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*Full Length Research Paper*

## Knowledge and risk perception of the middle-east respiratory syndrome corona virus [MERS-CoV] among Ivoirian hajj pilgrims in 2013

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The 2013 Hajj (Muslims' annual pilgrimage to Mecca) was marked by an outbreak of the middle-east respiratory syndrome coronavirus (MERS-CoV) in Saudi Arabia. In response to this threat, the Ivoirian health authorities carried out campaigns to inform and sensitize future pilgrims. Before departure to Saudi Arabia, a survey was conducted among the pilgrims to assess their level of knowledge about MERS-CoV as well as their perception concerning the risks of the illness. A cross-sectional study was carried out from September 19 to 29, 2013 at the Riviera Golf Mosque in Abidjan, a large gathering point for Hajj pilgrims. The sample size was estimated using a sampling rate of 10% on an estimated population of 4,500 pilgrim's. 460 respondents were selected using simple random sampling. A logistic regression analysis was carried out using SPSS software. Overall, 255 (55.4%) people had knowledge about MERS-CoV. Among those aware of MERS-CoV, 63.5% (162) expressed fear of contracting the illness during the Hajj. In a multivariable analysis, factors significantly associated with the fear of contracting MERS-CoV were sex (OR=0.4; CI 95% = 0.225-0.723) and participation in a MERS-CoV sensitization campaign in Saudi Arabia (OR=1.80; CI 95% = 0.980-3, 270). Ivoirian hajj pilgrims expressed great fear about contracting MERS-CoV.

**Key words:** Knowledge, middle-east corona virus, Hajj.

### INTRODUCTION

The 2013 edition of the Hajj was organized during an outbreak of the middle-east respiratory syndrome coronavirus (MERS-CoV) which was first identified in Saudi Arabia in September 2012 in two patients who

showed signs of severe pulmonary disease (Al-Ahdal et al., 2012; Sampathkumar, 2014; Zaki et al., 2012). The disease spread to several countries resulting in a total of 130 cases with 58 deaths by 20 September, 2013 (WHO,

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2013a). Many of the cases were reported in Saudi Arabia leading to dual fears of pilgrims contracting the disease and spreading it during the pilgrimage (Cauchemez et al., 2013; Khan et al., 2013; Mailles et al., 2013). In fact, during the hajj, one of the largest mass gatherings in the world, the transmission of respiratory diseases is significant due to overcrowding and population density (Abubakar et al., 2012; Ahmed et al., 2006; Al-Tawfiq et al., 2013). In response to this new threat, the World Health Organization urged states to implement reinforced surveillance and strategies geared towards informing pilgrims on measures to be taken to reduce the risks of infection and transmission of the disease (WHO, 2013b). With reference to this recommendation, the Ivorian health authorities implemented several strategies to protect future pilgrims (WHO, 2013b). This includes primarily the sensitization and early detection of cases of infection. However, the limited knowledge on the disease, and particularly on its method of transmission, the origin of the virus, the type of exposure that could lead to infection, and the lack of any available vaccine (Pebody et al., 2013; Sampathkumar, 2014; WHO, 2016) made it difficult to effectively implement the recommended measures. The Government of Côte d'Ivoire set up a special organization to allow more than 4000 people to participate in this religious ritual. These Hajj pilgrims thus benefitted from training sessions on religious aspects of the Hajj and health risks related to MERS-CoV. Prior to the pilgrims' departures to Saudi Arabia, scheduled for September 20 to 29, 2013, a survey was conducted among those departing with the aim of assessing the level of knowledge about MERS-CoV as well as their perception of the risk posed by the disease.

## METHODOLOGY

A cross-sectional study was carried out from September 19 to 29, 2013 at the Riviera Golf Mosque in Abidjan, a large gathering point for Hajj pilgrims. The sample size was estimated using a sampling rate of 10% and a non-response rate of 10%. Thus, for an estimated population of 4500 pilgrims, 500 people were to be surveyed. A random sampling was conducted using 10 daily lists of pilgrims scheduled for departure compiled by the organizers of the pilgrimage. Fifty people were chosen by random drawing each day for ten days and interviewed using a questionnaire. Each interview lasted about 15 min. Information collected covered participants' socio-demographic characteristics, the level of knowledge about MERS-CoV, and how the risk of contracting the disease is perceived. This information was used to measure the frequencies, estimate the proportions, and determine the odds ratio associated with the fear of contracting the disease and the level of knowledge.

The survey was authorized by the Ministry of Public Health and the Fight against AIDS of the Republic of Côte d'Ivoire, and all participants gave their verbal consent.

## Statistical analysis

A logistic regression model was realized to study the factors related

to the perception of risk of contracting the disease. The outcome variable was fear of contracting MERS-CoV. Univariate analysis was used to estimate crude odds ratios (OR) and 95% confidence intervals of potential predictors. The Pearson Chi-squared test was applied with a statistical significance of 5%.

In a multivariable analysis, potential predictors (age, gender, level of education, previous participation in the Hajj, sensitization about MERS-CoV, modes of transmission, existence of cases of MERS-CoV infections in Saudi Arabia, possibility of contracting the disease) were introduced as co-variable adjustments in logistics models. Model design was done through digressive selection of the predictors based on the logistic regression. Inclusion and exclusion criteria for independent variables were  $p \leq 0.05$  and  $p \geq 0.10$ . The adequacy of the final model was verified using the Hosmer-Lemeshow test to detect potential outliers by examining residuals. Table 4 shows the adjusted odds ratios and their confidence intervals at 95% as well as the P-values corresponding to the Wald Chi-squared test for each predictor included in the model. Analyses were carried out with the SPSS software version 17.0.

## RESULTS

Among the 460 subjects interviewed, 160 (34.8%) were aged 25-54 years, 233 (50.7%) were female, 265 (57.6%) had no education or primary education, 424 (92.2%) spoke Malinke, 260 (56.5%) spoke French and 410 (89.1%) had never participated in the Hajj (Table 1).

With regards to knowledge about MERS-CoV, 255 (55.4%) of respondents were aware of the disease. Information channels were the mosque (54.9%), radio (17.6%), television (14.9%) and print media (2%) respectively. Among those aware, 175 (68.6%) knew about the existence of cases in Saudi Arabia, 50 (19.6%) knew about the modes of transmission of the disease, 93 (36.5%) thought it was possible that they get the disease during the hajj. Measures to prevent the transmission of the disease were not known by 51 respondents (20%) while 79 (31%) knew at least one measure, 42 (16.5%) at least two measures, and 13 (5.1%) at least three measures. 162 respondents (63.5% of those aware of MERS-CoV) expressed fear of contracting the virus.

Results on attitudes and practices with respect to MERS-CoV showed 176 of those interviewed (38.3%) attended the sensitization campaign, 436 (94.8%) asserted that they will wear a nose mask, 444 (96.5%) said that they will wash their hands regularly with soap and water during the pilgrimage. In the event that respiratory signs did appear (cough and sneezing) during the Hajj, 172 pilgrims interviewed (37.4%) asserted that they will cover their mouths and nose with a handkerchief. 118 (25.7%) of respondents, said they will avoid close and prolonged contact with someone who has a cough or sneezes during the pilgrimage (Table 2).

With the univariate analysis, we observed that significant factors associated with the fear of contracting MERS-CoV during the hajj were related to sex and participation in a sensitization campaign on the disease and the possibility of contracting MERS-CoV in Saudi Arabia. In fact, the fear of contracting the disease during

**Table 1.** Characteristics of respondents (n= 460).

Variable	n	%
<b>Age (years)</b>		
25 - 54	160	34.8
55 - 63	150	32.6
64 and above	150	32.6
<b>Gender</b>		
Male	227	49.3
Female	233	50.7
<b>Level of education</b>		
None and primary education level	265	57.6
Secondary and University education	110	23.9
Coranic school	76	16.5
<b>Language understood</b>		
French	260	56.5
Malinke	424	92.2
Arabic	32	7.0
<b>Number of pilgrims who participated in the Hajj</b>		
No participants	410	89.1
One participant or more	39	8.5

the pilgrimage was less amongst men than in women (crude OR = 0.4; CI 95% = 0.235-0.715). This fear was stronger in pilgrims who had participated in a MERS-CoV sensitization campaign (crude OR = 2.89; CI 95% = 1.634-5.088) as well as among those who believed they could contract the disease in Saudi Arabia (crude OR = 1.77; CI 95% = 0.999-3.133). Other factors including age, the number of hajj pilgrims, the level of education, information about the existence of cases of MERS-CoV in Saudi Arabia, and knowledge about the modes of transmission were not significantly related to the fear of getting the disease (Table 3).

After adjustment, the results were the same as those of the univariate analysis. Therefore, the adjusted odds ratios were 0.4 for gender, 2.62 for participation in a sensitization campaign on MERS-CoV, and 1.80 for the possibility of contracting this disease during the hajj respectively (Table 4).

## DISCUSSION

Our study concludes that 55.4% of pilgrims were aware of MERS-CoV before embarking on the Hajj. This lack of information has also been observed in a similar study amongst the French pilgrims of whom about two-third (64.7%) was not informed of the MERS-CoV outbreak in Saudi Arabia (Gautret et al., 2013). Considering the high risk of infection during the pilgrimage (Cauchemez et al., 2013; Khan et al., 2013), recommendations were made by international health organizations to inform and sensitize all pilgrims on preventive measures (Gautret,

2013; WHO, 2013b; Kingdom of Saudi Arabia - Ministry of Health Portal, 2016). The organizers of this large religious mass gathering had to continue to disseminate information and conduct sensitization campaigns during the pilgrimage. The mosques were the best means of disseminating information to the pilgrims, surpassing classic media (television, radio, etc.) in effectiveness. In fact, training sessions, conducted in mosques, on religious practices during the Hajj offered an opportunity to inform pilgrims on health risks and particularly on MERS-CoV. The collaboration between health and administrative authorities in organizing the pilgrimage is essential because it takes into account public health issues when managing large gatherings. The level of knowledge about MERS-CoV in our study is low. In fact, less than 20% of the pilgrims were aware of the disease and knew about the methods of transmission; 20% were not cognizant of the measures to curb transmission and only 31% knew at least one preventive measure. This low level of knowledge related to the health risks during the Hajj (overcrowding, hygiene, heat) shows the magnitude of the risk of contracting MERS-CoV faced by Ivoirian Hajj pilgrims. Prior studies revealed significant risks of respiratory diseases during the pilgrimage (Abubakar et al., 2012; Ahmed et al., 2006; Al-Tawfiq et al., 2013). This low level of knowledge about MERS-CoV can be attributed to the quality of pre-pilgrimage information and sensitization campaigns. To improve this level of knowledge, information campaigns on the disease were conducted by teams of epidemiologists working for the Ministry of Health at the pilgrims gathering point before departure. The feeling of fear expressed by the pilgrims



**Table 2.** Knowledge about MERS-CoV, attitudes, and practices among pilgrims (n= 460).

<b>Knowledge about MERS-Cov*</b>	<b>Positive answers/Total answers</b>	<b>%</b>
<b>Information channel about MERS-CoV</b>		
Television	38/255	14.9
Radio	45/255	17.6
Print media	5/255	2.0
Mosque	140/255	54.9
Aware of the existence of cases of MERS-CoV in Saudi Arabia	175/255	68.6
Transmission of MERS-CoV through close contact with an infected person	50/255	19.6
Transmission of MERS-CoV through cough	50/255	19.6
The possibility of contracting MERS-CoV during the Hajj	93/255	36.5
<b>Knowledge about the measures to curb the transmission of MERS-CoV during the Hajj**</b>		
<i>Do not know any measures</i>	51/255	20
<i>One or two measures</i>	79/255	31.0
<i>Know at least two measures</i>	42/255	16.5
<i>Know at least three measures</i>	13/255	5.1
<b>Attitudes and practices on MERS-CoV</b>		
Fear of contracting MERS-CoV during the Hajj	162/255	63.5
Participated in at least one sensitization campaign on MERS-CoV	176/460	38.3
Will wear a mask during the pilgrimage	436/460	94.8
Will regularly wash hands with water and soap during the pilgrimage	444/460	96.5
<b>What to do in case cough or sneezing is noticed during the Hajj</b>		
Will limit contact with other pilgrims	34/460	7.4
Will cover mouth and nose with a handkerchief when coughing or sneezing	172/460	37.4
Will wash hands with water and soap after coughing or sneezing	39/460	8.5
Will cover mouth and nose with a mask	24/460	5.2
Will cough or sneeze into the elbows	19/460	4.1
Inform the leader about the situation	117/460	25.4
Nothing	44/460	9.6
<b>What to do when faced with a subject who coughs or sneezes during the Hajj</b>		
Avoid close and prolonged contact with such a person	118/460	25.7
Always wear a mask when around such a person	66/460	14.3
Call the attention of the leader	113/460	24.6
Nothing	41/460	8.9

\*Estimates made on subjects informed about MERS-CoV (n=255); \*\*measures: (1) regularly wash hands with soap and water, (2) cover mouth and nose with a handkerchief when coughing or sneezing, (3) avoid contact with someone with acute respiratory infection.

faced with the possibility of infection was real. More than 60% of pilgrims were afraid of contracting the disease and consequently dreaded the 2013 Hajj. The pilgrims who participated in the study were fully aware of the risk; however, they did not give up the hajj since the study was conducted at the gathering point at the airport before departure. The desire to accomplish this pillar of Islam overcame the fear of the possibility of getting MERS-CoV. Their fear was justified because this disease had caused many deaths in Saudi Arabia and was a source of international concern (Al-Ahdal et al., 2012; Assiri et al., 2013a, 2013b; Memish et al., 2013). The study shows that the fear of the disease was real among women and

people who participated in a sensitization session, and that those concerned did not exclude the possibility of contracting a MERS-CoV infection during the Hajj. This indicates that for people with this profile, it is necessary to implement actions which could assuage this fear to ensure a smooth Hajj in the event of similar threats during future years. These actions may include sensitization campaigns, providing nasal protection masks, and reinforcing hygiene measures throughout the pilgrimage.

This study had its limitations. In fact, the data were collected only among pilgrims that were part of the government's program (the largest group of Hajj pilgrims

**Table 3.** Factors associated to the fear of contracting MERS-CoV among the pilgrims: univariate analysis.

Variable	N (%)	OR*	CI** 95%	P-value
<b>Age (years)</b>				0.170
20 - 34	61(60.4)	ref		
35 - 40	56(73.7)	1.84	0.92-3.70	
41 and above	45(68.2)	1.41	0.70-2.85	
<b>Gender</b>				0.001
Male	73(57.5)	0.4	0.235-0.715	
Female	89(76.7)			
<b>Number of pilgrims who participated in the Hajj</b>				0.212
No participation	144(67.6)	1.67	0.742-3.759	
One participation and more	15(55.6)			
<b>Level of education</b>				0.372
None or primary education	77(63.6)	ref		
Secondary or University level	50(66.7)	1.14	0.60-2.19	
Koranic school	31(75.6)	1.77	0.75-4.29	
<b>Participation in a sensitization campaign on MERS-CoV: yes versus no</b>	124(74.3)	2.89	1.634-5.088	<0.001
<b>Existence of MERS-CoV cases in Saudi Arabia: Yes versus no</b>	116(67.8)	1.2	0.664-2.186	0.539
<b>Transmission of MERS-CoV by close contact with an infected person: Yes versus no</b>	34(68,0)	1,08	0555-2.098	0.822
<b>Possibility of contracting MERS-CoV in Saudi Arabia: Yes versus no</b>	69(74.2)	1.77	0.999-3.133	0.049

\* = odds ratio unadjusted. \*\* = confidence interval.

**Table 4.** Adjusted odds ratio derived from the logistic regression highlighting the associations with risk factors and the fear of contracting MERS-CoV among other pilgrims (n= 240; yes=160).

Variable	OR*adjusted	CI95%**	P-value <sup>\$</sup>
<b>Gender</b>			
Male	0.40	0.226 - 0.723	0.002
Female	ref		
<b>Participation in a sensitization campaign on MERS-CoV: Yes versus no</b>	2.62	1.454 - 4.715	0.001
<b>Possibility of contracting MERS-CoV in Saudi Arabia: Yes versus no</b>	1.80	0.980 - 3.270	0.058

\* = adjusted odds ratio; \*\* = confidence interval; \$ = Wald's test.

in Côte d'Ivoire). Those from private sector organizations were not interviewed.

## Conclusion

The fear of contracting MERS-CoV during the 2013 Hajj was significant amongst Ivorian pilgrims. Despite efforts made by Ivorian authorities, the pilgrims lacked ample knowledge of the disease. Well conducted information and sensitization campaigns before and during the pilgrimage can contribute to improving the level of knowledge of the health risks and the proper implementation of preventive measures. As the hajj is a large annual gathering, health authorities should anticipate known and emerging health risks like MERS-CoV by adopting specific strategies to fight the disease, thereby eliminating concerns and helping pilgrims

accomplish their religious duty with serenity.

## Conflict of interests

The authors have not declared any conflict of interests.

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*Full Length Research Paper*

## Assessment of substance abuse and risky sexual behaviour among female sex workers in Addis-ketema sub city, Addis-Ababa, Ethiopia

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The global burden of substance use is substantial, accounting for 8.9% of productive life lost annually due to disability and premature mortality, as measured in disability-adjusted life-years (DALYs). Among the ten leading risk factors in terms of avoidable disease burden, tobacco was fourth and alcohol fifth in 2000 and both remain high on the list in the 2010 and 2020 projections. Within any HIV epidemic, sex workers have been one of the groups most vulnerable and at risk of HIV infection due to their substance use and multiple sexual partners spanning multiple sexual networks. High rates of other sexually transmitted infections and unsafe sexual practices further increase the probability of HIV transmission in sex workers. As a result of the risks involved and their vulnerabilities. To assess the prevalence of substance use and magnitude of risky sexual behavior and its association with substance use among female sex workers in Addis-ketema sub city, Addis-Ababa, Ethiopia. Community based descriptive cross sectional study which employed quantitative approach was conducted on substance use among Addis-ketema female sex workers from April 1<sup>st</sup> to 30<sup>th</sup> 2015. Structured questionnaire was used to measure the magnitude and associated factors for substance use on a total sample size of 425 Addis-ketema sub-city female sex workers. The sample size was determined by using single population proportion formula and simple random sampling technique was used to get study subjects. Binary logistic regression analysis was carried out to see the association between each independent variable with outcome variable and then variables that showed significant association were included in a single model, and multiple logistic regressions were performed to identify the most significant predictors. This study revealed that a significant proportion (58.2%) of sex workers abused substances. Prevalence of consistent condom use among female sex workers in Addis-ketema Sub-city Addis-Ababa, Ethiopia was 28.1%. Substance use among female sex workers was significantly associated with marital status of the respondents (AOR = 0.5, 95%, CI = 0.21, 0.99), educational status of the respondents (AOR = 0.1, 95%, CI = 0.02, 0.66), monthly income (AOR = 0.6, 95%, CI = 0.27, 1.32), and risky sexual behaviour (AOR = 2.7, 95%, CI = 1.44, 5.18). The overall prevalence of consistent condom use among Addis-Ketema female sex workers was very low and the main predictors of substance use were found to be risky sexual behaviour, marital status knowledge, educational status and monthly income. Therefore, interventions targeting the predictors are recommended.

**Key words:** Substance use, risky sexual behavior, HIV/AIDS.

## INTRODUCTION

History of Substance and drug abuse is as old as history of mankind. Human beings have been using the different parts of plants as medicine for relieving different health conditions. The extent of illicit drug use is mainly seen among the female sex workers (FSW) (Lemma, 2009). In recent years, researchers have begun to explore the intersection of alcohol or drug use and sexual “risk behaviours” activities that put people at increased risk for STDs, unintended pregnancy, and sexual violence. Studies conducted indicate that drinking and illicit drug use often occurs in association with risky sexual activity (Kaiser, 2002). The global burden of substance use is substantial, accounting for 8.9% of productive life lost annually due to disability and premature mortality, as measured in disability-adjusted life-years (DALYs). Among the ten leading risk factors in terms of avoidable disease burden, tobacco was fourth and alcohol fifth in 2000 and both remain high on the list in the 2010 and 2020 projections. Tobacco and alcohol contributed 4.1 and 4.0%, respectively, to the burden of ill health in 2000, while illicit substances contributed 0.8% (Dawit et al., 2006). The Ethiopian government has identified populations who are most at-risk and/or highly vulnerable populations (MARPs) to HIV infection. MARP is defined as a group in a community with an elevated risk for HIV, often because group members engage in some form of high-risk behaviour; in some cases the behaviours or HIV sero-status of their sex partner may place them at risk (USAID, 2012). Within any HIV epidemic, sex workers have been one of the groups most vulnerable and at risk of HIV infection due to their substance use and multiple sexual partners spanning multiple sexual networks. High rates of other sexually transmitted infections and unsafe sexual practices further increase the probability of HIV transmission in sex workers. As a result of the risks involved and their vulnerabilities, HIV prevalence among female sex workers (FSWs) is often much higher than the general population (HAPCO, 2011). The epidemic continues to have a profound effect on female, male and transgender sexworkers. FSWs are 13.5 times more likely to be living with HIV than other women. In 2008, 37% of FSWs in Amhara region were found to be HIV positive (USAID 2012).

A cross-sectional survey in Adama city Ethiopia found that a high prevalence of work-related violence (59%) and alcohol abuse (51%) (Alem et al., 2006). Work-related violence was statistically significantly associated with unprotected sex with regular, non-paying partners among those who abused alcohol (OR: 6.34, 95% CI: 2.43 to 16.56) and among those who did not (OR: 2.98, 95% CI: 1.36 to 6.54). Alcohol abuse was not associated with inconsistent condom use within these partnerships,

though it may strengthen the effect of work-related violence on unprotected sex (Mooney et al., 2013). Different studies and reports tried to estimate the proportion of consistent condom use and associated factors among female sex workers. Some factors like substance use ,alcohol ,non-paying partners and taking incentives that might affect the consistent condom use, the possible factors associated with inconsistent condom use has not been assessed sufficiently yet. Thus it will be quite justifiable to strive in order to get data that inform how sex workers get exposed to unsafe sex. So that it will be possible to design effective prevention strategy. Therefore this study intends to estimate the extent of consistent condom use and associated factors among sex workers in a view to filling the gap. The objective of this study is to assess the prevalence of substance use and magnitude of risky sexual behavior and its association with substance use among female sex workers in Addis-ketema sub city, Addis-Ababa, Ethiopia, to determine the prevalence of substance use among female sex workers, to assess the magnitude of risky sexual behavior among female sex workers and to assess the association between substance use and risky sexual behavior among female sex workers.

## MATERIALS AND METHODS

The study area was in Addis-Ababa, Addis-Ketema sub city (Merkato). Merkato is the biggest open market in Africa, with 289,000 inhabitant, 2893 establishment based, home based and street based female sex workers residing in Merkato and, alot of hotel, bar, cafeteria, Tej bet ,Arake bet, Shisha bet , and brothels found in the sub city. (Addis-Ketema sub city and PSIE, 2012). A cross-sectional study was conducted to determine the prevalence of substance use and its association with risky sexual behavior among female sex workers in Addis-Ababa, Addis-Ketema sub city from April to May 2015. All establishments based, home based and street based female sex workers residing in Addis-Ketema sub city were considered for the study. Establishments based like FSWs working in hotels, bars, nightclubs, groceries, female sex workers working in their residence (brothel based), female sex workers who are working on the street and involving in a sex work during data collection were included. Females who are found in establishments like in hotels, bars, nightclubs, groceries, females found in the residence of female sex workers, on the street and who are not involving in a sex work during data collection were excluded. Sample size was determined using single population proportion formula for cross-sectional study. Taking current prevalence of khat chewing (51.9%) from study done among sex workers Adama, Ethiopia (Alem et al., 2006) to obtain maximum sample size at 95% certainty and a maximum discrepancy of  $\pm 5\%$  between the sample and the population. Adding 10% non-response rate, sample size became 425.

Regarding the sampling procedure, the sampling technique was simple random sampling based on mapping and size estimate (PSIE, 2012). Out of 715 venues of female sex workers, the venues

of the study subjects was randomly selected by assumption of three sex workers from each category of sex workers and by working with relevant governmental organizations, non-governmental organizations and members of the target group in the different venues, a list of locations where FSWs congregated was established, including the approximate number of FSWs found in each venue per day/night. Once the lists were constructed, 'time-location' clusters were used to take into account the possibility that sex workers exhibiting different behaviours might have high activity' and 'low activity' periods (considered by the study), along with the number of sex workers that were typically found at each venues on those nights.

The questionnaire for this study is developed by drawing relevant questions from guidelines and previous researches. The questionnaire addressed variables related to HIV risks demographic, socio economic and behavioural factors influencing sexual behavior. The structured questionnaire that addressed important variables was prepared in English and translated to Amharic. Another translator translated the Amharic version back into English version. Comparison was made on the consistency of the two versions. The Amharic version questionnaires was used for data collection helped both the interviewees and interviewers understand the questions and communicate easily and thereby ensured the quality of the collected data.

#### Data collection and processing

Data collection was done using a standardized, pre-coded, and pretested questionnaire; male and female interviewers were selected. The interviewers had completed high school and had some previous experience of collecting survey data. They were also trained on ways of administering the questionnaire before they started their work. Dependent variables of this study included consistent condom use, multiple sex partners and substance use. Data was entered and cleaned using Epi-Info version 3.5.3. SPSS version 21 was used for statistical analysis. Descriptive statistics was used. Bi-variate and multivariate analysis were employed in order to infer associations and predictions. Odds interval which does not contain 1 was considered statistical significance.

Ethical clearance was obtained from Haramaya university review board also permission was obtained from Addis-Ketema city Administration office, Addis-Ketema sub city health office, bar and hotel owners each of study subject was informed about the study. The data was collected at Woreda health posts (outreach sites). Data collectors was discuss the issue of confidentiality. Informed verbal and written Consent was obtain from the study subjects, the aim of study, potential benefit and risk was discussed and the questionnaires was pre coded in addition the participant has a right to refuse.

#### Operational definition

- 1) Substances: Any non-medical drugs used by study subjects such as alcohol, khat, tobacco, Cannabis, heroin, cocaine, and marijuana to alter their mood or behaviour.
- 2) Life time prevalence of smoking: The proportion of female sex workers who had ever smoked cigarettes in their life time.
- 3) Lifetime prevalence of alcohol drinking: The proportion of female

sex workers who had ever used alcoholic drinks in their lifetime irrespective of the amount and type

- 4) Life time prevalence of khat chewing: The proportion of female sex workers who had ever chewed khat in their life time.
- 5) Current prevalence of cigarette smoking: The proportion of female sex workers who are smoking cigarettes within 3 months preceding the study.
- 6) Current prevalence of khat chewing: The proportion of female sex workers who are chewing khat within 3 months preceding the study.
- 7) Current prevalence of alcohol drinking: The proportion of female sex workers who are drinking alcohol within 3 months preceding the study.
- 8) Sexual risk behavior: Sexual risk behaviours that female sex workers do. In this study it is defined as one of the following; not using condom (inconsistent use of condoms) and consistent condom use (use of a condom during every sexual encounter).

## RESULTS

### Socio-demographic characteristics of the respondents

Out of the total 380 commercial sex workers who responded to the questionnaire, 45 responses were excluded because of gross incompleteness which resulted to a response rate of 90.1%. Most (57.1%) of them were between the age of 18 and 24 years with mean age of 23.4 and standard deviation 6.4 ± years. Place of birth has similar distribution among the cities but rural areas has a smaller amount (11.6%). 58.2% were never married. Majority of the study population were Amahara 155 (40.8%) by ethnicity and the largest 272 (71.6%) were orthodox Christians by religion.

Concerning the educational status of the respondents, majority (56.1%) has attained secondary school (9 to 10 grade level) followed by primary school (1 to 8 grade level, 28.9%). About 170 (44.5%) demonstrated to earn monthly income in 2001 up to 3000 Ethiopian Birr while about 9 (2.4%) had monthly income less than 1000 Ethiopian Birr. About half (192, 50.5%) of the respondents have been working as a commercial sex worker for two to three years, whereas 49 (12.9%) have been working for five years and above. Concerning the reason for being commercial sex worker, 163 (42.9%) was due to financial problem (Table 1).

### Attitude and practice towards condom use

Almost all (373 98.2%) of the respondents think that condom prevent HIV. Concerning the expiry date, only 36 (9.5%) of them think condom could expire. Out of these,

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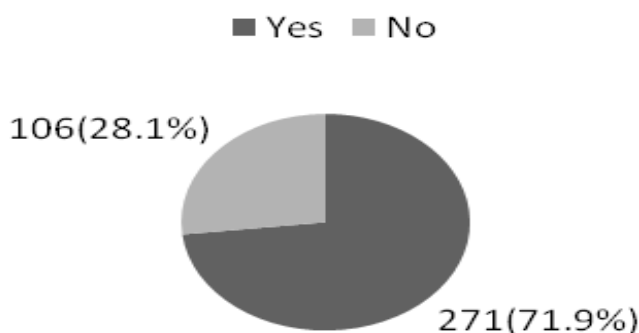
**Table 1.** Socio-demographic characteristics of the study population of female sex workers Addis-Ketema, Addis-Ababa, Ethiopia, March, 2015.

<b>Socio-demographic character</b>	<b>Frequency N = 380</b>	<b>Percent</b>
<b>Age of the respondent</b>		
<18	74	19.5
18 - 24	214	56.3
25 - 40	83	25.8
>40	9	2.4
<b>Place of birth</b>		
Regional city	116	30.5
Addis-Ababa	115	30.3
Rural city	103	27.1
Rural	46	12.1
<b>Marital status of the respondents</b>		
Never married	206	54.2
Married	50	13.2
Divorced	63	16.6
Widowed	19	5.0
Separated	42	11.1
<b>Religion of the respondent</b>		
Orthodox	268	70.5
Muslim	53	13.9
Protestant	59	15.5
<b>Ethnicity of the respondents</b>		
Amhara	155	40.8
Oromo	77	20.3
Tigri	23	6.1
Guragi	46	12.1
Wolayita	58	15.3
Hadya	21	5.5
<b>Educational status of the respondents</b>		
Illiterate	31	8.2
Primary	110	28.9
Secondary	214	56.3
Preparatory	14	3.7
College and above	11	2.9
<b>Monthly income of the respondent in birr</b>		
<1000	10	2.6
1000 - 2000	149	39.2
2001 - 3000	176	46.3
>3000	45	11.8
<b>Work experience as a sex worker in year</b>		
1 - 2	54	14.2
2 - 3	198	52.1

**Table 1.** Cont'd

3 - 5	90	23.7
>5	38	10.0
<b>Reasons for being sex worker</b>		
Financial problem	152	40.0
Death of parents	48	12.6
Divorce of parents	6	1.6
Disagreement with whom you live	89	23.4
Divorce	31	8.2
Peer pressure	54	14.2

### Consistant condom use in the last 12 month



**Figure 1.** Percentage distribution of ever had sex without condom in the last 12 months among commercial sex workers Addis-Ketema, Addis-Ababa, Ethiopia, march 2015.

8 (22.2%) have cheeked for expiry date of condom. 286 (75.3%) of the respondents did not know that putting condom on male pens without pressing (pinching) the tip of condom could cause condoms rupture, 307 (80.8%) did not know that condom exposed to sunlight could rupture easily and 290 (76.3%) did not put condom on partially erected penis because it could cause its slippage. More than half (214, 56.3%) of the respondents exclusively put condom to their clients. With regard to the reason why the clients did not put condom on their clients; I am ashamed and I do not know how to use it which reported with similar result of 29 (41.4%) (Tables 2 and 3).

#### Condom use

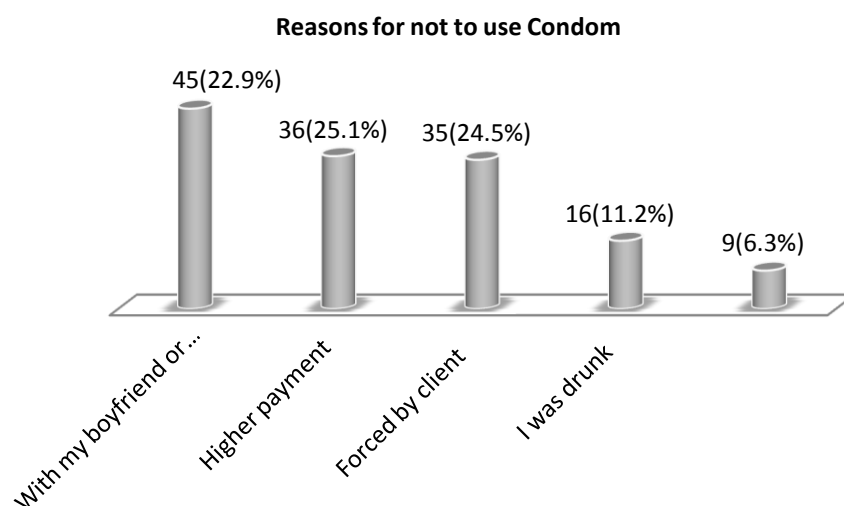
Among the respondents, it was found that 377 (99.2%) used condom, of those, 106 (28.1%) used condom

consistently in the last twelve months (Figure 1). Majority 288 (75.8%) of the respondents have boyfriend or husband. Of these, 35 (12.1%) always, 38 (13.2%) most of the time, 38 (13.2%) occasionally and 177 (61.5%) never used condom with their boyfriend or husband.

#### Reasons for not using condom

Concerning the sexual act in the last working day, more than half (201, 52.9%) of the respondents were not using condom and the main reason was that 65 (32.4%) requested higher payment, 55 (27.4%) were forced by clients, 45 (22.9%) with boyfriend or husband, 24 (11.9%) said they were drunk and 1(0.5%) condoms not available. And 179 (47.1%) of the respondents used condom. This condom was brought majority 125(69.8%) were herself, 40(22.4%) was client himself and the rest 14 (7.8%) was routinely kept in hotel (Figure 2).





**Figure 2.** Bar graph showing the distribution of the reason why not using condom by commercial sex workers Addis-Ketema, Addis-Ababa, Ethiopia, March 2015

**Table 2.** Knowledge, attitude and practice about STI/HIV of the study population of female sex workers Addis-Ketema, Addis-Ababa, Ethiopia, March, 2015.

<b>KAP towards condom use</b>	<b>Frequency N = 380</b>	<b>Percent</b>
<b>Do you think condoms prevent HIV?</b>		
Yes	374	98.4
I don't know	6	1.6
<b>Do you think condoms could expire?</b>		
Yes	36	9.5
I don't know	344	90.5
<b>Have you ever checked the expiry date of condom?</b>		
Yes	8	22.2
No	28	77.8
<b>Do you think condom which is exposed to sunlight could rupture easily?</b>		
Yes	73	19.2
I don't know	307	80.8
<b>Do you think putting condom on partially erected penis could cause its slippage?</b>		
Yes	59	15.5
No	1	0.3
I don't know	320	84.2
<b>Do you think putting condom on male penis without pressing (pinching) the tip of condom could cause condoms rupture?</b>		

Table 2. Cont'd.

Yes	88	23.2
No	2	0.5
I don't know	290	76.3
<b>Who puts a condom to your client?</b>		
Exclusively themselves	70	18.4
Exclusively myself	214	56.3
Either of us	96	25.3
<b>If you have ever put condoms to your clients why don't you put on a condom to on them?</b>		
I am ashamed of it	29	41.4
I do not like it	3	4.3
They do not ask me for it	9	12.9
I do not know how to use it	29	41.4

Table 3. Alcohol use of the study population of female sex workers Addis-Ketema, Addis-Ababa, Ethiopia, March, 2015.

Alcohol use	Frequency N = 380	Percent
<b>Have you been consuming drink containing alcohol?</b>		
Yes	193	50.8
No	187	49.2
<b>Did you get intoxicated in the last day of sexual intercourse?</b>		
Yes	73	37.8
No	120	62.2
<b>If yes, did you encounter sex without condom because of alcohol intoxication?</b>		
Yes	53	72.6
No	20	27.4
<b>In the last three months did you encounter sex without condom because of alcohol intoxication?</b>		
Yes	99	51.3
No	94	48.7

## Substance use

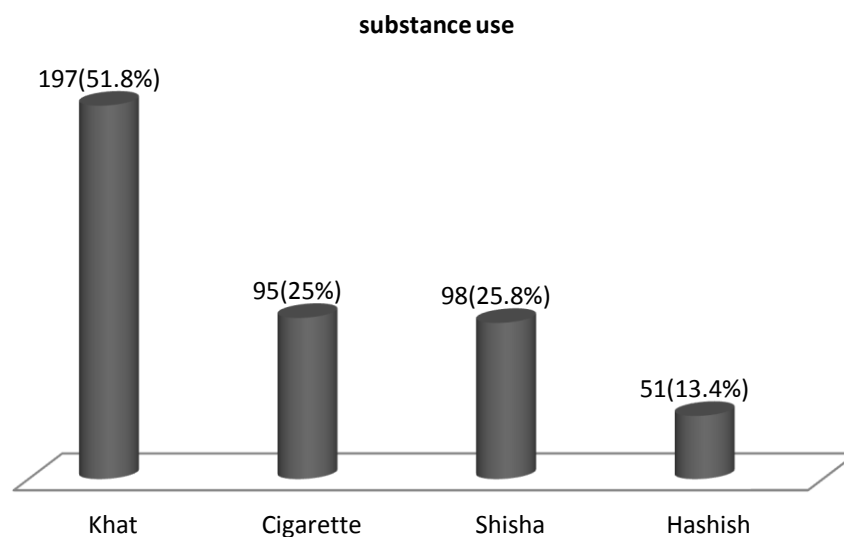
### Alcohol use

Half (193, 50.8%) of the respondents were drinking alcohol. Majority 137 (70.9%) of the respondents was drinking alcohol every day. Out of these, 73 (37.8%) was intoxicated in the last day of sexual intercourse. Majority (53, 72.6%) of these intoxicated by alcohol encountered sex without condom. Also, in the last three months, more than half 99 (51.3%) of the respondents did not use

condom because of alcohol intoxication (Table 4).

### Other substance use

On the other hand 221(58.2%) of the respondents consumed substance. The most widely used substance was khat (197, 51.8%) followed by Shisha (98, 25.8%) (Figure 3). Majority (158, 1.5%) of the respondents consumed substance every day. Out of these, almost all (197, 89.1%) consumed substance in the last day of



**Figure 3.** Percentage distribution of substance use among commercial sex workers Addis-Ketema, Addis Ababa, Ethiopia, March 2015

**Table 4.** Substance use of the study population of female sex workers Addis-Ketema, Addis-Ababa, Ethiopia, March, 2015.

<b>Substance use</b>	<b>Frequency N = 380</b>	<b>Percent</b>
<b>Have you consumed substance?</b>		
Yes	221	41.8
No	159	58.2
<b>How often have you used?</b>		
Every day	158	71.5
At least once week	5	2.3
Two to three times a week	30	13.6
Four or five times a week	9	4.1
Any time if available	19	8.5
<b>Did you consume substance in the last day of sexual intercourse?</b>		
Yes	197	89.1
No	24	10.9
<b>Did you encounter sex without condom because of substance use?</b>		
Yes	149	75.6
No	48	24.4
<b>In the last three months did you encounter sex without condom because of substance use?</b>		
Yes	154	69.7
No	67	30.3

Table 4. Cont'd.

If yes how many times?		
Once	38	24.7
Twice	53	34.4
Three times	58	37.7
Four and above	5	3.2

intercourse and 149 (75.6%) of the respondents encountered sex without condom because of substance use. Moreover, in the last three months, majority 154 (69.7%) did not use condom because of substance use (Table 5).

#### Association between predictor variable and consistent condom use

Using the binary logistic regression, an association between use of substance and socio-demographic character (age, marital status, educational status, and average monthly income) and other variables was made. This result shows there was significant difference in the marital status among those who were never married, married, divorced, widowed and separated and those who were married were 0.5 times more likely to use substance than those who were never married, divorced, widowed and separated.

With regards to educational status of the respondents, there was significant difference in the educational status among those who were illiterate, primary, secondary, preparatory and college and above and those who were illiterate were 0.1 times more likely to use substance than those who were primary, secondary, preparatory and college and above. Furthermore there was significant difference in income, those who were gaining 2001 to 3000 were 2.5 times more likely to use substance than those who were gaining <1000, and 1001 to 2000. Concerning the risky behaviour, there is a statistically significant difference. Those who have risky behaviour were 2.7 times more likely to use substance than those who have not used substance

## DISCUSSION

In this study a significant proportion (58.2%) of sex workers abused substances. This prevalence was higher than the report from female sex workers of seven urban cities of Ethiopia (12%) (Sam 2013). This difference may be due to the difference in study area and period. The findings of this study revealed that the commonly abused

drugs were Khat (51.8%), alcohol (50.7%), Shisha (25.8%), cigarette (25%) and hashish (25%). Apart from the prevalence, this is in agreement with findings in female sex workers of Adama city Ethiopia, alcohol abuse was 51% (Alem et al., 2006). A study conducted in seven urban cities concluded that unprotected sex and symptom of STI were associated with substance use (Sam 2013). Similarly this result also showed that substance use was associated with risky sexual behaviours. Those who have risky behaviour were 2.7 times more likely to use substance than those who have not used substance. Also, the association between alcohol use and inconsistent condom use among FSWs has also been documented by other studies (Chiao et al., 2006).

The overall prevalence of consistent condom use among sex workers was 28.1%. This magnitude was lower than the study conducted in seven urban centers in Ethiopia which was 88% (Sam, 2013). The major explanation for such discrepancy may be due to the difference in variation of sampling techniques of the two studies and due to time difference of research as well as the study area. The current study was not in accordance with a finding in Ethiopia 2012, where the prevalence of consistent condom use with non-regular partners was 98.4% (Witte et al., 2010). The discrepancy might be due to different reasons including variation in sampling technique. Moreover, the prevalence of consistent condom use in this study was lower than a study done in Metro Manila, Quezon City, Philippines, where a prevalence of 58% was reported (Chiao et al., 2006). This difference might be due to extreme poverty (42.9%), and family disruption (20.5%) was the common motivation to becoming a female sex worker. Also this idea was supported by a qualitative study done in china which identified that unreasonable trust toward clients, stereotypes and assumptions about customers, and financial incentives were reasons for agreeing to have sex without condoms (DKT, 2012).

#### Limitation of the study

The major limitation of this study was the nature of cross

**Table 5.** Association substance use with the selected socio- demographic characteristics and other variables within the past twelve months Addiss-Ketema sub city Addis-Ababa Ethiopia, March, 2015

Variables	Substance use		Crude OR (95% CI)	Adjusted OR (95%CI)
	Yes	No		
<b>Age of the respondent</b>				
<18	17	57	2.7 (0.65 - 11.12)	1.6 (0.05 - 2.08)
18 - 24	64	148	1.9 (0.48 - 7.12)	0.4 (0.07 - 2.53)
25 - 40	21	61	2.3 (0.57 - 9.47)	0.3 (0.05 - 1.74)
>40	4	5	1	1
<b>Marital status of the respondent</b>				
Never married	68	137	0.8 (0.42 - 1.61)	1.3 (0.56 - 3.01)
Married	7	43	5 (1.86 - 13.84) *	0.5 (0.21 - 0.99) **
Divorced	13	48	1.7 (0.74 - 3.69)	0.4 (0.16 - 1.25)
Widowed	6	13	0.9 (0.31 - 2.72)	1.2 (0.25 - 4.43)
Separated	12	30	1	1
<b>Religion of the respondent</b>				
Orthodox	82	185	0.9 (0.54 - 1.68)	1.5 (0.73 - 3.14)
Muslim	10	42	1.6 (0.72 - 3.38)	1 (0.36 - 2.79)
Protestant	14	44	1	1
<b>Educational status of the respondents</b>				
Illiterate	10	21	2.8 (0.67 - 11.52) *	0.1 (0.02 - 0.66)**
Primary	27	82	3 (0.84 - 11.11)*	0.1 (0.19 - 0.61)
Secondary	62	150	2.2 (0.62 - 7.71)	0.1 (0.03 - 0.77)
Preparatory	6	8	3.2 (0.61 - 16.31) *	0.1 (0.01 - 0.75)
College and above	1	10	1	1
<b>Monthly income of the respondent in birr</b>				
<1000	5	5	6.5 (1.18 - 35.19)*	2.1 (0.45 - 10.32)
1000-2000	41	107	3.9 (1.62 - 6.60)*	0.8 (0.35 - 1.83)
2001-3000	44	130	3.6 (1.53 - 8.77) *	0.6 (0.27 - 1.32)**
>3000	16	29	1	1
<b>Work experience as a sex worker in year</b>				
1 - 2	18	36	1.3 (0.55 - 3.09)	0.8 (0.26 - 2.42)
2 - 3	51	145	1.9 (0.89 - 3.83) *	0.6 (0.23 - 1.49)
3 - 5	22	67	1.9 (0.88 - 4.46) *	0.6 (0.20 - 1.52)
>5	15	23	1	1
<b>Risky behaviour</b>				
Yes	75	116	0.4 (1.99 - 0.67) *	2.7 (1.44 - 5.18)**
No	31	155	1	1

sectional study which may not explain the temporal relationship between the outcome variable and some

explanatory variables. The study topic by itself assesses personal and sensitive issues related to sexuality which

might have caused social desirability. Bias measurements probably could influence the output of this study. Thus, the finding of this study should be interpreted with these limitations.

## CONCLUSION

The prevalence proportion of substance use among Addis-Ketema female sex workers was 58.2%. This study revealed that the commonly abused drugs were Khat (51.8%), alcohol (50.7%), shisha (25.8%) cigarette (25%) and hashish (25%). The study also showed that 71.9% of the female sex workers were engaged in unsafe and risky sexual practices. Risky sexual behaviour, monthly income, marital status and educational status were significantly and independently associated with substance use among Addis-ketema female sex workers.

## RECOMMENDATIONS

Based on the findings of the study and understanding the nature of the sex worker:

- 1) The prevalence of consistent condom use in the study area was low; therefore the policy makers and concerned bodies should design appropriate program and strategies on consistent condom use.
- 2) Addis-Ababa health bureau should introduce condoms in the compound and strengthening information, education and communication activities through Medias, newspapers and peer group discussions collaborating with DKT-Ethiopia.
- 3) Concerned bodies better focus on interventions that deal with educational status, marital status, age, and consistent condom use need to be focused on.

## Conflict of interests

The authors declare that they have no competing interests.

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*Full Length Research Paper*

## Precarious employment and health outcomes in Sweden: A systematic review

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**This study aimed to review articles which investigated the relationship between precarious employment and health outcomes in the Swedish population at national and regional levels. Publications comparing health outcomes among permanent and precariously employed workers were accessed systematically. The results indicated that although scarce, available studies have found a relationship between precarious types of employment and health outcomes. Further research is needed to investigate health outcomes across different sub-groups of precarious employed persons to better identify which is more prone to experience worse health outcomes.**

**Key words:** Precarious employment, Sweden, health outcomes.

### INTRODUCTION

In the past decades, many developed countries have experienced an increased proportion of people under temporary employment (Tsurugano et al., 2012; ILO 2008; ILO 2011; ILO 2012). It is argued that the increase is a response to competition which in turn demands changes in supply and demand within the labour force (ILO 2008; ILO 2011; ILO 2012). Others go further to suggest that new technology has promoted the fragmentation of the production process as well as the outsourcing of certain tasks which in turn has triggered less stable employment (ILO 2008). According to the International Labour Organization, temporary employment increased in fifty five percent from 1985-2007 and deteriorated even further after the most recent economic recession (ILO 2011; ILO 2012).

Although the debate on the agreeable definition of

precarious employment goes on, consensus exists that precarious employment is characterised by strain related to high uncertainty, low income, limited social benefits and statutory entitlements and low social support (Vosko 2010). It is argued that as compared to workers in permanent employments, precariously employed workers experience difficult bargaining relations between workers and employers, low wages and economic deprivation, limited workplace rights and social protection, and powerlessness to exercise workplace rights (Benach et al., 2014). Also, precarious employment is found to be associated with poor working conditions or physically heavy work, as well as higher risk of accidents (Gash and McGinnity 2007). Overall, the majority of available literature indicates that the above mentioned features result in poor physical and mental health with

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consequences such as low productivity, absenteeism and premature retirement (Artazcoz et al., 2005; Caldbick et al., 2014; Tompa et al., 2007; Scott-Marshall and Tompa 2011; Clarke et al., 2007; Vives et al., 2013).

In Sweden, in most workplaces, there is collective agreements between unions and employers which regulate wage and working conditions (which include health and accident insurance) (LO, 2014). These agreements guarantee rules applied to everyone and establish what is considered to be a minimum acceptable in terms of employment in that sector. However, employers are free to offer even better terms. Furthermore, trade unions manage collective bargains and collective agreements in the workplace cover all employees regardless if they are members or not of a union. In Sweden, almost seventy percent of workers belong to a union, making the country one of the most unionized in Europe but also in the world (LO 2014). However, although employment rights and the overall welfare system are universal in Sweden, still precarious employment has an impact on worker's health. And due to the paucity of research in this area, this study aimed to review evidence of the relationship between precarious types of employment and health outcomes in the Swedish context. The research question is as follows: Is precarious employment associated with physical and psychological health in Sweden?

## METHODS

### Data sources and search strategy

In order to achieve the proposed objective, a series of searches were conducted using PubMed, Google Scholar, Medline, ProQuest, Scopus, JSTOR, ISI (institute of scientific information). A cross check of all the material obtained in the search engines (using specific key words such as precarious employment and physical and psychological health, flexible employment and health outcomes, Sweden) was done to make sure that all the relevant publications were captured. In this review, the following criteria were used: (a) country Sweden and (b) empirical papers published in peer review journals with focus on the relationship between precarious employment/temporary employment and health (physical and psychological) in the Swedish context (written in English only) were included. There was no limitation on age or year of study publication.

### Study selection

The review process started with the reading of abstracts and if they were not related to the review objectives, they were excluded. Other international studies on the same area were totally excluded. In addition, Swedish studies which only addressed job characteristics or ergonomics in the workplace and health outcomes without including employment conditions/arrangements were also excluded. Furthermore, letters and editorials were also excluded.

In order to achieve comprehensive results, the reviewed articles were considered for backward/forward assessment of their references and citations. In the second stage, the texts of the fully included articles were further reviewed by the author and two independent reviewers for quality assessment and data extraction.

In cases of difference between the extra invited reviewers, an additional third reviewer had the task of resolving the discrepancy. The selection process is presented using the PRISMA flowchart (Figure 1).

## RESULTS

The overall search retrieved 16 relevant articles (Figure 1). After screening for titles and abstracts, only 4 studies fulfilled the inclusion criteria.

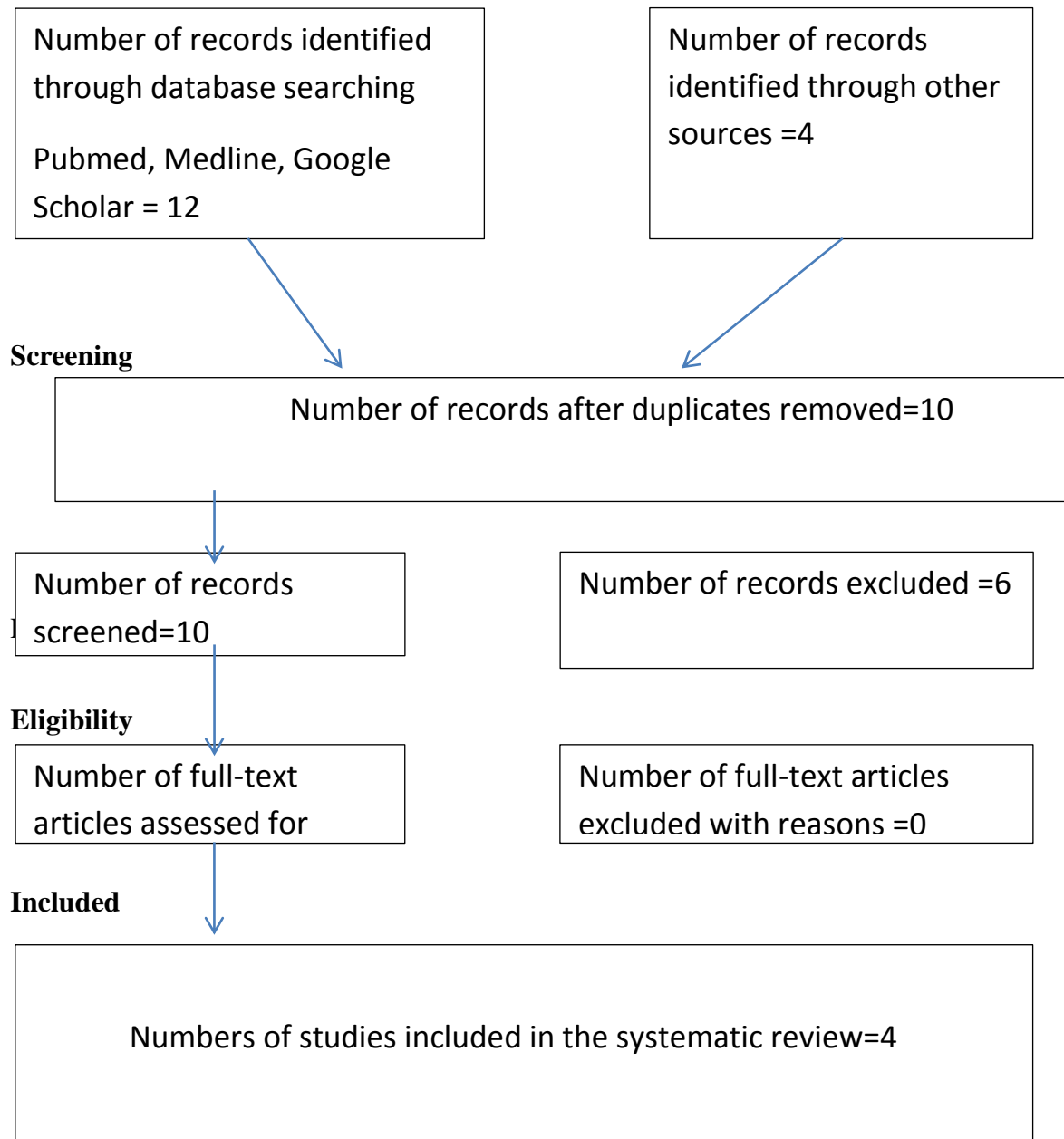
### Relationship between precarious employment and physical and psychological health outcomes

Results of the reviewed studies indicated an association between precarious employment and physical and psychological outcomes in the Swedish context. (Gustafsson et al., 2012) study showed high prevalence of temporary work among women as compared to men and that accumulated time in temporary employment was related to slightly more pronounced cortisol awakening response (CAR). Furthermore, a study by (Hammarström et al., 2011) which investigated the health consequences of temporary employment among low and higher educated persons found that self-rated health was poorest among the lower educated as compared to their high educated counterparts (Waenerlund et al., 2011). In addition, depressive symptoms were significantly higher among the low education-high exposure group, as compared to high education, low-exposure group (Waenerlund et al., 2011). However, Samuelsson et al. (2012), in their study, found no relationship between temporary types of employment and health. But the study reported an indirect link through less job control (Samuelsson et al., 2012). In another study, (Bildt et al., 2006) reported that women with temporary employment had a significantly high increase of sickness absence as compared to those permanently employed (Bildt et al., 2006).

## DISCUSSION

This review showed that there is an association between precarious employment and physical and mental health outcomes among men and women within the Swedish context (Gustafsson et al., 2012; Waenerlund et al., 2011; Samuelsson et al., 2012; Bildt et al., 2006). Furthermore, results indicated a relationship between temporary employment and absence of sickness (Bildt et al., 2006), a contrary finding from other studies that reported low-sickness absence among temporary employees (Benavides et al., 2000). In Europe (Cottini and Lucifora 2010; Robone et al., 2011; Caroli and Godard 2014) and elsewhere, precarious employment has been associated with self-reported physical and





**Figure 1.** PRISMA flowchart.

mental health (Sverke et al., 2002).

In a recent study by Moortel et al. (De Moortel et al., 2014) which investigated the links between contemporary employment arrangements and mental well-being in men and women across Europe, it was found that regardless of type of welfare state, men and women in several sub-dimensions of low employment quality were significantly associated with poor mental well-being, especially in South Europe. And the relationship persisted after controlling for job characteristics and that household income, irregular and unsocial working hours were strong predictors of poor mental health (De Moortel et al., 2014).

But in line with contradictory results of other studies outside Sweden, Samuelsson et al. (Samuelsson et al., 2012) found no direct relationship between precarious employment and health. Furthermore, in a study of eight Finish towns, (Virtanen et al. 2002) found that men and women with fixed-term employment had better self-rated health as compared to their permanent counterparts. Also, using data from the first ten waves of the British Household Panel Study, Bardasi and Francesconi (Bardasi and Francesconi 2004) reported that atypical employment did not have long-lasting detrimental effects on self-rated health of workers and in mental health

**Table 1.** Epidemiological research on the association between precarious employment and health outcomes in the Swedish context.

Reference	Design	Sample	Region	Main results
Bilt, 2006	Longitudinal: Precarious employment measured "temporary employment"	was as N=473 participants	South Sweden	Women in temporary employment conditions had a high risk of sickness absence as well as low sense of coherence
Waenerlund et al., 2011	Cross-sectional: Precarious employment measured "temporary employment Contract"	was as N=985 participants	North Sweden	Temporary employees had higher risk of non-optimal self-rated health and psychological distress
Gustavsson et al., 2012	Longitudinal: Precarious employment measured as "time in unemployment"	was as N=791 participants	North Sweden	Long-term exposure to temporary employment was associated with hypothalamic-pituitary-adrenal axis dysregulation (HPA) in form of increased dynamics of CAR and circadian suppression
Samuelsson et al., 2012	Longitudinal: Precarious employment measured "temporary employment"	was as N=877 participants	North Sweden	No direct relationship between temporary employment and health among men and women Indirect relationship of poor health status among men and women in temporary work which experienced less control at work.

between workers with fixed-term and permanent contracts. In another study, (Keuskamp et al., 2013), while pointing at strong association between casual full-time employment and poor physical health, found no significant relation between casual full-time or part-time employment and poor mental health, in a sample of Australian workers (Keuskamp et al., 2013). In this review, the samples are from one cross-sectional and three longitudinal studies carried out in Sweden's South and Northern regions (Table 1).

In addition, the studies used different categorization of precarious employment (including lack of differentiation between those who might have chosen to be in temporary employment from others who had no other choice but to be in that type of employment). In a sociological based study, Jonsson and Nyberg (Jonsson and Nyberg, 2009) characterized precarious work in Sweden into three distinct categories: (a) highly precarious work with no rights to the social security system. They argued that most workers in this group did not have right to be in the country, leaving them vulnerable in relation to their employer which ends in jobs with greater employment insecurity, low pay and poor working conditions. Many immigrant workers are in

restaurant and cleaning jobs (Jonsson and Nyberg, 2009; Fastighetsanställdas förbund, 2008; Bernhartz 2012); (b) moderately precarious work- basic rights to the social security system. This group include housewives (or home-makers) who perform unpaid work on full time bases (and are provided for by a spouse) and do not receive the allowances based on earnings. As compared to the highly precarious, this group have relatively high chances to enter the labour-market and the earnings-based social security system, and can therefore escape from their somewhat precarious situation; (c) least precarious work-full rights to the social security system (Jonsson and Nyberg, 2009). This group is comprised of registered, permanent residents who are employees.

According to Jonsson and Nyberg (2009), this group is at the top tier of social security system as well as earning benefits. But like elsewhere, some workers within this group are precarious than others due to differences in access to social rights (Jonsson and Nyberg, 2009; Fastighetsanställdas förbund, 2008; Bernhartz, 2012). In general, what is called fixed-term contract workers, many have on call and work more or less by the hour (temporary employment) (Jonsson and Nyberg, 2009).

However, some of these jobs are "leave replacement"

for people who might have leave of absence due to various reasons (Jonsson and Nyberg, 2009; Fastighetsanställdas förbund, 2008; Bernhartz, 2012).

The few available studies indicate that people employed by hour, experience the most precarious work because they have very limited possibilities for on-the-training, and they are least likely to draw attention on their working environment (Nelander and Goding, 2005). Moreover, they also experience difficulties in their private life, especially in planning their future as well as lack of control of their economic situation (Nelander and Goding, 2005; Håkansson, 2001).

One of the difficulties when analysing the relationship between precarious employment and health outcomes in Sweden is the lack of standard and consensual categorization of precarious employment. For instance ethnic minorities have high non-response rates in the four year regular surveys "Health in Equal Terms" (a survey carried out every four years to monitor population health in Sweden). This makes it difficult to predict the impact of precarious employment among this specific group.

Although, this review has found an association between precarious employment and health outcomes in Sweden, it is likely that due to the favourable labour policies as well as universal welfare state, precariously employed workers might be better off in Sweden than elsewhere in Europe. For instance in a review of the impact of welfare states on the health consequences of precarious employment, (Kim et al., 2012) reported that precarious workers in Scandinavian welfare states had better or equal health status as compared to their permanent counterparts. And being precarious worker in other welfare regimes (Bismarckian, South European, Anglo-Saxon, Eastern European and East Asian) was associated with adverse health outcomes such as poor self-rated health, musculoskeletal disorders, injuries and mental health problems. (Kim and colleagues 2012) argued that it may be that welfare state regimes act as an important mediating factor determining the health of precarious workers.

Findings of this review demonstrate the need for further research to investigate how precarious employment in Sweden affects health outcomes specifically among the different layers of precarious employees suggested by (Jonsson and Nyberg 2009). Of great importance is the need to create standardised categorizations of precarious employment which will enable researchers to compare their findings.

## Conclusions

This review showed evidence that there is a relationship between precarious types of employment and physical and psychological health outcomes within the Swedish context. But further research is needed to investigate health outcomes across different subgroups of precarious employed persons to better identify which is more prone

to experience worse health outcomes.

## Conflict of Interests

The authors have not declared any conflict of interests.

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*Full Length Research Paper*

# Prevalence of xerophthalmia and associated factors among school age children of Fadis, Oromia regional state, Eastern Ethiopia: School based cross-sectional study

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Vitamin A deficiency has long been a public health nutritional problem among children across the world, affecting mostly children in sub-Saharan African countries including Ethiopia. Vitamin A deficiency causes xerophthalmia, a range of eye conditions from night blindness to more severe clinical outcomes such as keratomalacia and corneal scars, and permanent blindness. Therefore, this study aimed to assess prevalence of xerophthalmia and associated factors among Fedis primary School children, Oromia National Regional State, Eastern Ethiopia. A cross-sectional study was conducted on randomly selected 738 children of age 6 to 12 years. Data were collected using structured interview based questionnaires and ocular examination was carried out by ophthalmologic nurse to identify xerophthalmia. The data were entered into Epi data version 3.1. and exported to SPSS version 20 for analysis. Bivariate analysis and multivariate analysis were performed. Odd ratio together with 95% CI was estimated to identify factors associated with xerophthalmia. Level of statistical significance was declared at  $p < 5\%$ . The prevalence of Bitot's spot, night blindness and xerophthalmia was 2.8% [95%CI (1.82 to 4.24%)], 14.2% [95%CI (11.85 to 16.89%)] and 14.6% [95%CI (12.2 to 17.3%)], respectively. The odds of xerophthalmia is 0.13 times less among uneducated mother/caregiver [AOR=0.13, 95%CI (0.03-0.55)]. Children whose family produce cash crop were 4.80 times more affected by xerophthalmia [AOR=4.80, 95% CI (1.55 to 14.83)]. The odds of xerophthalmia among the children from household which have no latrine is 1.92 times higher [AOR=1.92, 95% CI (1.06 to 3.48)]. In general, the prevalence of xerophthalmia was very high and remains a public health issue. Cash crop production, maternal education and availability of latrine were factors associated with xerophthalmia. Therefore, awareness creation to the community and emphasis on vitamin A rich food consumption for prevention of vitamin A deficiency was highly recommended.

**Key words:** Prevalence, Xerophthalmia, Bitot's spots, vitamin A deficiency, Night blindness, school age children.

## INTRODUCTION

Vitamin A deficiency is a major contributor to child mortality (Vitamin A global Initiative, 1997). Deficiency of

vitamin A has long been identified as a serious and preventable nutritional disease. It also contributes

significantly, even at sub-clinical levels, to morbidity and mortality from common childhood infection. Studies suggest that ill health and risk of death from some infection are also increased even in children who are not clinically deficient but, whose vitamin A body store is depleted (WHO, 1996).

Vitamin A deficiency causes xerophthalmia, a range of eye conditions from night blindness to more severe clinical outcomes such as keratomalacia and corneal scars, and permanent blindness (Imdad et al., 2010). Xerophthalmia, which includes night blindness, Bitot's spots, corneal xerophthalmia and keratomalacia, remains the leading cause of blindness among children in developing countries (McLaren and Frigg, 2001).

Though one of the main causes of xerophthalmia is poor intake of vitamin A rich foods, it is also associated with poverty, ignorance, faulty feeding habits among the entire population but young children in particular. The main underlying cause of VAD as a public health problem is a diet that is chronically insufficient in vitamin A that can lead to lower body stores and fail to meet physiologic needs (WHO, 2009).

Health of a child is a growing concern all over the world with rapid economic growth and social changes both in developed and developing parts of the world. Nutritional status during school age is a major determinant of nutritional and health status in adult life. Health hazards associated with under nutrition and micro nutritional deficiencies remain major public health problems (Nigudgi et al., 2012).

Vitamin A deficiency is a major nutritional concern in poor societies, especially in lower income countries (WHO, 2009). Vitamin A (VA) deficiency exists as a public health nutrition problem among children in 118 developing countries around the globe, with the South-East Asian Region harboring the maximum number of cases (Ahmed et al., 1997). Approximately, 250,000 to 500,000 children in the developing countries become blind each year due to vitamin A deficiency, with highest prevalence in Africa and South East Asia (Swar et al., 2014).

Eyesight is the most important source of information about one's environment and hence is the vital developmental significance. Childhood blindness has profound consequences not only for individual child, but also for the family & community. Visual impairment is a worldwide problem that has a significant socioeconomic impact (WHO, 2011). Data on the prevalence and causes of blindness and severe visual impairment in children is needed for planning and evaluating preventive, curative, special education and low vision services for children (WHO, 2011).

In Ethiopia, studies in 1990s showed that signs of

vitamin A deficiency did not show any correlation with occupation and education of head of household and household size (Wolde-Gebriel et al., 1991), malnutrition (Lemma and Mariam, 1996; Moore et al., 2013) and low income (Lemma and Mariam, 1996). There are no up to date literatures in survey area and even a country literatures on exophthalmia are scarce

## MATERIALS AND METHODS

School based cross sectional study was carried out from April 15, 2015 to May 15, 2015 among school age children in Fedis woreda. Fedis woreda is one of the 19 Woredas of East Hararghe zone which is 545 km away from Addis Ababa and 20 km from Harar town. The woreda has 2 urban and 17 rural kebeles. The total population in the woreda is 140316. The woreda has 1 preparatory school, 1 secondary school, 57 rural and 2 urban primary schools.

Sample size was determined by using a single population proportion formula which took the following assumptions into consideration. Proportion of school age children with VAD to be 10.7% (Asrat et al., 2002), 95% level of confidence ( $Z=1.96$ ); 3% marginal error ( $d = 0.05$ ), design effect 1.5. The sample size was calculated by using EPI INFO computer Software version 3.5.1 and non-response rate of 10% was considered. The final sample size was 738. After the lists of school students were obtained from primary school, systematic sampling method was employed. Finally, 738 participants were included in the study with non-response rate of 10%.

Mothers or immediate care takers of study subject, those who live within the kebele of selected school were invited to the school for data collection day. The data was collected using structured questionnaire prepared by reviewing prior study and other materials on the topic. This questionnaire has six parts such as: part one: socio-demography of child, part two: socio-demography of parent, part three: mother's/care takers information about health and nutrition, part four: the dietary pattern of child, part five: history of child night blindness and part six: clinical (sign and symptoms of xerophthalmia). The data collection team was comprised of seven (7) members, four (4) clinical nurse, two (2) public health officer field supervisors and one (1) research supervisor. The data collectors for interviewing and clinical examination were clinical nurses (ophthalmologist), who have had experience of working in health facilities for more than 5 years. Data were entered into EPI data version 3.1 and exported to SPSS version 20.0 software package for analysis. The data were analyzed using both binary and multiple logistic regressions to determine the effect of various factors on the outcome variable and to control confounding effect. The results were presented in the form of tables, figures and text using frequencies and summary statistics such as mean, standard deviation and percentage to describe the study population in relation to relevant variables. The degree of association between independent and dependent variables were assessed using odds ratio with 95% confidence interval.

Ethical approval was obtained from Institutional Health Research Ethics Review Committee (IHERC), Haramaya University, College of Health and Medicine Science. Supportive official letter was obtained from Zonal, Woreda Education Office and from selected school directors, respectively. Additionally, written consent was obtained from each study subject's guardians before proceeding to

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**Table 1.** Socio-demographic characteristics of children and their parents/caregivers of Fedis primary school children, Fadis, Eastern Ethiopia, April 15, to May 15, 2015 (n= 738).

<b>Variables</b>	<b>Frequency</b>	<b>Percent</b>
<b>Sex</b>		
Male	452	81.2
Female	286	38.8
<b>Children age</b>		
6-8 years	296	40.1
9-10 years	309	41.9
11-12 years	133	18.1
<b>Respondent</b>		
Father	392	53.1
Mother	346	46.9
<b>Ethnicity</b>		
Oromo	720	97.6
Amharic	15	2.0
Others	3	0.4
<b>Religion</b>		
Muslim	703	95.3
Christian	35	4.7
<b>Father education</b>		
Illiterate	711	96.3
Literate	27	3.7
<b>Mother education</b>		
Illiterate	727	98.5
Literate	11	1.5
<b>Father occupation</b>		
Farmer	729	98.8
Daily Laborer	5	0.7
Employed	4	0.5
<b>Mother occupation</b>		
Housewife	732	99.2
Merchant	3	0.4
Employed	3	0.4
<b>Climatic zone</b>		
Lowland	291	39.4
Highland	447	60.6
<b>Head of household</b>		
Father	723	98.0
Mother	15	2.0
<b>Farm size</b>		

Table 1. Contd

less than half an hectare	260	35.2
Greater than half an hectare	478	64.8
<b>Harvest cash crops</b>		
Yes	721	97.7
No	17	2.3
<b>Types of cash crops</b>		
Khat	724	98.1
Coffee	14	1.9
<b>Livestock</b>		
Yes	734	99.5
No	4	0.5
<b>Milk livestock</b>		
Yes	537	72.8
No	201	27.2
<b>Household Annual Income</b>		
Less than 1000	661	89.6
1000-1500	27	3.7
Greater than 1500	50	6.8

data collection. The consent form of the questionnaire was read to each participant, and the participants who agreed were included in the study and all this consent procedure were documented on each questionnaire. Confidentiality was assured before conducting the data collection. Voluntary verbal consent was obtained since the study does not adversely affect participants' rights and welfare. This procedure of voluntary verbal consent was approved by institutional Health Research Ethics Review Committee (IHERC), Haramaya University, College of Medicine and Health science.

## RESULTS

### Socio-demographic characteristics

From all the 738 respondents selected, all were included in the analysis giving a response rate of 100%. The mean age of the respondents was 8.92 years ( $SD \pm 1.675$ ). Majority of the respondents were male 452 (81.2%), Muslims by religion 703 (95.3%), Oromo by ethnicity 310 (97.6%). Concerning the parents' education, 648 (81.4%) fathers and 711 (96.3%) mothers of respondents were illiterate. Two hundred and ninety one (39.4%) of the children were living in lowland, whereas 447 (60.6%) were living in highland. Great majority (98%) of households were headed by father and similarly, great majority (97.7%) of household produced cash crops and

greater than one-third (35.2%) of households own half or less hectares of farm land (Table 1).

### Mothers/care taker's awareness on nutrition and child feeding pattern

With regards to mothers/care giver, two hundred and twenty eight (30.9%) of the mothers/care giver had health education on nutrition, and only one-third of the mothers/care givers knew that vitamin A deficiency is a preventable cause of night blindness, while 222 (30%) of them know vitamin A rich food sources.

Concerning feeding practice of children, most respondents 488(66.1%) gives milk to their children every day and 306 (27.9%) of them give their children milk 1-2 times per week. Majority of the respondents 376 (50.9%) reported that they did not feed their child with animal products (meat/eggs). Nearly one tenth of the mothers/care taker (11.1%) give their child fruit every day, while 62.7% of them never give fruit to their children. And, 306 (41.5%), 333 (45.1%), 164 (22.2%), and 276 (37.4%) of the respondents fed their children with vegetable and legumes, 1-2 times per week and once every month, respectively. Nearly two third (67.5%) of the household did not have latrine (Table 2).

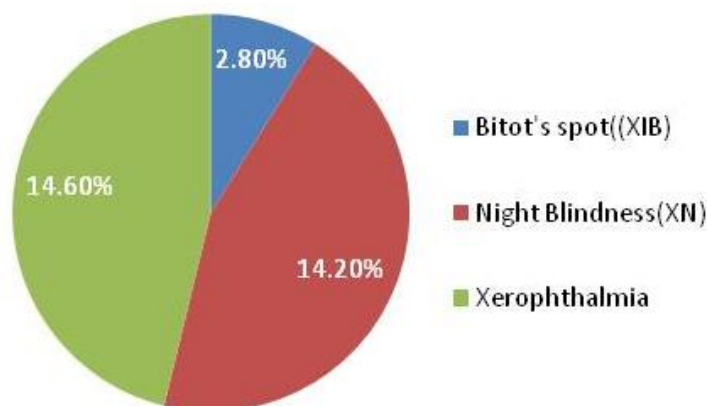


**Table 2.** Mother's/care taker's awareness on nutrition and child feeding pattern of Fedis primary school children, Fedis, Eastern Ethiopia, April 15, 2015 to May 15, 2015 (n= 738).

<b>Variable</b>	<b>Frequency</b>	<b>Percent</b>
<b>Got health education on nutrition</b>		
Yes	228	30.9
No	510	69.1
<b>Know VAD is preventable</b>		
Yes	224	30.4
No	514	69.6
<b>Know causes of VAD</b>		
Yes	253	34.3
No	485	65.7
<b>Know Vitamin A rich food sources</b>		
Yes	222	30.1
No	516	69.9
<b>Milk consumption</b>		
everyday	488	66.1
1-2 times per week	206	27.9
Once Per month	31	4.2
Never	13	1.8
<b>Eat animal product(Meat/EGGS)</b>		
Every day	47	6.4
1-2times per week	126	17.1
Once every month	189	25.6
Never	376	50.9
<b>Eating fruits</b>		
Every gay	82	11.1
1-2 per week	193	26.2
Never	463	62.7
<b>Eat vegetables</b>		
Once everyday	82	11.1
1-2 times a week	306	41.5
Once every month	333	45.1
Never	17	2.3
<b>Eating legumes</b>		
Every gay	164	22.2
1-2 per week	276	37.4
Never	298	40.4
<b>Sources of drinking water</b>		
Public tap	19	2.6
Pond	719	97.4
<b>Have latrine</b>		
Yes	240	32.5
No	498	67.5

Table 2. Contd

Child has infectious disease		
Yes	8	1.1
No	730	98.9



**Figure 1.** Prevalence of xerophthalmia among Fedis primary school children, Fadis, Eastern Ethiopia, April 15, 2015 to May 15, 2015 (n=738).

### Prevalence of xerophthalmia

The prevalence of Bitot's spot, night blindness and xerophthalmia was 2.8 [95%CI (1.82-4.24%)], 14.2 [95%CI (11.85-16.89%)] and 14.6% [95%CI (12.2-17.3%)], respectively (Figure 1).

### Factors associated with xerophthalmia

The result of binary logistic regression showed that among socio-demographic and information of parents of the child, household crop production, farm size, got health education, mother education, knowing source of vitamin A, eating fruit and vegetables and having latrine was significantly associated with xerophthalmia. Sex, age, head of household and household income was not statistically associated with xerophthalmia (Table 3).

### Multivariate analysis of factors associated with xerophthalmia

Variables with p-value <0.05 during bivariate analysis were taken for multiple logistic regression and the result of multiple logistic regression showed that variables: mother education, availability of latrine and harvesting cash crop have an association with xerophthalmia.

The odds of xerophthalmia is 0.13 times less among uneducated mother/caregiver when compared with mother/

caregivers with some educational background [AOR=0.13, 95%CI (0.03-0.55)]. Households that produce cash crop were 4.80 times more affected by xerophthalmia than those who do not produce cash crop [AOR=4.80, 95% CI (1.55-14.83)]. In this study, the odds of xerophthalmia among the children from household which have latrine is 1.92 times higher when compared with children household without latrine [AOR=1.92, 95% CI (1.06-3.48)] (Table 4).

### DISCUSSION

In this study, the prevalence of xerophthalmia among school children was assessed. The overall prevalence of xerophthalmia in school children was found to be 14.6% which is much more higher than that of the study conducted in Jimma town which was 0.6% (Getaneh et al., 2000) and study conducted in Arsi Zone, Ethiopia and Southeastern Asia which was 10.7% (Asrat et al., 2000) and 10.9% (Singh and West, 2004), respectively. But it is less than that of the study conducted in Bushulo South Ethiopia which was 20% (Moore et al., 2013).

This study showed that maternal education has unexpected negative association with xerophthalmia. The odds of xerophthalmia are 87% less likely among uneducated mother/caregiver when compared with mother/caregivers with some educational background.

This is consistent with study conducted in Republic of Benin (Reed et al., 1996). It could be that maternal

**Table 3.** Bivariate analysis of factors affecting xerophthalmia among Fadis primary school children, Fedis, East Ethiopia, April 15, 2015 to May 15, 2015 (n= 738).

Variables	Xerophthalmia		Chi-square( $\chi^2$ )	p-value
	Yes	No		
<b>Age</b>				
6-8	41	260	1.99	0.37
8-10	43	265		
Greater than 10	24	105		
<b>Sex of child</b>				
Male	62	390	0.79	0.37
Female	46	240		
<b>Household Head</b>				
Mother	103	620	4.28	0.05
Father	5	10		
<b>Household income</b>				
Less than 1000	99	562	0.61	0.74
1000-5000	3	24		
Greater than 5000	6	44		
<b>House hold land size</b>				
less than half an hectare	46	214	3.00	0.08
Greater than half an hectare	62	416		
<b>Household Cash crop production</b>				
Yes	100	621	14.64	0.001
No	8	9		
<b>Got health education on nutrition</b>				
Yes	19	209	10.49	0.001
No	89	421		
<b>Mother educational status</b>				
Illiterate	102	625	14.24	0.002
Literate	6	5		
<b>Know source of Vitamin A</b>				
Yes	18	204	10.82	0.001
No	90	426		
<b>Consume fruits and vegetables</b>				
Every day	8	74	9.24	0.01
One to two times a week	59	247		
Never	41	309		
<b>Having functional latrine</b>				
Yes	20	220	11.30	0.001
No	88	410		

education enabled women to participate in activities outside the home without simultaneously ensuring adequate child care.

Households who produce cash crop were 4.80 times more affected by xerophthalmia than those that do not produce cash crop. This might also be related to poor utilization of crop and lay emphasize on marketing and

dark green leafy vegetables grown in the area usually sold to the nearest town and not consumed locally. This finding coincided with the study conducted in Wukro, Ethiopia (Kassaye et al., 2001) and India (Dhadave et al., 2013).

In this study, the odds of xerophthalmia among children from household which have latrine is 1.92 times higher

**Table 4.** Multiple logistic regression analysis of factors associated with xerophthalmia among Fedis primary school children, Fadis, Eastern Ethiopia, April 15 to May 15, 2015. (n= 738).

Variables	Xerophthalmia		
	Yes	No	AOR (95CI)
<b>Age</b>			
6-8	41	260	1
8-10	43	265	0.76(0.44-1.31)
greater than 10	24	105	0.95(0.05-1.79)
<b>Sex of child</b>			
Male	62	390	0.76(0.49-1.17)
Female	46	240	1
<b>Farm size</b>			
less than half an hectare	46	214	1.10(0.67-1.74)
Greater than half an hectare	62	416	1
<b>Household Cash crop production</b>			
Yes	100	621	<b>4.80(1.55-14.83)*</b>
No	8	9	1
<b>Got health education on nutrition</b>			
Yes	19	209	1
No	89	421	1.02(0.20-5.25)
<b>Mother educational status</b>			
Illiterate	102	625	<b>0.13(0.03-0.55)*</b>
Literate	6	5	1
<b>Know source of Vitamin A</b>			
Yes	18	204	1
No	90	426	2.10(0.42-10.90)
<b>Consume fruits and vegetables</b>			
Every day	8	74	1
One to two times a week	59	247	1.31(0.25-3.31)
Never	41	309	0.64(0.25-1.62)
<b>Having functional latrine</b>			
Yes	20	220	1
No	88	410	<b>1.92(1.06-3.48)*</b>

when compared with children from household which have no latrine. This is consistent with the study reported in India (National Nutrition Monitoring Bureau, 2006; Laxmaiah et al., 2013) where xerophthalmia is significantly lower among children from household having latrine when compared with those from household without latrine. Age, sex, consumption of green vegetables and fruits and maternal awareness on benefits of vitamin A does not explain xerophthalmia.

## CONCLUSIONS

In general, the prevalence of xerophthalmia was very high and remains a public health issue in this study. Household crop production, maternal education and availability of latrine are factors associated with xerophthalmia. Therefore, awareness creation to the community and emphasis on vitamin A rich food consumption for prevention of vitamin A deficiency is

highly recommended. Effective vitamin A deficiency prevention strategies like supplementation, fortification and diversification of diet should be employed to prevent vitamin A related ocular and other disorder among school aged children.

### Conflict of interests

The authors have none to declare.

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## Full Length Research Paper

# Epidemiology of *Campylobacter* species in poultry and humans in the four agricultural zones of Sokoto State, Nigeria

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A study was conducted to establish the epidemiology of *Campylobacter* species in the four agricultural zones of Sokoto. A total of 798 (506 cloacal and 292 fecal) swabs from poultry and humans respectively were screened and analyzed using standard culture isolation technique and biochemical characterization. A total of 152 (30%) and 160 (55%) were positive for *Campylobacter* spp. in poultry and humans respectively. The prevalence rates of 53, 28, and 18% were for *Campylobacter coli*, *Campylobacter lari* and *Campylobacter jejuni* in poultry while 39, 37 and 24% were for *C. coli*, *C. lari* and *C. jejuni* in humans, respectively. The prevalence rate of 30% was recorded in both chicken and guinea fowl, while 14, 56 and 50% were found in pigeon, ducks and turkey, respectively. The prevalence rates were slightly higher in males than females in both poultry and humans. There was no significant statistical association ( $P>0.05$ ) between prevalence rate and species. The prevalence in agricultural zones revealed 42, 39, 28 and 13% in Gwadabawa, Isah, Sokoto and Tambuwal, respectively in poultry, while in humans, 65, 25, 50 and 70% were recorded in the same order. There was no significant statistical association ( $P>0.05$ ) between prevalence rate and sex, but the association between prevalence and zones were statistically significant ( $P<0.05$ ) in both poultry and humans. Poultry in the state have been shown to harbor *Campylobacter* spp. and may serve as reservoir of infection for humans. Humans independent of age and sex, were infected with *Campylobacter* spp.. The transportation of poultry together with humans in the same truck while moving birds from different locations to live bird markets should be discouraged. Adequate environmental sanitation and strict hygiene measures should be implemented in the poultry slaughter slabs and processing units in the state.

**Key words:** *Campylobacter* species, poultry, humans, agricultural zones, Sokoto State, Nigeria.

## INTRODUCTION

*Campylobacter* species (formerly *Vibrio fetus*) were first associated with diseases of cattle and sheep at the beginning of 20th century. They are small curved or spiral-shaped gram negative bacilli that exhibit rapid

darting and spinning motion (WHO, 2002). They are neglected zoonotic disease agents with an increased frequency of isolation from man, food, water, animals and their products (Salihu et al., 2010; Ugboma et al., 2013).

The economic loss due to *Campylobacter* infection poses a challenge to food and livestock industries as they usually colonize the gastrointestinal tract of birds causing diarrhea, less feed conversion ratio, decrease egg production and mortality in day old chicks (Butzler, 2004; Ruiz-Palacios et al., 1981). The rate of infection in poultry is affected by seasons and the type of production system (Kapperud et al., 1993; Wallace et al., 1997). Thermophilic *Campylobacter* spp., mainly *Campylobacter jejuni* and to a lesser extent *Campylobacter coli* have been recognized as the most common bacteriological causes of gastroenteritis in animals and humans worldwide (Jones et al., 1931). The gastroenteritis caused by these species is associated with abdominal pain and discomfort which sometimes persist even after the diarrhea has stopped (Jones et al., 1931). Humans acquire infection through handling and consumption of undercooked poultry meat. However, in the developing countries more cases of infection in children have been associated with poor hygiene (Coker et al., 2002). Other risk factors include the consumption of food and water contaminated with untreated animal or human waste in addition to close proximity and contacts with farm animals (Coker and Adefeso, 1994; Cools et al., 2003; Lindmark et al., 2009). Cost implication of treatment, in addition to increased resistance of these *Campylobacter* spp. to antimicrobial agents has been a concern in public health and disease control (Hein et al., 2003; Tollefson et al., 1999).

The aim of this study was to establish the prevalence of *Campylobacter* species in poultry and humans in the four agricultural zones of Sokoto State, Nigeria.

## MATERIALS AND METHODS

### Ethical approval

The research was approved by the Ethical Committee of the Faculty of Veterinary Medicine, Usmanu Danfodiyo University, Sokoto. Ethical clearance was obtained from the Ministry of Health, Usman Farouk Secretariat Sokoto, Sokoto State.

### The study area

The study was carried out in Sokoto State, which is located in the extreme Northwestern Nigeria and lies between the latitudes 12°N to 58°N and longitudes 4.8°E to 6.54°E with annual average temperature of 28.3°C. The 23 Local Government Areas have been grouped into 4 agricultural zones (MANR Sokoto, 2000). The state shares boundaries with Zamfara State to the East, Republic of Niger to the North and Kebbi State to the West.

### Sample size determination

The minimum sample size for this study was determined by the

formula  $N = Z^2 p(1-p)/d^2$  (Thrusfield, 2005), where N=Sample size; Z=the score for a given interval which is 1.96 (S.E) at 95% confidence interval; P= known or estimated prevalence; d=5% level of precision. The prevalence rate of 38.8% in birds in Sokoto was used for poultry (Salihu et al., 2009) while 20% was estimated for humans. With the known prevalence, the minimum calculated sample size (n) required for the study in birds was  $1.96^2 \times 0.39 \times 0.61/0.05^2 = 365$ , while the minimum sample size required for humans was  $1.96^2 \times 0.20 \times 0.80/0.05^2 = 245$ .

### Sampling in poultry

A minimum of one Local Government Area (LGA) was randomly selected from each of the four Agricultural zones of the state. Visits were made to live bird markets in each of the selected LGAs to seek approval and cooperation from the authorities of the market union and estimate the number of birds that were presented for sales and slaughter during the market days. For each of the live bird market, visits were made once in every 2 weeks to avoid repeat sampling as birds presented for sales are usually transported from one live bird market to another and at least 40% (2 in every 5) of birds counted were sampled at each visit. In zone that has slaughter slab/processing points, cloacal swabs were collected outside the two weeks that samples were routinely collected from the market to avoid sampling same birds twice at both sales and slaughter unit.

### Sampling in humans

Visits were made to the randomly selected hospitals in the Local Government Areas (LGAs) selected from each agricultural zone. Introductory letters from the hospital service management board were presented to the Chief Medical Officers of the selected hospitals. Convenient sampling technique was used in the collection of faecal swabs after the assigned health workers have explained the purpose of the study to the patients and such consented.

### Sample transportation and processing

The samples were placed in Amies transport media (CMO425, Oxoid), kept cold with the use of ice pack (Butzler, 2004) and transported to the Veterinary Public Health Laboratory, Faculty of Veterinary Medicine, Usmanu Danfodiyo University Sokoto for analyses. Samples were plated directly onto modified Charcoal Cefaperazone Deoxycholate Agar (mCCDA) and incubated at 42°C for 48 h under microaerophilic condition generated by Campygen® (Oxoid, BR0056) in the anaerobic jar (Butzler, 2004).

### Identification of *Campylobacter* spp.

The plates were examined for typical *Campylobacter* colonies, characterized by creamy or white, greyish, moist, flat or slightly raised extending along the streak line, or regular circular discrete colony (Atabay and Corry, 1998). All the distinct pure colonies were gram-stained and isolates were identified to species level using the standard *Campylobacter* spp. phenotypic identification tests (Atabay and Corry, 1998; Barrett et al., 1988; Quinn et al., 1994).

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**Table 1.** Prevalence of *Campylobacter* species in Humans and Poultry in Sokoto State.

Sample source	Total sampled	Total + (%)	<i>C. jejuni</i> (%)	<i>C. coli</i> (%)	<i>C. lari</i> (%)
Humans	292	160 (55)	38 (24)	63 (39)	59 (37)
Poultry	506	152 (30)	29 (19)	79 (52)	44 (29)
Total	798	312 (39)	67 (21)	142 (46)	103 (33)

**Table 2.** Prevalence of *Campylobacter* species in different Species of Poultry in Sokoto State.

Species	Total sampled	Total positive (%)	<i>C. Jejuni</i> (%)	<i>C. coli</i> (%)	<i>C. lari</i> (%)	$\chi^2$ value	P value
Chicken	400	119 (30)	23 (19)	62 (50)	34 (29)	8.106	0.0878 (P>0.05)
G/fowl	67	20 (30)	3 (15)	10 (50)	7 (35)		
Pigeon	21	3 (14)	2 (67)	0	1 (33)		
Duck	16	9 (56)	0	7 (78)	2 (22)		
Turkey	2	1 (50)	1 (100)	0	0		
Total	506	152 (30)	29 (19)	79 (52)	44 (29)		

G/fowl: Guinea fowl.

**Table 3.** Prevalence of *Campylobacter* species in male and female birds in Sokoto State.

Sex	Total sampled	Total+ (%)	<i>C. jejuni</i> (%)	<i>C. coli</i> (%)	<i>C. lari</i> (%)	$\chi^2$ value	P value
Male	257	84 (32)	17 (20)	44 (52)	23 (27)	2.315	0.1281
Female	249	66 (27)	11 (17)	35 (53)	20 (30)		P>0.05
Total	506	150 (30)	28 (19)	79 (52)	43 (29)		-

### Statistical analysis

The results obtained were presented in tables and percentages. Chi-square ( $\chi^2$ -test) was used to determine any significant statistical association between *Campylobacter* prevalence in poultry and humans with some categorical variables such as species, sex, and agricultural zone.

### RESULTS

Out of the 798 samples analyzed, 506 were from poultry and 292 from humans. A total of 312 samples were positive for *Campylobacter* spp.; 152 (30%) and 160 (55%) in poultry and humans, respectively. The prevalence rates of 52, 29 and 19% were for *Campylobacter coli*, *Campylobacter lari* and *C. jejuni*, respectively in poultry while 39, 37 and 24% were for *C. coli*, *C. lari* and *C. jejuni*, respectively in humans (Table 1). The prevalence rate of 30% was recorded in both chicken and guinea fowl while 14, 56 and 50% were for pigeon, ducks and turkey, respectively (Table 2). In chicken, *C. coli* had the prevalence rate of 50% which is higher than 29 and 19% recorded for *C. lari* and *C. jejuni*, respectively. *C. coli* also recorded high rates in guinea fowl and ducks with 50 and 78%, respectively (Table 2).

In poultry, 84 (32%) and 66 (27%) prevalence rates were recorded for males and females, respectively while in humans, 70 (56%) and 89 (55%) were positive for males and females, respectively (Tables 3 and 4). *C. coli* had a higher prevalence rates than other species of *Campylobacter* in both male and female poultry. In humans, the same prevalence rates were recorded for *C. coli* and *C. lari* in males while *C. coli* had higher rate than others in female (Table 4). The zonal prevalence revealed 42, 39, 28 and 13% in Gwadabawa, Isah, Sokoto and Tambuwal zones, respectively in poultry while in humans, 65, 25, 50 and 70% were recorded in the same order (Tables 5 and 6). There was no significant association (P>0.05) between prevalence rate, species and sex in both poultry and humans, but the association (P<0.05) between prevalence and zone were statistically significant.

### DISCUSSION

The prevalence of *Campylobacter* spp. in both poultry and humans has been established in the study area. The 30% prevalence rate in poultry was lower than 38.8% recorded in indigenous chicken in Sokoto by Salihu et al. (2009). The reduced rate could be an indication of



**Table 4.** Prevalence of *Campylobacter* species in males and females humans in Sokoto State.

Sex	Total sampled	Total+ (%)	<i>C. jejuni</i> (%)	<i>C. coli</i> (%)	<i>C. lari</i> (%)	$\chi^2$	P value
Male	126	70 (56)	14 (20)	28 (40)	28 (40)	0.00218	0.9628
Female	161	89 (55)	24 (27)	34 (38)	31 (35)		P>0.05
Total	287	154 (54)	38 (25)	62 (40)	59 (38)		

Sex was not indicated in 5 faecal samples

**Table 5.** Prevalence of *Campylobacter* species in poultry in the selected Zones/Local Government Areas of Sokoto State.

Zone	LGA	Total sampled	Total+ (%)	<i>C. jejuni</i> (%)	<i>C. coli</i> (%)	<i>C. lari</i> (%)	$\chi^2$ value
Sokoto	S. North	156	42 (27)	7 (17)	19 (45)	16 (36)	19.795
	Dange Shuni	116	33 (28)	14 (42)	11 (33)	8 (24)	
Gwadabawa	Illella	63	20 (32)	3 (15)	13 (65)	4 (20)	P=0.0014
	Silame	43	22 (51)	0	18 (82)	4 (20)	
Tambuwal	Yabo	53	7 (13)	0	3 (43)	4 (57)	P < 0.05
	Tambuwal	-	-	-	-	-	
Isah	Wurno	75	29 (39)	5 (17)	17 (58)	7 (24)	
	Rabah	-	-	-	-	-	
Total		506	153	30	82	43	

**Table 6.** Prevalence of *Campylobacter* species in humans in the selected Zones/Local Government Areas of Sokoto State.

Zone	LGA	Total sampled	Total+ (%)	<i>C. jejuni</i> (%)	<i>C. coli</i> (%)	<i>C. lari</i> (%)	$\chi^2$ value
Sokoto	S. North	-	-	-	-	-	18.321
	Denge Shuni	158	79 (50)	35 (44)	23 (29)	21 (26)	
Gwadabawa	Illella	49	32(65)	3(9)	13 (41)	16 (50)	P=0.0004 P <0.05
	Silame	-	-	-	-	-	
Tambuwal	Yabo	-	-	-	-	-	
	Tambuwal	61	43 (70)	0	25 (58)	18 (42)	
Isah	Wurno	-	-	-	-	-	
	Rabbah	24	6 (25)	0	1 (17)	5 (83)	
Total		292	160	38	66	60	

increased awareness and improved environmental sanitation at backyard poultry houses at different homes, live bird markets and poultry farms. The prevalence rate in poultry was also in agreement with that of Uaboi-Egbenni et al. (2008) that recorded 33% prevalence rate in Lagos. However, it differs with the high prevalence rates of 94.2 and 89% recorded by Workman et al. (2005) and Georgios et al. (2004) in chicken meat and faeces, respectively. The similarities and variations in the prevalence rates could be a reflection of environmental

contamination, however, other factors such as stock density, season, feeding regimen and geographical location have been proposed to account for significant differences and similarities in the isolation rates (Mary et al., 2004; Stern, 1994).

The rate of prevalence among species of poultry was high in ducks, which is a water fowl. Ducks are known to tip up on the surface of shallow water or submerge completely and swim under the water in search of food. They get infected especially when the ground water is

contaminated with *Campylobacter* spp. (Savill et al., 2001). The low prevalence rate recorded in chicken might be linked to the free range system which is common in the study area as coprophagy which enhances bird to bird spread is limited. This can be supported by findings of Robino et al. (2010) with a *Campylobacter* spp. prevalence rate of 78.4% in intensively reared poultry and 18.3% in small scale rural poultry farming in Italy. The prevalence rates in pigeon, turkey and guinea fowl also revealed the possibilities of infection through feeds as they usually feed on insects, fruits, seeds and flowers which have been suggested as potential routes of infection in poultry (Waldenstrom et al., 2002). The interaction of these birds among themselves and with human communities suggests the possibilities of infection and transmission to humans (Shane, 1992; Waldenstrom et al., 2002). The higher prevalence of *C. coli* than other species in poultry in this study agreed with the findings of Wiczorek et al. (2012) that revealed 58.9% as *C. coli* and 41.1% as *C. jejuni*. Other reports on the higher isolation rate of *C. coli* compared to *C. jejuni* have also been reported (Kurincic et al., 2005; Lynch et al., 2011). However, the findings disagreed with the higher isolation rate of *C. jejuni* than other species in the work of Salihu et al. (2009) that reported 72.9% of the total isolate from chicken as *C. jejuni* and Cuiwei et al. (2001) who recorded the prevalence rate of 53.6, 41.3 and 5.1% for *C. jejuni*, *C. coli* and other species, respectively. Such differences have been attributed to several factors, including isolation method, sample size, seasonal variation and geographical location (Allos, 2001; Stanley et al., 1998). Since contact and consumption of contaminated improperly cooked poultry meat has been attributed to the occurrence of gastroenteritis in humans, the prevalence rate in poultry may have contributed to the prevalence in humans as over 80% of human population in the state are engaged in agriculture (Corry and Atabay, 2001).

The prevalence rate of 55% in humans disagreed with 78.4% recorded in Salihu (2009) study in the same study area and that of 87% among livestock workers as recorded by Saenz et al. (2000) in Spain. Salihu et al. (2009) collected and analyzed samples from a risk group (Poultry processors) while the focus of this study was on diverse groups which included people attending outpatient and ante natal clinics in the hospitals. *C. coli* had higher rate of 39% which contradicts the findings of workers who observed *C. jejuni* as the most common species of *Campylobacter* in humans (Ohanu and Offune, 2009; Salihu, 2009). *C. coli* also had high rate of 51% in chicken which was in agreement with the record of 58.9% as *C. coli* and 41.1% as *C. jejuni* by Wiczorek et al. (2012). It has been observed that *C. lari* is mostly found in wild birds and its isolation has remained low both in humans and poultry (Benjamin et al., 1983). However, the isolation rate for *C. lari* in poultry in this study was in agreement with that of 28% by Baserisalehi et al. (2007)

in Iran. Furthermore, the lower isolation rate of *C. lari* to *C. coli* in this study was in agreement to the work of Uaboi-Egbenni et al. (2008) who reported a zero rate of *C. lari* and 14.2% for *C. coli*. The prevalence of *Campylobacter* spp. may be dependent on the sample size and weather conditions of different areas as some species grow optimally during the hot temperature and high humidity. Other species such as *Campylobacter hyointestinalis*, *Campylobacter sputorum* and *Campylobacter fetus* not found in the study were likely due to the high temperature of birds that do not support their survival, agents in the selective medium such as cefoperazone that might have hindered their growth and unsuitable temperature at 42°C used in the isolation (Martin et al., 2002).

The prevalence rates as recorded in the agricultural zones can be used as a reflection of environmental contamination in the areas. The high prevalence rates in poultry and humans recorded in Gwadabawa zone can be linked to the presence of large live bird market at Niger/Nigeria border town of Illella located in this zone whereby poultry that were transported unchecked into the country may have served as carriers of infection for humans.

High and low prevalence rates for humans and poultry, respectively in Tambuwal zone suggest the possibilities of other source of infection in humans other than poultry (Cools et al., 2003; Ugboma et al., 2013). However, genetics studies are needed to further link the isolates from poultry and humans. There was no much difference in prevalence rates in male and female birds and humans which is in agreement with the findings of Samuel et al. (2004) that recorded similar rates suggesting no sex preference in *Campylobacter* infection.

## Conclusion

The study has established the prevalence of *Campylobacter* spp. in both poultry and humans in Sokoto State. Poultry and humans were infected independent of species and sex while different prevalence rates were recorded in different agricultural zones. Hence, human activities like the transportation of poultry together with humans in the same truck while moving birds from different Local Government Areas to live bird markets should be discouraged. Adequate environmental sanitation and strict hygiene measures such as washing of hands after handling of live birds, raw poultry meat especially for those that work in poultry slaughter slabs should be implemented to avoid the spread of *Campylobacter* infection in the state.

## Conflict of interests

The authors have not declared any conflict of interests.

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