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Pitout JDD, Church DL, Gregson DB, Chow BL, McCracken M, Mulvey M, Laupland KB (2007). Molecular epidemiology of CTXM-producing *Escherichia coli* in the Calgary Health Region: emergence of CTX-M-15-producing isolates. *Antimicrob. Agents Chemother.* 51: 1281-1286.

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Full Length Research Paper

Routine dissemination of summary syndromic surveillance data leads to greater usage at local health departments in North Carolina

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Public health surveillance data is critical as it provides actionable information to guide public health response. Thirty interviews were conducted across North Carolina from May to September, 2009 with local public health department staff to describe the use of routine syndromic surveillance data during a local outbreak and compared this to usage during a large, statewide outbreak, during which the state disseminated syndromic data. The study examined the use of the syndromic surveillance system (NC DETECT) and the reportable communicable disease system (NC EDSS) during the 2009 novel influenza A (H1N1) pandemic and during another respondent-selected infectious disease outbreak. A larger percent of local health department (LHD) staff reported using information from NC DETECT (52%) during the 2009 H1N1 pandemic than during another infectious disease outbreak (20%) (P value = 0.01). North Carolina local public health staff used information from syndromic surveillance data more when the state health department disseminated summary syndromic surveillance reports than when this summary information was not provided. State aggregation and dissemination of timely and disease-relevant syndromic surveillance data may facilitate greater usage of such information at the local health department level.

Key words: Public health surveillance, public health practice, outbreaks, influenza A virus (H1N1) subtype.

INTRODUCTION

Public health departments receive surveillance data from a variety of sources, including clinicians, syndromic

surveillance systems and more traditional infectious disease reporting systems (Burkom et al., 2005).

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Syndromic surveillance systems are able to identify some cases of interest, such as clusters, more rapidly than traditional reporting systems (Miller et al., 2004). However, at the local health department level, it is often difficult to use syndromic surveillance systems to obtain actionable information because of the over-abundance of records and the nonspecific nature of the information provided (Szpiro et al., 2007). Surveillance data cannot be used as part of optimally controlling an outbreak unless it is effectively integrated into public health practice at the local health department level (Stoto et al., 2004). Providing summary syndromic surveillance reports, rather than or in addition to requiring local level staff to directly access the syndromic surveillance system and generate their own reports, may facilitate the integration of this information with the other types of information used for outbreak response at the local level. Use of all available data may lead to a more rapid and precise outbreak control.

North Carolina has both a syndromic surveillance system (NC DETECT) and a reportable communicable disease surveillance system (NC EDSS), in addition to a sentinel provider network surveillance system which is used to monitor influenza-like-illnesses during flu season. NC DETECT captures data from emergency department, poison control center, and emergency medical services settings (Samoff et al., 2012). These data are made available in a timely manner through the NC DETECT web portal. Employees of any public health agency may receive access to NC DETECT appropriate to their jurisdiction, but only communicable disease (CD) staff at local and state public health agencies can access NC EDSS. Currently, NC DETECT is primarily used by state-level epidemiologists and hospital-based public health epidemiologists (PHEs), who specialize in interpreting and using syndromic surveillance data. In general, LHD staff receive NC DETECT information from PHEs or state surveillance staff (Samoff et al., 2012; Markiewicz et al., 2012); this distribution occurs on an as-needed basis. Syndromic surveillance data are distributed to LHDs by telephone call; a small number of LHDs also received regular reports from hospital-based PHEs in 2009. Some PHEs also regularly distribute reports to local counties, although the report may cover the hospital rather than the LHD jurisdiction. During outbreaks, state staff and PHEs can serve as a link between syndromic surveillance data and LHD staff.

During the 2009 novel influenza A (H1N1) pandemic, state health department staff took a different approach to distribution of syndromic surveillance information. State-wide syndromic surveillance case numbers were distributed to North Carolina's local health departments (LHDs) by email in a weekly influenza surveillance summary report produced by the state (Lee, 2010). The first page of the report provided a description of state information and the sample from which the data were derived. The second page contained information on the

number of influenza-like illness cases reported by sentinel surveillance systems during each week of the outbreak. Graphical representations of the data followed as well as the characterization of confirmed cases by virus type for cases reported by sentinel surveillance. The syndromic surveillance data were presented graphically in as many as four different but complementary figures to detail the status of the outbreak distribution, magnitude, and morbidity and mortality. A short description of influenza-related deaths was included in the report, and it concluded with a list of sentinel surveillance data providers.

This study compared the use of syndromic surveillance information during the H1N1 pandemic and a reportable disease outbreak occurring between June 2008 and June 2009.

MATERIALS AND METHODS

The 85 NC local health departments (LHDs) were stratified by NC state population tertiles, and then 1 very large (population >200,000, 10 of 85 LHDs), 7 large (population 53,377 -200,000, 41 of 85 LHDs), and 7 small (population <53,377, 37 of 85 LHDs) LHDs were randomly selected for study. The LHD Director and a CD Nurse from each LHD were invited to participate, with a total of 30 LHD staff invited to participate. Face-to-face interviews using a standardized questionnaire were conducted with LHD Directors and communicable disease nurses (CD Nurses) across North Carolina from May to September, 2009. The project was exempted from review by the Institutional Review Board of the University of North Carolina at Chapel Hill.

The interview survey captured information on responses to two outbreaks: one was chosen by the respondent ("an event you responded to in the past year") and the other was the 2009 H1N1 influenza pandemic. These will be referred to as the "infectious disease outbreak" and the "H1N1 influenza outbreak". The survey captured qualitative and quantitative data, including questions on how staff received information from NC EDSS and NC DETECT ("Do you access NC DETECT/NC EDSS yourself?" "Do you look at NC DETECT/NC EDSS data provided by someone else?" and, "If someone else, who?") and on NC EDSS and NC DETECT usage for both the H1N1 pandemic and another prior reportable disease outbreak ((during this outbreak) "Did anyone look at data from NC DETECT/NC EDSS?"). The survey also asked how public health officials first learned about each outbreak ("From what source did you first learn about this event?"), and what other data sources were used to learn about an outbreak ("Please list data sources used to learn whether there was an increase in cases"). Proportions were calculated to compare users and uses of NC DETECT and NC EDSS by outbreak. Fisher's exact test was used to test for differences. Respondents were asked to describe the response to the outbreaks, how surveillance data were used in the response, and whether the surveillance data were useable and timely; these responses were transcribed and Atlas.ti was used to code qualitative responses. All quantitative data analyses were performed using SAS 9.1 (Cary, NC). Statistical significance was determined using an alpha of 0.05

RESULTS

Interviews were completed with 27 LHD staff members

Table 1. Sources by which initial outbreak notice was received, 27 Public Health Agency Staff, North Carolina, May-August 2009.

Source	Infectious disease outbreak (n Sources listed by respondents (%))	H1N1 Pandemic (n Sources listed by respondents (%))
NC EDSS	22 (34)	17 (20)
Other	13 (20)	15 (18)
Clinicians/Practitioners	13 (20)	9 (11)
Public health staff	5 (8)	13 (15)
NC DETECT	4 (6)	14 (16)
Laboratory	5 (8)	8 (9)
Hospital	1 (2)	3 (4)
NC HAN	2 (3)	3 (4)
Media	0 (0)	2 (2)
Epi X	0 (0)	1 (1)
Total	65	85

Epi X: CDC's Epidemic Information Exchange; NC DETECT: North Carolina Disease Event Tracking and Epidemiologic Collection Tool; NC EDSS: North Carolina Electronic Disease Surveillance System; NC HAN: North Carolina Health Alert Network. Percentages do not sum to 100 because initial outbreak notification could have been received from multiple sources.

from 14 LHDs for a total of 27/30 invitees (a 90% response rate); one small LHD did not respond. When asked about knowledge of NC DETECT, 93% (25 of 27) of the respondents correctly described NC DETECT as a syndromic surveillance system, and 48% (13 of 27) reported "using information from NC DETECT to learn about public health events."

Respondents described surveillance data use for infectious disease outbreaks of shigellosis, salmonellosis, hepatitis A, norovirus, pertussis, and rabies exposure, as well as H1N1 influenza.

Our hypothesis that LHD staff may be contacted by PHEs and state surveillance staff when a case is of public health interest was confirmed with qualitative data; for example, one survey respondent stated [the PHE] "is really good about calling ... and giving me a heads up". However, only a subset of the 27 respondents (29%) reported contact with a PHE during the infectious disease outbreak. All LHDs responded to the H1N1 influenza outbreak, and all received the previously described influenza surveillance report.

Local public health staff reported receiving initial notice of outbreaks from several different sources. During the infectious disease outbreak, NC EDSS (34%), other public health staff (20%), and clinicians and practitioners (20%) were the most commonly reported sources for initial notice of the outbreak by local staff (Table 1). In contrast, during the H1N1 pandemic, local public health staff most frequently reported receiving initial notice from NC EDSS (20%), other (18%), and NC DETECT (16%) (Table 1).

The percentage of the 27 local public health staff who reported using information from the NC DETECT or NC EDSS systems for outbreak monitoring was greater than

the percentage receiving initial notice of an outbreak from either NC surveillance system for both the infectious disease outbreak and H1N1 pandemic. During the infectious disease outbreak, 6% of the local public health staff reported monitoring the outbreak in NC DETECT, and 20% reported using NC DETECT data (Fig. 1). Similarly, during the infectious disease outbreak, 34% of local public health staff reported monitoring the outbreak in NC EDSS, and 62% reported using NC EDSS data during the outbreak (Figure 1). During the H1N1 pandemic, 16% of local public health staff reported monitoring the outbreak in NC DETECT, and 52% reported using NC DETECT data during the outbreak; 20% of local public health staff reported monitoring the outbreak in NC EDSS, and 60% reported using NC EDSS data during the outbreak (Figure 1). A statistically significant larger percent of LHD staff reported using information from NC DETECT during the 2009 H1N1 pandemic than during the infectious disease outbreak (P value = 0.01). A similar increase in LHD staff using information from NC EDSS during the pandemic was not observed (Figure 1).

DISCUSSION

Local health departments in North Carolina find syndromic surveillance information useful (Samoff et al., 2010), but may have difficulty using NC DETECT to identify an outbreak because of the overwhelming number of signals these types of systems produce (Szpiro et al., 2007). Local public health staff in this study, conducted between May and September 2009, reported using information from NC DETECT as well as

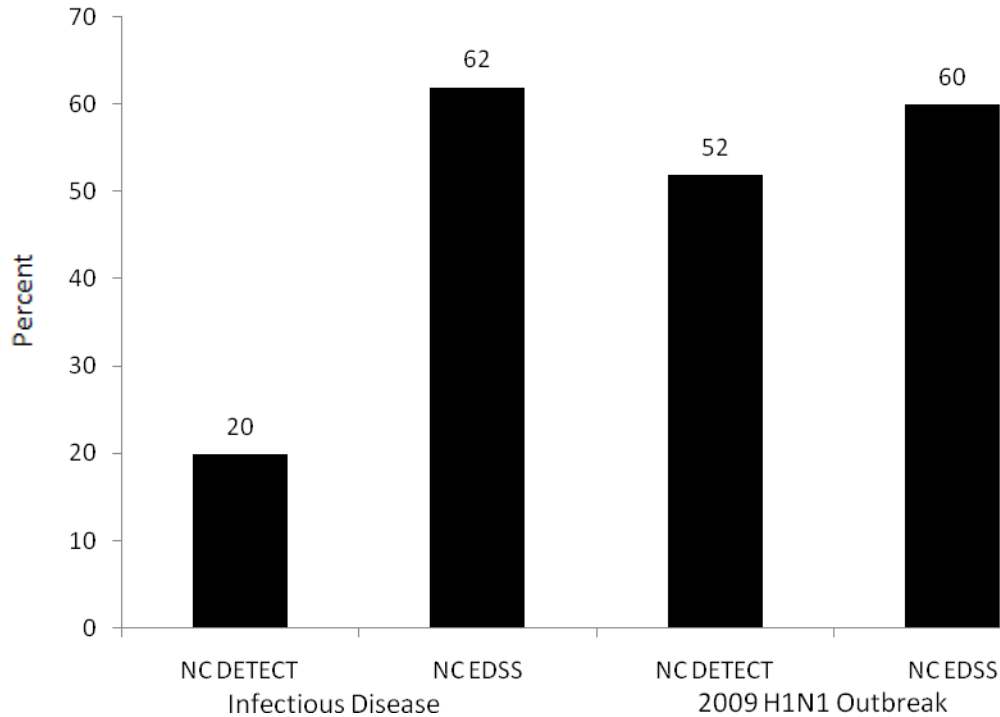


Figure 1. NC EDSS and NC DETECT data usage by type of outbreak, 27 public health agency staff, North Carolina, May-August 2009. NC DETECT: North Carolina Disease Event Tracking and Epidemiologic Collection Tool; NC EDSS: North Carolina Electronic Disease Surveillance System.

the reportable communicable disease system more frequently for monitoring and responding to outbreaks than for identifying outbreaks. During the H1N1 pandemic, North Carolina's state public health department distributed frequent reports to all counties on the status of the outbreak. These reports provided syndromic surveillance data to help local public health staff monitor the outbreak. More public health staff reported using syndromic surveillance data during the H1N1 pandemic than during the comparison infectious disease outbreak. Similarly, more public health staff reported using syndromic surveillance information to monitor the H1N1 pandemic than reported using reportable disease surveillance information. During the H1N1 influenza outbreak, syndromic surveillance data reached more LHDs and provided additional state-wide outbreak information than during other outbreaks; more frequent use of syndromic surveillance data was reported by all public health staff during this outbreak. Thus, changes in summary information distribution likely resulted in an increased use of the information by local public health staff.

Production of summary syndromic surveillance reports by specialist staff employed by the state health department may be more efficient than production of individual reports by LHDs. The number of staff available to do this work at LHDs is limited. One study found that local health departments devote an average of 1.0 FTE to

syndromic surveillance data analysis and signal response (Buehler et al., 2008). That would equate to 85 FTEs in North Carolina; however, the actual number of NC DETECT users in NC counties (from NC DETECT system data) is much lower (0.46 per LHD), and in none of the LHDs with staff using NC DETECT is a full FTE devoted to syndromic surveillance. Centralizing report production at the state-level decreases the need for FTEs devoted to syndromic surveillance data analysis at the local level and may result in a more efficient distribution of labor between the state (analysis) and the LHD (local action), and better syndromic surveillance data integration in local health departments. Similarly, programming NC DETECT to produce reports customized for each LHD's data may achieve better data integration in LHDs. Since the completion of this study in 2009, dashboard interfaces with LHD specific data have been implemented resulting in a small increase in local system use.

This work has several important limitations. While case-patients from many of the outbreaks described by local health department staff may present in settings where the syndromic surveillance data originates in North Carolina (e.g. the emergency department), case-patients were known to have presented at the emergency department for the H1N1 pandemic, making emergency department surveillance more important to this outbreak response than it may have been in the participant selected infectious disease outbreak. The H1N1 pandemic may

have been more memorable to local public health staff than another infectious disease outbreak, possibly resulting in recall bias. Furthermore, the study sample was small and the sample included only 1 large urban county which may not be representative of the other NC large urban county. Finally, the interviews were conducted in person, possibly leading to social desirability bias in the form of over-reporting of NC DETECT and NC EDSS use.

Conclusions

During the 2009 H1N1 pandemic, North Carolina's state health department reported summary H1N1 influenza data obtained from syndromic surveillance systems to LHDs. Aggregation of syndromic surveillance data at the state level decreased the need for data analysis at the local level, allowing LHDs to focus on public health action. This summarization and dissemination of syndromic surveillance information allowed LHD staff to quickly use these surveillance data for public health response. The increase in access to aggregated syndromic surveillance data may account for the increase in syndromic surveillance data usage in LHDs during the H1N1 pandemic. In times of outbreak, when staff resources are even more limited than usual, using state resources to provide summary syndromic surveillance reports to LHDs may facilitate an effective outbreak response.

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Conflict of Interest

The authors have no conflicts of interest to declare.

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Full Length Research Paper

Knowledge, attitude and acceptance of voluntary male medical circumcision among male students attending Botswana University

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In recent years safe voluntary male medical circumcision (VMMC) has been recommended by the World Health Organization (WHO) as one of the preventive strategies for human immunodeficiency virus (HIV)-infection for those countries with high HIV prevalence and low medical male circumcision rates. This study aimed to assess the level of knowledge, attitude, and acceptance of safe VMMC among male university students attending Botswana University. A survey instrument was used to collect descriptive data in this study. Out of the total number of faculties within the university (8), we purposively selected our sample from the faculty of science due to its predominant male student population of 1,045. A total of 437 students were recruited from the various departments within the faculty. A semi-structured questionnaire was used for data collection. Study results indicate that 95.4% of the participants had heard about VMMC and 64.8% of those who had heard about VMMC were uncircumcised. About 31.4% knew about the complications of VMMC. Participants having undergone VMMC were twice as likely to be aware that VMMC reduces the risk of penile cancer and that it improves penile hygiene. Participants who knew that VMMC reduces the risk of other STIs were found to be four times more likely to accept VMMC as a preventive method for HIV infection. Participants having been medically circumcised were four times more likely to disagree with the statement that VMMC decreases sexual satisfaction and ten times more likely to disagree with the statement that the tip of the penis has to be covered by the foreskin. Study findings suggest that in terms of knowledge and attitude, the most significant factor associated with men's acceptability of VMMC was their awareness that it reduces the risk of other STIs. It is therefore concluded that even though there exist a high-level of awareness and favourable attitude towards VMMC among the young male population; such awareness does not seem to influence individuals to become medically circumcized.

Key words: Voluntary male medical circumcision, human immunodeficiency virus (HIV) prevention, sexual transmitted infections, university students.

INTRODUCTION

Male circumcision (MC) is one of the oldest and most common surgical procedures worldwide and is undertaken for many reasons such as religious, cultural, social and medical (World Health Organization/Joint

United Nations Programme on HIV/AIDS [WHO/UNAIDS], 2007). Approximately 30% of the world's male population aged 15 and above are circumcised (WHO/UNAIDS, 2007). Of these, approximately two-thirds

(69%) are Muslims (living mainly in Asia, the middle east and north Africa), 0.8% are Jewish and 13% are non-Muslims/non-Jewish men living in the United States (WHO/UNAIDS, 2007). Male circumcision is common in many African countries. For instance, MC is nearly universal in North Africa and much of West Africa (UNAIDS, 2012). In contrast, MC is less common in southern Africa, where self-reported prevalence of MC is approximately 15% in many southern African countries, including Botswana (WHO/UNAIDS, 2007). Botswana has been one of the hardest hit in southern African countries by HIV and AIDS with national adult (15 to 49 years) HIV prevalence exceeding 23.4% (Avert, 2012). The country has been addressing the HIV epidemic through various strategies such as condom promotion, effective treatment of sexually transmitted infections, voluntary testing, counselling and introduction of a universal anti-retroviral treatment program. Despite these measures, the number of new HIV infections was estimated at 9,000 cases (UNAIDS, 2012); there is a need for the adoption of innovative and evidence-based interventions. Evidences from various researches have demonstrated that male circumcision has been proven to have a modest protective effect from HIV infection (Auvert et al., 2005; Bailey et al., 2006; Gray et al., 2007).

According to the WHO estimates, 30% of males worldwide are circumcised; with almost 70% of them being Muslims (WHO/UNAIDS, 2007). The prevalence of MC in Africa varies from less than 20% in some southern African countries to near universal in north and West Africa (Bailey et al., 2006). The University of Botswana is the largest institution which comprises the youth population, with a total enrolment of 17,678 students as per the 2012/2013 academic year. Therefore, studying the knowledge, attitude and acceptance of safe male circumcision of this population group has paramount importance for the success of the programme itself in the country. This study was therefore the first of its kind in institutions of higher learning in Botswana. Further, the low uptake of safe male circumcision since its launching in the country in 2009 was another important reason which triggered the research team to conduct this study amongst the university students. For instance, the national voluntary male medical circumcision (VMMC) programme's target for the number of circumcised individuals was set at 40,000 from October, 2011 to May, 2012. However, only a total of 14,353 (36%) males were eventually circumcised (Botswana Ministry of Health, 2012). Hence, the underlying aim of this study was to investigate the level of knowledge amongst male university students in Botswana (Gaborone) about the basic facts related to VMMC; their attitude/perception towards VMMC; their behaviour towards male circumcision

circumcision; and finally their degree of acceptance of VMMC as a preventive strategy against HIV infection. It cannot be ignored that male circumcision is often associated with various beliefs in society especially in relation to sexual matters in every region around the world. For instance, in one study that was conducted in the Dominican Republic it was found that a proportion of about 46% of the respondents reported that male circumcision reduces sexual pleasure amongst men (Brito et al., 2009). There is still a strong belief amongst males even in the Southern region of Africa that male circumcision decreases their natural sexual ability.

METHODOLOGY

Design

A quantitative, descriptive survey design was used as it was found suitable in carrying-out this study of assessing the level of knowledge, attitude, and acceptance of VMMC among male university students in Botswana.

Population and sampling

The study was conducted amongst male students in the main campus of the University of Botswana. The university has eight different faculties with a total enrollment of 7,953 male students during the 2012/2013 academic year. Each faculty was composed of roughly 600 to 1500 male students. Out of the total of 8-faculties, we purposively selected the faculty of science due to its large male student population of 1,045. From the head-count of 7,953 male students during the 2012/2013 academic year, then the Raosoft sample calculator was used to determine a reasonable sample population size (Raosoft, 2004), from which a sample size of 367 was calculated with a margin of error of 5%, confidence level of 95% and a distribution of 50%. In order to compensate for any eventualities as regard to the completed questionnaires (in terms of incomplete responses or wrongly completed questions), our sample size was deliberately increased and 450 participants were targeted. Each and every department within the faculty of sciences were then approached during the recruitment of participants. Students were approached while in their classes either before or after a lecture and briefed about the objectives of the study.

Data collection tool

A semi-structured questionnaire was used for data collection. The questionnaire was written in the English language as the participants were at tertiary level of education. Data collection instrument comprised three sections. These include the participants' socio-demographic characteristics, knowledge about VMMC, and lastly attitude/perceptions towards VMMC.

Data collection

The questionnaire were pre-tested on 10 male students from the

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faculty of education two weeks before data collection to improve reliability and validity of the questionnaire, and not many changes were necessary in its wording. Data collection was conducted immediately after students returned to campus for their last semester. After receiving the permission from the university administration to conduct the study, data collection was carried out for a period of five-days (one-week). Arrangements were made with lecturers in visiting their lecture rooms while students were in the class rooms after a lecture. During each session, a brief description about the study was given to all students in class, and those who were willing to participate were there-after invited to remain behind. More briefing was thereafter given to those who were willing to participate. After signing their consent forms which comprised detailed information about the study including its significance and purpose, the participants were given the questionnaires including additional instructions on how to respond to the questions. This normally took them about 15 to 20 min, after which all responses were collected.

Data analysis

All responses were individually checked in order to identify some mistakes and completeness of data. Data were later entered into Microsoft Excel spread, coded and thereafter imported into both the Epi-info and Stata-10 statistical software for statistical processing and analysis. The t-test, chi-square test, and odds ratios (OR) with 95% confidence interval were used to measure associations. All statistical tests were performed using the two-tailed tests, and a p -value of less than 0.05 was considered statistically significant. Further, the logistic regression analysis was used to assess the bivariate relationship between the knowledge, attitude, and acceptance of VMMC amongst the students. Finally, findings were described using summary measures expressed as means (standard deviations), medians (ranges), modes, and proportions.

Validity, reliability and bias

Reliability was guaranteed by trying to standardize the questionnaire as much as possible. Furthermore, the questionnaire was pre-tested amongst 10 students from a different faculty which was not part of the study sample. An appropriate design was further employed and suitable variables were selected for our study objectives in order to increase the validity of the study. It was also ensured that experts from the department of public health at the University of Botswana and Medunsa validated the entire design of the study. However, in terms of our sample size, no attempt was made to extrapolate the results to the general population of the entire university student population in Botswana.

Ethical issues

The Medunsa Campus Ethics Committee (MREC) approved the study with the certificate Ref. [MREC/H/60/2013:PG]. In addition, permission to conduct the study was granted by the Health Research and Development Division in Botswana (at the Ministry of Health). Further, the office of Research and Development at the University of Botswana granted permission for conducting the study. It was ensured that all participants of the study were fully informed about the nature of study and were provided with a consent form which comprised detailed information about the study including its significance and purpose. Confidentiality of all information provided such as how and where data will be stored (in a password-accessed computer base) was explained to the participants. The study was strictly voluntary and participants were

given an absolute right to refuse to participate. Furthermore, participants' were informed that their names should not be written on the questionnaires.

RESULTS

Sample characteristics

Out of a targeted total sample of 450 students, we reached a response rate of 97.1% (437). Majority of the respondents (83.3%, $n=364$) were aged 25 years or below and the median age was 21 years. Most of the students were single, but 46.5% ($n=203$) of them had girlfriends. About 45% of the students ($n=199$) originated from the central district which is the most populous district in Botswana, and majority of the tribes in which the students belonged were: Kalanga (19%, $n=83$), Mongwato (14.2%, $n=62$), Mokgatla (8.5%, $n=37$) and Mokwena (7.6%, $n=33$). Christianity was found to be the dominant religion among the study participants (86%, $n=376$). Out of the 437 participants, 30.9% ($n=135$) were circumcised, 64.8% ($n=283$) were uncircumcised, and 4.3% ($n=19$) were not willing to reveal their circumcision status.

Knowledge of VMMC

Almost all the respondents (95.4%, $n=417$) reported that they have heard and know about VMMC. In regard to knowledge about benefits of VMMC, the participants mentioned the following: (i) reduction of the risk of HIV infection (55.4%, $n=242$); (ii) reduction of the risk of other STIs (43.5%, $n=190$); and (iii) improved genital hygiene (21.1%, $n=92$). Some of the reported complications known by the participants were: (i) improper procedure (27%, $n=37$); (ii) delayed wound healing (19.7%, $n=27$); (iii) interference with sexual activities (18.3%, $n=25$); (iv) excessive blood loss (10.2%, $n=14$). Most respondents had high level of awareness on the fact that VMMC has no 100% HIV protection (96.8%, $n=423$). About 91.1%, $n=398$ felt there was a need for condom use after VMMC. About 90.2%, $n=394$ felt it was important to abstain from sex for 6 weeks post circumcision, and that VMMC improves genital hygiene (89.9%, $n=393$).

Attitudes about VMMC

A significantly high number of respondents believe that the tip of the penis has to be covered by the foreskin (44.9%, $n=196$) and male circumcision makes the penis vulnerable to environmental hazards (34.1%, $n=149$). Otherwise, majority of the study participants disagreed that VMMC decreases sexual satisfaction, and that circumcised men have more sexual feeling than the uncircumcised ones. However, 25.9% ($n=113$) of the

Table 1. Practices of voluntary male medical circumcision by the study participants.

Variable	Frequency	Percentage
MC practiced in the society		
Yes	281	64.3
No	108	24.7
Don't know	35	8.0
No response	13	3.0
Total	437	100.0
Circumcision status		
Circumcised	135	30.9
Not circumcised	283	64.8
No response	19	4.3
Total	437	100.0
Age at circumcision (among the circumcised , n=135)		
Prior to the official launch of SMC (2009)	64	47.4
Post 2009	67	49.6
Don't know	2	1.5
No response	2	1.5
Total	135	100.0
Type of circumcision (n=135)		
Medical	121	89.6
Traditional	6	4.4
Don't know	5	3.7
No response	3	2.2
Total	135	100.0

respondents believed that women prefer circumcised sexual partner than uncircumcised ones. About 64.3% (n=281) of the respondents reported that male circumcision is practiced in their communities. According to the study participants, majority of the male circumcisions were conducted for medical reasons (44.2%, n=193). Tradition/rite as a reason for male circumcision was reported by only 13.5% (n=59) respondents. Medical reason was mentioned by the majority of the circumcised males (89.6%, n=121) as basis for them being circumcised (Table 1). Almost half of them (47.4%, n=64) did the circumcision post 2009 after the official launch of the national VMMC program in Botswana. Out of the 283 uncircumcised males, 43.8% (n=124) accepted VMMC as a preventive strategy against HIV infection and 43.8% (n=124) did not accept it and 12.4% (n=35) were not sure. Among those who accepted VMMC as a preventive strategy for HIV infection, 64.5% (n=80) had a plan to be circumcised whereas 35.5% (n=44) had no plan to be circumcised (Table 1).

Acceptability of VMMC

It was found out that circumcised respondents were twice

likely to be aware of the fact that “VMMC reduces the risk of penile cancer” and “VMMC improves penile hygiene” than the uncircumcised ones [OR=2.47(1.59-3.83); OR=2.54 (1.03-6.27)], respectively. Otherwise, there was no significant knowledge difference on other facts of VMMC between circumcised and uncircumcised respondents. Again, circumcised participants were found to be four-times likely to disagree with the beliefs that “VMMC decreases sexual satisfaction” [OR=4.06(2.06-8.00)], and ten-times more likely to disagree with the fact that “the tip of the penis has to be covered by foreskin” [OR=9.95(5.57-17.79)]. It was further discovered that the participants were four-times likely to disagree with the statement “VMMC makes the penis more vulnerable to environmental hazards” [OR=3.79(2.19-6.56)], and six-times likely to disagree with the statement “VMMC is an old practice and should not be reintroduced in the community” [OR=6.28(2.74-14.38)] than uncircumcised participants. On the other hand, non-circumcised respondents were found to be less likely to believe that “circumcised men have more sexual feeling than uncircumcised” [OR=0.18(0.07- 0.47)], and that “circumcised men enjoy sex more than uncircumcised” [OR=0.33(0.17-0.64)]. Respondents who had the

Table 2. Knowledge as predictor of acceptance of SMC among non- circumcised participants.

Knowledge Variable	Acceptance of SMC		Crude OR (95% CI)	Adjusted OR (95% CI)
	Yes (%)	No (%)		
Know about complications of SMC				
Yes	30 (25.0)	45 (38.5)	0.53 (0.31-0.93)	0.47 (0.26-0.86)
No	90 (75.0)	72 (61.5)		
SMC reduces only the female-to-male HIV transmission				
Yes	60 (50.0)	44 (37.6)	1.66 (.99-2.78)	1.712 (0.98-2.99)
No	60 (50.0)	73 (37.6)		
SMC does not provide 100% protection				
Yes	117 (97.5)	112 (95.7)	1.74 (0.41-7.46)	0.682 (0.10-4.46)
No	3 (2.5)	5 (4.3)		
Need to abstain from sex for 6 weeks after circumcision				
Yes	116 (96.7)	99 (84.6)	5.273 (1.73-16.10)	4.807 (1.38-16.69)
No	4 (3.3)	18 (15.4)		
Need for condom use after male circumcision				
Yes	115 (95.8)	105 (89.7)	2.63 (0.90-7.71)	1.406 (0.35-5.68)
No	5 (4.2)	12 (10.3)		
MC reduces the risk of other STDs				
Yes	108 (90.0)	81 (69.2)	4.0 (1.96-8.17)	3.44 (1.55-7.62)
No	12 (10.0)	36 (30.8)		
MC reduces the risk of penile cancer				
Yes	62 (51.7)	45 (38.5)	1.710 (1.02-2.87)	1.06 (0.59-1.93)
No	58 (48.3)	72 (61.5)		
MC improves penile hygiene				
Yes	109 (90.8)	101 (86.3)	1.57 (0.70-3.54)	0.89 (0.33-2.3)
No	11 (9.2)	16 (13.7)		

knowledge of “VMMC reduces the risk of other STIs” were found to be four-times likely to accept VMMC as a preventive strategy for HIV than those who lack this knowledge [OR= 4.0(1.96-8.17)].

Participants who accepted VMMC as a preventive strategy for HIV infection were found to be five-times likely to be aware of the fact that “it is important to abstain from sex for 6 weeks post circumcision” [OR=5.27(1.73-16.10)] than those respondents who refused to accept VMMC. However, those who have some knowledge about the complications of VMMC were found to be 53% less likely to accept VMMC as a preventive strategy for HIV infection than those who lacks the knowledge [OR=0.53(0.31-0.93)]. On the other hand, participants who accepted VMMC as a preventive strategy against HIV infection were found to be five-times likely to disagree with attitude/perceptions of “male circumcision decreases sexual satisfaction” [OR=4.82(1.90-12.22)],

and four-times more likely to disagree with “the tip of the penis has to be covered by the foreskin” [OR=4.21(1.99-8.94)]. These participants were further discovered to be three times likely to disagree with the statement “male circumcision makes the penis more vulnerable to environmental hazards” [OR=3.39(1.71-6.72)], and their odds were seven-times likely to disagree with the statement “male circumcision is an old practice and should not be reintroduced into the community” [OR=7.27(3.44-15.37)] than those who did not accept VMMC as a preventive strategy against HIV infection. Acceptability and non-acceptability of VMMC as a preventive strategy for HIV infection were as follows: (i) the awareness about complications of VMMC [OR=0.53(0.31-0.93)]; (ii) VMMC reduces the risk of other STIs [OR= 4.0(1.96-8.17)]; (iii) the fact that it is important to abstain from sex for 6 weeks post circumcision [OR=5.27(1.73-16.10)] (Tables 2 and 3).

Table 3. Attitude as predictor of acceptance of VMMC among non-circumcised participants (N=222).

Attitude variable	Acceptance of SMC		Crude OR (95% CI)	Adjusted OR (95% CI)
	Yes	No		
MC decreases sexual satisfaction				
Agree	14 (34.1)	27 (65.9)	Reference	Reference
Disagree	0 (71.4)	12 (28.6)	4.82 (1.90-12.22)	1.81 (0.64-5.09)
Don't know	72 (51.8)	67 (48.2)	2.07 (1.00- 4.28)	2.25 (0.79-6.44)
Circumcised more sexual feelings than uncircumcised				
Agree	5 (83.3)	1 (16.7)	Reference	Reference
Disagree	39 (48.8)	41 (51.2)	0.19 (0.02- 1.70)	1.56 (0.13-19.17)
Neutral	72 (52.9)	64 (47.1)	0.23 (0.03- 1.98)	0.62 (0.25-1.59)
Circumcised enjoy sex more than uncircumcised				
Agree	16 (80.0)	5 (2.0)	Reference	Reference
Disagree	27 (42.9)	44 (17.9)	0.19 (0.06- 0.63)	1.55 (0.36-6.60)
Don't know	73 (52.5)	73 (29.7)	0.28 (0.09- 0.87)	0.67 (0.25-1.84)
MC decreases the size of the penis				
Agree	7 (46.7)	8 (53.3)	Reference	Reference
Disagree	60 (57.1)	45 (42.9)	1.52 (0.52- 4.51)	1.25 (0.30-5.23)
Don't know	49 (48.0)	53 (52.0)	1.06 (0.36- 3.13)	1.29 (0.56-2.97)
Women prefer circumcised male sexual partner				
Agree	62 (62.8)	16 (37.2)	Reference	Reference
Disagree	18 (41.9)	25 (58.1)	0.43 (0.18- 1.01)	0.85 (0.32-2.22)
Don't know	71 (52.2)	65 (47.8)	0.65 (0.32- 1.31)	0.83 (0.31-2.23)
Male circumcision proves manhood				
Agree	73 (73.7)	5 (26.3)	Reference	Reference
Disagree	42 (42.5)	77 (57.5)	0.26 (0.09- 0.78)	0.70 (0.15-3.26)
Don't know	45 (65.2)	24 (34.8)	0.67 (0.22- 2.08)	0.28 (0.13- 0.64)
SMC violates principles of traditional MC				
Agree	6 (42.9)	8 (57.1)	Reference	Reference
Disagree	73 (57.9)	53 (42.1)	1.84 (0.60- 5.61)	0.70 (0.17-2.93)
Don't know	37 (45.1)	45 (54.9)	1.10 (0.35- 3.44)	0.59 (0.13-2.72)

Table 3. Cont'd.

The tip of penis has to be covered by foreskin				
Agree	50 (38.8)	79 (61.2)	Reference	Reference
Disagree	32 (72.7)	12 (27.3)	4.21 (1.99-8.94)	1.92 (0.77-4.83)
Don't know	34 (69.4)	15 (30.6)	3.58 (1.77-7.24)	3.52 (1.44-8.58)
MC makes the penis more vulnerable to hazards				
Agree	32 (36.0)	57 (64.0)	Reference	Reference
Disagree	40 (65.6)	21 (34.4)	3.39 (1.71-6.72)	1.61 (0.65-3.9)
Don't know	44 (37.9)	24 (38.9)	2.80 (1.47-5.32)	2.54 (1.07-6.04)
MC is an old practice and shouldn't be reintroduced in to the community				
Agree	28 (28.0)	36 (72.0)	Reference	Reference
Disagree	82 (73.9)	29 (26.1)	7.27 (3.44-15.37)	6.68 (2.62-17.05)
Don't know	20 (17.2)	106 (47.7)	1.25 (0.55-2.84)	0.67 (0.24-1.85)

DISCUSSION

In this study, it was found that almost all participants have heard and knew about VMMC. Most significantly, just over half of them were aware of the fact that VMMC can decrease the risk of HIV infection. This is consistent with studies conducted in Jamaica and Uganda, which indicated a higher proportion of awareness of male circumcision (Wilcken et al., 2010; Walcott et al., 2013). Some differences were noted on the level of awareness about the VMMC's protective effect on HIV amongst the respondents where we found that in our study it was higher as compared to other studies conducted in other regions such as East/Central Africa e.g. Uganda with a proportion of 38.2% (Wilcken et al., 2010) and Swaziland with a proportion of 18% (Tsela and Halperin, 2006). Perhaps such differences in terms of the awareness of male circumcision between these studies may be explained based on the fact that our study was conducted among

students from an institution of higher learning. In such institutions, students have access advantage to a wide range of educational information compared to an ordinary individual in the society. However, even though such awareness of male circumcision seems to be relatively higher in our study as compared to the earlier mentioned studies, this seems to have no impact on the acceptability of VMMC amongst the participants. Based on these revelations, it can only postulate that this may be due to the fact that many participants in our study seemed to have been hesitant in believing results of the protective effect of VMMC produced by some scientific studies globally.

It was also noted that a significantly high proportion of participants were aware of the effect of VMMC in reducing the risk of Sexually Transmitted Infections (STIs) with a proportion of about 89.9%. Likewise, this was found to be consistent with a study conducted by Tsela and Halperin (2006) in Swaziland in which 81% of the

respondents knew that male circumcision reduces the risk of getting STIs. On a positive note, it was noted that having the knowledge that "VMMC reduces the risk of getting STIs" had a significant effect on the acceptability of VMMC in our study in which those who had the knowledge were found to be four-times likely to accept VMMC compared to those who lack the knowledge (OR=4.00, 95% CI=1.96-8.17). Around half of the respondents in our study knew that male circumcision reduces the risk of penile cancer (50.6%). This was found to be consistent with a relatively similar study that was conducted in china which indicated a proportion of about 50%. However, those who were aware that male circumcision decreases the risk of penile cancer were twice likely to accept VMMC than those who lacked such an awareness (OR=1.71, 95% CI=1.02-2.87). This was consistent with a study conducted in China in which it was found that people, who were given health education regarding the effect of male circumcision in reducing penile cancer, increased

their acceptability rate substantially (Yang et al., 2012).

It was also noted that majority of the respondents in this study had high level of awareness about the hygienic benefit of safe male circumcision (89.9%) which is consistent with other studies conducted in Kenya (Bailey et al., 2006), Malawi (Ngalande et al., 2006), and Botswana (Kebaabetwe et al., 2003). However, having the knowledge that "VMMC improves penile hygiene" was not found to be a significant predictor of SMC acceptance (OR=1.57, 95% CI=0.70-3.54).

We found a significant difference in terms of attitude towards VMMC between those who were circumcised and those who were uncircumcised. For instance, uncircumcised respondents were found to be ten times less likely to agree with the belief that "the tip of the penis has to be covered by foreskin" [OR=9.95(5.57-17.79)], and four-times less likely to agree with the statement "VMMC makes the penis more vulnerable to hazards" [OR=3.79(2.19-6.56)]. On the other hand, those who were circumcised were found to be 82% less likely to agree with the statement "circumcised men have more sexual feelings than uncircumcised men" compared to the uncircumcised respondents [OR=0.18(0.07-0.47)]. This shows that even though there is no available scientific evidence regarding human sexual-feelings and male circumcision, some favourable beliefs were discovered in this regard among the participants in this study. This will be crucial in promoting the acceptance of VMMC. It was by no surprise that even in studies conducted in Jamaica, Malawi and Uganda participants believed that male circumcision enhances sexual satisfaction (Walcott et al., 2013; Ngalande et al., 2006; Wilken et al., 2010). The acceptability of safe male circumcision among the uncircumcised respondents in our study was found to be 43.8% which was much lower than the median acceptability rate in the sub-Saharan African countries which was 65% (Westercamp and Bailey, 2007). However, these finding seem to be much lower than those of Kebaabetswe et al. (2003) in Botswana which was 60%, which later went up to 80% after a brief information session (conducted among male and female adult population in various communities in Botswana). It must be noted though that in our study the participants were tertiary level educated, male students who have the ability to question any new ideas like VMMC for HIV prevention. These could be the possible explanations for the observed differences between our study and the one conducted by Kebaabetswe et al. (2003). The other important reason given by our respondents for not accepting VMMC was the belief that the foreskin of the penis has a natural importance, which in effect, seems to be an important determinant factor for acceptability of VMMC. This however was not explored in the study of Kebaabetswe et al. (2003).

Through our findings, the factors which were found to be associated with increased acceptability of VMMC which included "the awareness that male circumcision reduces the risk of having STDs" [OR=4.0(1.96-8.17)],

and that such an awareness also "reduces the risk of having penile cancer" [OR=1.71(1.02-2.87)] were also noted. In addition, participants in our study were found to be having favourable attitudes towards VMMC which resulted in higher levels of acceptability, and that those who were aware of some of the complications of male circumcision were 47% likely to accept VMMC compared to those without such awareness (OR=0.53, 95% CI=0.31-0.93). However, this is not the case in most studies conducted in the sub-Saharan African countries which indicated pain as the main limiting factor for acceptability of male circumcision (Westercamp and Bailey, 2007).

Conclusion

It can therefore be concluded that majority of the students at the University of Botswana are not circumcised. Further, a significantly high percentage of the students at the University of Botswana have heard and knew about safe male circumcision. The students at the University of Botswana have good knowledge about the basic facts on safe male circumcision especially, in relation to its benefits in the prevention of HIV and other STIs, improving penile hygiene, and reducing the risk of penile cancer. To us, this suggests some favourable attitude towards VMMC among the students of the University of Botswana, which is an important positive factor for the success of the VMMC program. On the other hand, we can safely state that safe male circumcision has not been well accepted by majority of the student population at the University of Botswana. This is despite the students' adequate knowledge about such a program, and their relatively good attitude towards it.

STUDY LIMITATIONS

Possible limitations in this study include the use of a purposive sampling technique (which lacks a true probability method of sampling) of the faculty of science due to its large male population in order to reach our desired sample size of 450 male students.

Conflict of Interest

The authors have no conflicts of interest to declare.

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Full Length Research Paper

Knowledge, attitudes and participation of community pharmacists in Lagos State, Nigeria towards primary health care (PHC)

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The general objective of this study was to evaluate community pharmacists' participation in primary health care as well as to assess community pharmacists' knowledge of primary health care and determine their level of participation in health promotion, disease prevention and curative primary health care activities in Lagos, Nigeria. A total of 120 community pharmacists were used for this study. Data was collected through the use of a self completion questionnaire given to community pharmacists in their premises and collected on the spot or after some time. Analysis was done through the use of Microsoft SPSS Version 10. This study revealed that most of the community pharmacists are aware of primary health care (95.8%), even though they do not know much of its history (26.6%). Participation in the different components of primary health care i.e. in health promotion, disease prevention and in curative primary health care services was very high. However, participation in immunization services was very low (14.1%) and many of them agreed that their participation in PHC could further be improved through continuous education and training in primary health care programmes (91.6%). Community pharmacists participate actively in primary health care activities in Lagos State, Nigeria. A large number of community pharmacists are aware of primary health care and have undergone training in primary health care activities mostly at the undergraduate level, though only a few have undergone refresher course in primary health care. The community pharmacists participate actively in health promotion mostly in the provision of drug information services, tobacco/alcohol cessation services as well as other health promotion services as well as in disease prevention activities. The community pharmacists also participate actively in disease treatment as a first contact health care provider.

Key words: Community pharmacy, primary health care, community pharmacists, participation.

INTRODUCTION

A community pharmacy is the place where most pharmacists practice the profession of pharmacy. It is the

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community pharmacy where the dichotomy of the profession exists; health professionals who are also retailers. Some community pharmacists provide specialized services to help patients with conditions such as diabetes, asthma, smoking cessation, or high blood pressure; others are also trained to administer vaccines.

The World Health Organization (WHO) defined primary health care as the principal method of delivering health care at the most local level of the system. It is the health care provided to a patient at first contact with the health care system. For a successful primary care, it is essential that it should fully involve all members of the health care team, of which the pharmacist is an integral part (Canadian Pharmacist Association, 2004).

The role that many people associate with pharmacists is with the dispensing of medications. However, pharmacists have a more important role in meeting the needs of their patients as medication management experts (Canadian Pharmacist Association, 2004). Pharmacists do provide integrated, accessible, accountable health care services in a variety of areas. They are capable of developing and sustaining partnerships with patients and other health providers and practicing in the context of the family and the community. Pharmacists are the most accessible and trusted of all health care providers (Commission on the future of Health Care in Canada, 2002).

In a survey undertaken to document the primary health care roles of pharmacists in London, the volume of primary contacts, the types of problems handled and the advice given by the pharmacists were of particular interest (Bass, 1975). The contribution of pharmacist in primary care was found to be large, with neighbourhood pharmacies being the most active.

An independent enquiry into pharmacy practice has concluded that pharmacists are underutilized resource. A wide-ranging role development was therefore recommended (Oparah and Arigbe-Osula, 2001).

Community pharmacists in Nigeria perform primary health care roles without an official acknowledgement. A survey of their involvement in primary health care programmes in Benin City revealed a marginal, slightly satisfactory involvement of the community pharmacist in primary health care services with quality of care being fair (Oparah and Arigbe-Osula, 2001).

The present study and its findings will be beneficial in the cost effective delivery of pharmacy based primary health care services at the community level. Also, policy makers may find it useful in developing and formulating appropriate policies to ensure effective utilization of the untapped potential of the pharmacists. The general objective was to evaluate community pharmacists' participation in primary health care in Lagos State Nigeria. The specific objectives are to assess the community pharmacists' knowledge of primary health care and determine their participation in health promotion, disease prevention and curative primary health care activities, respectively.

MATERIALS AND METHODS

Setting

The investigation was carried out in Lagos State Nigeria. There are 2028 registered pharmacists in Lagos State according to the Pharmacists Council of Nigeria (PCN) as at the time of this research spread across numerous hospitals (local, state and federal hospitals), private clinics and medical centres as well as in the academia, industries and the community pharmacies.

The concept of primary health care entails first contact health care. This served as the inclusion criteria. The exclusion criteria entail non participation in first contact health care services. Based on this, pharmacist in the academia, industries, private hospitals as well as clinics, secondary and tertiary institutions are excluded. This thus left the community pharmacist as the ideal pharmacist for this research.

Survey Instrument

A 30 item stem consisting of 3 points response scale was developed for the survey questionnaire. It was a questionnaire developed from a modification of the questionnaire used for a similar study carried out in Benin City, Edo State in South-South Nigeria. Items included in the instrument covered different aspect of primary health care programme such as knowledge/awareness about primary health care, history and components of primary health care, health promotion, disease prevention and curative service, enabling structures for further improvements of community pharmacists' participation in primary health care. The questionnaire was prefaced: Yes, No and Not sure.

Samples

A total of 120 community pharmacists were included in the study using the convenience sampling method. A self completion questionnaire was administered to the community pharmacists in their premises and collected either on the same day or some days later.

Data analysis

The retrieved copies of the questionnaire were entered on Microsoft excel computer package for sorting and analyzed with SPSS version 10.0. Statistical analysis was done through the use of descriptive statistics

RESULTS

Table 1 shows community pharmacists' response to their knowledge about primary health care. Questions asked from participants ranged from knowledge of history of primary health care, levels of primary health care, perception of community pharmacists' ability to provide primary health care as well as training/update lectures on primary health care. Table 2 shows community pharmacists' response to participation in health promoting primary health care activities. Participation is very satisfactory as shown by a high percentage of positive

Table 1. Item analysis of community pharmacists' response to knowledge about primary health care.

Item	Participation (%)
What level of healthcare services do you provide in your pharmacy?	81.7 (Primary Health Care)
Have you ever heard of Primary Health Care?	95.8 (YES)
Primary Health Care became prominent with the Alma-Ata declaration of 1978?	26.6
Primary Health Care is the first contact health care a patient receives?	94.3
Primary Health Care could either be promotive, preventive or curative in nature?	96.7
The pharmacist can provide Primary Health Care services?	97.5
Were you taught Primary Health Care as part of your undergraduate curriculum?	71.7
Have you ever gone for a refresher course on Primary Health Care?	28.3

Table 2. Item analysis of community pharmacists' response to participation in health promoting primary health care activities.

Item	Participation (%)
Health education/leaflet provision	89.1
Tobacco cessation advice	83.3
Alcohol cessation advice	84.2
Promotion of healthy lifestyle on individual/community basis	95.8
Emergency contraception services	86.7
Provision of regular patient advice on diet, nutrition as well as the Body Mass Index (BMI)	87.5
Detection of Adverse Drug Reaction	80.8
Counseling services to patients	95.8

Table 3. Item analysis of community pharmacists' response to participation in disease preventing primary health care activities.

Item	Participation (%)
Provision of routine immunization services of routine immunization services	14.1
Health screening of at risk patients for diabetes, hypertension, etc.	70.8
Medication screening for possible drug interactions	84.1
Routine laboratory test request	88.3

Table 4. Item analysis of community pharmacists' response to participation in curative primary health care activities.

Item	Participation (%)
Diarrhoea management in children with oral rehydration salts	96.7
Supply of essential medicines and dressings	85.8
Assessment and treatment of common diseases e.g. malaria, cold and catarrh and sore throat	95
Referral of patients to appropriate health care provider after the provision of first aid services	94.2
Patient monitoring for detection of possible adverse drug reaction	68.3
Syndromic management of sexually transmissible diseases	81.7
Assessment and treatment of minor soft tissue injuries	80.8

positive response in each of the items. Table 3 shows community pharmacists' response to participation in disease preventing primary health care activities.

Participation is very satisfactory. Table 4 shows the community pharmacists' response to participation in curative primary health care activities.

DISCUSSION

Knowledge of primary health care

Many of the respondents are aware of the level of health care services that they provide, that is, primary health care (81.7%). This is in agreement with their response to whether the community pharmacist can provide primary health care services (97.5%); however, 7.5, 0.8 and 1.7% wrongly believed that they (community pharmacists) provide self care, secondary and tertiary health care services, respectively. There was a non response of 8.3% which could be interpreted to mean that they were not sure of the level of health care service that they provide.

With respect to the history of primary health care, while a large number of the respondents have heard of primary health care (95.8%), only 26.6% of the respondents knew that the primary health care concept became prominent with the Alma-Ata declaration of 1978. Many of the respondents despite not knowing about the Alma-Ata declaration however agreed that primary health care is the first contact health care service that a patient receives (97.5%), that it has health promoting, disease preventing as well as curative components (96.7%). These large number of respondents could be explained by the fact that many of the respondents were taught primary health care at the undergraduate level as part of their academic curriculum (71.7%), though only a few have gone for a refresher course in primary health care (28.3%) after qualification. Adequate knowledge of primary health care by community pharmacists will have an effect on their participation in the provision of primary health care services.

Participation in health promotion

The importance which pharmacists attach to vital health promoting behaviours and their health promotion beliefs have been shown to affect their practices.

The participation of the community pharmacists in health promotion was assessed on the basis of their participation in activities directed towards ensuring people and the community increase control over their health and determinants, and thereby increases their health. A large number of the respondents participate in patient education on health matters as well as the provision of drug information services (89.1%), this confirms the importance of the community pharmacists' role as a drug information provider. Most of the health promoting services which the community pharmacists provide includes the provision of tobacco cessation advice to patients (83.3%), participation in the provision of alcohol cessation advice (84.2%), participation in the provision of emergency contraception services (86.7%), participation in the provision of health based advice on

diet, nutrition and body mass index (BMI, (87.5%), detection of adverse drug reaction (80.8%) and the provision of counseling services to patients (95.8%). Community pharmacists' participation in health education and the provision of drug information leaflets to patients as well as medication counselling services could contribute to the prevention of drug abuse as well as drug misuse. The participation of the community pharmacists in the provision of patient medication counseling services is in line with modern pharmacy practice where emphasis have shifted from a product oriented pharmacy practice to a form of practice (pharmaceutical care) where much emphasis is now on the patient. Their participation in health promotion could also help in improving and maintaining the quality of life of patients and also to prevent death, disease and disability.

Disease prevention

The result of the participation of community pharmacists in the provision of immunization services showed that only a few (14.1%) of the respondents participate in the provision of immunization services. This corroborates an earlier research by Igwilo and Aderemi-Williams (2008) which revealed the unwillingness of parents/care givers to use community pharmacies for routine immunization of their wards. This is an area where the community pharmacists can work on by virtue of the proximity of community pharmacies to the people as well as their accessibility. More than half of the respondents however participate in the screening of at risk patient for the diseases, e.g. hypertension (70.8%), a large number of the respondents are also involved in screening for possible drug interactions (84.1%) and also request for laboratory tests, e.g. malaria parasite test, Widal tests before the provision of pharmaceutical care services in such situations (88.3%).

Curative services

In response to participation in curative primary health care services, most of the respondents (96.7%) reported participation in diarrhoea management in children with oral rehydration salts (ORS). This response in addition to showing that community pharmacists do participate in curative health services also shows that primary health care services which community pharmacists provide is not limited to adults. Also a large number of the respondents participate in the provision of essential medicines and dressings (85.8%) which is an important feature of pharmacy practice and also in the assessment and treatment of cold and catarrh, sore throat, diarrhea (95%). Many are also involved in patient referral to appropriate health care provider (after the provision of the first contact services) (94.2%). Many also reported to

participate in patient monitoring for possible adverse drug reaction (68.3%), as well as in the syndromic management of sexually transmissible infections (STIs) (81.7%) as well as in the treatment of minor soft tissue injuries (80.8%). The participation of community pharmacists in disease treatment may raise some legal/ethical questions as to the function of the pharmacists in health care delivery. In Nigeria, the existing laws governing pharmacy practice are yet to incorporate this aspect of pharmacy practice (Oparah, 2009).

Conclusion

Community pharmacists participate actively in primary health care activities in Lagos State. A large number of them are aware of primary health care and have undergone training on primary health care activities mostly at the undergraduate level, though only a few have undergone refresher course on primary health care.

The community pharmacists participate actively in health promotion mostly in the provision of drug information services, tobacco/alcohol cessation services as well as other health promotion services.

The community pharmacists participate also in disease prevention, however, participation in the provision of immunization services is very low, and this is an area which the pharmacists should strive to participate more in. Continuous education is important for all cadres of health personnel. The subject of immunization reveals from this study shows the underutilization and participation of community pharmacists in immunization services. Immunization as a specific protection in the primary level of disease prevention is an important area where community pharmacists can be much better utilized than

it is at present allowed through the forensic pharmacy practice of Nigeria. The community pharmacists also participate actively in disease treatment as a first contact health care provider.

Conflict of Interest

The authors have no conflicts of interest to declare.

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Short Communication

Environmental human faecal contamination in pig raising in Soroti district of Uganda: A short communication

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Environmental faecal contamination is the defecation on the ground or failure to dispose faeces into the latrine; it could be because of lack of latrines or even a deliberate shunning of latrines. This contamination is a worldwide problem that is perhaps exacerbating parasitic neglected tropical diseases (NTDs). The vice enables the lifecycle of parasitic zoonoses like taeniasis which is associated with neuro-cysticercosis (NCC) in the pig raising communities where primitive methods of free ranging are used. This cross-sectional study was made to assess the estimated human faecal density as an indicator of poor sanitation and latrine coverage in Soroti district of Uganda. Approximated transects of varying areas were made in which global positioning system (GPS) coordinates of faecal heaps along walk ways were recorded. Latrines and faeces that were observed in the selected homesteads of the approximated transects were also recorded. Faeces were seen around houses and latrines; the latrine coverage was 46% which is far below 90% required to achieve good sanitation; however observing large faecal heaps near latrines indicated possible deliberate shunning of latrines even where latrines were available. Some faeces possibly end up in the water sources if not eaten by the scavenging pigs making the communities vulnerable to many diseases. If latrine coverage is not campaigned with a per capita approach and applied just as latrine per homestead then it still remains ineffective against poor sanitation. In places where primitive habits of eluding latrines are still practiced; just having a good latrine coverage is not enough to guarantee good sanitation. There is need for a realistic sensitization and demystification about all faeces.

Key words: Faeces, Latrine, pig

INTRODUCTION

Environmental human faecal contamination is thought to be a result of deliberate or desperation of not using latrines, this may be due to negligence or taboos obstructing particular people from using latrines. Faecal

environmental contamination is a worldwide problem in both rural and urban areas which causes public inconveniences and illnesses (McLaughlin et al., 2007). Faecal contamination of the environment can also be as

a result of flow of latrine/toilet sludge during flooding seasons and when latrines are erected in wetlands. Poor sanitation in swine keeping areas is associated with porcine cysticercosis (Gonzalez et al., 2005). Environmental faecal contamination predisposes the human population to the consumption of *T. solium* eggs in food and water. The infected individuals become carriers and sources of infection by oral-faecal contamination (Antoninks et al., 1999). Poor sanitary conditions such as deficiency of latrines and raising pigs by free ranging methods increase the prevalence of swine cysticercosis. Flowing of sewerage sludge from leaking latrine/toilets are some of the factors that increase swine chances of accessing human faeces. Pigs are not provided with any feeds or are fed on scanty rations and then left to fend for themselves through scavenging. The frequency in which pigs were seen consuming human faeces was slightly different among age groups; it also depended on hierarchical order with the most dominant taking more faeces than the rest (Gonzalez et al., 2005).

The methods of pig keeping in Soroti were not clearly known; however, in case of any human faeces along road sides and in bushes surrounding homesteads roaming pigs could inevitably eat it. The unknown levels of environmental faecal contamination in conjunction with swine roaming might be escalating into taeniasis which is bound to significantly affect the productivity and grade of life of the members of the community by predisposing them to neurocysticercosis (NCC), epilepsy, hepatitis and psychiatric complications. The enterococci which are passed out in faeces are opportunistic pathogens which are responsible for millions of human and animal infections annually (Mululeedhara et al., 2012).

Soroti district is between latitudes (1°15N and 2°00N) and longitudes (33°00E and 33°45E). Soroti district headquarters are at 01°46N, 33°39E (Latitude: 01°7711 and Longitude: 33°6555). The district has a total surface area of 2262.6 km² and a land area of 2256.5 km² with 70500 households with a population of 367600 (UBOS, 2006). Despite various efforts by NGOs and government to sensitize about having latrines, many people have not listened or the communication has been misunderstood. The influx of North Eastern sometimes overwhelms the sanitation facilities in Soroti district. Environmental sanitation is one of the millennium development goals (MDG) and environmental faecal contamination can spread not only taeniasis but a multitude of other water borne infections.

Latrine use

With increase in human population, treatment and

disposal of human waste is increasing, since human faeces are the main source of diarrheal infections (Quinlan and James, 2009). Making latrines is a simple technology that can be used to control diarrhoea and related cases, but latrine coverage has to reach 90% of a population to have an impact on the community health (McConville, 2003). Some people do not respond to latrine construction and use because of what they call high costs of construction, lack of space and the difficulties of maintaining (McConville, 2003). In many places, children's faeces are considered harmless and therefore not disposed in latrines.

MATERIALS AND METHODS

A cross-sectional study was done in 2011 to determine the extent of environmental faecal density in the various selected areas by counting and mapping of faecal matter deposits and latrines in selected areas. This was done along paths or any roads and in some homesteads in the selected areas. Though the mapping of faeces along the paths and roads was continuous in the approximated transects; the visiting of homesteads for mapping latrines and faeces was discontinuous. A homestead after every five was selected in urban areas, while only two homesteads were skipped in rural areas because rural areas were more sparsely populated. The coordinates of the faeces and latrines were read from a universal transverse Mercator- global positioning system (UTM-GPS) device after reaching them physically and examining for the case of latrines.

RESULTS

A total of 83 homesteads were sampled in 25 approximated transects that were assumed in the various parts of Soroti district. The coordinates of faeces and latrines in the various selected areas of the study area are summarized as shown in Table 1.

Faeces were found in the homesteads even near latrines; however, the general latrine coverage was 46% (Table 2 and Figure 1), and lack of latrines was more common with rural homesteads. There were unknown reasons for not disposing children's faeces in the latrine. Many households were usually clustered in a single homestead and sharing a single latrine; however, the demography was not captured. most contaminated with human faeces.

DISCUSSION

Areas had varying results possibly because of different people of various lifestyles regarding latrine use and general sanitation. Commensurate latrines or the people were not interested in latrine use. Areas in peri-urban

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Table 1. Coordinates of the faeces, latrines in the selected areas.

Transect No.	Start coordinates	Ended coordinates	Faeces coordinates	Latrines coordinates	Village/Parish/Subcounty
1	36N0569415/0199237	36N0569499/019987	36N0569462/0199325 36N0569480/0199879	36N0569422/0199257 36N0569467/0199372 36N0569467/0199613 36N0569552/0199891	Omadera/Aloet/Arapai
2	36N0569084/0198793	36N0569498/0198139	36N0569352/0198287	36N0569003/0198741	Arapai/Arapai/Arapai
3	360570808/0198188	36N0570849/0198717	36N0570849/0198209	36N0570759/0198213 36N0570865/0198661	Aloet /Aloet/Arapai
4	36N0568219/0188336	36N0568342/0187772	36N0568329/0187770	36N0568303/0188257 36N0568218/0188338 36N0568209/0188150 36N0568189/0188124 36N0568058/0188085	Pamba/Pamba/WD
5	36N0568622/0187731	36N0568436/0187017	36N0568578/0187704 36N0568747/0187118	36N0568587/0187697 36N0568503/0187553 36N0568556/0187367 36N0568715/0187131	Opiyai A/Ameni/Soroti
6	36N0573942/0196833	36N0574856/0196543	36N0574678/0196721	-	Angaro/Dokolo/Gweri
7	36N0574852/0196568	36N0574699/0195393	-	36N0574748/0195968 36N0574724/0195460 36N0574697/0195339	Angaro/Dokolo/Gweri
8	36N0574282/0195870	36N0574117/0195991	-	36N0574092/0195944	Angaro/Dokolo/Gweri
9	36N0566570/0181011	36N0566940/0181064	-	36N0566696/0181011	Asuret/Mukura/Asuret
10	36N0566594/0180867	36N0567438/0180839	-	36N0566594/0180867 36N0567490/0180908	Asuret/Mukura/Asuret
11	36N0567404/0180678	36N0566524/0180690	36N0567404/0180678	36N0567462/0180671 36N0566524/0180688	Asuret/Mukura/Asuret

Table 1. Cont'd.

12	36N0566532/0190636	36N0565809/0191721	36N0566035/0191418	36N0566034/0191398 36N0566817/0191719	Asuret/Mukura/Asuret
13	36N0570109/0190041	36N0570156/0190046	-	36N0570109/0190042 36N0570156/0190046 36N0570114/0190042	Kichinjaji/Kichanjaji/ND
14	36N0570359/0197906	36N0570371/0197228	36N0570356/0197908 36N0570313/0197695 36N0570295/0197597	36N0570290/0197596 36N0570344/0197420 36N0570367/0197446	Aloet/Aloet/Arapai
15	36N0570369/0197228	36N0568842/0193396	36N0568693/0193345	36N0568524/0193221 36N0568530/0193225 36N0568597/0193349 36N0568705/0193368	Asinge/Madera/ND
16	36N0571870/0200588	36N0572024/0200873	-	36N0572024/0200577 36N0571800/0200590	Akaikai/Dakabela/Arapai
17	36N0573810/0200586	36N0573392/0198722	36N0573407/0198869	36N0573304/0198814 36N0573407/0198869 36N0573489/0198746 36N0573495/0198796	Abia/Awaliwali/Gweri
18	36N0573597/0199045	36N0574868/0199655	-	-	Amoroto/Awaliwali/Gweri
19	36N0574874/0199659	36N0575009/0200566	-	36N0574842/0200166	Amoroto/Awaliwali/Gweri
20	36N0572910/0198772	36N0573065/0198798	-	36N0572898/0198793	Abia/Awaliwali/Gweri
21	36N0570117/0189980	36N0560130/0203077	-	-	Odamasiko/Ojumu/Katine
22	36N0562774/0206388	36N0562568/0206836	-	36N0562773/0206386 36N0562663/0206619	Ogwolo/Olwelai/Katine
23	36N0561837/0210188	36N0560871/0211941	-	36N0561837/0210188	Anyalai A/Palaet/Tubur

Table 1. Cont'd

24	36N0562040/0209544	36N0562038/0209546	-	-	-
				36N0560543/0212458	
				36N0567832/0188804	
25	36N0567832/0188804	36N0567750/0189489	-	36N0567910/0188832	Sq/CW/Eastern Division.
				36N0567668/0189243	
				36N0567750/0189489	

WD: Western division, ND: northern division, Sq: senior quarters, CW: central ward.

and urban areas they had latrines, but there was faecal littering possibly because on latrine per capita basis, the latrines were not enough.

Latrine coverage

The observed latrine coverage of 46% (Table 2 and Figure 1) was very low and indicates that there were many people defecating on the open grounds, yet some latrines still lacked walls and roofs and could only be used at night. For good sanitation, latrine coverage should reach the minimum of 90% (McConville, 2003). However, for effective sanitation, latrine coverage per se still remains implausible unless per capita latrine coverage is considered because of the varying population densities. Although the urban and peri-urban areas had more latrines per square kilometer, they were not proportional to the population densities and this could have led to faecal littering. In some cases latrines existed but people opted to defecate not in the latrine but around, because of unknown reasons possibly because of negative myths or the rooms were too small for some people to fit in. Therefore, even with recommended latrine coverage, it is possible for scavenging pigs to be vulnerable to cysticercosis.

Disposal of children's faeces into latrines

Across Uganda many cultures discourage throwing children's faeces into the latrine and instead just throw in bushes or dump on dust bins if any attempts to dispose are made at all. The findings made us to presuppose a tendency to assume children's faeces not as unsafe as for adults and this makes faeces to enter the food or water cycle. Hepatitis A and amoebiasis is said to be spread by fecal contamination of food or water (Cuthbert, 2001; Fiore, 2004); no wonder the diseases are prevalent in Soroti district, although the levels are not known. Most children's faeces and other undisposed faeces are possibly eaten by scavenging swine or could end up in the community water bodies (McQuaig et al., 2006; Fawell and Nieuwenhuijsen, 2003). Environmental fecal littering can lead to contamination of even underground water sources with human enteric viruses (Gibson et al., 2011; Touron et al., 2007; Sinton et al., 1998; Ottoson and Stenstrom, 2003). More study is needed to estimate the prevalence of all diseases related to sanitation in Soroti district.

Faecal density

In the rural Soroti, the households were traditionally

crowded in one homestead having distant neighborhoods with insufficient or zero latrine facilities (Table 2). The sparse distribution of the human population in the rural areas makes people too lax to construct latrines. Markets places have underestimated the requirement for the latrine facilities and their charges are perceived as expensive while others have no latrine facility at all. Travelers are accustomed to stopping on the roadsides for helping themselves and no public toilets have been constructed on the roadsides with resultant faeces littered all over the environment. Other factors identified as major reasons for human faecal littering include the rampant alcoholism as drunkards are usually careless or incapable of reaching the latrines; also upcoming kindergarten school facilities in the villages without Latrines.

The general latrine coverage was far lower than that required to control disease and therefore the communities are either having subclinical diseases or are at risk of the various diseases of poor sanitation that just having latrines per se can affect sanitation or the prevalence of porcine cysticercosis unless the habit of latrine use is adopted. There is still deliberate ignoring of latrines by adults and not disposing children's faeces into latrines. A holistic sensitization is needed not only in Soroti but in most communities

Table 2. Selected homesteads and status of having or lacking latrines.

Transect No.	Homestead No.	Have Latrine?
1	1	Yes
	2	Yes
	3	No
	4	Yes
2	1	No
	2	No
	3	No
	4	Yes
3	1	Yes
	2	Yes
	3	No
	4	No
4	1	Yes
	2	Yes
	3	Yes
	4	No
5	1	Yes
	2	No
	3	Yes
	4	Yes
	5	No
	6	Yes
6	1	No
	1	No
	2	No
	3	Yes
7	1	No
	2	No
	3	Yes
	4	Yes
8	1	No
	2	Yes
9	1	Yes
	2	No
	3	No
10	1	No
	2	Yes
	3	No
	4	No
11	1	Yes
	2	Yes
	3	Yes
12	1	Yes
	2	Yes

Table 2. Cont'd.

13	1	No
	2	Yes
14	1	No
	2	No
	3	No
	4	Yes
	5	No
15	1	Yes
	2	Yes
	3	No
	4	No
16	1	No
	2	No
17	1	Yes
	2	Yes
	3	Yes
	4	Yes
18	1	No
	2	No
	3	No
	4	No
19	1	No
	2	Yes
	3	Yes
20	1	Yes
	2	No
	3	No
21	1	No
	2	No
	3	No
	4	No
22	1	Yes
	2	No
	3	Yes
23	1	No
	2	No
	3	No
	4	Yes
24	1	No
	2	No
25	1	Yes

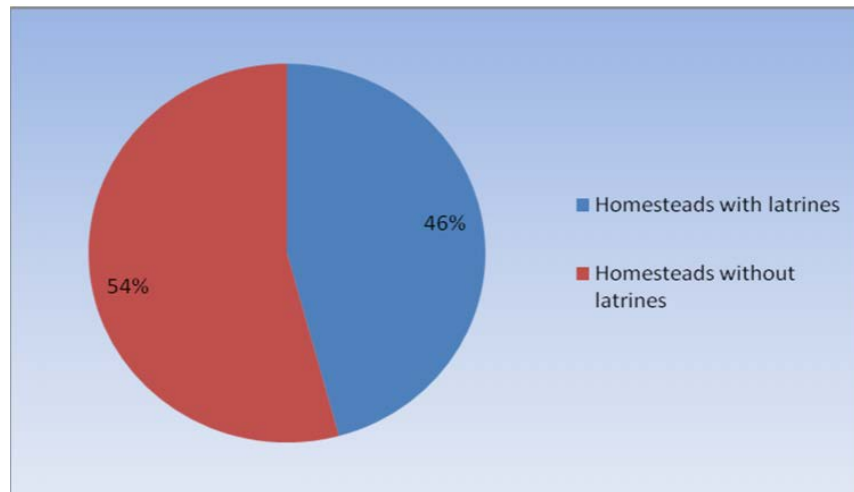


Figure 1. Observed latrine coverage in Soroti district.

of Uganda about sanitation; otherwise the masses are at a great risk of preventable diseases. Poor sanitation exacerbates parasitic zoonoses where swine and ruminants are intermediate hosts.

Conflict of Interest

The authors have no conflicts of interest to declare.

Abbreviations

NCC, Neuro-cysticercosis; **NGO**, Non-governmental organization; **MDGs**, millennium development goal; **NTD**, neglected tropical diseases; **UTM**, universal transverse mercator; **GPS**, global positioning system; **Km²**, Square kilometer.

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