HHS Public Access

Author manuscript

Matern Child Health J. Author manuscript; available in PMC 2017 November 01.

Published in final edited form as:

Matern Child Health J. 2016 November ; 20(11): 2392–2401. doi:10.1007/s10995-016-2066-1.

Screening caregivers of children for risky drinking in KwaZulu-Natal, South Africa

Myra Taylor[1], **Justin Knox**[2], **Meera K Chhagan**[3,4], **Shuaib Kauchali**[5], **Jane Kvalsvig**[1], **Claude Ann Mellins**[6], **Stephen M Arpadi**[2,7], **Murray H Craib**[1], and **Leslie L Davidson**[2,7]

[1] University of KwaZulu-Natal, South Africa

[2] Department of Epidemiology, Mailman School of Public Health, Columbia University, USA

[3] Posthumous: School of Public Health, University of Western Cape, South Africa

[4] Posthumous: Department of Paediatrics, University of KwaZulu-Natal, South Africa

[5] Department of Public Health, KwaZulu-Natal, South Africa (when the study was completed)

[6] HIV Center for Clinical and Behavioral Studies, Columbia University and New York State Psychiatric Institute, USA

[7] Department of Pediatrics, College of Physicians and Surgeons, Columbia University, USA

Abstract

Background—Alcohol abuse, a significant health problem in South Africa, affects the ability of adults to care for children. Little is known regarding risky alcohol use among child caregivers there. A large population-based study examined the prevalence of, and factors associated with, risky drinking among caregivers of young children in KwaZulu-Natal, South Africa comparing the use of the Alcohol Use Disorders Identification Test (AUDIT) and the AUDIT-C screens for hazardous or harmful drinking (referred to here as risky drinking).

Methods—83% of child caregivers from five tribal areas were interviewed using the 10-question AUDIT to screen for risky drinking. The AUDIT-C screen, a subset of AUDIT questions, targets alcohol consumption and binge drinking. Factors associated with risky drinking were investigated using logistic regression.

Results—1,434 caregivers participated, 98% female. Sixteen percent reported ever drinking alcohol. Based on AUDIT criteria for risky drinking, 13% of the sample scored as moderate drinkers, 2% as hazardous users, and 1% as harmful or dependent users (identifying 3% as risky drinkers). Using AUDIT-C criteria to identify risky drinking significantly increased the proportion of caregivers identified as risky drinkers to 9%. In multivariate analyses, factors associated with risky drinking were similar in both screens: partner violence, smoking, HIV-infection, caring for a child with disabilities.

Corresponding author: Leslie L Davidson, Mailman School of Public Health, 722 W 168 St, New York, New York, 10032, USA, 01-212-342-0247, lld1@columbia.edu.

Conclusions—Since the AUDIT–C identified risky alcohol use not otherwise detected with the full AUDIT, and since resources for screening in health care settings is limited, the AUDIT-C may be a more appropriate screen in populations where binge drinking is common.

Keywords

Alcohol Use; Binge drinking; AUDIT; AUDIT-C; Child caregivers; Population-based; South Africa

Introduction

In a recent national survey of alcohol use in South Africa using the Alcohol Use Disorders Identification Test (AUDIT), (Babor *et al.* 2001), 42% men and 17% women reported current alcohol use, and 9% scored as risky drinkers (17% men and 3% women (Peltzer, Davids, & Njuho, 2011). South Africa also has one of the highest incidences of fetal alcohol syndrome in the world (May *et al.*, 2013). Besides the potential harm to fetal development from maternal drinking early in pregnancy, maternal alcohol use patterns may affect child rearing practices including child safety and welfare (Kelleher *et al.,* 1994). For example, children of mothers who binge drink defined in the AUDIT as six or more drinks on one occasion, are more likely to have behavioral problems due to a lack of a nurturing environment. Further, alcohol misuse by child caregivers may compromise caring and nutritional practices, emotional support and cognitive stimulation (S. J. Ondersma, Delaney-Black, Covington, Nordstrom, & Sokol, 2006)(O'Connor *et al.*, 1993).

Child caregivers may be at high risk for alcohol misuse as a result of certain stressors, including mental distress, poverty, and the burden of caring for ill family members (Khan, Murray, & Barnes, 2002). South Africa has an HIV prevalence of 18%, one of the highest in the world (Africa, 2013; UNAIDS, 2010) making it possible the stress of a child caregiver's HIV infection or that of family members could lead to increased alcohol use and abuse (Myer *et al.*, 2008). However, few studies have examined alcohol use among child caregivers in South Africa, particularly those residing in high HIV prevalence areas. Understanding the patterns of alcohol use and associated risk factors are critical to promoting caregiver functioning and child safety, development and well-being (Freisthler, Wolf, & Johnson-Motoyama, 2015).

This paper reports on screening for alcohol abuse amongst the children's primary caregivers using the AUDIT, the Alcohol Use Disorders Identification Test (Babor, 2001). In this study, we compare the results of the overall AUDIT with those from the AUDIT- C (C for Consumption), an abbreviated version of the AUDIT that includes the first three AUDIT questions on consumption, frequency and binge drinking (Bradley *et al.*, 2007). Binge drinking, drinking to intoxication, is potentially harmful both to caregivers and to the children for whom they care because intoxication impairs judgment and diminishes the ability to fulfill important responsibilities such as caring for children (Kendler *et al.*, 2013) (Steven J. Ondersma, Svikis, Thacker, Beatty, & Lockhart, 2016). The AUDIT- C, due to its brevity, would be more effective to use in primary healthcare settings where time and personnel are extremely limited (Reinert & Allen, 2007). This study, part of a larger

population based cohort study of children and their caregivers, examined caregiver and child factors associated with risky drinking, defined as hazardous or harmful drinking, as measured by either the AUDIT and the AUDIT-C. The study described here asks two research questions: 1) What is the prevalence of, and factors associated with, hazardous drinking among caregivers of young children in KwaZulu-Natal, South Africa? 2) Whether the use of the Alcohol Use Disorders Identification Test (AUDIT) or the AUDIT-C is a better screen for risky drinking amongst these caregivers.

Methods

Study population and procedures

Data for this project were drawn from the Asenze study, a population-based study of preschool children and their primary caregivers set in five isiZulu tribal lands in KwaZulu-Natal, South Africa, the province with the highest antenatal HIV prevalence (37%) and one of the highest in the world.

A door-to-door survey of all households within the study areas, identified those with a child between 4-6 years of age in a peri-urban area (Chhagan *et al.*, 2014). The caregivers of these children (two thirds mothers, 20% grandmothers and 15% other relatives) were invited to participate in the Asenze study of health and psychosocial need and child development and disability. The study had ethical approval from the University of KwaZulu-Natal's ethical review committee and from Columbia University's Institutional Review Board. Children and their primary caregiver who gave informed consent were assessed for health and psychosocial challenges by a team of mid level psychological assistants, health assistants and a doctor.

Sample characteristics

A total of 14,425 households in the study were visited by the team of fieldworkers between September 2008 and July 2010. Of 1787 eligible 4-6 year old children identified and enrolled in the study, 1,581 (88%) completed the health and psychosocial assessments. Of 1,736 primary child caregivers looking after these children and enrolled during the household visit, 1,434 (83%) returned for and completed all assessments. The mean age of the children's caregivers was 35 years and 98% were females. Two thirds (68.6%) were birth mothers of an index child, 16.4% were grandmothers, 11.2% were other female relatives such as aunts, 1.6% were fathers, and 1.6% were older siblings. Table 1 presents characteristics of the primary caregivers, their children and households.

Measures

All measures were translated into isiZulu and back translated into English using standard procedures (Beaton D.E., 2002; Chhagan *et al.*, 2014). Alcohol use was measured using the AUDIT, which asks about quantity, frequency and problems experienced due to alcohol consumption. There are ten questions with a total score of 40. AUDIT-determined alcohol use patterns were defined as follows: hazardous alcohol use (8-15); harmful alcohol use (16-19), possible alcohol dependence (≥20) (Babor, 2001). For this paper, hazardous and harmful alcohol use and possible dependence were categorized as risky drinking. The

abbreviated AUDIT- C (Questions 1, 2 and 3 of the AUDIT) which measures how often the respondent drinks, how many drinks are consumed in a typical day and how frequently s/he drinks six or more drinks at a time (defined as binge drinking), provides criteria that are gender specific (Bradley *et al.*, 2007). Of a maximum score of 12, risky drinking is a score in women of 3 or more or four or more in men. The AUDIT and AUDIT-C have been validated in South Africa (Myer et al., 2008); (Peltzer, Seoka, Babor, & Obot, 2006), (Aalto, Alho, Halme, & Seppä, 2009). The AUDIT was administered to the child's caregiver by trained research assistants who were bilingual in English and isiZulu.

The Ten Questions (TQ) was used to screen for children's disability. It has been shown to have sensitivity in the range of 80-100% for serious (moderate and severe) cognitive, motor or seizure disabilities (Durkin et al., 1994; Durkin et al., 1995). A positive answer to any of the ten questions indicates the presence of a functional limitation or disability as perceived by the caregiver. Caregiver mental health was assessed using the Client Diagnostic Questionnaire (CDQ), a screening tool designed for use by lay mental health workers to assess the range of psychiatric disorders known to be prevalent among persons infected with HIV. The CDQ has been validated in the United States among populations of people living with HIV. It was shown to have good sensitivity and specificity for detecting the presence of a psychiatric disorder in the USA and in the Asenze study population (Aidala A & Ko, 2004; C. A. Mellins et al., 2016). For this analysis, we used a summary dichotomous variable (due to small numbers) to indicate whether the caregiver screened positive for one or more of the following conditions covered in the CDQ – depression (major and other), anxiety, panic and post-traumatic stress disorder (PTSD), (Chhagan *et al.*, 2014).

Caregivers were offered rapid HIV testing for themselves and their children. HIV was recorded as Results were recorded as HIV positive, negative, or unknown (unknown included indeterminate tests). The independent variables also included those which might be related to alcohol use: caregiver characteristics - sex, age, experience of current partner violence (verbal, physical or sexual), cigarette use; Characteristics of the household – which area of the five, overall asset index (Filmer & Pritchett, 2001) number of employed adults, highest educational level of adults, monthly food expenditure (above $60 or not), had the household had run out of food the previous month, did household children receive social grants and whether the household had experienced a recent death.

Statistical analyses

Data were analyzed using SAS version 9.3 software (SAS Institute Inc., North Carolina). For comparisons of caregiver, child and household characteristics by AUDIT risk categories (≥8 for risky drinking or misuse of alcohol) and AUDIT- C risk categories (score ≥3 for women and ≥4 for men), chi-square tests and independent t-tests were used. Bivariate analyses were conducted for all caregiver, child and household characteristics. All variables associated with risk for risky drinking at $P < .20$ were considered for inclusion in multivariate analyses where logistic regression models were used to estimate adjusted odds ratios and 95% confidence intervals. All statistical tests were 2-sided and $P < .05$ was considered statistically significant.

Results

Alcohol use and abuse

The majority (84%) of caregivers reported never drinking alcohol. Of the 16% (n=228) who reported that they did, most (n=182) of those who consumed alcohol had a low AUDIT total score (1-7); this included 94% (n=33) of the 35 male caregivers (Table 2). In total, 3% reported alcohol consumption and consequences that placed them in the high-risk categories, comprising hazardous, harmful and dependent drinkers (AUDIT score ≥8). Using the AUDIT- C criteria, 131 (9.1%) of all child caregivers were categorized as risky drinkers. This included 124 women with an AUDIT- C score ≥3 and 7 men with an AUDIT- C score ≥4. Table 2 presents the distribution of alcohol use and abuse according to the two screens among the sample. The single question on binge drinking was “How often do you have six or more drinks on one occasion?”. Six and a half percent answered less than monthly, 1.2% answered monthly, 1.8% weekly and 0.1% answered daily or almost daily. When asked about other substance use, seven female caregivers reported smoking marijuana and no other substance use was reported.

Of the 46 caregivers screening positive for risky drinking, using the AUDIT, 43 (94%) also screened positive using the AUDIT- C. The AUDIT-C identified an additional 88 child caregivers (6%) not identified as high risk drinkers using the AUDIT.

Correlates of risky drinking

Table 3 presents the distribution of risk factors by alcohol abuse on each of the two screens. In multivariate analyses (Table 4) using the AUDIT screen results for risky drinking, having experienced partner violence with their current partner (aOR 2.95 (1.53-5.68)), smoking cigarettes (aOR 5.23 (1.97-13.92)), caregivers who were HIV positive (vs. negative) (aOR 3.06 (1.54-6.07)) reporting that the index child was experiencing one or more developmental disabilities (aOR 2.03 (1.02-4.05)) were more likely to be at risk of abusing alcohol. Similarly using multivariate analyses with the AUDIT- C, having experienced partner violence with their current partner (aOR 2.36 (1.55-3.57)), smoking cigarettes (aOR 10. 76 (5.50-21.06)) and caregivers who were HIV positive (vs. negative) (aOR 1.82 (1.17-2.82) were more likely to be at risk of abusing alcohol. Unlike the AUDIT, having a child with a disability was not associated with risky drinking (Table 4).

Discussion

In one of the first, large epidemiological studies conducted among caregivers of young children in South Africa, caregivers reported relatively low rates of risky alcohol drinking compared to the prevalence of adult risky drinking in South Africa (Peltzer *et al.,* 2011). However, when stratified by sex, the national prevalence for risky drinking using the same AUDIT screen, is similar to that in the Asenze study that is predominantly women where 3.2% scored as risky drinkers using the AUDIT criteria (comprising Hazardous, Harmful and Dependent Drinkers (Table 2).

Yet, when using the AUDIT-C, risky drinking remains a problem among almost 10% of caregivers of preschool children in this population-based study, the majority of whom had

answered yes to the binge drinking question. Risky alcohol use was very low in the small group of male caregivers in this sample (6%) but these men were atypical because they were caregivers of children, which is unusual in South Africa.

Of note, binge drinking was found to be more of an issue among this population than physiologic dependence on alcohol. Thus, the AUDIT-C identified more caregivers at risk of risky drinking than did the AUDIT. Binge drinking is a more important problem among those with child care responsibilities, as is physiologic dependence on alcohol, since an inebriated caregiver might allow unsafe activities, create unsafe conditions, be less responsive to a child's needs or might react impulsively and inappropriately when a child misbehaves.

Improved identification of risky drinking among caregivers is essential for effective prevention and intervention efforts. There is some evidence, especially in high income countries that brief interventions by nurses in health-related settings can decrease risky drinking (Joseph, Basu, Dandapani, & Krishnan, 2014). The Audit-C, because of its brevity, and because it identified a high proportion of risky drinkers also identified by the whole AUDIT, may be a more efficient and cost effective tool for screening for risky alcohol use in community healthcare settings. The AUDIT-C identified just less than 95% of those scoring on the full AUDIT as at risk for other forms of risky drinking; and it did so at a fraction of the effort and the cost. Given the shortage of professional staff in primary care settings in low- and middle-income countries the AUDIT-C could more easily be incorporated into child primary health care visits with nurses or community health workers. Doing so would allow the healthcare system to target information about the risks of binge drinking to caregivers at risk in order to enhance the welfare of children. Caregivers who screen positive for risky drinking could be offered appropriate counseling or brief interventions shown to be effective.

Our finding that the performance of the AUDIT-C was comparable to that of the AUDIT is in agreement with previous reports in high-income countries. As an example, a study from a high-income country, (Bradley *et al.,* 2007), reported that the two screening tools performed equally well at identifying those at risk for alcohol abuse in a cross-sectional validation study conducted in a primary care setting in the U.S. A subsequent study of the effectiveness of the AUDIT- C, also conducted in a primary care setting in the U.S., characterized its overall performance as excellent (Frank *et al.*, 2008).

Our study also assessed whether previously known risk factors for alcohol abuse were associated with screening positive on the AUDIT and the AUDIT-C. Of the individual characteristics that were assessed, caregivers who had experienced partner violence with their current partner were more likely to abuse alcohol, according to both measures. This finding matches those of studies of partner violence in high-income countries though it remains unclear if alcohol is a risk factor for, and/or a consequence of, partner violence (Breiding, Black, & Ryan, 2008). Neither bodes well for the development of the child as the partner violence itself is a risk to child development and suggests interventions are needed to address both issues.

Caregivers who smoked were far more likely to abuse alcohol, according to both measures. The use of cigarettes and of alcohol are known to be strongly correlated. This is of great concern as second-hand smoke exposure additionally places children at risk of ill effects on their health beyond negatively impacting the health of the caregiver (Hwang, Hwang, Moon, & Lee, 2012). In the setting of our study, cultural norms are changing and women are increasingly likely to use alcohol or tobacco despite increased efforts to regulate them (WHO, 2012). Our findings suggest that alcohol and tobacco use are a significant problem in this population.

Caregivers who were HIV positive were also more likely to be risky drinkers than caregivers who were HIV negative, according to both measures. This finding is in accordance with Thompson's 1996 report that HIV positive individuals consumed more alcohol due to increased levels of stress (Thompson, Nanni, & Levine, 1996). In another study, 7% of HIV infected individuals attending an HIV clinic in Cape Town were found to be alcohol dependent (Myer *et al.*, 2008). Our findings are of particular concern because the province where the study was conducted, KwaZulu-Natal, has the highest prevalence of HIV in South Africa (Shisana O & Mbelle N, 2009). Work in high resource countries suggests that in addition to health-related services, alcohol and mental health treatment may be critical to promoting the overall wellbeing of people living with HIV (C. A. Mellins, Havens, J. F., McCaskill, E. O., Leu, C.S., Brudney, K., & Chesney, M. A., 2002) We did not find an association of risky drinking with the diagnosis of a mental health problem though in a previous study of mental health and HIV, we have recommended the need for mental health treatment interventions in South Africa (Chhagan et al., 2014).

Caregivers who reported that the index child was experiencing one or more neurodevelopmental disabilities, were also more likely to meet criteria for risky drinking than caregivers who did not meet criteria, but this finding was statistically significant only on the AUDIT not the AUDIT-C. A high proportion of children (45%) in our study screened positive on the TQ for a developmental disability, and a study completed by UNICEF confirmed that there is limited health service provision for such children in communities such as those of the population in our study (UNICEF, 2012). The lack of support is likely to place additional stress on the caregiver and may contribute to increased use of alcohol to relieve such stress. The consequences of alcohol misuse by caregivers could further affect these children through compromised caring practices (O'Connor M.J.; Sigman, 1993; S. J. Ondersma et al., 2006), and caregivers who are under the influence of alcohol are also less likely to engage in supportive and stimulating parent-infant communication and attachment essential practices for normal cognitive development (Murphy, Marelich, Armistead, Herbeck, & Payne, 2010).

None of the household characteristics that were measured were associated with alcohol misuse according to either screening measure, the AUDIT or the AUDIT-C. The household characteristics assessed included measures specifically developed to distinguish among socioeconomic status in this highly disadvantaged setting, including an asset index, at least one employed person in the household, food insecurity during the previous month, and households where all the children received child support grants. Our findings are in contrast to Khan *et al.*'s finding that poverty increases alcohol use in South Africans (Khan *et al.*,

2002). It is possible that in our participants, most of whom were poor and unemployed, there was not enough variability to test this hypothesis.

There are a few limitations of the study that are important to mention. The data used for these analyses were cross-sectional, which precludes the ability to draw conclusions about the temporal directionality of the associations observed. For example, we can make no assumptions about whether drinking preceded HIV infection, vice versa or both before and after. Self-report bias may be an issue here than with other studies of adult alcohol use, since the caregivers may be ashamed to report drinking because they are caring for young children and may have been underreported their true alcohol intake. Alternatively, there may have been selection bias to the extent that in a situation where caregiving duties are shared among members of a household, adults with alcohol misuse would have been less likely to be the prime caregiver or to accompany the child to an assessment and, thus, were less likely to be screened.

In summary, this large epidemiological study conducted among caregivers of young children in South Africa identified relatively low rates of alcohol abuse in caregivers, although levels of binge drinking were of concern. The AUDIT-C was shown to be a more effective screening tool because it identified a group of risky drinkers who would be missed if only using the AUDIT questionnaire scoring criteria, and it did so at a fraction of the effort. We recommend screening for alcohol abuse using the AUDIT-C in primary health care settings in resource-limited settings where binge drinking is of concern. Further research using randomized controlled trials, should investigate the use of the AUDIT-C to identify risky drinkers, followed by brief interventions for those identified as hazardous drinkers. If clinically effective, this could also be a feasible and cost-effective approach to reducing the harm that risky drinking poses to those with child care responsibilities and to their children.

Acknowledgements

We wish to thank the children and their families who shared their lives and their time with us and the study team, the field workers and psychological assessors who made it all possible. We also thank Andrew Pangilinan for assestance with the analyses.

The ASENZE study was funded by the National Institute of Drug Abuse 5 R01 DA023697 in conjunction with the Fogarty Brain Disorders in Developing Countries Program. The opinions represented here are the sole responsibility of the authors and do not necessarily represent the official views of the National Institutes of Health.

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Significance

There is substantial evidence in high-income countries that risky drinking (binge drinking or alcohol dependence) in caregivers is detrimental to children. There is little evidence that this holds true in low-income countries nor evidence on which screen for risky drinking is most effective in these settings. We present a population-based investigation into correlates of risky alcohol use among caregivers of children in poor tribal communities of South Africa and compare the use of the AUDIT with the brief AUDIT-C screen for risky alcohol use finding the AUDIT-C more effective because binge drinking is more common than dependent drinking in these communities.

Table 1

Characteristics of caregivers, index children and their households

	N	(%)
Adult		
Sex		
Female	1399	97.6
Male	35	2.4
Age		
Mean (SD)	35	(SD13)
Greater than 25 years old	1034	72.1
Less than or equal to 25 years old	400	27.9
Current partner violence		
Yes	296	20.7
No	1137	79.3
Cigarette smoker		
Yes	46	3.2
No	1388	96.8
Mental health disorder		
Yes	448	31.3
No	984	68.7
HIV Status		
Positive	374	26.1
Negative	932	65.0
Unknown	128	8.9
Child		
Disabled / delayed development		
Yes	656	45.9
No	773	54.1
HIV Status		
Positive	57	4.0
Negative	1166	81.3
Unknown	211	14.7
Household		
Asset index		
Bottom 3rd	494	34.6
Middle 3rd	451	31.6
Top 3rd	482	33.8
Employed adult(s) in household		
Yes	1089	78.7
No	294	21.3

	N	(%)
Household ran out of food during past month		
Yes	343	25.0
No	1030	75.0
Recent death in the household		
Yes	310	22.3
No	1083	77.7
Somebody in household with education past high school		
Yes	126	9.1
No	1259	90.9
Household spends more than $60 per month on food		
Yes	714	54.3
No	601	45.7
All children in household on social grants		
Yes	394	28.4
No	993	71.6
Study sites		
1	250	17.4
2	244	17.0
3	160	11.2
4	462	32.2
5	318	22.2

Table 2

Proportion of Risky Drinkers Identified on the Audit and the Audit-C risk categories

AUDIT Score	**N**	**%**	**AUDIT-C Score**	**N**	**%**
Abstinent (0)	1206	84.1	Abstinent (0)	1235	86.1
Low-risk (1-7)	182	12.7	Low risk (Women ≤ 3 and Men ≤ 4)	68	4.7
Total High Risk Categories (Risky drinkers as defined by the Audit)	**46**	**3.2**	**Total Risky Drinkers as defined by the AUDIT-C** (Women > 3, Men >4)	**131**	**9.1**
Hazardous drinkers (8-15)	32	2.2			
Harmful use (16-19)	10	0.7			
Dependent drinkers (20+)	4	0.3			
Total Number of Caregivers	1434	100.0	Total Number of Caregivers	1434	100.0

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Table 3

Bivariate associations between Adult, Child, Household Characteristics and Risky Drinking among Caregivers using the AUDIT and the AUDIT- C Screening Tests

	Audit					Audit-C				
	# Audit ≥8	**%**	**# Audit <8**	**%**	***P***	**# Audit-C ≥3/4**	**%**	**# Audit-C <3/4**	**%**	***P***
Adult										
Sex					0.3755					**0.0239**
Female	44	3.1	1355	96.9		124	8.9	1275	91.1	
Male	2	5.7	33	94.3		7	20.0	28	80.0	
Age					0.7859					0.3294
Mean (SD)	35	(10SD)	35	(SD13)		34	(12SD)	35	(13SD)	
Age (25 ≤) vs. (25 >)					0.9550					0.6153
25 ≥ Age	13	3.3	387	96.7		39	9.8	361	90.2	
25 < Age	33	3.2	1001	96.8		92	8.9	942	91.1	
Current partner violence					**0.0003**					**<.0001**
Yes	19	6.4	277	93.6		46	15.5	250	84.5	
No	26	2.3	1111	97.7		84	7.4	1053	92.6	
Cigarette smoker					**<.0001**					**<.0001**
Yes	8	17.4	38	82.6		23	50.0	23	50.0	
No	38	2.7	1350	97.3		108	7.8	1280	92.2	
Mental health disorder					0.3991					**0.1654**
Yes	17	3.8	431	96.2		48	10.7	400	89.3	
No	29	2.9	955	97.1		83	8.4	901	91.6	
HIV Status					**0.0025**					**0.0127**
Positive	21	5.6	353	94.4		44	11.8	330	88.2	
Negative	19	2.0	913	98.0		70	7.5	862	92.5	
Unknown	6	4.7	122	95.3		17	13.3	111	86.7	
Child										
Disabled / delayed development					**0.0045**					**0.0291**
Yes	30	4.6	626	95.4		71	10.8	585	89.2	

	Audit					Audit-C				
	# Audit ≥8	**%**	**# Audit <8**	**%**	***P***	**# Audit-C ≥3/4**	**%**	**# Audit-C <3/4**	**%**	***P***
No	15	1.9	758	98.1		58	7.5	715	92.5	
HIV Status					0.3809					**0.1253**
Positive	2	3.5	55	96.5		4	7.0	53	93.0	
Negative	34	2.9	1132	97.1		100	8.6	1066	91.4	
Unknown	10	4.7	201	95.3		27	12.8	184	87.2	
Household										
Asset index					0.5689					0.6726
Bottom 3rd	18	3.6	476	96.4		45	9.1	449	90.9	
Middle 3rd	15	3.3	436	96.7		45	10.0	406	90.0	
Top 3rd	12	2.5	470	97.5		40	8.3	442	91.7	
Employed adult in household					**0.0658**					0.5779
Yes	29	2.7	1060	97.3		96	8.8	993	91.2	
No	14	4.8	280	95.2		29	9.9	265	90.1	
Household ran out of food during past month					0.5382					**0.1590**
Yes	13	3.8	330	96.2		38	11.1	305	88.9	
No	32	3.1	998	96.9		88	8.5	942	91.5	
Recent death in the household					0.5589					0.9531
Yes	8	2.6	302	97.4		28	9.0	282	91.0	
No	35	3.2	1048	96.8		99	9.1	984	90.9	
Somebody in household with education past high school					0.2606					0.8851
Yes	6	4.8	120	95.2		12	9.5	114	90.5	
No	37	2.9	1222	97.1		115	9.1	1144	90.9	
Household spends more than $60 per month on food					0.7327					0.3630
Yes	25	3.5	689	96.5		62	8.7	652	91.3	
No	19	3.2	582	96.8		61	10.1	540	89.9	
All children in household on social grants					0.6764					0.2301
Yes	11	2.8	383	97.2		30	7.6	364	92.4	
No	32	3.2	961	96.8		96	9.7	897	90.3	

	Audit					Audit-C				
	# Audit ≥8	%	# Audit <8	%	*P*	# Audit-C ≥3/4	%	# Audit-C <3/4	%	*P*
Study Sites (dichotomized)					**< 0.0001**					**0.0141**
1	18	7.2	232	92.8		33	13.2	217	86.8	
All others (2-5)	28	2.4	1156	97.6		98	8.3	1086	91.7	

Table 4

Multivariate adjusted odds ratios (aORs) and 95% confidence limits comparing Adult, Child and Household Factors with Risky Drinking among caregivers using the AUDIT and the AUDIT- C screening tests [*] **

	Audit				Audit-C			
	aOR	**LCL**	**UCL**	***P***	**aOR**	**LCL**	**UCL**	***P***
Adult								
Sex								
Female					0.60	0.22	1.65	0.3242
Male (Reference)								
Current partner violence								
Yes	2.95	1.53	5.68	**0.0012**	2.36	1.55	3.57	**<.0001**
No (Reference)								
Cigarette smoker								
Yes	5.232	1.97	13.924	**0.0009**	10.76	5.50	21.06	**<.0001**
No (Reference)								
Mental health disorder								
Yes					0.96	0.63	1.46	0.8403
No (Reference)								
HIV Status								
Pos vs. Neg	3.06	1.54	6.074	**0.0014**	1.82	1.17	2.82	**0.0074**
Unknown vs. Neg	1.67	0.58	4.807	0.3453	1.44	0.75	2.78	0.2758
Negative (Reference)								
Child								
Disabled / delayed development								
Yes	2.03	1.02	4.05	**0.0447**	1.33	0.884	2.00	0.1712
No (Reference)								
HIV Status								
Pos vs. Neg					0.57	0.18	1.78	0.3302
Unknown vs. Neg					1.57	0.93	2.66	0.0927
Negative (Reference)								
Household								
Employed adult in household								
Yes	0.55	0.28	1.09	0.0847				
No (Reference)								
Household ran out of food during past month								
Yes					1.14	0.71	1.81	0.5922
No (Reference)								
Study Site (Dichotomized)								
Site 1 vs. Sites 2-5	2.07	0.994	4.30	0.0518	1.29	0.77	2.18	0.3341

*all variables correlated with risky drinking in Table 3, the bivariate analysis, at a p<.20 were included in the respective multivariate model for Risky Drinking identified by the AUDIT and by the AUDIT-C. aORs were not calculated for variables where the p<0.2.