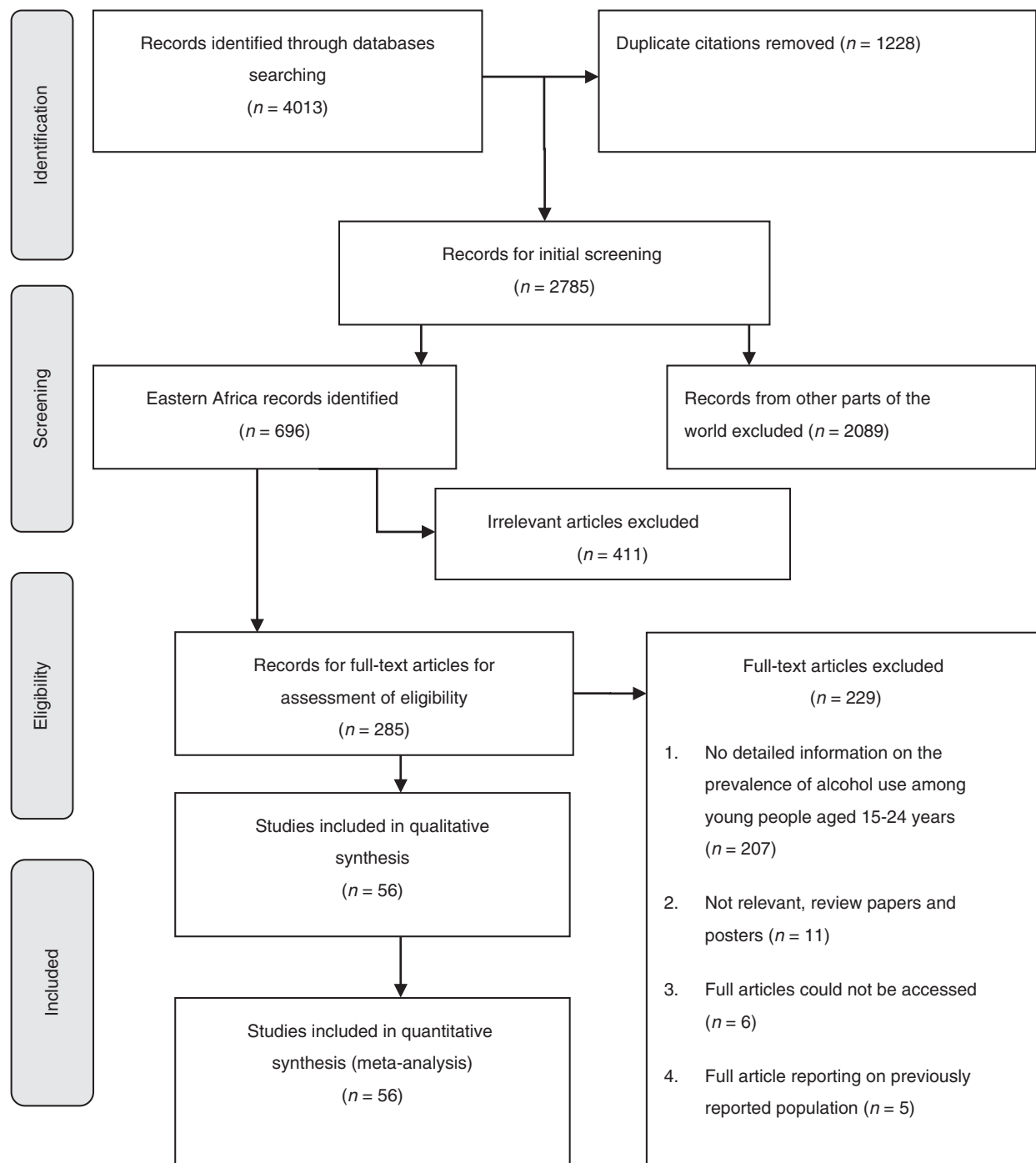


Figure 1 Flow Diagram for literature review.

reported current alcohol use. Three studies were from the general population (median prevalence = 29%, IQR: 21–34%) with a pooled prevalence of 30% (95%CI: 27–33%)

and one from university students (prevalence = 22%, 95% CI: 19–25%). One study reported gender-specific prevalence; it was high among males (34% *vs* 17%).

Table 1 Description of studies included in the systematic review and meta-analysis

First author	Year the study conducted	Country	Study population	Sample size	Prevalence	95% CI of prevalence	Alcohol screening tool	Gender	Location
Ever-used alcohol									
Taffa <i>et al.</i> (2002)	2000	Ethiopia	General population	561	15.7	12.7–18.7	None	Both	Urban
Mbatia <i>et al.</i> (2009)	2003	Tanzania	General population	275	16.7	12.3–21.1	AUDIT	Both	Urban
Zablotska <i>et al.</i> (2009)	1994–2002	Uganda	General population	3422	19.8	18.5–21.1	None	Female	Rural
Malaju and Asale (2013)	2012	Ethiopia	General population	405	31.6	27.1–36.1	None	Both	Both
Bwana (1996)	Not reported	Kenya	General population	306	54.9	49.3–60.5	None	Both	Rural
Kagimu <i>et al.</i> (2012)	2010	Uganda	General population	530	56.2	52.0–60.5	None	Both	Rural
Fekadu and Alemayehu (2009)	2008	Ethiopia	General population	634	64.0	60.3–67.8	None	Both	Rural
Ndetei <i>et al.</i> (2010)	Not reported	Kenya	Secondary school students	343	5.2	2.9–7.6	None	Both	Rural
Reda <i>et al.</i> (2012)	2010	Ethiopia	Secondary school students	1721	22.2	20.2–24.2	None	Both	Both
Kuria (1996)	Not reported	Kenya	Secondary school students	952	53.0	49.9–56.2	None	Both	Both
Otieno & Ofulla (2009)	Not reported	Kenya	Secondary school students	458	57.9	53.3–62.4	None	Both	Urban
Othieno and Obondo (2000)	1997	Kenya	Street children	50	14.0	4.4–23.6	None	Both	Urban
Atwoli <i>et al.</i> (2011)	2009	Kenya	University students	500	52.0	47.6–56.4	None	Both	Urban
Zein (1988)	1983	Ethiopia	University students	485	70.1	66.0–74.2	None	Both	Urban
Gedif and Eshetu (2007)	2006	Ethiopia	University students	674	81.6	78.7–84.5	None	Both	Urban
Twa-Twa <i>et al.</i> (2008)	2003	Uganda	Primary school students	1709	27.8	25.7–29.9	None	Both	Urban
Tegang <i>et al.</i> (2010)	2007	Kenya	Female sex workers	137	65.7	57.7–73.6	None	Female	Urban
Alcohol use in the last one year									
Rijken <i>et al.</i> (1998)	1993	Tanzania	General population	34	20.6	7.0–34.2	None	Both	Rural
Usman <i>et al.</i> (2006)	2004	Eritrea	General population	490	29.4	25.4–33.4	None	Both	Both
Mbona and Kasirye (2005)	2003	Uganda	General population	247	33.6	27.7–39.5	None	Both	Rural
Deressa and Azazh (2011)	2009	Ethiopia	University students	608	22.0	18.7–25.3	None	Both	Urban
Current alcohol use									
Maru <i>et al.</i> (2003)	Not reported	Kenya	General population	90	6.7	1.5–11.8	None	Both	Urban
Mbatia <i>et al.</i> (2009)	2003	Tanzania	General population	275	9.8	6.3–13.3	AUDIT	Both	Urban
Hargeaves <i>et al.</i> (2002)	1996	Kenya	General population	889	11	9.0–13.1	None	Both	Urban
Chande and Salum (2007)	NR	Tanzania	General population	86	11.6	4.9–18.4	None	Both	Urban
Odero and Zwi (1997)	1995	Kenya	General population	28	14.3	1.3–27.2	Breathalyser	Both	Urban
Molla <i>et al.</i> (2008)	2004	Ethiopia	General population	3044	17.9	16.5–19.3	None	Both	Both

(continued)

Table 1 (Continued)

First author	Year the study conducted	Country	Study population	Sample size	Prevalence	95% CI of prevalence	Alcohol screening tool	Gender	Location
Khasakhala and Mturi (2008)	2002	Kenya	General population	3639	19	17.7–20.3	None	Both	Both
Derege <i>et al.</i> (2005)	2001–2002	Ethiopia	General population	20434	21.3	20.7–21.9	None	Both	Both
Kitange <i>et al.</i> (1993)	Not reported	Tanzania	General population	1467	23.5	21.3–25.7	None	Both	Both
Kagimu <i>et al.</i> (2012)	2010	Uganda	General population	530	30.8	26.8–34.7	None	Both	Rural
Swahn <i>et al.</i> (2012)	2011	Uganda	General population	461	32.5	28.3–36.8	None	Both	Urban
Bette <i>et al.</i> (1997)	1994–1995	Ethiopia	General population	1436	34.3	31.9–36.8	None	Both	Urban
Mnyika <i>et al.</i> (2011)	2002	Tanzania	General population	926	34.6	31.9–37.3	None	Both	Rural
Alemu <i>et al.</i> (2007)	2003	Ethiopia	General population	628	43.8	39.9–47.7	None	Both	Urban
Boris <i>et al.</i> (2008)	2004	Rwanda	General population	539	49.2	44.9–53.4	None	Both	Rural
Tengia-Kessy <i>et al.</i> (2010)	1995	Tanzania	General population	1104	60	57.1–62.9	None	Both	Rural
Namagembe <i>et al.</i> (2010)	2006	Uganda	Healthcare service	384	16.4	12.7–20.1	CAGE	Female	Urban
Kullgren <i>et al.</i> (2009)	2007	Uganda	Healthcare service	76	21.1	11.9–30.2	CAGE	Both	Urban
Hassan <i>et al.</i> (2005)	1999	Kenya	Healthcare service	45	24.4	11.9–37.0	None	Both	Urban
Ayuku and Odero (2002)	1995–1996	Kenya	Healthcare service	778	26.5	23.4–29.6	Breathalyser	Both	Both
Luchters <i>et al.</i> (2011)	2008	Kenya	Male sex workers	222	68.9	62.8–75.0	AUDIT	Male	Urban
Kebede and Ketsela (1993)	1989–1990	Ethiopia	Secondary school students	519	9.2	6.8–11.7	None	Both	Urban
Dhadphale <i>et al.</i> (1982)	Not reported	Kenya	Secondary school students	2918	10.3	9.2–11.4	None	Both	Both
Reda <i>et al.</i> (2012)	2010	Ethiopia	Secondary school students	1721	10.4	9.0–11.8	None	Both	Both
Shiferaw <i>et al.</i> (2011)	2009	Ethiopia	Secondary school students	240	26.7	21.1–32.3	None	Both	Rural
Tengia-Kessy <i>et al.</i> (2010)	2008	Tanzania	Secondary school students	400	39.0	34.2–43.8	None	Both	Urban
Van Decraen <i>et al.</i> (2012)	Not reported	Rwanda	Secondary school students	285	43.9	38.1–49.6	None	Both	Rural
Lioul and Jemal (2009)	2005	Ethiopia	Secondary school students	810	51.5	48.0–54.9	None	Both	Urban
Faeh <i>et al.</i> (2006)	Not reported	Seychelles	Secondary school students	390	60.5	55.7–65.4	None	Both	Urban
Arnold <i>et al.</i> (2008)	2006	Ethiopia	University students	1330	19.2	17.1–21.3	None	Female	Urban
Regassa and Kedir (2011)	2010	Ethiopia	University students	606	29.7	26.1–33.3	None	Both	Urban
Amemori <i>et al.</i> (2011)	2006	Tanzania	University students	66	30.3	19.2–41.4	None	Both	Urban

(continued)

Table 1 (Continued)

First author	Year the study conducted	Country	Study population	Sample size	Prevalence	95% CI of prevalence	Alcohol screening tool	Gender	Location
Zein (1988)	1983	Ethiopia	University students	485	31.1	27.0–35.3	None	Both	Urban
Philpart <i>et al.</i> (2009)	2006	Ethiopia	University students	1378	31.2	28.8–33.7	None	Male	Urban
Gedif and Eshetu (2007)	2006	Ethiopia	University students	674	31.2	27.7–34.7	None	Both	Urban
Agardh <i>et al.</i> (2011)	2005	Uganda	University students	980	41.1	38.0–44.2	None	Both	Rural
Problem drinking Kebede and Alem (1999)	1994	Ethiopia	General population	4586	1.2	0.9–1.5	CAGE	Both	Urban
Alem <i>et al.</i> (1999)	Not reported	Ethiopia	General population	2997	2.6	2.0–3.2	CAGE	Both	Rural
Ghebremichael <i>et al.</i> (2009)	2002–2003	Tanzania	General population	214	15.0	10.2–19.7	CAGE	Female	Urban
Ao <i>et al.</i> (2011)	2002–2006	Tanzania	Female bar workers	723	36.2	32.7–39.7	CAGE	Female	Urban
Luchters <i>et al.</i> (2011)	2008	Kenya	Male sex workers	222	46.8	40.0–53.0	AUDIT	Male	Urban

AUDIT, Alcohol Use Disorder Identification Test.

Current use of alcohol

Current alcohol use may be more relevant than ever use for designing intervention strategies. The prevalence of reported current alcohol use is presented in Figure 3 for general populations, healthcare service attendees, male sex workers, secondary school students and university students. Heterogeneity was highest in studies conducted in general populations and among secondary school students. The prevalence was highest in the one study among male sex workers (69%; 95%CI: 63–75%). Median prevalence among secondary school students was 33% (IQR: 10–48%) and 31% (IQR: 30–31%) among university students and was lower in the general population (median 22%; IQR: 13–34%) and healthcare attenders (median 23%; IQR: 16–24%). Eight studies reported gender-specific prevalences. The median prevalence was high among males; 21% (IQR: 7–26%) *vs.* 9% (IQR: 9–20%) in the general population, 28% (IQR: 13–44%) *vs.* 19% (IQR: 7–32%) among healthcare service attenders, 60% (IQR: 56–63%) *vs.* 41% (IQR: 24–58%) in secondary schools, and 43% *vs.* 28% in a university. There was no significant heterogeneity in studies conducted among university students except one study among female university students (Arnold *et al.* 2008). Reported current alcohol use was more common among males than females and not associated with other factors.

Problem drinking

Problem drinking among young people was reported in five studies, three from the general population, one from female bar workers and one from male sex workers. The prevalence of problem drinking was 36% (95%CI: 33–40%) among female bar workers and 47% (95%CI: 40–53%) among male sex workers. Median prevalence in the general population was 3% (IQR: 1–15%); two of the studies in the general population were from Ethiopia and showed low levels of problem drinking (1–3%), but a study from Tanzania reported a rather high median prevalence of 15% (95%CI: 10–20%).

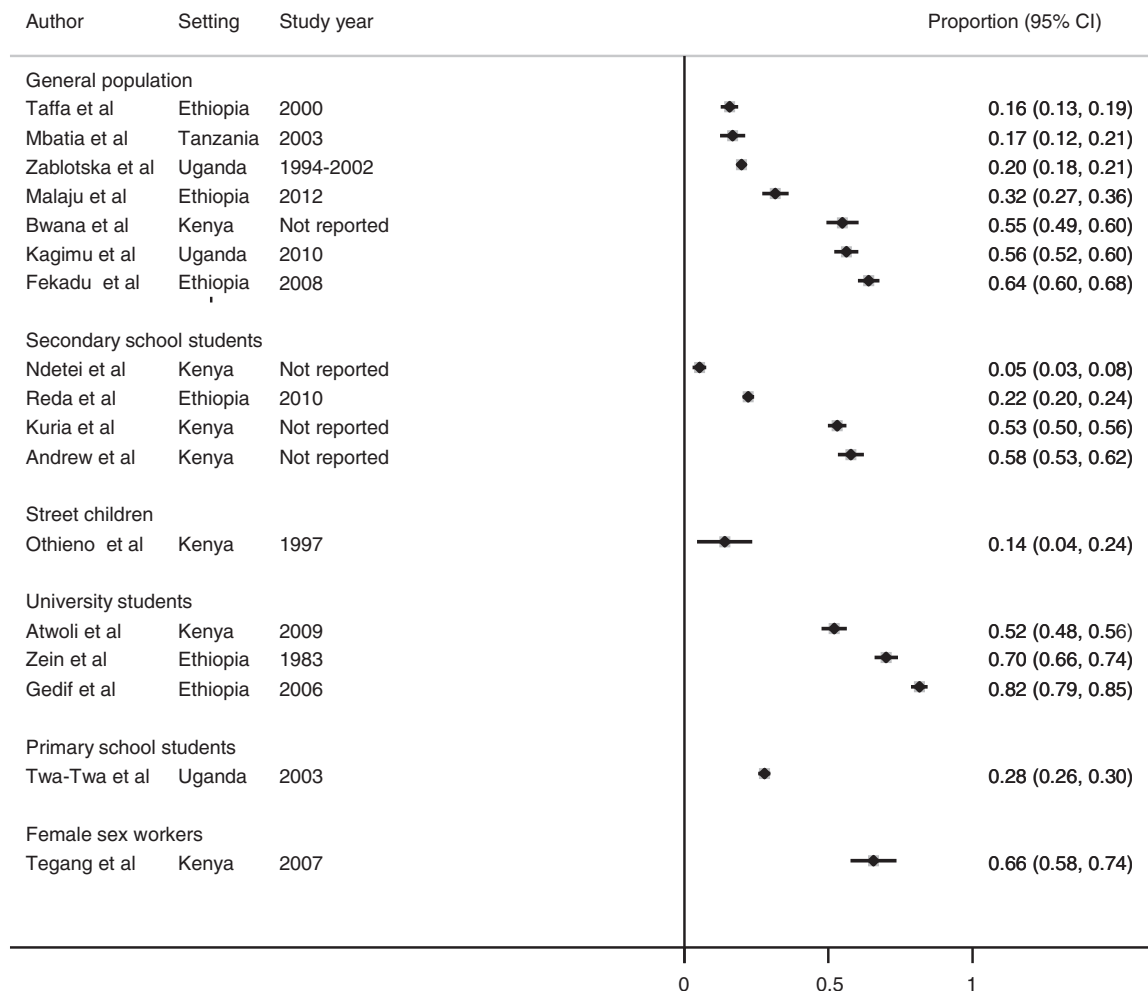
In this review, eight studies reported problematic drinking, two studies applied AUDIT, and six (13%) used CAGE to screen for problem drinking; two of the studies that applied CAGE and one study that applied AUDIT did not report scores according to age groups (Kullgren *et al.* 2009; Mbatia *et al.* 2009; Namagembe *et al.* 2010).

Discussion

Among young people in eastern Africa, alcohol use is common and its extent of use varies between specific

Table 2 Quality of the papers included in the systematic review and meta-analysis

Quality variable	Quality variable categories	Number of studies	Proportion (%)
Sampling	Non probability	14	25.0
	Probability	42	75.0
Alcohol use information collection	Breathalyser	2	3.6
	Alcohol Use Disorder Identification Test	2	3.6
	CAGE	6	10.7
	Other self-reports	46	82.1
	Between 60 and 80%	6	10.7
Response rate	Above 80%	33	58.9
	Not reported	17	30.4
	Face to face	36	64.3
Interview modality	Self-administered	20	35.7

**Figure 2** Prevalence of ever use of alcohol among studies included in the systematic review and meta-analysis.

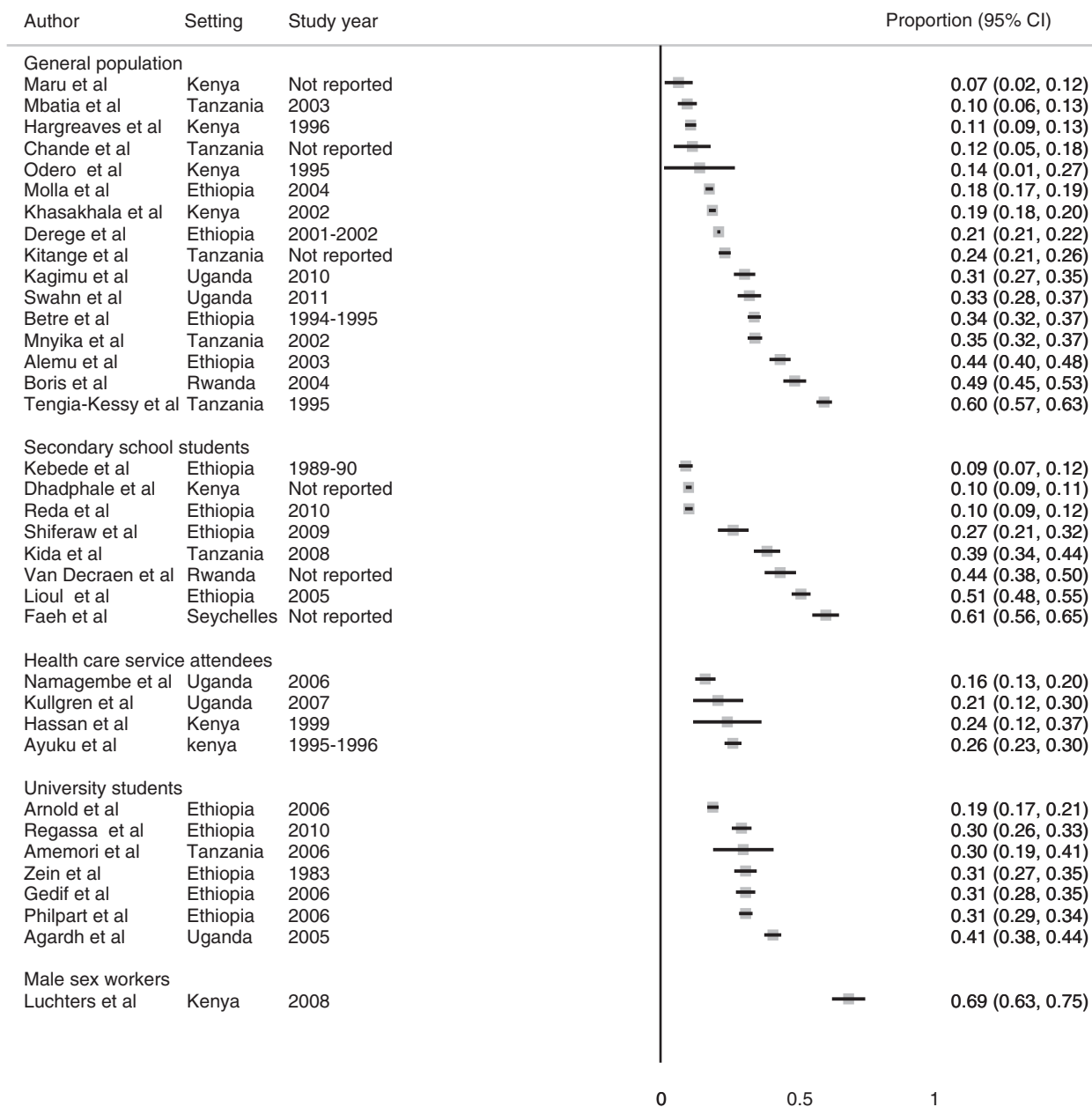


Figure 3 Prevalence of current alcohol use among studies included in the systematic review and meta-analysis.

populations and settings. Due to high level of heterogeneity between studies, we did not report pooled prevalence. The prevalence of reported ever use was highest among university students (70%) and female sex workers (66%) and lower among the general population and primary school students. Few studies reported alcohol use in the last year, and median prevalence in the general population was 29%. Reported current alcohol use was highest

among male sex workers (69%), followed by the university students (33%), and was lowest in the general population and secondary school students with the exception of one study in the Seychelles that reported a high prevalence of 61%. Problem drinking was highest among groups known to engage in high-risk behaviours (such as bar workers and sex workers). Generally, reported alcohol use across all definitions of use was highest among

groups known to engage in high-risk behaviours, followed by university students. Individuals attending healthcare services and general populations and secondary school students reported the lowest prevalence. Studies included in this review were of good quality; however, about two-thirds employed face-to-face interviewing approaches, an approach prone to social desirability bias that could lead to underreporting of alcohol use.

The varied prevalence of reported alcohol use among groups of young people is potentially due to specific population characteristics (general population *vs.* students *vs.* sex workers). We also attribute these variations to social influence and peer pressure (Smith & Foxcroft 2009; Li *et al.* 2010a,b). For example, the high prevalence of reported alcohol use among secondary school students from the Seychelles may be attributed to the relatively high purchase power of young people in this study population (Faeh *et al.* 2006). In addition, study settings, gender and use of non-standardised alcohol screening questionnaires could partially explain these variations.

Problem drinking was common among young sex workers and female bar workers. Several factors may have contributed to this, including the intertwined nature of bar work and transactional sex – the negotiation of commercial sex usually involves drinking. Also bar workers' psychosocial history, multiple sexual partners, level of education, religion, marital status, number of pregnancies and living conditions, for example, not living within the drinking establishment were found to influence problematic drinking in studies from eastern Africa (Ao *et al.* 2011; Kagimu *et al.* 2013).

The varied prevalence of reported alcohol use for specific groups of young people and the varied risk factors associated with it implies that the need for alcohol interventions is not uniform for all groups of young people. The interventions should address specific needs of a targeted group. For example, in the eastern Africa context, we may need to develop specific strategies to reduce harmful alcohol use among college students, bar workers and commercial sex workers.

An important finding of our review was lack of data on the initiation and persistence of alcohol use among young people in this region. Few studies mentioned factors associated with the initiation of alcohol use, such as peer influence, family and friends, religion and sexual experiences (Otieno & Ofulla 2009; Ndeti *et al.* 2010; Amemori *et al.* 2011; Atwoli *et al.* 2011). Future studies should aim to elicit in-depth information on social factors influencing alcohol use to inform potential interventions.

The use of effective and validated instruments for the screening and assessment of alcohol use is essential to guide research and is important for the design and

evaluation of interventions. AUDIT is validated and recommended by WHO for use at the primary healthcare settings and for the assessment of AUD in developing countries (Saunders *et al.* 1993; Chishinga *et al.* 2011; Kapiga *et al.* 2013); it is, however, not widely used for the assessment of AUD among young people in general populations. In our review, only two studies used the internationally recommended AUDIT alcohol screening questionnaire (Mbatia *et al.* 2009; Luchters *et al.* 2011).

Conclusion

Reported alcohol use among young people in eastern Africa is common and varies between different populations. The prevalence of AUD was highest among populations known to engage in high-risk sexual behaviours, but was also high among students in some of the studies. The studies reviewed lacked data about initiation and persistence of alcohol use, and little information was available about risk factors associated with alcohol use, and AUD. Notably, only few of the studies reviewed used internationally recommended and validated screening questionnaires such as AUDIT. Future epidemiological studies on alcohol use among young people should apply these questionnaires to facilitate comparison. However, such questionnaires have not been evaluated among young people in Africa, and studies closing this knowledge gap are therefore also required. Future studies should also determine factors responsible for initiation, persistence, and patterns of use in preparation for potential interventions. There is an urgent need of targeted interventions for groups of young people with a particularly high risk of alcohol use and AUD such as college students and young sex workers.

Acknowledgement and funding

This work was supported by the Training Health Researchers into Vocational Excellence (THRiVE) in East Africa, Grant number 087540, funded by Wellcome Trust, MRC UK MITU core fund, and the STRIVE research programme consortium funded by UK's Department for International Development. The views expressed do not necessarily reflect the official policies of the funding agencies.

References

- Abbey A (2011) Alcohol's role in sexual violence perpetration: theoretical explanations, existing evidence and future directions. *Drug and Alcohol Review* 30, 481–489.

- Agardh A, Odberg-Pettersson K & Ostergren PO (2011) Experience of sexual coercion and risky sexual behavior among Ugandan university students. *BMC Public Health* **11**, 527.
- Agardh A, Cantor-Graae E & Ostergren PO (2012) Youth, sexual risk-taking behavior, and mental health: a study of university students in Uganda. *International Journal of Behavioral Medicine* **19**, 208–216.
- Ahmed AT, Karter AJ & Liu J (2006) Alcohol consumption is inversely associated with adherence to diabetes self-care behaviours. *Diabetic Medicine* **23**, 795–802.
- Aldridge-Gerry AA, Roesch SC, Villodas F *et al.* (2011) Daily stress and alcohol consumption: modeling between-person and within-person ethnic variation in coping behavior. *Journal of Studies on Alcohol and Drugs* **72**, 125–134.
- Alem A, Kebede D & Kullgren G (1999) The epidemiology of problem drinking in Butajira, Ethiopia. *Acta Psychiatrica Scandinavica, Supplementum* **397**, 77–83.
- Alemu H, Mariam DH, Belay KA & Davey G (2007) Factors predisposing out-of-school youths to HIV/AIDS-related risky sexual behaviour in northwest Ethiopia. *Journal of Health, Population & Nutrition* **25**, 344–350.
- Amemori M, Mumghamba EG, Ruotoistenmaki J & Murtomaa H (2011) Smoking and drinking habits and attitudes to smoking cessation counselling among Tanzanian dental students. *Community Dental Health* **28**, 95–98.
- Ao TT, Sam N, Kiwelu I *et al.* (2011) Risk factors of alcohol problem drinking among female bar/hotel workers in Moshi, Tanzania: a multi-level analysis. *AIDS and Behavior* **15**, 330–339.
- Arnold D, Gelaye B, Goshu M, Berhane Y & Williams MA (2008) Prevalence and risk factors of gender-based violence among female college students in Awassa, Ethiopia. *Violence & Victims* **23**, 787–800.
- Atwoli L, Mungla PA, Ndung'u MN, Kinoti KC & Ogot EM (2011) Prevalence of substance use among college students in Eldoret, western Kenya. *BMC Psychiatry* **11**, 34.
- Ayuku D & Odero W (2002) Violence and alcohol: a study of injury presentations to emergency departments in Eldoret, Kenya. *African Safety Promotion* **1**, 38–42.
- Betre M, Kebede D & Kassaye M (1997) Modifiable risk factors for coronary heart disease among young people in Addis Ababa. *East African Medical Journal* **74**, 376–381.
- Boris NW, Brown LA, Thurman TR *et al.* (2008) Depressive symptoms in youth heads of household in Rwanda correlates and implications for intervention. *Archives of Pediatrics and Adolescent Medicine* **162**, 836–843.
- Brandish E & Sheron N (2010) Drinking patterns and the risk of serious liver disease. *Expert Review of Gastroenterology & Hepatology* **4**, 249–252.
- Brooks PJ, Enoch MA, Goldman D, Li TK & Yokoyama A (2009) The alcohol flushing response: an unrecognized risk factor for esophageal cancer from alcohol consumption. *PLoS Medicine* **6**, e50.
- Bwana SA (1996) Health services and the adolescent health situation in a rural setting: the Kenyan experience. *African Journal of Health Sciences* **3**, 110–119.
- Chande H & Salum I (2007) Prevalence of and factors associated with alcohol consumption in Temeke in August/September, 2002. *East African Journal of Public Health* **4**, 64–66.
- Chen L, Davey Smith G, Harbord RM & Lewis SJ (2008) Alcohol intake and blood pressure: a systematic review implementing a Mendelian randomization approach. *PLoS Medicine*, **5**, e52.
- Chishinga N, Kinyanda E, Weiss HA, Patel V, Ayles H & Seedat S (2011) Validation of brief screening tools for depressive and alcohol use disorders among TB and HIV patients in primary care in Zambia. *BMC psychiatry* **11**, 75.
- Chong EW, Kreis AJ, Wong TY, Simpson JA & Guymer RH (2008) Alcohol consumption and the risk of age-related macular degeneration: a systematic review and meta-analysis. *American Journal of Ophthalmology*, **145**, 707–715.
- Derege K, Atalay A, Getnet M *et al.* (2005) Khat and alcohol use and risky sex behaviour among in-school and out-of-school youth in Ethiopia. *BMC Public Health*, **5**, 109.
- Deressa W & Azazh A (2011) Substance use and its predictors among undergraduate medical students of Addis Ababa University in Ethiopia. *BMC Public Health* **11**, 660.
- Dersimonian R & Laird N (1986) Meta-analysis in clinical trials. *Controlled Clinical Trials* **7**, 177–188.
- Dhadphale M, Mengech HNK, Syme D & Acuda SW (1982) Drug-abuse among secondary-school students in Kenya - a preliminary survey. *East African Medical Journal* **59**, 152–156.
- Ewing JA (1984) Detecting alcoholism. The CAGE questionnaire. *JAMA* **252**, 1905–1907.
- Faeh D, Viswanathan B, Chiolerio A, Warren W & Bovet P (2006) Clustering of smoking, alcohol drinking and cannabis use in adolescents in a rapidly developing country. *BMC Public Health*, **6**, 169.
- Fekadu M & Alemayehu W (2009) Age at sexual initiation and factors associated with it among youths in North East Ethiopia. *Ethiopian Journal of Health Development* **23**, 154–162.
- Fisher JC, Bang H & Kapiga SH (2007) The association between HIV infection and alcohol use: a systematic review and meta-analysis of African studies. *Sexually Transmitted Diseases* **34**, 856–863.
- Gedif T & Eshetu E (2007) Prevalence of Khat, cigarette and alcohol use among students of Technology and Pharmacy, Addis Ababa University. *Ethiopian Pharmaceutical Journal* **24**, 116–124.
- Genkinger JM, Spiegelman D, Anderson KE *et al.* (2009) Alcohol intake and pancreatic cancer risk: a pooled analysis of fourteen cohort studies. *Cancer Epidemiology Biomarkers & Prevention* **18**, 765–776.
- Ghebremichael M, Paintsil E & Larsen U (2009) Alcohol abuse, sexual risk behaviors, and sexually transmitted infections in women in Moshi urban district, northern Tanzania. *Sexually Transmitted Diseases* **36**, 102–107.
- Gmel G & Rehm J (2003) Harmful alcohol use. *Alcohol Research & Health* **27**, 52–62.
- Hargreaves JR, Morison LA, Chege J *et al.* (2002) Socioeconomic status and risk of HIV infection in an urban population in Kenya. *Tropical Medicine and International Health* **7**, 793–802.

- Hassan S, Macharia WM & Atinga J (2005) Self reported alcohol use in an urban traffic trauma population in Kenya. *East African Medical Journal* 82, 144–147.
- Horn-Ross PL, Canchola AJ, West DW *et al.* (2004) Patterns of alcohol consumption and breast cancer risk in the California Teachers Study cohort. *Cancer Epidemiology Biomarkers & Prevention* 13, 405–411.
- Kagimu M, Guwatudde D, Rwabukwali C *et al.* (2012) Religiosity for HIV prevention in Uganda: a case study among Christian youth in Wakiso District. *African Health Sciences* 12, 17–25.
- Kagimu J, Weiss HA, Bukonya J *et al.* (2013) Alcohol use, mycoplasma genitalium, and other STIs associated With HIV incidence among women at high risk in Kampala, Uganda. *Journal of Acquired Immune Deficiency Syndromes: JAIDS* 62, 119–126.
- Kahl KG, Greggersen W, Schweiger U *et al.* (2010) Prevalence of the metabolic syndrome in men and women with alcohol dependence: results from a cross-sectional study during behavioural treatment in a controlled environment. *Addiction* 105, 1921–1927.
- Kalichman SC, Simbayi LC, Kaufman M, Cain D & Jooste S (2007) Alcohol use and sexual risks for HIV/AIDS in sub-Saharan Africa: systematic review of empirical findings. *Prevention Science* 8, 141–151.
- Kebede D & Alem A (1999) The epidemiology of alcohol dependence and problem drinking in Addis Ababa, Ethiopia. *Acta Psychiatrica Scandinavica, Supplementum* 397, 30–34.
- Kebede D & Ketsela T (1993) Suicide attempts in Ethiopian adolescents in Addis Abeba high schools. *Ethiopian Medical Journal* 31, 83–90.
- Khasakhala AA & Mturi AJ (2008) Factors associated with risky sexual behaviour among out-of-school youth in Kenya. *Journal of Biosocial Science* 40, 641–653.
- Kitange HM, Swai AB, Masuki G *et al.* (1993) Coronary heart disease risk factors in sub-Saharan Africa: studies in Tanzanian adolescents. *Journal of Epidemiology & Community Health* 47, 303–307.
- Kullgren G, Alibusa S & Birabwa-Oketcho H (2009) Problem drinking among patients attending primary healthcare units in Kampala, Uganda. *African Journal of Psychiatry* 12, 52–58.
- Kuntsche E, Knibbe R, Gmel G & Engels R (2005) Why do young people drink? A review of drinking motives *Clinical Psychology Review* 25, 841–861.
- Kuria MW (1996) Drug abuse among urban as compared to rural secondary schools students in Kenya: a short communication. *East African Medical Journal* 73, 339.
- Li Q, Li X & Stanton B (2010a) Alcohol use among female sex workers and male clients: an integrative review of global literature. *Alcohol and Alcoholism* 45, 188–199.
- Li Q, Wilsnack R, Wilsnack S & Kristjanson A (2010b) Cohabitation, gender, and alcohol consumption in 19 countries: a multi-level analysis. *Substance Use and Misuse* 45, 2481–2502.
- Lioul B & Jemal H (2009) Does exposure to sexually explicit films predict sexual activity of the in-school youth? Evidence from Addis Ababa high schools *Ethiopian Journal of Health Development* 23, 183–189.
- Luchters S, Geibel S, Syengo M *et al.* (2011) Use of AUDIT, and measures of drinking frequency and patterns to detect associations between alcohol and sexual behaviour in male sex workers in Kenya. *BMC Public Health* 11, 384.
- Makimoto K & Higuchi S (1999) Alcohol consumption as a major risk factor for the rise in liver cancer mortality rates in Japanese men. *International Journal of Epidemiology* 28, 30–34.
- Malaju MT & Asale GA (2013) Association of Khat and alcohol use with HIV infection and age at first sexual initiation among youths visiting HIV testing and counseling centers in Gamo-Gofa Zone, South West Ethiopia. *BMC International Health and Human Rights* 13, 10.
- Maru HM, Kathuku DM & Ndeti DM (2003) Substance use among children and young persons appearing in the Nairobi Juvenile Court, Kenya. *East African Medical Journal* 80, 598–602.
- Mbatia J, Jenkins R, Singleton N & White B (2009) Prevalence of alcohol consumption and hazardous drinking, tobacco and drug use in urban Tanzania, and their associated risk factors. *International Journal of Environmental Research and Public Health* 6, 1991–2006.
- Mbona NT & Kasirye R (2005) Alcohol and its association with sexual abstinence, condom use and risky behaviour among unmarried young people aged 18–24 years in Uganda. *African Journal of Drug and Alcohol Studies* 4, 17–31.
- Mnyika KS, Masatu MC & Klepp K-I (2011) Prevalence of and predictors of substance use among adolescents in rural villages of Moshi district, Tanzania. *East African Journal of Public Health* 8, 1–5.
- Moher D, Liberati A, Tetzlaff J, Altman DG & Group P (2009) Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *PLoS Medicine*, 6, e1000097.
- Molla M, Berhane Y & Lindtjorn B (2008) Traditional values of virginity and sexual behaviour in rural Ethiopian youth: results from a cross-sectional study. *BMC Public Health* 8, 9.
- Namagembe I, Jackson LW, Zullo MD *et al.* (2010) Consumption of alcoholic beverages among pregnant urban Ugandan women. *Maternal & Child Health Journal* 14, 492–500.
- Ndeti DM, Khasakhala LI, Mutiso V, Ongecha-Owuor FA & Kokonya DA (2009) Psychosocial and health aspects of drug use by students in public secondary schools in Nairobi, Kenya. *Substance Abuse* 30, 61–68.
- Ndeti DM, Khasakhala LI, Mutiso V, Ongecha-Owuor FA & Kokonya DA (2010) Drug use in a rural secondary school in Kenya. *Substance Abuse* 31, 170–173.
- Odero W & Zwi AB (1997) Drinking and driving in an urban setting in Kenya. *East African Medical Journal* 74, 675–679.
- Othieno CJ & Obondo AA (2000) Patterns of substance abuse among Kenyan street children. *Southern African Journal of Child and Adolescent Mental Health* 12, 145–150.
- Otieno A & Ofulla A (2009) Drug abuse in Kisumu town western Kenya. *African Journal of Food, Agriculture, Nutrition and Development* 9, 846–858.
- Patra J, Taylor B, Irving H *et al.* (2010) Alcohol consumption and the risk of morbidity and mortality for different stroke

J. M. Francis *et al.* **Alcohol use in eastern Africa**

- types—a systematic review and meta-analysis. *BMC Public Health* **10**, 258.
- Pearson A (2004) Balancing the evidence: incorporating the synthesis of qualitative data into systematic reviews. *JBIM Reports* **2**, 45–64.
- Philpart M, Goshu M, Gelaye B, Williams MA & Berhane Y (2009) Prevalence and risk factors of gender-based violence committed by male college students in Awassa, Ethiopia. *Violence & Victims* **24**, 122–136.
- Reda AA, Moges A, Wondmagegn BY & Biadgilign S (2012) Alcohol drinking patterns among high school students in Ethiopia: a cross-sectional study. *BMC Public Health* **12**, 213.
- Regassa N & Kedir S (2011) Attitudes and practices on HIV preventions among students of higher education institutions in Ethiopia: the case of Addis Ababa University. *East African Journal of Public Health* **8**, 141–154.
- Rehm J, Taylor B & Room R (2006) Global burden of disease from alcohol, illicit drugs and tobacco. *Drug and Alcohol Review* **25**, 503–513.
- Rehm J, Mathers CD, Popova S *et al.* (2009) Global burden of disease and injury and economic cost attributable to alcohol use and alcohol use disorders. *Lancet* **373**, 2223–2233.
- Rijken T, Velema JP & Dijkstra R (1998) Alcohol consumption in the rural population of Misungwi subdistrict in Mwanza Region, Tanzania. *Journal of Studies on Alcohol* **59**, 146–151.
- Saunders JB, Aasland OG, Babor TF, de la Fuente JR & Grant M (1993) Development of the Alcohol Use Disorders Identification Test (AUDIT): WHO Collaborative Project on Early Detection of Persons with Harmful Alcohol Consumption—II. *Addiction* **88**, 791–804.
- Shiferaw Y, Alemu A, Girma A *et al.* (2011) Assessment of knowledge, attitude and risk behaviors towards HIV/AIDS and other sexual transmitted infection among preparatory students of Gondar town, north west Ethiopia. *BMC Research Notes* **4**, 505.
- Smith LA & Foxcroft DR (2009) The effect of alcohol advertising, marketing and portrayal on drinking behaviour in young people: systematic review of prospective cohort studies. *BMC Public Health* **9**, 51.
- Smith MJ, Abbey A & Scott RO (1993) Reasons for drinking alcohol: their relationship to psychosocial variables and alcohol consumption. *International Journal of the Addictions* **28**, 881–908.
- Stroffolini T, Coticelli G, Medda E *et al.* (2010) Interaction of alcohol intake and cofactors on the risk of cirrhosis. *Liver International* **30**, 867–870.
- Swahn MH, Palmier JB, Kasirye R & Yao H (2012) Correlates of suicide ideation and attempt among youth living in the slums of Kampala. *International Journal of Environmental Research and Public Health* **9**, 596–609.
- Taffa N, Klepp KI, Sundby J & Bjune G (2002) Psychosocial determinants of sexual activity and condom use intention among youth in Addis Ababa, Ethiopia. *International Journal of STD & AIDS* **13**, 714–719.
- Tegang SP, Abdallah S, Emukule G *et al.* (2010) Concurrent sexual and substance-use risk behaviours among female sex workers in Kenya's Coast Province: findings from a behavioural monitoring survey. *SAHARA J: Journal of Social Aspects of HIV/AIDS Research Alliance* **7**, 10–16.
- Tengia-Kessy IA, Manyori C & Masalu JR (2010) Prevalence and correlates of perceived oral malodor among adolescents in Temeke district, Dar es Salaam. *East African Journal of Public Health* **7**, 49–53.
- Thomas J, Harden A, Oakley A *et al.* (2004) Integrating qualitative research with trials in systematic reviews. *BMJ* **328**, 1010–1012.
- Twa-Twa JM, Oketcho S, Siziya S & Muula AS (2008) Prevalence and correlates of condom use at last sexual intercourse among in-school adolescents in urban areas of Uganda. *East African Journal of Public Health* **5**, 22–25.
- Usman A, Mebrahtu G, Mufunda J *et al.* (2006) Prevalence of non-communicable disease risk factors in Eritrea. *Ethnicity & Disease* **16**, 542–546.
- Van Decraen E, Michielsens K, Herbots S, van Rossem R & Temmerman M (2012) Sexual coercion among in-school adolescents in Rwanda: prevalence and correlates of victimization and normative acceptance. *African Journal of Reproductive Health* **16**, 139–152.
- WHO (2004) *Global Status Report on Alcohol*. World Health Organization, Geneva, pp. 1, 1, 53.
- Wong WC, Cheung CS & Hart GJ (2008) Development of a quality assessment tool for systematic reviews of observational studies (QATSO) of HIV prevalence in men having sex with men and associated risk behaviours. *Emerging Themes in Epidemiology* **5**, 23.
- Zablotska IB, Gray RH, Koenig MA *et al.* (2009) Alcohol use, intimate partner violence, sexual coercion and HIV among women aged 15–24 in Rakai, Uganda. *AIDS & Behavior* **13**, 225–233.
- Zaleski M, Pinsky I, Laranjeira R, Ramisetty-Mikler S & Caetano R (2010) Intimate partner violence and alcohol consumption. *Revista de Saude Publica* **44**, 53–59.
- Zein ZA (1988) Polydrug abuse among Ethiopian university students with particular reference to khat (*Catha edulis*). *Journal of Tropical Medicine & Hygiene* **91**, 71–75.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Appendix S1. Search Strategies.

Corresponding Author Joel M. Francis, London School of Hygiene and Tropical Medicine, Keppel Street, London WC1E 7HT, UK. E-mail: Joel.Francis@lshtm.ac.uk or joelmfrancis@gmail.com