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FOREWORD

I am pleased to write a few words of introductions to the first Zambian Public Health Journal, ***The Health Press – Zambia.*** It has been established at a very important time when the landscape of public health globally has changed, where timely and accurate data is emphasised as critical for decision making. In November 2016, *The Health Press – Zambia* was established under the Zambia National Public Health Institute with financial support, including staff salaries and publication costs, being provided by the Zambian government and Bloomberg Philanthropies though the CDC Foundation. *The Health Press – Zambia*, is the platform established under the Information Systems cluster of the Zambia National Public Health Institute. The establishment of this communication tool comes timely when Zambia has been assigned to carry out the public health functions of the Africa CDC, Southern Region Hub.

The Health Press – Zambia which established an online issue in January 2017, has aspirations to be a leading publication that communicates reliable health information to policy makers, public health practitioners, and the general public by effectively and expeditiously disseminate influential scientific information and recommendations that will improve public health in southern Africa and beyond. The long-term goal is to provide a platform for public health professionals in this region and beyond to publish their work as a means to advance the science of public health. The monthly online and quarterly print issues established will effectively inform not only the countries' health related policies, but will also influence change of mind-set of the health practitioners and community at large in prevention and better curative methods.

I take this opportunity to thank the authors who continue to submit articles to *The Health Press – Zambia,* and more so the Editors, Editorial Board and Reviewers who have contributed to this innovative communication tool. I am encouraged with the continued improvement in the quality of the online publication thus far, owing to the reliable Editorial and Reviewer team

I am delighted to endorse this new initiative of an effective communication tool for public health management.

Honourable Chitalu Chilufya MP
Minister of Health
5th May 2017

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EDITORIAL

The Health Press – Zambia Official Launch

By ML Mazaba

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It is with great honour and pride that we announce the official launch of *The Health Press – Zambia (THP-Z).* We present to you the official launch and first print version of the publication. The monthly online issue was launched in January 2017 and 3 publications have been disseminated thus far. The print version shall be published quarterly.

As intimated in the inaugural online issue, *THP-Z* is a publication of the Zambia National Public Health Institute which was established in February 2015. As it moves towards its vision to be a leading publication that will inform policy makers, public health practitioners and the general public at large, *THP-Z* will publish and disseminate effectively and timely influential scientific information and recommendations of public health importance that will transform public health worldwide, and more so for the underserved and poor populations.

THP-Z which is available for free, has an editorial policy that is guided by high standards, ensuring quality and integrity, being managed by a team of Associate Editors with varying expertise. We encourage you to subscribe with *THP-Z* on http://www.znphi.co.zm/, like us on our Facebook page and follow us on Twitter.

Our cover page shows a soaring fish eagle with its catch. This was influenced by a combination of our vision, mission and objectives to be a high-flying quality publication that will effectively and timely 'fish for' (source) and disseminate authenticated influential information of public health importance for policy and help build public health capacity in Zambia and beyond.

THP-Z has as part of its content in this official launch issue, original articles and perspectives covering a wide range of subjects including psychosocial matters, infectious disease epidemiology in Tuberculosis and Meningitis, Non-communicable conditions including Obesity and hearing loss, a policy brief relating to Tuberculosis screening in health workers, response to programs including antiretroviral therapy and sanitation and clinical care including a paper relating to postnatal care knowledge and appropriateness of antipsychotic drug prescriptions.

In April, Word Health Day is celebrated and in 2017 the theme was focused on depression. Depression which is described as a state of low mood and aversion to activity that can affect a person's thoughts, behaviour, feelings, and sense of well-being is a feature found in psychiatric syndromes such as major depressive disorder and dysthymia [1]. According to WHO, depression is a major human blight that is responsible for more years lost to disability compared to other conditions affection up-to 350 million people of all ages worldwide. Despite this major public health concern, it is widely undiagnosed and untreated owing to the stigma, lack of effective therapies and inadequate mental health resources [2]. Depression often leads to suicide with close to 800,000 people dying from suicide annually, placing suicide as the second leading cause of death in the 15 to 29 year olds [3].

In this issue, we publish 5 papers relating to psychological maters including depression. Dr Ravi Paul documents the epidemiology of parasuicides reported at UTH and psychiatric disorders which include depression as the third cause of parasuicides reported to the hospital. According to this article the top three causes of parasuicides, which is defined as self-injurious behaviour with a non-fatal outcome, include domestic dispute (74%), alcohol abuse (10%) and psychiatric conditions (8%). The paper characterizing patients with psychosis presenting at Ndola Teaching Hospital Psychiatric unit in Ndola, Zambia by Lukonde and Siziya lists the common causes as alcohol use (76.7%), followed by cannabis abuse (35.2%); then familial psychosis (27.6%) and lastly antiretroviral drug use (10.3%). The increasing number of patients accessing the Psychiatry ward at UTH have alcohol related disorders according to von Hammerstein et.al in their paper on the increasing problem of alcohol abuse among the Zambian population in the psychiatric setting. On reviewing the papers just discussed, I would like to infer

that alcohol abuse, depression, psychosis and parasuicides or suicide are interlinked. This inference can be substantiated with findings by other researchers and scholars. According to Pompili et.al psychiatric disorders may increase the risk of suicidal behaviour and have reciprocal influences with alcohol drinking patterns [4]. Another publication attributes alcohol and substance abuse among other factors as causes of mental disorders include depression, anxiety, schizophrenia, and psychosocial and mental disorders [5]. A preliminary study to measure the appropriateness of antipsychotic drugs prescribed for first episode psychosis by clinicians at Chainama Hills College hospital in Lusaka indicates possible gaps in clinician practice such as performing important components of the medical workup for patients with new psychosis and for patients with first-episode schizophrenia; and prescribing doses of antipsychotic medication that are too high and administered for an inadequate duration. They recommend further studies to confirm the preliminary findings. They also recommend additional educational interventions be put in place to align clinical management with published practice guidelines.

Depression and other mental health disorders are a major contributor to the global burden of disease. The Global Burden of Disease (GBD) 2010 survey identified as a leading cause of burden, depressive disorders, with Major Depressive Disorder (MDD) being a contributor to suicide and ischemic heart disease. The PLoS Medicine editor in 2013 recommended that from findings of the 2010 survey, depressive disorders must be treated as a public health priority with the implementation of cost-effective interventions to reduce their ubiquitous burden [6]. In Zambia, depression has been recognised as the most commonly diagnosed mental illness alongside other neuropsychiatric disorders [7] associated with alcohol and substance abuse, HIV and other social factors [7,8]. All hope is not lost in an improved system to help mitigate the problems surrounding mental health as the government of Zambia called for a re-strategy to include increased investment in mental health and integration of services in all primary health care facilities to mark the World Health Day 2017, taking recognance of the fact that “many people were suffering from depression in Zambia and yet limited resources were allocated for interventions to address this salient potential killer” [9].

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PERSPECTIVES

Dramatic rise in sanitation uptake in Zambia

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Access to water and sanitation and uptake of good hygiene practices can reduce the risk of getting diarrhoea by an estimated 30%. Since diarrhoea is the world's second leading cause of death and the leading cause of malnutrition and stunting in children under five [1-3], finding ways to reduce the diarrheal burden is essential to the health and wellbeing of Zambians.

Community-Led Total Sanitation (CLTS) is used in developing contexts around the world to improve sanitation in rural communities. Under the CLTS model, communities take stock of their own defecation practices and collectively make a decision to end open defecation by building and using household latrines. Under the CLTS model, communities work together to build low-cost latrines using locally sourced materials and are responsible for maintaining these latrines.

The CLTS model can be powerful in terms of driving behavior change. However, the data collection systems typically used to monitor whether communities are building and maintaining latrines are slow and error prone; the resulting information is insufficient to measure progress. The lack of timely and reliable data makes it nearly impossible to follow-up with communities that are lagging behind and/or champion communities that have embraced the use of latrines. In Zambia, Akros has supported the former Ministry of Local Government and Housing (MLGH) and UNICEF to resolve this data issue.

In 2014 the MLGH introduced a Mobile to Web (M2W) platform to collect and aggregate the CLTS data. Using simple technology, volunteer community champions submit latrine construction data using a mobile phone on a monthly basis. These data

are creating the ability for government, chiefs and communities to see their progress towards better sanitation practices. The platform has expanded to include water access monitoring so that government officials can take monthly stock of community-level water access and know when pump minders are needed in the field.

Chief Singani of Zambia's Choma district shows the tablet he uses to keep tabs on his chiefdom's sanitation progress. The leadership of chiefs and chieftainesses in Zambia equipped with real-time data has helped drive the country's sanitation agenda

One key component of the CLTS M2W model is the Chief's Visualizer Tool. Chiefs are provided tablets equipped with a widget or mobile application that delivers sanitation reports of the Chief's land. Since the chiefs are the key agents of behavior change in rural Zambia, being equipped with real-time data on the performance of the villages within their chiefdom allows them to make judicious use of limited fuel and monitoring resources to place pressure on villages that may be underperforming [4]. This goes hand-in-hand with one of the main CLTS principals of communal resolve to improve the health of yourself and your neighbour.

In Zambia, the introduction of CLTS M2W saw 1.5 million new users of sanitation in the first 18 months of implementation and has helped to declare three districts as open defecation free. This level of sanitation uptake is such a short period of time is unprecedented [5].

Akros has continued to work with the MLGH (now called the Ministry of Water Development, Sanitation and Environment Protection) to support roll-out of the system in Zambia. The system currently receives data from over 1,900 community champions across 67 districts. Although the CLTS platform is the largest of its kind in Zambia, Akros has also supported the design and implementation of information systems for health, education and agriculture in Zambia. For more information about Akros in Zambia, please visit www.akros.com.

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PERSPECTIVES

Annual Tuberculosis screening for Health Care Workers - A strategy to ensure a healthy workforce in Zambia

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The incidence of Tuberculosis (TB) in Health Care Workers (HCWs) can be as high as twice that in the general population One undiagnosed TB patient can infect up to 10 individuals each year. Undiagnosed TB among HCWs may result in the transmission of infection to family members, colleagues, and patients. Annual screening of TB in a HCW can identify 76% more cases and prevent 35% more secondary cases.

The Problem

TB is an ongoing public health problem that is easily spread from person to person. The source of infection stems from an untreated person with TB. Reducing TB transmission in hospital or clinical settings occurs by improving ventilation, isolating patients with TB, and ensuring that all patients who may have TB are screened and put on treatment [1]. TB is common in Zambia: approximately 6 out of every 1,000 Zambians has TB (0.6%). In 2014 the National TB Program reported 37,931 cases of TB. However, the World Health Organization has estimated 84,000 TB cases in Zambia [2], meaning that there are many undiagnosed TB cases in the community. Notably, the prevalence of TB among HCWs is 1.5 to 3 times higher than the general population. A study done in the University Teaching Hospital in Lusaka in 2005 [3] showed that 1.8% of the nurses were treated for TB while another study that screened HCW in Ndola found that 1.02% had TB [4].

Policy options

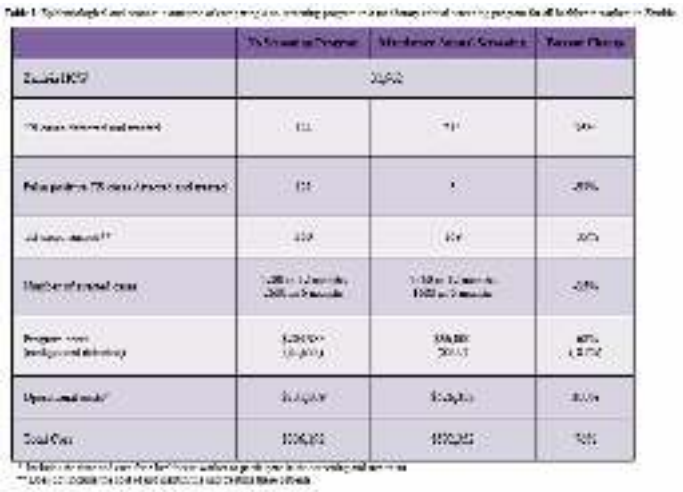
Implementing a mandatory annual TB screening program for all HCW will ensure the early diagnosis and treatment of disease, improve the outcome of treatment, reduce the possibility of transmission of TB to other HCWs and/or patients, and helps maintain a healthy workforce.

Annual TB Screening for Health Care Workers

WHAT: The intervention would require re-establishing occupational health clinics, access to x-ray facilities, and access to laboratory testing for sputum using the GeneXpert. Providing this for all health care workers will have a large cost, yet also an impact in terms of numbers of cases of TB diagnosed. Using a 3-step process to identify those who are most likely to have TB will reduce the number of HCWs needing chest x-ray and sputum tests. After a screening questionnaire, HCW with the presence of any symptoms typically associated with TB will have a chest x-ray, and those with an abnormal x-ray will give a sputum sample (secretions from the lungs) to test for TB.

WHY: The costs associated with implementing a mandatory screening program for all HCWs are **$66,000,** while in the absence of a screening program, the costs associated with diagnosing and treating TB among HCW are **$204,983**. Implementation of the screening program will result in fewer missed cases of TB than associated with the status quo (168 compared to 259), thus leading to fewer additional TB cases.

The opportunity costs associated with implementation of the screening program are much greater than those associated with TB diagnosis and treatment in the absence of a screening program ($526,352 compared to $131,509). Although the cost of missing TB patients are not included in these calculations, a potential additional 910 new TB case will occur under the no screening program compared to the mandatory annual screening program



FEASIBILITY: Annual health screening is already a requirement for health workers. However, currently, there is no systematic enforcement of this requirement. We suggest linking TB screening to staff's annual appraisal as a way of ensuring that HCWs undergo the TB screening. This strategy will thus use existing facilities and staff, and take advantage of staff gatherings at healthcare facilities, such as at workshops, trainings and meetings to provide the screening.

Mandatory health screenings should be presented in a manner to avoid stigmatization of staff found with TB.

Recommendations

We recommend screening of all HCWs. This strategy will make it possible to identify TB cases earlier than the current situation, thus reducing transmission of infection and secondary TB cases.

The Policy will be presented to the National TB Program for feedback. We will also request this strategy to be included in the 2017 -2021 National TB Strategic Plan currently being developed.

The policy brief will be presented to Senior Management of MOH and other stakeholders such as the General Nursing Council, the Health Professions Council, and the Zambia Medical Association to obtain approval and support.

Implementation of the program can begin with an initial pilot targeting the nurses in Lusaka, as a way of understanding implementation challenges in order to guide a wider national rollout.

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Available literature

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RESEARCH REPORT

Description of cases of parasuicides reported at University Teaching Hospital, Lusaka. Zambia: preliminary findings

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Parasuicide has become a public health problem of importance. A sample size of 207 case records of patients was estimated considering a prevalence of 16+5% obtained in the project area, z=1.96 and margin of error of 5%. The case records were conveniently sampled. A total of 141 (68.1%) out of 207 records were reviewed of which 53.2% were for males. About a third of the cases were in the age group 20-24 years (35.0%), employed (33.1%) and students (28.8%). Most of the cases were married (47.9%), lived with their families (95.0%) and attained secondary level of education (79.9%). The most common reasons for parasuicide were domestic dispute, alcohol-related and psychiatric condition in that order. The most common methods used in parasuicide were organophosphate poisoning, drug overdose and acid poisoning. The common reasons and methods for parasuicide obtained in the current study may be considered in the care of parasuicides. Further studies should be conducted to establish factors associated with parasuicide.

Introduction

Suicide and parasuicide rates are important markers of the mental health of a population. Suicide is an act of deliberately killing oneself [1]. Meanwhile, parasuicides is an apparent attempt at suicide without the actual intention of killing oneself [2]. While suicide is a worldwide problem affecting all age groups, it mostly affects persons aged 70 years or older and persons in the 15-29 years age group in which it is the second leading cause of death [3]. Persons who commit an act of parasuicide tend to repeat the act. A study carried out in Canary Islands, Spain in the year 2006 showed that previous parasuicide is highly predictive of future parasuicide. As the study revealed, 24.9 percent of parasuicidal persons in Tenerife of which 106 persons (6.3%) repeated at least one parasuicide act in the five-year period analysed. In another town named Gran Canaria 21 percent had committed previous

parasuicide of which 143 persons (8.8%) repeated at least one parasuicide in the three-year period analysed [4].

About half of all people who kill themselves have a history of deliberate self-harm. Hawton et.al report that an episode of parasuicide occurs within a year before death in 20-25% [5]. In 2013, it was observed that parasuicides rates in Europe in the previous 50 years had been on the increase. [6]. Michel et al [7] reported average suicide rates for persons aged 15 years or older of 140:100 000 and 193:100 000 for males and females, respectively, in Europe. Contrary to the general finding by Madu and Matla [8] that

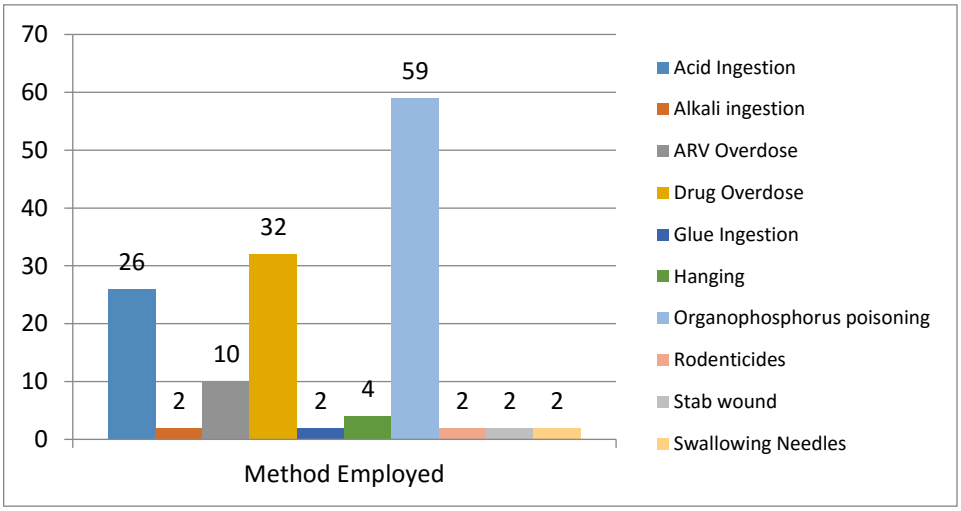

Figure 1 Methods used in parasuicides

more females than males attempt suicide in Africa, except in Nigeria, Egypt, Ethiopia and Uganda.

There is scarcity of information on parasuicide in Africa and Zambia in particular. Mars et al [9] in their review reported that data on suicide attempt was only available from 11 countries and Zambia was not among them. Suicide attempt incidence rates for the 7 countries varied from 0.1 per 100000 in Ghana to 100 per 100000 in Namibia; lifetime prevalence from 0.7% in Nigeria to 6.0% in Liberia. The objective of the current was to contribute to the body of knowledge by describing socio-demographic factors, reasons for parasuicide and method used in attempting suicide among cases of parasuicide attending the University Teaching Hospital in Lusaka, Zambia.

Methods

Case records of patients reporting to the University Teaching Hospital (UTH) for parasuicide between from January2014 to July 2015 were reviewed.

A sample size of 207 was estimated using a formula: $n=z^2*p(100-p)/m^2$ considering a prevalence of 16±5% obtained in the project area, z=1.96 and margin of error of 5%. The case records were conveniently sampled.

The following variables were collected and data entered in an Excel spreadsheet:

patient's ID, address, date for suicide committed, age, gender, marital status, education level, occupation, living with family or not, method employed, reason for such attempts and number of attempts. All the data was handled confidentially and safely stored in a locked filing cabinet. Data analysis was conducted using SPSS® version 16.0.

Table 1 Socio-demographic characteristics for cases of parasuicides ([a]no information on 1 case, [b]no information on 2 cases)

Factor	n (%)
Age (years)[a]	
<20	29 (20.7)
20-24	49 (35.0)
25-29	34 (24.3)
30+	28 (20.0)
Gender	
Male	75 (53.2)
Female	66 (46.8)
Marital status[a]	
In relationship	20 (14.3)
Married	67 (47.9)
Unmarried	53 (37.9)
Education[b]	
Primary	18 (12.9)
Secondary	111 (79.9)
Tertiary	10 (7.2)
Occupation[b]	
Employed	46 (33.1)
Home maker	14 (10.1)
Not employed	30 (21.6)
Self employed	9 (6.5)
Student	40 (28.8)
Living with family	
Yes	134 (95.0)
No	7 (5.0)

Results

A total of 141 (68.1%) out of 207 records were reviewed of which 53.2% were for males. About a third of the cases were in the age group 20-24 years (35.0%), employed (33.1%) and students (28.8%). Most of the cases were married (47.9%), lived with their families (95.0%) and attained secondary level of education (79.9%). These results are shown in Table 1.

Reasons for parasuicide are shown in Table 2. The most common reason for parasuicide was domestic dispute (77.0%) seconded by alcohol-related (10.4%) and psychiatric condition (5.9%). Figure 1 shows the methods that were used in parasuicide. The most common methods used in parasuicide were organophosphate poisoning (42%), drug overdose (23%) and acid poisoning (18%).

Discussion

The current study showed that most cases of parasuicide were married, lived with their

families, attained secondary level of education, aged 20-24 years, employed or were students. The most common reason for parasuicide was domestic dispute and most common method used for parasuicide was organophosphate poisoning.

Table 2 Reasons for parasuicide (Total =135)

Reasons for parasuicide[c]	
Alcohol related	14 (10.4)
Chronic disease- rvd r	2 (1.5)
Dispute with friends	1 (0.7)
Domestic dispute	104 (77.0)
Infidelity	1 (0.7)
Psychiatric condition	8 (5.9)
Sexual abuse	2 (1.5)
Work stress	3 (2.2)

[c] No information on 6 cases

Being married was common in the present study among persons who committed parasuicide, suggesting that it may be a risk factor for the action. However, it remains to be established if it is a risk factor as observed by Shahid and Hyder [10]. However, Welch [11] reported to the contrary that being single or divorced was a risk factor for parasuicide in the general population. Further studies are needed to establish if being married being common in the current study among the parasuicides is indeed a risk factor by conducting analytical studies.

Although most parasuicides in the current study lived with their families, further studies need to be conducted to establish is living with family is associated with parasuicide. A study conducted in Bristol in the United Kingdom found no significant association between living alone and parasuicide [12].

Most of the cases in the current study had attained secondary level of education, contrary to the majority of parasuicides in Dar es Salaam, Tanzania, who had primary level of education [13].

The most frequent age group for parasuicide in the current study was the 20-24 years, suggesting that young age may be a risk factor for deliberate self-harm as reported by Shahid and Hyder [10]. Ndosi and Waziri [13] also reported that parasuicides were mostly young adults. Young age was also reported to be a risk factor for parasuicide in the general population by Welch [11].

The majority of cases were employed. Being employed may not directly be linked to parasuicide. To the contrary, lack of employment may induce stress in the unemployed and result in the act of parasuicide.

The finding in the current study that students were also overrepresented in the current study may suggest that being a student is associated with parasuicide. A study to establish what stresses students may shade some light on the association of being a student and parasuicide. Among the factors to be considered are academic pressures as well as interpersonal relationships.

The most frequently reported precipitating factor in the current study was domestic violence, a finding similar to that reported elsewhere of family problems and disputes [14,15].

The most common methods used in parasuicide in the present study were organophosphate poisoning at 59%, drug overdose (32%) and acid poisoning (26%) in that order (figure 1). In Greek medical ward, the most frequently methods were ingested drugs (psychopharmaceuticals and analgesics/anti-rheumatics) and pesticides among patients coming from rural areas [14], similar to the finding by Ndosi and Waziri [13] who reported that most of the parasuicides ingested overdose of medicaments, including chloroquine Morgan et al [12] finding concurs with this finding that drug overdose occurred in most of all cases. Organophosphate insecticides second to benzodiazepines were also common methods used in deliberate self-harm in Pakistan [16]. The method used may depend on its availability in the area, suggesting that developed countries may have similar agents used in parasuicide and similarly, agents that may be used in parasuicide in developing countries may be similar. Since developing countries are agriculture oriented, agents used in parasuicide in these countries are agents that are used in production of crops or rearing of livestock. Prevention interventions should be tailored with availability of agents in the general population in mind.

As is the case with retrospective studies, the current study faced a number of limitations. The first being that of missing data in the records. The findings in the study may not be generalizable to population. Persons who attend health facilities tend to be different from those who do not with respect socio-demographic characteristics. More importantly, the frequency of the factors in the study does not imply that the factors may be associated with the outcome. The factors in question may equally be common in parasuicides and non-parasuicides, thus, such factors cannot be associated with the outcome. The sample size was not achieved

and the findings may change with an increased sample size.

In conclusion, the common reasons and methods for parasuicide obtained in the current study may be considered in the care of parasuicides. Further studies should be conducted to establish factors associated with parasuicide.

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RESEARCH ARTICLE

Appropriateness of antipsychotic drugs prescribed for First episode psychosis by clinicians at Chainama Hills college hospital in Lusaka

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Mental health disorders pose an increasing burden on societies all over the world Notable one is Psychosis, a debilitating condition that presents as marked distortion in thinking and perception, whose first presentation of symptoms in a newly diagnosed patient requires accurate and evidence based drug treatment. Patients with first episode psychosis may present in a variety of clinical settings to providers who have a range of knowledge and skills. This study aimed to assess the appropriateness of antipsychotic drugs prescribed by clinicians in the management of first episode psychosis.

A cross sectional study to assess appropriateness of antipsychotic drugs prescribed in the management of first episode psychosis using convenient sampling method and the NICE 2014 antipsychotic treatment guidelines as gold standard was conducted at Chainama hills college hospital in Lusaka.

There were a total of 31 prescribers assessed for this study 38.7% psychiatrists and 61.3% clinical officer psychiatrists. The proportional difference of the two groups of prescribers assessed was not statistically significant, P-value = 0.21. Risperidone was the most frequently chosen antipsychotic with 58.1% of the respondents. Overall, there were 96.8% prescribers who did not prescribe anti psychotics in line with published guidelines. 3.2% of prescriber did prescribe in line with NICE 2014 guidelines.

The front-line clinicians who encounter patients with first episode psychosis may have significant gaps in the initial and follow-up care of these patients. Given the preliminary nature of this study and the debate about the optimal care for first episode psychosis, further study with larger sample size is needed. If such gaps are confirmed additional educational interventions are required to align clinical management with published practice guidelines

Introduction

Psychiatry, as in all branches of medicine, an ever- expanding range of therapeutic options to treat psychosis is being created. And one response to this evolving complexity has been the development of guidelines (Evidence –based practices) for which there is scientific evidence consistently showing that they improve client outcomes, also

intended to inform and influence clinical practice. Fenton [1]. A proximal goal of practice guidelines is to promote the use of effective therapeutic interventions and reduce inappropriate variations in clinical practice [2].

In First-episode Psychosis, antipsychotic pharmacological treatments should be introduced with great care due to the higher risk of extrapyramidal symptoms (EPS). Appropriate strategies include gradual introduction of antipsychotic medication with the lowest possible effective dose, combined with careful explanation [3]. This should so because, patients with First-episode psychosis exhibit increased treatment responsiveness and an increased sensitivity to adverse effects. Therefore, antipsychotic treatment should be started with lower doses [4]. Extrapyramidal side effects from antipsychotic treatment should be avoided in order to encourage future adherence to medication. Although typical antipsychotics maybe efficacious as atypical antipsychotics in reducing positive symptoms, they are frequently not well tolerated at low doses. For this reason, atypical antipsychotics should be used as first line therapy, commencing with a low dose and titrating upwards very slowly over a period of several weeks [5].

However, such practices in clinical set ups are far-fetched as studies have found that clinicians are particularly reluctant to recommend antipsychotic treatments in consent with treatment guidelines and follow their dosage recommendations. Disease-specific treatment guidelines serve as a useful tool for effective clinical management [6].

Methods

This was a cross sectional, descriptive study design that assessed appropriateness of antipsychotic drugs prescribed for the management of treatment First- episode psychosis by clinicians at Chainama Hills college hospital.

A clinical case vignette, presenting a patient with first-episode psychosis was administered to prescribers. This is because Formal assessment of guideline adherence by prescribers' ability to evaluate and treat first –episode psychosis is challenging. Closed-ended multiple-choice questions and other commonly used assessment tools are unlikely to reflect clinical practice. In contrast, clinical case vignettes that allow free-form responses to open-ended questions appear to closely assess adherence as measured by chart reviews and simulated patients and are more efficient than these other measures of adherence [7].

Hence in this study, we described our preliminary study of the mental health prescribers' ability to provide guideline-adherent treatment of patients with First-episode psychosis as measured by responses to a clinical case vignette.

The study population included Psychiatrists, Master of Medicine Students of Psychiatry, Resident doctors and clinical officer Psychiatry who are mandated by law to prescribe antipsychotics and treat mental patients in Zambia and based at Chainama hills college hospital.

The data source was the clinical case vignette of a patient presenting with classical symptoms of psychosis on first presentation. The vignette had four open-ended response questions.

Individual Prescriber were consented in written at a place of their convenience. The participant was asked to provide free-form written responses to open-ended questions at strategic points during the case.

The first two questions related to assessment of First- episode psychosis in general.

On the front side of the response form, Question 1 asked about differential diagnosis, and Question 2 inquired about the next steps in evaluation of the patient. On the reverse side of the form, the Participant was then instructed to assume that the patient is diagnosed with schizophrenia. Hence, they will be asked to provide answers to Question 3 regarding first-line medication treatment (including type, name, initial dose and target dose of treatment). Finally; Question 4 asked for the proposed duration of treatment once the patient's symptoms had remitted.

To generate the numerical scoring system for the free-form responses, published guidelines [8] were reviewed on the assessment and treatment of schizophrenia.

In this study both Descriptive and Inferential statistic were used. All statistical tests were two tailed and significance was set at $P < 0.05$ [9].

Response frequencies for all questions were recorded with specific focus on the Proportion of Prescribers who recommended a toxicology screen and other medical work up (Question 2), Antipsychotic treatment most frequently chosen and mean target dose (Question 3) and Mean duration of Antipsychotic treatment the prescriber planned to put the simulated patient in the vignette on, after the remission of symptoms (Question 4).

All statistical tests were at 5% significance

level. The Pearson's chi-squared test was used for comparison of proportions between psychiatrists and clinic officer psychiatry.

For each prescriber who attempted the clinical case vignette, the score for the four (04) total questions and each of the individual questions were tabulated. in addition, the combined mean scores for assessment questions 1&2 and treatment questions 3&4 were calculated and an independent sample *t*-test was used to compare the performance between pooled assessment and pooled treatment questions to determine whether performance between these domains differed. The maximum score for each question was four and the maximum attainable score was 16 points.

With regards to impact of discipline on overall performance on all questions, all consenting Prescribers were required to provide information on their profession discipline. This was in order to make it possible to perform *t*-test to determine whether there were group differences. Differences were examined between Doctors and Clinical officers Psychiatry. These evaluations were performed using total score on individual questions and pooled scores on the assessment and treatment questions as the dependent variable in separate analyses.

Overall assessment of appropriateness of antipsychotic drugs was measured as a percentage of adherence to treatment NICE guidelines, a percentage arising from the combined mean scores for assessment questions 1&2 and treatment questions 3&4using Traffic-Lights system.

Results

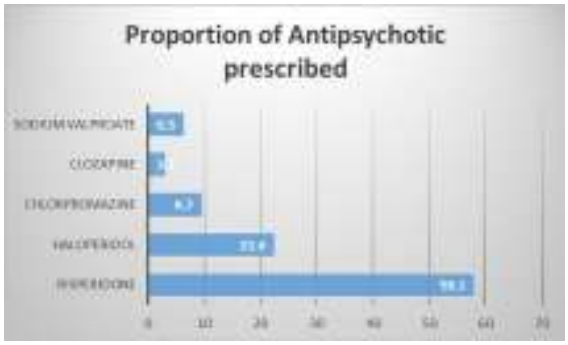
The results of the study showed that there were 50% female psychiatrist and 50% male psychiatrists as opposed to 15.8% female clinical officer psychiatry and 84.2 % male clinical officer psychiatry.

The results showed that of the Five prescribed antipsychotics, the majority of the respondents prescribed Risperidone an atypical antipsychotic drug 58.1% as opposed to Haloperidol with (22.6%). The study further shows that the mean initial dose and target dose for Risperidone was 3.2 ± 1.92 and 8.1 ±2.22 respectively (fig 1and table 1).

Figure 1 shows a higher proportion of prescribers prescribed Risperidone at 58.1% Figure 2 Shows percentage of duration of treatment recommended.

The study found that a slightly larger proportion of prescribers did not recommend

Figure 1 Proportion of antipsychotic prescribed at Chainama hills hospital



any treatment duration (32%).The overall mean treatment duration was 0.7 years ± 0.3.

Table 1 Antipsychotics (mean initial and target doses) selected by prescribers

Antipsychotic	Number (%)	Mean initial dose (mg)	Mean target dose (mg)
Risperidone	18 (58.1)	3.2 ± 1.92	
Haloperidol	7 (22.6)	6.0 ± 3.86	10.7 ±4.50
Chlorpromazine	3 (9.7)	83.3 ± 28.87	133.3 ±57.74
Clozapine	1 (3.2)		
Sodium Valproate	2 (6.5)		

The study did not find a significant relationship between the two groups of prescribers visa vis the variable in table 2

Discussion

In this study, it was found that the majority of participants where Clinical officers psychiatry. The evidence being that of the total 31 prescribers assessed 61.3% were COP and 38.7% were Psychiatrists. Of the Psychiatrist 50% where female and 50% where male. Of the 19 clinical Officer psychiatrist 15.8% where female and 84.2% where male. The proportional difference of the two groups of prescribers assessed was not statistically significant (P-value = 0.21). The results of this study are similar to another study by Jeff [10] who also reported a high proportion of mid-level prescribers who participated in their study as opposed to psychiatrists.

This study found that prescribers at Chainama hills hospital did not prescribe initial and target doses of antipsychotic drugs in concert with the NICE 2014 guidelines but were able to recommend the correct pharmacological class of antipsychotics. With regards to treatment, the prescribers (66.7% Psychiatrist and 52.6% COP) appropriately selected a second generation antipsychotic as their agent of choice. These agents are considered the first-line treatment of psychosis, though recent literature suggests a reconsideration of first generation antipsychotics as first-line agents for patients with first- episode schizophrenia Kahn*et al., (*2008), Sikich *et al., (*2010). However, the prescribers selected doses that were substantially higher (mean dose 4.3 Psychiatrists, 3.2 COP) than those recommended for patients with firs-episode psychosis [11].

This study found that prescribers did not recommend treatment durations as stipulated in the antipsychotic treatment guidelines for managing First-episode schizophrenia. This is evidenced from the fact that, once the patient's symptoms had remitted, less than half of the prescribers (33.3% Psychiatrist, 26.3% COP) recommended duration of treatment that was longer than one year.

These dosing considerations are important, given that patients with first-episode psychosis respond well to low antipsychotic doses [12,13], tend to have higher rates of side effects than those with chronic illness Merlo*et al.,* (2008) and are frequently non-adherent to treatment. Such non-adherence could certainly be exacerbated by side effects from high doses of antipsychotics.

With respect to duration of treatment, relapse rates of schizophrenia are very high with discontinuation of antipsychotics. Discontinuation of successful treatment after only months of stability is likely to lead to symptom re-emergence within 1 or 2 years Gitlin*et* [14].

The study further found that the psychiatrists performed better overall than the COP. The mean total score on the vignette questions

Table 2 Bivariate analysis of study variables with professional discipline

Variable	**Psychiatrist**		**COP**		**P-value**
	n	**%**	**n**	**%**	
Initial medication treatment					
Chlorpromazine	0	0.00%	3	15.8%	0.34
Clozapine	0	0.0%	1	5.3%	
Haloperidol	4	33.3%	3	15.8%	
Risperidone	8	66.7%	10	52.6%	
Sodium Valproate	0	0.0%	2	10.5%	
Recommended urine toxicology					
No	5	41.7%	13	68.4%	0.14
Yes	7	58.3%	6	31.6%	
Question 3 Initial dose correct					
No	5	41.7%	11	57.9%	0.38
Yes	7	58.3%	8	42.1%	
Question 3 target dose correct					
No	10	83.3%	17	89.5%	0.63
Yes	2	16.7%	2	10.5%	
Recommended 1 year treatment					
No	8	66.7%	14	73.7%	0.70
Yes	4	33.3%	5	26.3%	

Question 1 score					
mean, SD	3.2, 0.94		2.5, 1.01		0.09
Question 3 score					
mean, SD	2.9, 0.71		2.5, 1.09		0.27
Assessment Question (1&2)					
mean, SD	5.5, 2.94		3.8, 2.67		0.11
Treatment Question (3&4)					
mean, SD	4.3, 2.27		3.7, 2.54		0.48
Overall score					
mean, SD	9.8, 4.75		7.5, 4.84		0.19

was 8.4 points ± 4.86 out of a possible 16 points. The minimum score was 1 and maximum 16 points. The respondents scored best (mean score 2.8 ± 1.02 out of 4 points) on the differential diagnosis question (1) and lowest (mean score of 1.2 ± 1.85) on the treatment duration question (4). The mean score on the assessment questions (questions 1 and 2) was slightly greater than the treatment questions (question 3 and 4) but not significantly different; mean score on the assessment questions was 4.5 ± 2.87 vs. 3.9 ± 2.42 on the treatment questions; t = 0.77; P-value = 0.45.

There were 48.4% respondents that prescribed the initial dose within guidelines for question 3, however, only 12.9% prescribed the target dose within guidelines. The mean score for question 2 was 1.7 ± 2.01 and the mean score for question 3 was 2.6 ± 0.97. However, even these specialized clinicians (Psychiatrists) had substantial gaps in their performance as most prescribed inappropriately high doses of antipsychotics, and more than one-third planned to discontinue anti- psychotic treatment prematurely. These results are consistent with the findings of a similar study conducted in Nigeria Adeponle [15].They reported that psychiatrists performed better that other prescribers with regards management of new onset psychosis but the group difference where not statistically different.

This exploratory study had several limitations. A major and important limitation is related to the ongoing uncertainty about several aspects of care for patients with first-episode psychosis. Evaluations of schizophrenia guidelines have shown a lack of consensus in many key areas, including what constitutes an ideal medical workup, the exact optimal duration of treatment and whether typical antipsychotics should be considered first-

line agents alongside atypical antipsychotics. Therefore, the results of this evaluation must be tempered by the fact that clear, widely accepted guidelines are either not available or conflicting in important areas of evaluation and management of firs-episode schizophrenia, and thus, it can be substantially difficult to assess clinical 'competence' in some domains.

Finally, though clinical case vignettes with systematic scoring of free-form responses to clinical questions appear to be a substantially improved method of adherence assessment, such vignettes may not precisely match respondents' behaviour in a given clinical encounter.

In conclusion, it appears that there may be important gaps in the assessment and treatment of patients with first-episode psychosis by clinicians owing to low levels of adherence to antipsychotic treatment recommendations. However, these results must be interpreted cautiously in the context of the ongoing debate and uncertainty about what constitutes optimal care for these patients.

Clinicians may not routinely and systematically perform important components of the medical workup for patients with new psychosis and for patients with first-episode schizophrenia, Prescribers may prescribe doses of antipsychotic medication that are too high and administered for an inadequate duration. If these practice gaps from this preliminary study are confirmed, additional education should be provided to front line Prescribers regarding the optimal workup and treatment of this vulnerable population.

Conflict of interest

None declared

Declaration of funding

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RESEARCH ARTICLES

Increasing problem of alcohol abuse among the Zambian population in the psychiatric setting

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Alcohol abuse is related to the development of cancer, neuropsychiatric disorders, cardiovascular diseases and cirrhosis of the liver among others. Level of alcohol abuse varies in different subpopulations and is hypothesized to be high in psychiatry patients. The objective of the study was to determine proportions of patients with history of alcohol abuse and alcohol related disorders in the Psychiatry ward of the University Teaching Hospital (UTH) in Lusaka, Zambia. All diagnoses made in the Psychiatry ward between January 2012 and October 2015 were reviewed for frequency of alcohol related disorders. Additionally, randomly selected files in 2016 were examined for history of alcohol abuse. The Chi-squared test was used to compare proportions, while trends were established using simple linear regression. The cut off point for statistical significance was set at 5%. Totals of 6212 (3629 male and 2583 female) and 109 (79 male and 30 female) records were reviewed for alcohol related disorders and alcohol abuse, respectively. More males (75.9%) than females (23.3%) had a history of alcohol abuse (p<0.001). No significant linear trends were observed in the proportion of alcohol related disorders for both gender between 2012 and 2015 (males: slope = 3.980; 95% CI [-1.213, 9.173]; females: slope = 1.101; 95% CI [-1.479, 3.682]). Overall, rates of alcohol related disorders increased linearly from 9.3% in 2012 to 18.7% in 2015 (slope = 2.920; 95% CI [0.099, 5.741]). Proportions of alcohol abuse and alcohol related disorders are high among patients in the Psychiatry ward of the University Teaching Hospital (UTH) in Lusaka, Zambia. Generally, the rate of alcohol related disorders is on an increase. Interventions are needed to reduce rates of alcohol abuse and subsequently alcohol related disorders. Rehabilitation centres are needed to provide affected patients with appropriate support.

Introduction

The link between alcohol consumption and direct loss of health has been established in the research literature. A risk assessment by the World Health Organization (WHO) showed that the damaging impact of alcohol consumption on the worldwide burden of disease and injury is immense. It is the third highest global risk factor for disability-adjusted life years (DALYs, ranked after underweight during childhood and having unprotected sex [1].

Alcohol misuse is an important and preventable major risk factor for chronic diseases that are related to lifestyle choices. It has been shown to be associated with more than 60 physical and mental illnesses; and social problems [2]. The excessive use of alcohol is related to the development of serious illnesses such as cancer, neuropsychiatric disorders, cardiovascular diseases and cirrhosis of the liver [3].

Alcohol consumption has been a part of the Zambian culture for a long time. Social drinking is commonly accepted and included in many important traditions and ceremonies [4]. Zambia is one of the African nations with the highest drinking levels. According to the WHO health report of 2014, the 12-month prevalence of alcohol use disorders among Zambians above 15 years of age, including alcohol dependence and harmful use of alcohol, is 7.9% of the male and 1.0% of the female population with an overall rate of 4.5% which is above the average of 3.3% for the WHO African Region [5]. This gender difference is shown in the effects of alcohol which causes significantly more harm to males than female, suggesting different drinking habits in relation to quantity and pattern of drinking [1]. The estimates above relate to the general population and may vary from one subpopulation to the other. It is postulated that alcohol misuse is high in psychiatry patients. Since no information is available on alcohol misuse and its health effect in Zambia, a study was conducted to determine proportions of patients with history of alcohol abuse and alcohol related disorders in the Psychiatry ward of the University Teaching Hospital (UTH) in Lusaka, Zambia.

Methods

This was a retrospective study conducted between February and March 2017 at the Department of Psychiatry of the University Teaching Hospital (UTH) in Lusaka, Zambia. All patient records were reviewed for the years 2012 to 2015 to address alcohol related disorders and only a sample for the year 2016 to address history of alcohol abuse. Patients aged under the age of 18 years were excluded from the study.

The Chi-squared test was used to compare proportions, while trends were established using simple linear regression. Regression estimates are reported together with their 95% confidence intervals (CI). The cut off point for statistical significance was set at 5%.

Results

Totals of 6212 (3629 male and 2583 female) and 109 (79 male and 30 female) records

Table 1 Distribution of patients by year, gender and alcohol related disorder

Year	Total number of patients	Male (%)	Female (%)	Total % alcohol related disorder diagnoses
2012	1233	55.6	44.4	9.3
2013	1424	57.8	42.2	15
2014	1739	57.8	42.2	16
2015	1816	61.3	38.7	18.7

were reviewed for alcohol related disorders and alcohol abuse, respectively. There were more male than female patients in the Psychiatry ward of the University Teaching Hospital (UTH) in Lusaka, Zambia. More males (75.9%) than females (23.3%) had a history of alcohol abuse ($p<0.001$). Table 1 shows the distribution of cases by year, gender and alcohol related disorders. The overall rate of alcohol related disorders increased linearly from 9.3% in 2012 to 18.7% in 2015 (slope = 2.920; 95% CI [0.099, 5.741]). However, there were no significant linear trends were observed in the proportion of alcohol related disorders for both gender between 2012 and 2015 (males: slope = 3.980; 95% CI [-1.213, 9.173]; females: slope = 1.101; 95% CI [-1.479, 3.682]). Table 2 shows rates of alcohol related disorders for males and females over time.

Discussion

There were more male than female patients in the current study. More males than females had a history of alcohol abuse. The rate of alcohol related disorders increased linearly from 9.3% in 2012 to 18.7% in 2015 with no gender difference.

There were more males than female patients in the Psychiatry ward of the University Teaching Hospital (UTH) in Lusaka, Zambia. Similar findings have been reported elsewhere [6-8]. These findings suggest that males be more exposed to stressors than females leading to alcohol and other drug abuses among others. This hypothesis is supported by yet another finding from the current study that more males than females had a history of alcohol abuse. These findings support the importance of introducing rehabilitation centres in Zambia. As of right now, the only possibility to have an in-ward detoxification is at Chainama, a psychiatric hospital located outside of Lusaka. This hospital though is not a professional rehabilitation centre but takes on all

Table 2 Alcohol related disorder diagnoses between males and females by year

	Male		Female	
Year	Number	% alcohol related disorder diagnoses	Number	% alcohol related disorder diagnoses
2012	685	15.9	548	1.1
2013	824	25	600	1.2
2014	1006	25.5	733	3
2015	1114	29	702	2.4

complicated psychiatric cases. This does not make it a perfect place to go through the different stages of alcohol withdrawal. Zambia seems to face an increasing alcohol-attributable burden at a time when the knowledge about effective strategies to control the harms made by alcohol exists.

Apart from alcohol abuse being related to the development of illnesses such as cancer, neuropsychiatric disorders, cardiovascular diseases and cirrhosis of the liver, it is also related to HIV since it elevates the sexual risk taking behaviours concerning the number of partners, condom use and intimate partner violence. Several studies have shown that alcohol can impair judgment and lead to improper use of condoms while also enhancing promiscuous and aggressive behaviour [9,10]. A recent study also listed the role of alcohol as one of the three major risk factors for HIV infection among Zambian men [11]. More alcohol-related interventions might help reduce a further expansion of the epidemic which already affects around 13% of the Zambian population [12-14]. The relationship between alcohol and HIV goes even further. HIV-infected people who are problem drinkers are less than half as likely to follow antiretroviral treatment guidelines as a recent meta-analysis shows [15]. From this perspective, it is suggested that HIV prevention programs should also acknowledge the importance of fighting alcohol abuse.

Alcohol use is also a risk factor for the incidence and re-infection of TB and is linked to its worsening [16,17]. Given the evidence of the causal linkage between alcohol and the infection with TB, establishing rehabilitation centres which help people out of their addiction could lower the prevalence of TB infections. Drinking alcohol elevates the seizure threshold. On cessation of drinking this threshold declines which can lead to seizures, usually 6-48 hours after the last drink [18]. A recent meta-analysis which covered 48 years of studies regarding this topic supported the assumption that alcohol abuse can also be a trigger for epileptic seizures [19].

It has been reported by numerous studies that alcohol use is related to assaults [20]. The positive link between alcohol abuse and intimate partner violence (IPV) has also been proven by several meta-analyses [20,21]. The proportion of men who abuse their intimate partner increases with the frequency they drink alcohol [22]. The opportunity to receive treatment for alcohol related disorders could reduce the problem of domestic violence.

The Psychiatry ward of UTH is flooded with people being treated for alcohol related disorders. The problem is taking up much of the time and resources of the employed psychiatrists, psychologists and mental health nurses. If professional rehabilitation centres would be available for the low-income population it might not only help the sick needing care but it would also reduce the burden on the psychiatry wards which would lead to them having more capacities for other mental health issues. Alcohol use disorders are risk factors for the incidence and re-infection of TB and are as well causally linked to worsening of the disease course. [3,16].

The study may not have been powered enough to estimate the alcohol abuse rate. However, we have no reason to believe that our findings were greatly biased, partly due to missing information as generally is the case in retrospective studies. In conclusion, proportions of alcohol abuse and alcohol related disorders are high among patients in the Psychiatry ward of the University Teaching Hospital (UTH) in Lusaka, Zambia. Generally, the rate of alcohol related disorders is on an increase. Interventions are needed to reduce rates of alcohol abuse and subsequently alcohol related disorders. Rehabilitation centres are needed to provide affected patients with appropriate support.

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RESEARCH ARTICLES

Characteristics of patients with psychosis at Ndola Teaching Hospital Psychiatric Unit, Zambia

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Description of patients with psychosis is important in deciding on the best treatment to be offered to them. The objective of the study was to describe patients with psychosis at Ndola Central Hospital Psychiatric Unit, Zambia. Of the 699 patients who were seen and diagnosed with psychosis in a period of 12 months (01/01/14 to 31/12/14), records of 248 patients were considered in the study. However, 233 (94.0%) of 248 records were reviewed. Most of the patients were single (47.2%), of male gender (64.8%), unemployed (73.5%), attained secondary or higher level of education (70.3%) and from families made up of 5 or more members. Among males, 90.8% consumed alcohol compared to 33.3% of females (p<0.001). In relation to drug abuse, 54.3% of males smoked cannabis while none of the females smoked it. Among females, 28.0% of them were on HAART compared to 0.7% of males. Overall, alcohol use was very common (76.7%), followed by cannabis abuse (35.2%); then familial psychosis (27.6%) and lastly antiretroviral drug use (10.3%). Further studies are needed to establish associations between the common factors found in the current study and psychosis.

Introduction

Mental illnesses such as psychoses are attributable to many predisposing factors. Psychosis can either be primary or secondary. Schizophrenia is a form of primary psychosis [1]. Forms of primary psychosis include brief psychotic disorder, schizophrenia, schizoaffective disorder and depression with psychosis [2]. Secondary psychosis can develop when there is sudden variation in the hormone levels whether due to low or high specific human body hormones [3]. Secondary psychosis comprises the following categories: Traumatic brain injury; Autoimmune disorders; Congenital/cytogenetic disorders; Toxic/drug-induced disorders; Iatrogenic psychoses; Cerebrovascular disorders; Space-occupying intracranial disorders; Metabolic disorders; Dietary disorders; Sepsis/infectious diseases; Unknown cause/degenerative/demyelinating disorders;

Seizure disorders and Endocrine disorders [4]. Description of patients with psychosis is important in deciding on the best treatment to be offered to them. Hence, the objective of the study was to describe patients with psychosis at Ndola Teaching Hospital Psychiatric Unit, Zambia.

Table 1 Social demographics of patients with psychosis at Ndola Teaching Hospital, 2014

	Total	Male	Female	
Factor	**n (%)**	**n (%)**	**n (%)**	**p value**
Age				0.020
<30yrs	75(25.9)	58(41.7)	17(24.3)	
30+yrs	154(64.1)	81(58.3)	53(75.7)	
Marital Status				0.536
Single	42(47.2)	27(51.9)	15(40.5)	
Married	29(32.6)	16(30.8)	13(35.1)	
Divorced/Widowed	18(20.2)	9(17.3)	9(24.3)	
Gender				
Male	151(64.8)	-	-	-
Female	82(35.2)	-	-	
Employment				0.056
Employed	18(26.5)	13(55.7)	5(11.5)	
Unemployed	50(73.5)	27(64.3)	23(88.5)	
Education				1.000
Up to Primary	27(39.7)	16(200.2)	6(28.6)	
Secondary or Higher	64(10.3)	57(69.8)	15(71.4)	
Family Size				0.335
<5 Members	27(28.7)	15(25.4)	12(37.5)	
5+ Members	64(70.3)	44(74.6)	20(62.5)	

Methods

The site of this study was Ndola Teaching Hospital Psychiatric Unit (NTHPU). Ndola Central Hospital is the second highest hospital in Zambia. The study population consisted of patients that were seen and diagnosed with psychosis at NTHPU from 1st January to 31st December 2014.

This was a retrospective study.

A total of 248 out of 699 records for patients with psychosis was determined as the sample size using a prevalence of 50±5% because of unknown prevalence of study variables. About 1 in 3 systematic sampling method was used to select records for the study.

Data was obtained from hospital registers and patients' files and was computerized using Epi Data Version 3.1. Analysis was conducted using SPSS Version 16.0 for analysis. The Chi-squared test was used to determine associations of factors with gender. The cut off point for statistical significance was set at the 5% level.

Ethical considerations: The study was approved by the Copperbelt University, School of Medicine, Public Health Unit. Permission to conduct this research was given by Ndola Teaching Hospital management.

Results

Altogether, 233 (94.0%) out of 248 patient records with psychosis were reviewed. Table 1 describes factors related to gender. Of the factors in the table, only age was significantly associated with gender (p=0.020). Males tended to be younger than females at presentation with psychosis. Most of the patients were single (47.2%), of male gender (64.8%), unemployed (73.5%), attained secondary or higher level of education

Table 2 Distributions of alcohol and drug use by gender among patients at Ndola Teaching Hospital with Psychosis, 2014

	Total	Male	Female	
Factor	n (%)	n (%)	n (%)	p-value
Alcohol				<0.001
Yes	122(76.7)	109(90.8)	13(33.3)	
No	37(23.3)	11(9.2)	26(66.7)	
Drugs				<0.001
Cannabis	82(35.2)	82(54.3)	0(0)	
HAART	24(10.3)	1(0.7)	23(28.0)	
Others	18(7.7)	8(5.3)	10(12.2)	
None	109(46.8)	60(39.7)	49(59.8)	

(70.3%) and from families made up of 5 or more members.

Table 2 makes description that drug use was significantly associated with gender. Among males, 90.8% consumed alcohol compared to 33.3% of females (p<0.001) with an overall alcohol use prevalence of 76.7%. In relation to drug abuse, 54.3% of males smoked cannabis while none of the females smoked it with an overall cannabis use prevalence of 35.2%. Among females, 28.0% of them were on HAART compared to 0.7% of males, giving an overall rate of 10.3% of patients who were on HAART. History of psychosis was not associated with gender (p=0.864). Overall, 27.6% of the patients had history of psychosis as shown in Table 3.

Discussion

In the current study, alcohol use was very common (76.7%), followed by cannabis abuse (35.2%); then familial psychosis (27.6%) and lastly antiretroviral drug use (10.3%). In a study [5] done in the Western Cape-South Africa, it was revealed that alcohol (27%) abuse was the highest abused substance hence, contributor to development of psychosis though its abuse is often times underestimated because it is a legal substance in many regions. Another study [6] done in Manchester-UK, demonstrated that alcohol (24%) abuse had a bearing on developing psychosis in general population. Both studies done in South Africa and Manchester-UK also had psychosis caused by alcohol on the top list.

Table 3 Family history of Psychosis by gender among patients with psychosis at Ndola Teaching Hospital, 2014

	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	
[illegible]	[illegible]	[illegible]	[illegible]	

The lower values in the two regions compared with the findings in this research according to the local setting, stresses the fact that there is probably more alcohol intake in this region than in some other regions. Cannabis abuse had the second highest frequency from alcohol use. This was expected due to the fact that cannabis is widely available in many regions. In a study [7] done in India, it was documented that individuals who abused cannabis (28%) and had a genetic predisposition to developing psychosis had 10 times chances higher of

developing psychosis than those who did not have genetic predisposition. The former explained the reason why cases of familial psychosis with third highest frequency in the current study, were encountered in this study as well. A cross-sectional study [8] done on the Australian population demonstrated that, even though alcohol and cannabis dependence had an association with developing psychosis, control of the abuse of these substances reduced markedly on the chances of developing psychosis.

Antiretroviral drug use had the lowest frequency of the cases of psychosis seen at Ndola Central Hospital Psychiatric Unit in 2014. This finding was not consistent with a study [9] done in the Germany outlined that about half of the patients on HAART having efavirenz developed psychosis. Other studies support the assertion that antiretroviral drugs such as efavirenz are neurotoxic and can cause psychotic illness [10,11]. This makes it difficult to distinguish between HIV induced psychosis and antiretroviral drugs induced psychosis especially in resource poor settings where proper diagnostic tools may be lacking.

Missing information is common in record reviews and this study was no exception to this limitation. We have no reason to believe that the study results may have been significantly affected by this limitation. In conclusion, there is need to establish associations between the common factors that have been identified in the current study and psychosis.

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RESEARCH ARTICLES

Epidemiology of tuberculosis in the context of HIV and AIDS in Sinazongwe district of Zambia: A retrospective analysis

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TB cure and completion rates have remained poor for Sinazongwe district in the past five years. Mortality, treatment failure and defaulter rates among TB patients have also been increasing in the same period. The reasons for the observed poor treatment outcomes are not well understood but could be attributed to high HIV co-infection among TB patients in the district.

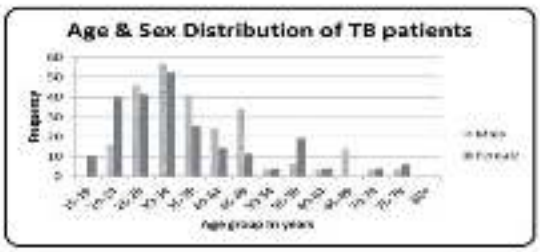
This study was aimed at determining the prevalence of HIV/AIDS among TB patients and asses the association between the common TB treatment outcomes. A retrospective study of 484 TB patients' clinical files drawn from a total of 2,137 files was conducted at Sinazongwe Zonal Health Centre. HIV was more prevalent among female TB patients at 61.5% compared to their male counterparts, 54%. TB/HIV co-infection were higher for patients with extra pulmonary TB compared to patients with pulmonary TB (p= 0.002).

HIV prevalence among TB patients in Sinazongwe district was high and there was no evidence of declining trend observed across the reference period. HIV did not only fuel the number of new TB infections but was also, in part, responsible for reducing TB cure rate and increasing mortality rate among TB patients registered in the routine TB program.

Introduction

Tuberculosis is a chronic, progressive infectious bacterial disease that affects all species of mammals, including humans. Human tuberculosis (TB) is chiefly associated with infection by members of the *Mycobacterium tuberculosis* complex (MTC) which includes *Mycobacterium tuberculosis, Mycobacterium bovis, Mycobacterium africanum, Mycobacterium caprae, Mycobacterium microti, Mycobacterium pinnipedii and Mycobacterium canetti* [1,2]. *Mycobacterium tuberculosis* is the common causative agent of human tuberculosis (TB). This bacterium mainly affects the lungs but

may progress to other parts of the body such as the meninges, kidneys, bones and lymph [3].



Human Immunodeficiency Virus (HIV) alone is a known cause of human mortality and when combined with TB, it becomes a lethal co-infection for human beings [4]. HIV affects the immune system and increases susceptibility to TB infection by causing depletion of CD4 T cells, which are important in the control of TB [4, 5]. HIV has effects on other cells, including macrophages, and influences cytokine production, which may also prevent a host from containing an initial or latent *Mycobacterium tuberculosis* infection [3]. Further, HIV increases the chance of relapse in TB cured persons [6].

Globally, TB–HIV co-infection accounts for 13% of TB deaths and about 8% of these are attributed to HIV [8]. Zambia, with a population of about 13 million people, is one of the countries experiencing high TB notification rates coupled with a high HIV disease burden in selected places [4, 9, 10]. The analysis of medical metadata has shown undesirable TB treatment outcomes strongly associated with high HIV co-infection rates [11]. The rapid increase of tuberculosis case notification in Zambia from 1985 onwards is mainly attributed to the HIV epidemic, but other factors like population growth, urban overcrowding and improved access to health care have also contributed [9, 12].

Arising from recent studies conducted in selected parts of the Country, medical metadata analysis indicates that incidence of TB/HIV co-infections has increased and that HIV is the major reason for high TB notifications in Zambia [12, 13, 14]. In Sinazongwe district, new HIV infection rates have increased by twenty two percent (22%) between 2007 and 2012 [15, 16]. The number of patients on ART has also grown by 18% between 2007 and 2012 [17]. TB cure and completion rates have remained poor for Sinazongwe characterized by high mortality, treatment failure and defaulter rates in the same period [13, 16, 17, 18]. The reason for the observed poor treatment outcomes is not well understood but could be attributed to high HIV co-infection among TB patients at this facility.

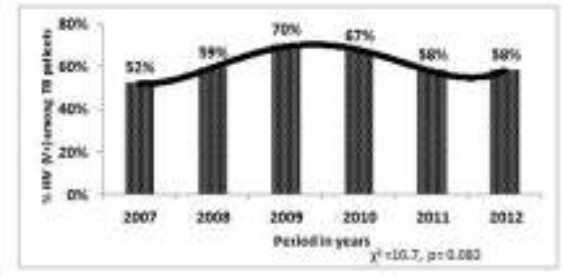
Therefore, a retrospective study was undertaken with the overall objectives of determining (i) period prevalence of

HIV/AIDS among TB patients and (ii) factors associated with treatment outcomes of patients in the routine TB program from 2007 to 2012 at Sinazongwe Zonal Health Centre. Due to limited information generated in the routine TB program, the extent to which HIV/AIDS influences TB treatment outcome has remind unknown since the initiation of TB and ART services in the study district. Thus, this article intends to provide baseline data on understanding the major issues that need to be addressed in TB control in the context of HIV/AIDS and inform policies that will ensure implementation of effective interventions for impact.

Methods

A retrospective study was used to review TB clinical files and charts for TB patients registered in the routine TB care program at Sinazongwe Zonal Health Centre for the period between 2007 and 2012.

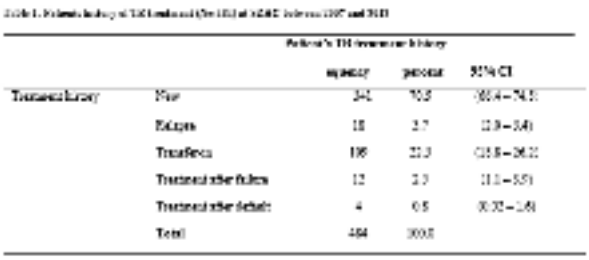
Sinazongwe has an estimated population of 118,000 people [19]. The district is part of the Zambezi valley in the southern part of Zambia covering approximately 4200 square kilometres. Being a retrospective study, the study did not have any direct interaction with the patients but rather reviewed all adult patients (15 years and above) data, diagnosed with TB by symptoms, positive sputum smear, culture or chest x-ray, who were entered into the TB register and received treatment at Sinazongwe Zonal Health Centre at least a month prior to initiation of the study. Medical files that did not meet these criteria were thus excluded from the study. A



TB patient file for this study was defined as any suspected TB patient with a sputum smear on microscopy examination (SSM) indicating presence of acid fast bacillus (AFB) or chest x-rays (CXR) results appearing abnormal (showing some whitish spots in the lungs) or the results of a bacterial culture and acid fast bacteria (AFB) culture indicating growth of *Mycobacterium* [20, 21].

Patients' clinical files were stratified into six strata with each stratum representing the year in which the patient's files were opened. Hospital TB registers were used to generate sampling frames for each of the years under review. The study aimed at soliciting medical metadata from patients aged 15 years and above who were diagnosed with TB by sputum smear microscopy examination or

chest x-ray and or culture. Using this inclusion criterion, 2, 137 clinical files were eligible for inclusion out of the total of 3,821 registered files. Random samples were drawn from each stratum using the simple random formula described by Dahiru [22].



It was planned that the prevalence estimate would be determined at 5% precision at a confidence level of 95% assuming that patient clinical files were drawn from a normally distributed population. Consequently, using simple random sampling for each stratum (period stratum) with the design effect of stratified random sampling estimated at 2, TB prevalence of 3.2% [42] the sample size required for the study was calculated as 484 [22].

A review of records was accomplished by trained data collectors who were oriented in the data collection procedures prior to the activity. Variables of interest included age, sex, diagnosis, type of TB, treatment history, HIV/AIDS status and treatment outcomes. Validity and reliability issues were addressed through pre-testing of the research instruments.

Data was cleaned and entered into the Statistical Package for Social Sciences (SPSS) version 16.0, where all the statistical analyses were performed including descriptive statistics. Prevalence of HIV among TB patients was calculated. The Chi-square (χ^2) test was used to test for associations between categorical variables. A stepwise logistic regression model was used to determine predictors of TB treatment outcomes among the patients. All variables with p-values less than 0.250 in the univariate analysis were included in the model. The variables under consideration were sex of patients, weight, age, and level of education, type of TB, type of patient, HIV status and marital status. The Logit link function reported the coefficient, p-value, odds ratio (OR) and 95% lower and upper confidence interval values for the OR. Criteria used in determining whether the constructed model adequately fitted the data were, a non-significant Hosmer and Lemeshow Test ($p > 0.05$) and a significant Omnibus Test of Model Coefficients ($p < 0.05$). All statistics were considered significant at $p \leq 0.05$.

Ethics Statement

The reviewed data/documents were anonymized /de- identified and permission to perform the study in the district was obtained from the Provincial and District Medical

Officer (DMO) as well as Sinazongwe Rural Health Centre. Being a retrospective study, waiver of consent was sought and granted. Further the study was approved by the Institutional Review Board (ERES converge IRB) ethical review committee (ref. number: 2014-Mar-001).

Results

A total of 484 TB patient files from 2,137 eligible files were reviewed during this study. The analysis of basic demographic and clinical characteristics of patients indicated that majority (52.5%, 95%, CI: 48.0 – 56.9) of TB cases registered at Sinazongwe Zonal Health Centre between 2007 and 2012 were male and compared to females (47.5% (95% CI: 43.7 – 52.0). Further, the mean age of males (38.9 years, 95%, CI: 36.3 – 41.4) was slightly higher than females (35.4 years; (95%, CI: 32.8 - 38.0) (Figure 1). Figure 1 further shows that, there were relatively more young females between the age groups of 15-24 years with TB compared to males of the same age group. The trend changed slightly after 25 years when there proportionally were more males with TB compared to females (Figure 1).

With regards to education, the level of education for about 45% of the patients was not indicated in the files and amongst those who indicated that they had been to school, 46.6% (95%, CI; 40.6– 52.6) reached primary level of education, 39.2% (95%, CI; 33.3 – 45.0) reached secondary school, and only 14.2% (95%, CI; 10.3 – 18.8) had attained tertiary education. With respect to marital status, it was observed that most of the TB patients at this facility in the period under review were married 48.6% (95%, CI 42.3 – 50.1) followed by the singles 19.6% (95%, CI 17.8 -20.3). It was further observed that 70.5% (95%, CI 66.4 – 74.5) of the TB patients at Sinazongwe Zonal Health Centre registered between 2007 and 2012 were new TB patients and 23% (95% CI, 21.1 – 24.7) transferred-in from other facilities. Relapses and treatment failure accounted for 3.7% and 2.5%, respectively (Table 1).

Table 2: HIV testing results among TB patients at Sinazongwe Zonal Health Centre 2007-2012

HIV testing results					
Sex of patient			CT results		Total
			Positive	Negative	
Male	Date of registration	2007	4	13	17
		2008	10	11	21
		2009	13	8	21
		2010	23	7	30
		2011	8	2	10
		2012	8	14	22
	Total male		**66**	**66**	**131**
Female	Date of registration	2007	10	16	26
		2008	6	10	16
		2009	23	2	25
		2010	14	4	18
		2011	19	10	29
		2012	11	10	21
	Total female		**83**	**52**	**135**
Grand total (male and female)			**149**	**107**	**266**

An estimated 79.8% (95% CI: 76.2 – 83.3) of TB patients at this facility were diagnosed using sputum smear microscopy examinations, followed by X-ray (12.4%, 95% CI: 9.5 – 15.3); and culture (7.8%, 95%

CI: 5.4 – 10.2). Further, it was observed that among the smear diagnosed patients, majority were males (57.2%, 95%, CI; 52.3 – 62. 189), whereas among those diagnosed using X-ray and culture majority were females (75%, 95% CI: 64.0 – 86.0) and (52.6%, 95% CI: 36.8 – 68.5), respectively. Further, the study observed that about 84% (95% CI: 80.3 – 87.3) of the TB cases at this facility were diagnosed with pulmonary TB, whereas extra-pulmonary TB accounted for only 16% (95% CI: 12.6 – 19. 2) of the cases. Notably among the pulmonary cases, majority were males 55.3% (95%, CI: 50.4 – 60.1), while the majority of patients with extra-pulmonary TB were females 62.4% (95% CI: 51.5 – 73.2). The study established an association between type of TB and sex. Females were more likely to get extra-pulmonary TB, than their male counterparts (OR 2.1, 95% CI: 1.6 – 2.7, p=0.03) and that HIV positive individuals had a higher risk of presenting with extra-pulmonary TB than the pulmonary form, when compared to HIV negative patients (OR 2.0, 95% CI: 1.6 – 2.5, p=0.00).

Only 221 (45.7%; 95%, CI: 41.2 – 50.1) of TB patients knew their HIV status at TB registration and the majority of these were males 58.8% (130) (95% CI: 52.3 – 65.3). Those who did not know their HIV status at TB registration were further asked to concert for HIV testing and over 98% agreed to be screened and positivity rate was thus determined at 58.2% (95% CI: 52.2 – 64.2). Although most of the patients that tested positive for HIV were females at 61.5% (95% CI: 53.3 – 69.7), there was no statistically significant difference between sexes (p=0.164) (Table 2).

Overall, the study indicated that the mean prevalence of HIV among TB patients in the reference period was 62% (95% CI: 54.3 – 64.6), with the highest 70% (95% CI: 67.3 – 78.7) reported in 2009 and the lowest 52% (95% CI: 38.6 – 60.9) reported in 2007. The

Table 3: Maximum likelihood estimates of predictors of TB treatment outcomes in Sinazongwe district of Zambia

Variable	Category	Odd Ratio (OR)	95% C.I. for OR		p-value
			Lower	Upper	
Age (years)	15 to 20	15.01	3.45	65.31	<0.000
	20 to 34	10.45	3.18	36.29	<0.000
	35 to 44	2.74	0.92	8.25	0.072
	≥ 45*	-	-	-	-
Type of TB	Pulmonary	24.85	5.74	107.41	<0.000
	Extra-pulmonary *	-	-	-	-
Treatment completed	completed	[illegible]	[illegible]	[illegible]	<0.000
	Not completed*				
	Constant	3.000			<0.000

CI – confidence interval, *Reference category

observed variations in HIV prevalence rates among TB patients was not statistically significant (p =0.082) (Figure 2).

A forward step-wise binary logistic regression model was used to determine predictors of TB treatment outcome in Sinazongwe district of Southern Province of

Zambia. The Omnibus test for model coefficients was significant ($p<0.001$) and the Hosmer and Lemeshow test was non-significant ($p=0.997$), indicating that the model fitted the data. However, the confidence intervals of the estimates were very wide due to uncertainty of the estimates. The variables that were found to be significant predictors of TB treatment outcome were the age of the patient, the type of TB and whether the patient completed the treatment or not (Table 3). Patients who were between 15 and 28 years old were more than fifteen times more likely to be cured than those who were more than 44 years old, while those who were between 29 and 34 years old were more than ten times more likely to be cured than those who were above 44 years old. Further, patients who had pulmonary TB were more than twenty-four times more likely to be cured than those who had extra-pulmonary TB. Furthermore, patients who had completed their medication were more than 438 times more likely to be cured than those who had not completed the treatment (Table 3).

Discussion

The study was aimed at determining the prevalence of HIV/AIDS among TB patients and determining factors associated with TB treatment outcomes of the patients registered in the routine TB care program at Sinazongwe Zonal Health Centre between 2007 and 2012. Generally, the demographic distribution of TB burden observed in Sinazongwe does not deviate from the global picture reported elsewhere [23, 24]. The study highlighted that the majority of the patients in this community had a humble education with only 39% having reached secondary level of education. This is in agreement with findings from elsewhere that there is a positive correlation between number of years spent in school and TB infections [42]. It has been hypothesised that increased schooling results into improved knowledge, decent work and work environment, improved health seeking behaviour and improved housing conditions to mention but a few [23, 25], thus reducing the risk of contracting TB.

The study documented that majority of patients were diagnosed using sputum smear microscopy, followed by x-ray and culture. Though this exemplifies the application of standard TB diagnosis and treatment guidelines as recommended for rural health facilities in Zambia [13], the use of microscopy comes with numerous challenges especially in the light of MDR-TB [20, 25, 26]. The current guidelines of World Health Organization and the International Union

against Tuberculosis and Lung Diseases specify that the essential step in the investigation of patients who are suspected of having pulmonary tuberculosis should have at least three microscopic examinations [27]. Sputum smear microscopy examination has a significant limitation in its performance in that sensitivity is compromised when the bacterial load is less than 10,000 organisms/ml sputum sample [28, 29].

It is also important to note that sputum smear microscopy has a poor track record in extra-pulmonary tuberculosis, paediatric tuberculosis and in patients co-infected with HIV and Tuberculosis [30, 31]. Studies have further showed that microscopic examination could cause treatment defaulters and loss to follow up due to repeated requirement for sputum samples for subsequent examinations [32, 33]. In view of the high prevalence of HIV among TB patients at this facility (62%), diagnosing TB by sputum smear microscopy would conceal valuable information. Therefore, it is important to consider the use of the rapid methods such as the automated Nucleic Acid Amplification Test, Xpert MTB/RIF) to revolutionaries TB diagnosis in Sinazongwe. The use of such technology provides improved sensitivity and specificity in people living with HIV with a detection rate of 80% (95% CI: 67% - 88%), which would represent an increased case detection of TB by 45% when compared to microscopy [34, 35, 36]. However, Expert MTB/RIF comes with its own challenges such as increased running costs, demand for trained manpower, infrastructure and investment requirements that are often beyond the scope of most diagnostic facilities that offer TB diagnosis to communities, particularly in resource limited rural communities [34, 37].

The study revealed that over, fifty-four percent of the TB patients did not know their HIV status at enrolment. This could have been largely due to non-availability of HIV testing kits, poor community sensitization and inactive TB/HIV working groups [12]. As part of diagnosis and treatment guideline of TB, all TB patients should be tested for HIV [13, 18]. Therefore, candidates who did not know their HIV status were requested to go for diagnostic counselling and testing for HIV during their follow up visits. Overall, HIV testing rates among TB patients was established at 98% (95% CI: 97.7 – 99.2). Screening over 90% of TB patients for HIV is a big success as observed by Wesen and USAID who reported, that most of the countries only manage to test between 87% and 90% [26, 38], respectively.

Overall, the study found that HIV prevalence was high among TB patients in the study

community with an average of 62% co-infection rate annually. Trend analysis indicated that the high HIV prevalence among TB patients reminded sustainably high during the 5 years period with no evidence of reducing. The persistently high HIV infection rates among TB patients could largely be attributed to the influx of people into the district due to increased social economic activities such as opening of two coal mines, opening of the thermal power plant, fishing and trade in livestock. As it is generally known that, the influx of people comes with numerous public health threats such mushrooming of shanty compounds, night clubs/bars, substance abuse, overcrowding, commercial sexual workers (prostitution) and all kinds of environmental pollution and social devices that predispose increased exposure to communicable diseases. These conditions are, in part, favorable risk factors for rapid spread of infectious diseases such as HIV and TB [4].

Furthermore, the study found that TB/HIV co-infection was high for both sexes. Particularly, it was observed that the mean age of female patients co-infected with HIV was lower (29 years) compared males (38 years). The results obtained in this study regarding age and sex distribution of TB/HIV co-infected individuals are in line with what has been reported elsewhere concerning Zambia's TB epidemiological patterns [4, 10, 12]. The findings also are consistent with findings from other HIV/AIDS studies conducted in Zambia showing the same age groups affected by TB to have high prevalence of HIV [4, 9, 14]. The observed pattern indicates no significant reduction in the disease progression from 2007 to 2012. The situation is worrisome and calls for scrutiny of public health approach such as the methods used by the district to deliver health education messages as well as models of health promotion.

The logistic regression model revealed that age was significant predictor in TB treatment outcome with younger persons having an increased chance of being cured or TB. The observed trend is as would be expected considering that the biology of young people support rapid system recovery [40]. Further, patients who had pulmonary TB were more likely to be cured than those who had extra-pulmonary TB. In extra-pulmonary TB infection, the pathogen sometime lodges in organs or tissues that are not easily accessed by drugs and thus contributing to treatment failure [41]. As would be expected, patients who had completed their medication were more than 438 times more likely to be cured than those who had not completed the

treatment, underpinning the importance completing the treatment.

This study has established that HIV prevalence among TB patients was high in Sinazongwe district. The high prevalence was observed in all individual years from 2007 to 2012 with no evidence of declining trend.

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RESEARCH ARTICLES

Antiretroviral therapy for all: barriers to achieving universal access in Chikuni Mission in Zambia

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Zambia has attempted to create universal access to antiretroviral therapy. However, barriers still remain at the individual, institutional and national levels to access ART. The objective of the study was to determine factors related to accessibility to ART by PLHIV in Chikuni Parish in Southern province of Zambia. Out of a total of 1,067 Chikuni Home Based Care clients, 182 filled in the questionnaire: 173 adults, 7 youth aged 15-25 years and 2 children below the age of 15 years. In addition, two local partners implementing HIV and AIDS-related programs were interviewed. Purposive sampling was used to select participants. Out of 182 respondents, 125 (67%) described their condition as of by then to be very good, 44 (24%) as good, and 9 (5%) as not too good. Appointments to collect ARVs were not kept as reported by 43% of the respondents. About a quarter (24%) reported that there was a shortage of ARVs. About 1 in 10 (9%) of the respondents did not take the medication regularly. Access to ART was rated as by 54% of the respondents as good and 45% rated it as fair. Two thirds of the respondents found it hard to reach the facility for treatment; reasons being hospital too far from home, transport too expensive and sometimes transport was not available. On the services received, 56% of the respondents were dissatisfied with the attention and quality of care they received. Challenges of under staffing and self-stigma were some of the barriers to accessing ART. About 1 in 10 (9%) of the respondents did not take the medication regularly. Decentralizing model for ART delivery would improve access to ART.

Introduction

The prevalence of HIV infection in Zambia is 15.1% among women and 11.3% among males with an overall prevalence of 13.3% among persons of age 15-49 years [1]. Antiretroviral drugs (ARVs) were registered for use in Zambia in 2002, but the drugs were not provided free of cost until June 2004. ART not only prolongs the lives of people living with HIV (PLHIV); it also benefits HIV-negative people by reducing the risk of acquiring infection. Cohen et al [2] found that early initiation of ART (when a patient's CD4 count was between 350 and 550 cells per cubic millimeter) reduced the number of HIV-1 transmissions between discordant couples by 96%. In 2013, the World Health Organization (WHO) recommended that ART should be initiated in all individuals

with severe or advanced HIV clinical disease (WHO clinical stage 3 or 4) and individuals with CD4 count ≤350 cells/mm3 and in individuals with HIV with CD4 count 350-500 cells/mm3 regardless of WHO clinical stage. WHO further recommended initiation of ART at peripheral health facilities with maintenance at the community level between regular clinical visits; trained non-physician clinicians, midwives and nurses can initiate first-line ART and maintain ART; and trained and supervised community health workers can dispense ART between regular clinical visits [3].

Factors associated with accessibility to ART in rural areas have been reported before. Akullian et al [4] found that HIV clients who travelled longer distances to access healthcare were less likely to access ART services in rural Uganda. In rural Mozambique, Schwitters et al [5] observed that barriers to accessing health clinics included transportation and distance-related issues (reliability, cost, and travel time). In a study to compare outcomes for children receiving care in mobile and hospital-affiliated HIV clinics in rural Zambia, van Dijk et al [6] found that access to HIV care and treatment can be increased using outreach teams. A study in rural Nigeria revealed among factors that fears that free ART will cease was a barrier to access care [7]. In a study in a rural hospital in Zambia among HIV infected children, van Dijk et al [8] reported that most participants had difficulties accessing the clinic due to long travel times including insufficient money, lack of transportation and roads in poor condition. Barriers to accessing ART in rural Tanzania included experienced and anticipated discrimination, among others [9]. Although factors related to accessibility to ART are known, barriers are contextual, cultural and evolving. Hence, the objective of the study was to determine factors related to accessibility to ART by PLHIV in Chikuni Parish in Southern province of Zambia.

Methods

The study was conducted in Chikuni Mission which is a Jesuit mission located in the rural areas of Zambia's Southern Province, approximately 30 km southeast of the nearest town of Monze. Chikuni Parish extends up to 50 km away from the mission in all directions and is comprised of 21 outstations. Chikuni Parish Home Based Care (HBC) is a project run by the parish that strives to alleviate the suffering of those infected and affected by HIV. HBC has approximately 1,000 clients, most of whom access ART from Chikuni

Mission Hospital at the centre of Chikuni Parish.

This was a cross sectional study. The distance some PLHIV cover to come to the health facility determined the sample size. All the respondents cover at least 40-50km from the homes to Chikuni Mission Hospital. The study considered to interview the following PLHIV: 173 adults, 7 youth aged 15-25 years and 2 children below the age of 15 years. Since the study was qualitative, purposive sampling was used in order to cover the full range of issues that was covered in the questionnaire.

Interviews were conducted with PLHIV when they were accessing services at Home Based Care outreach visits or ART clinic at Chikuni Mission Hospital. In addition, interviews were conducted with two local partners implementing HIV and AIDS-related programs, namely: coordinator at the District AIDS Task Force, a government institution fighting HIV and AIDS and a nurse from Chikuni Mission Hospital.

Ethical clearance

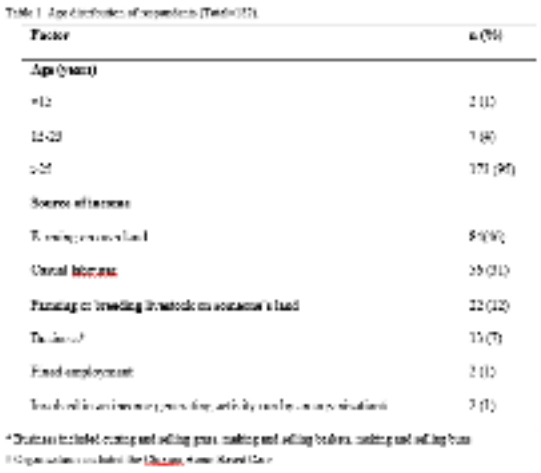
Before conducting the study permission to conduct the study was sought from Chikuni Mission Hospital Administrators and District AIDS Task Force (DATF) staff in Monze. Prior to the interview, the questionnaire was explained to the interviewees. It was emphasized that the interviewer should confirm with the interviewee that it is agreeable to having the interview. It was important to re-affirm and re-establish consent. All the persons interviewed did so freely, knowing how the information they gave was going to be used and for what purpose. Privacy is always a concern, especially when disclosing an individual's HIV status. To ensure privacy, no names were taken of the interviewees.

Results

The results are presented in two sections: people living with HIV and institutional interviews:

People living with HIV interviews

Out of a total of 1,067 Chikuni Home Based Care clients, 182 filled in the questionnaire of which 74% were female. Most (95%) respondents were aged more 25 years or older and on ART (96%). The majority of the respondents generated income by farming on their land (46%) followed by casual labourer (31%). These results are shown in Table 1. All the respondents went to Chikuni Mission Hospital for follow-ups and medication. Only 12 (7%) out of 182 respondents came from other health facilities: Monze Mission Hospital, Choma General Hospital and Namwala Hospital.



The average number of follow-up visits per year was 3.3. Most (73%) of the respondents thought that the frequency for appointments in a year given to them for regular medical follow-ups was frequent enough.

Tests that were conducted at Chikuni Mission Hospital found that almost all (99%) respondents reported that they had CD4 count done. About a third (38%) reported that viral load determination was done, although this test was not done in the hospital. Cholesterol test was done in 96 (53%) of the respondents. These results are shown in Table 2.

Altogether, 96% of the respondents took ARVs. All the seven respondents who did not take ARVs indicated that they did not take ARVs because, according to the healthcare staff, they did not need ARVs yet. Out of 182 respondents, 125 (67%) described their condition as of by then to be very good, 44 (24%) as good, and 9 (5%) as not too good. Most (96%) respondents reported that ARVs were free of charge. Out of 182 respondents, 78 (43%) reported that the number of times that they agreed with the medical attendants to be collecting the ARVs in a year was not followed as per agreed schedule.

When the respondents were asked if they experienced any shortage of ARVs supply when their day for collection was due, 24% of the respondents said there was a shortage of ARVs. For the 24% of respondents who had experienced ARV shortages, 92% of them said it happened only sometimes, 5% said it happened frequently and 3% said they usually found what they needed. When there was a shortage, most clients still received ARVs but fewer of them. Chikuni Mission Hospital usually gave out ARVs for three months at a time, but when there was a shortage, PLHIV only received a one-month supply of drugs. The majority of the respondents indicated that the supply of ARVs was improving.

When the respondents were asked if they ever shared the medication with family members or friends, 177 responded to the question of which 175 (99%) said they did not share ARVs with anyone. When they were asked if healthcare staff ever advised them to share medication with others, 26% of the

respondents said they were advised to share medications.

Table 2: Laboratory tests done on follow-up (Total=182)

Test	n (%)
CD4 count	180 (99)
Viral load	70 (38)
Cholesterol	99 (55)
Chest X-ray	17 (9)
Other sexually transmitted infection	12 (7)

When they were asked if there was a time when they stopped taking ARVs, 3% admitted to having stopped taking the drug. About 1 in 10 (9%) of the respondents did not take the medication regularly. Most of those who did not take it regularly gave the reason that they were forgetting to take medicine.

A question was asked to the respondents on how they would rate their access to ART. About half (54%) of the respondents rated it as good and 45% rated it as fair. Nobody said his or her access to ART was bad or very bad. Overall, 120 (66%) respondents found it hard to reach the facility where they received treatment. Of the 120 respondents who indicated that the hospital was not in easy reach, 108 (90%) said that the hospital was far from home and it took them many hours to get there, 66 (55%) indicated that transport was too expensive and 46 (38%) reported that there was no transport available at all. On the services received, 56% of the respondents were dissatisfied with the attention and quality of care they received.

Institutional interviews

Two local partners implementing HIV and AIDS-related programs were interviewed, namely: coordinator at the District AIDS Task Force, a government institution fighting HIV and AIDS and a nurse from Chikuni Mission Hospital. The following challenges were expressed by the DATF: (a) Due to distance some clients failed to reach the hospital on the day that they agreed with the medical staffs hence defaulting. It was even worse during rainy season; (b) There were families that were critically lacking food to eat and the district did not provide food. Therefore, poor nutrition also caused some clients to refrain from taking ARVs since ARVs cannot be taken without food; (c) Some church pastors were preaching to the people that they were healed and the virus was no more. Therefore, no need of taking ARVs when one is healed. This lead to default hence causing the patient to die early or recommended to move to another stage of treatment that might have been difficult to get; (d) Mixing alcohol with ARVs caused some people to default; (e) The challenge of under staffing in the Ministry of Health affected the service delivery; and (f) Self-stigma among clients themselves. Some even

reached the extent of paying some people to collect drugs on their behalf.

The challenges expressed by the nurse from the Chikuni Mission hospital were as follows: (i) Mixing alcohol, traditional herbs with ARVs led most of the clients to develop kidney problems; (ii) The nurses were overloaded with work. There were so many clients against very few medical officers; (iii) There was no nutrition support to help the clients who were critically stricken by hunger; and (iv) Most of the clients came from far places. Others even spent night on the way before they got to the hospital.

Discussion

Overall, it appeared that nearly every HIV-positive person who was eligible for ART (i.e., has a CD4 count below 350 cells/mm3) received it. Of the 4% of respondents who did not receive ART, all indicated that it was because they did not qualify for it yet, indicating that their CD4 counts were above the threshold defined by Zambia's ART protocols [10].

The drug shortages that were reported to be particularly acute in urban, government-run facilities appeared to have been less severe at Chikuni Mission Hospital. PLHIV had never been unable to collect drugs from Chikuni Mission Hospital; they just received a reduced amount and had to return to collect more. While PLHIV had basic access to ART, there were still barriers related to ease of access and quality of care. According to the findings, barriers to ART were identified at three levels: individual, institutional, and national.

Individual barriers were found at the household level and affected an individual person's ability to access ART. The individual barriers varied from person to person, but two typical barriers emerged from the study: physical distance and opportunity costs. Because Chikuni Parish was a rural area and clients came from over 50 km away to reach the ART clinic at Chikuni Mission Hospital, physical distance was the major challenge that individuals faced when accessing ART. The difficulties of distance disproportionally affected women, children, and the elderly. Women were less likely than men to own a bicycle, and children – especially young children – and the elderly were not strong enough to cycle long distances.

The physical barriers identified in the current study are consistent with factors cited in literature. Roura et. al [11] conducted a study in semi-rural Tanzania to evaluate attrition in the country's ART program. They found that distance to the clinic was as a barrier to clinic attendance. The majority of respondents in

their study indicated that ART services should be brought closer to the clients, and this is in line with the WHO's 2013 recommendations that ART services be decentralized [3].

Related to the barrier of distance and the time it takes to reach the treatment facility is the barrier of opportunity costs. Opportunity costs have a variety of implications on the economic and educational aspects of people's lives. An opportunity cost is the opportunities foregone when choosing one expenditure over another. In the case of PLHIV, one of the opportunity costs of traveling long distances to access ART is the loss of one (or two or three) days of work. Over half (59%) of the respondents relied on agriculture as their main source of income, and presumably more relied on it as a secondary or supplementary source of income. Agriculture is labour-intensive work, and spending up to 10% of the month accessing ART (3 days out of 30) can have a serious impact on income generation.

For children accessing ART, the opportunity costs include missed days of school. This can have a serious impact on student achievement, especially if the child's appointment at the ART clinic is on a critical learning day, such as a test day.

Finally, widows and single parents face the opportunity costs of the risk of leaving children at home alone and unattended while the parent goes to the ART clinic. If the adult is fortunate, a relative who lives nearby or a friendly neighbour can watch the children. However, there are also cases where the children are left at home without adult supervision. The parent must prepare food in advance and hope that nothing happens to the children while he or she is away.

Other studies found similar barriers and outlined the effects of poor service delivery. Gourlay et al [12] reviewed literature regarding the barriers to uptake of ART for PMTCT. Of 23 studies, 52% of the studies included staff shortages as a barrier. Staff shortages have huge impacts on the quality of care PLHIV receive from treatment facilities. In addition to staff shortages, drug shortages are other problems that affect individuals accessing ART at local health facilities. Drug shortages not only have the potential to do serious physical harm to people who rely on the drugs for survival. The shortages also cause mental anguish for PLHIV. They know their life depends on their ability to get the drugs, so a shortage raises concerns that one day the drugs may become unavailable. While access to ART has given PLHIV hope for their future, they also see instability in the

situation and worry that their health - and life - is at risk.

Because of the sampling method, there might have been significant selection bias. Chikuni HBC is located in a rural area, and clients live too far apart to visit in their homes. Additionally, only the clients' villages are known, not the specific location of their house. Thus, random sampling could not have been possible because it was difficult to construct a sampling frame. Instead, participants were sampled in a place where many people had gathered during HBC outreach visits or follow-up visit days at the hospital. The challenge with this sampling method, however, is that the people interviewed were already accessing services. There might have been people in the communities who could not have accessed services at all and the findings might have been biased against them.

Though there is widespread ART coverage in Zambia, PLHIV still face many challenges when accessing ART. Barriers at three levels – individual, institutional and national – hinder people's attempts to access ART and following them in their own centres (outreach) could improve accessibility to ART.

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RESEARCH ARTICLES

Level of knowledge on postnatal care and its associated factors in Ndola, Zambia

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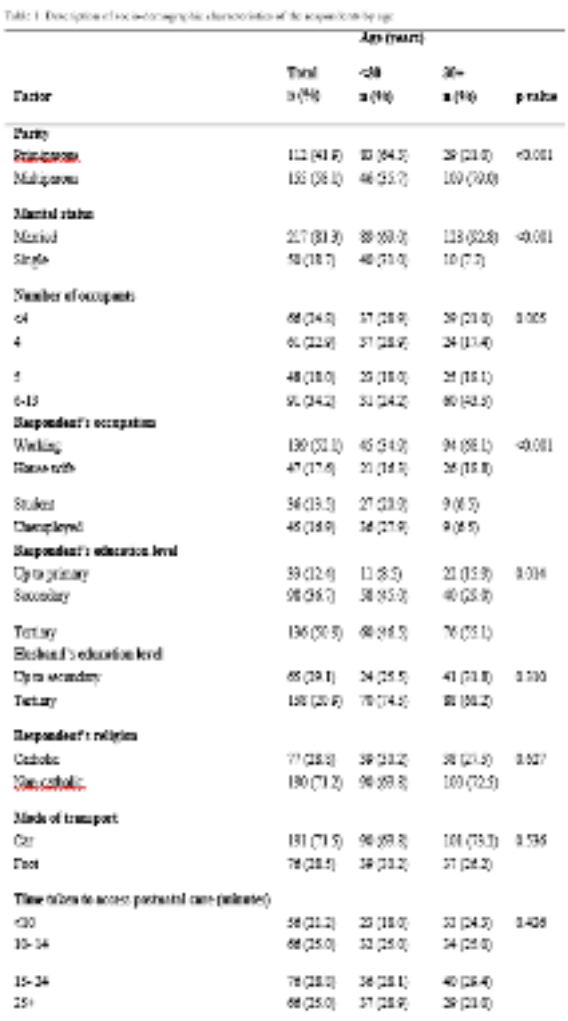
Postnatal care (PNC) is considered as the most important maternal and child health service offered for a period of six weeks from the time of delivery. Inability to promote health behaviours affecting mothers and newborn children, illnesses, disabilities and death occur due to lack of PNC. Hence, the study was conducted to determine the level of knowledge on PNC and its associated factors. In early 2015, a cross sectional study was conducted at an urban health facility run by the district health office providing mother and child health care services in Ndola, Copperbelt province, Zambia. A total of 268 women attend postnatal care clinic were interviewed using a structured questionnaire. The chi-square test and fisher's test were used to determine association and multivariate logistic regression was used to determine independent factors for knowledge on PNC. Among the respondents, 18.7% had knowledge on postnatal care. Respondents who had attained up to primary level of education 87% (OR=0.13; 95% [0.02- 0.97]) were less likely to have knowledge on postnatal care. Level of knowledge on postnatal care was low among the respondents. Change towards Information, Education and Communication (IEC) materials such as pictorial presentations should be used, while conducting postnatal clinics in order to improve women's level of knowledge.

Introduction

Postnatal care is the care given to the mother and the infant from delivery up to six weeks. The principal objectives of postnatal care services are to evaluate, maintain and promote the health of the birthing woman and the new born and to foster an environment that offers help and support for diverse health and social needs. Postnatal care is one of the important maternal health care services for only prevention of complications of impairment and disability but also reduction of maternal mortality. Postnatal care services enable health professionals to identify post-delivery problems, individual potential complications and prompt treatments as well as promoting health of the mother and baby [1]. Multiple factors have been identified worldwide to affect utilization of postnatal care services such as socio-demographic, economic and cultural factors as well as knowledge of women on postnatal care [2-4]. Lack of knowledge is a significant predictor

of utilization of most health services. Procedures require women's knowledge and that of health care providers. So, health care providers should disseminate appropriate information in an appropriate way in order for women to understand the information on why they need to utilise the services.

This indicates that in order for women to utilise the service the need to have the right information and knowledge for them to



Factor	Total n (%)	Age (years) <20 n (%)	20+ n (%)	p value
Parity				
Primiparous	112 (41.8)	83 (64.3)	29 (21.0)	<0.001
Multiparous	155 (58.1)	46 (35.7)	109 (79.0)	
Marital status				
Married	217 (81.3)	89 (69.0)	128 (92.8)	<0.001
Single	50 (18.7)	40 (31.0)	10 (7.2)	
Number of occupants				
<4	68 (24.6)	37 (28.9)	29 (21.0)	0.005
4	61 (22.9)	37 (28.9)	24 (17.4)	
5	48 (18.0)	23 (18.0)	25 (18.1)	
6-13	91 (34.2)	31 (24.2)	60 (43.5)	
Respondent's occupation				
Working	130 (52.1)	45 (34.9)	84 (68.1)	<0.001
Stays with	47 (17.6)	21 (16.3)	26 (18.8)	
Student	56 (15.3)	27 (23.3)	9 (6.5)	
Unemployed	45 (16.9)	36 (27.9)	9 (6.5)	
Respondent's education level				
Up to primary	33 (12.4)	11 (8.5)	22 (15.9)	0.016
Secondary	98 (36.7)	58 (45.0)	40 (28.9)	
Tertiary	136 (50.9)	60 (46.5)	76 (55.1)	
Husband's education level				
Up to secondary	65 (29.1)	34 (35.5)	41 (33.3)	0.100
Tertiary	158 (70.9)	70 (74.4)	88 (66.2)	
Respondent's religion				
Catholic	77 (28.8)	39 (30.2)	38 (27.5)	0.627
Non catholic	190 (71.2)	90 (69.8)	100 (72.5)	
Mode of transport				
Car	191 (71.5)	90 (69.8)	101 (73.2)	0.536
Foot	76 (28.5)	39 (30.2)	37 (26.8)	
Time taken to access postnatal care (minutes)				
<30	56 (21.2)	23 (18.0)	33 (24.5)	0.428
30-14	66 (25.0)	32 (25.0)	34 (25.0)	
15-24	78 (29.5)	36 (28.1)	40 (29.4)	
25+	66 (25.0)	37 (28.9)	29 (21.3)	

utilize service such as postnatal care [5]. Most studies reveal that level of knowledge on postnatal care is associated with the following factors; maternal age, parity, marital status, occupation, education level of both mother and spouse, religion, number of household occupants, place of delivery, residence, source of information and antenatal visit. A few studies also include mode of delivery, chronic diseases (such as HIV, hypertension, diabetes mellitus etc.), birth attendant, complications associated with previous pregnancies, general condition of mother and baby after delivery, care providers attitude and mother's attitude [6-8]. A number of studies have been done on utilization of postnatal care services, factors associated with utilization of postnatal care services and a few on knowledge, attitude and practice towards utilization of postnatal care in Zambia as well as other counties. No study on knowledge on postnatal care and its associated factors has been done in Ndola, Zambia. Hence the objective was to determine the knowledge level and its associated factors on postnatal care in this part of the country.

Methods

A cross sectional study was conducted from February, 2015 to May, 2015 at an urban health facility in Ndola, Copperbelt province, Zambia.

Women attending postnatal clinic and under five clinics were requested to take part in the study. Out of a population of 891 women attending postnatal clinic during the period of four months, 268 mothers participated in the study. Using a Statcalc programme in Epi Info version 7 with the population size assuming expected frequency of 50% ± 5% and 95% confidence level the required minimum sample size was 268. Data was collected from all women who accepted to participate in the study.

A structured questionnaire was used to interview women that contained both closed and open ended questions. The questionnaire included information on socio-demographic characteristics, history of previous and current pregnancy, knowledge on PNC and attitude towards utilization of PNC. Knowledge questions included items on postnatal care timing, activities conducted in postnatal clinic and the benefits of utilizing postnatal care services.

Filled in questionnaires were checked for completeness and consistency of responses. Open ended questions were coded and entered on questionnaire. Data entry was done using Epi data version 3.1 and exported to SPSS version 16.0 for analysis. Editing was done after running the frequencies and checking for out of range responses. Responses to questions on attitudes were pre-coded as strongly agree, agree, strongly disagree or disagree. During the analysis, these were post-coded to either positive attitude or negative attitude. The Chi-squared test was used to determine associations between predictor variables and the outcome; and in cases were the Chi-squared test was not valid the Fisher's exact test was used. Meanwhile, the Backward logistic regression analysis was used to determine independent predictors for knowledge on PNC. The Odds ratio (OR) was reported together with its 95% confidence interval (CI).

The proposal was reviewed and approved by the Public Health Unit of the School of Medicine, Copperbelt University. Permission to conduct the study was sought from the District Health Office (DHO), Copperbelt University- School of medicine, the facility were the study was conducted and all respondents before participating in the study.

Results

Two hundred and sixty eight women were interviewed in the study with a response rate of 100%. Table 1 shows that all factors

Table 1: Socio-demographic characteristics factors associated with knowledge on postnatal care

		Knowledge		
	Total	Yes	No	
Factor	n (%)	n (%)	n (%)	p-value
Parity				
Prim-parous	112 (41.8)	22 (19.6)	90 (80.4)	0.729
Multi-parous	156 (58.2)	28 (17.9)	128 (82.1)	
Age (years)				
<30	129 (48.1)	25 (19.4)	104 (80.6)	0.791
30 and above	139 (51.9)	25 (18.0)	114 (82.0)	
Marital status				
Married	215 (80.2)	44 (20.5)	171 (79.5)	0.349
Single	53 (19.8)	3 (5.7)	50 (94.3)	
Number of occupants				
<5	67 (25.0)	11 (16.4)	56 (83.6)	0.573
5	61 (22.8)	9 (14.8)	52 (85.2)	
6	49 (18.3)	9 (18.4)	40 (81.6)	
6-12	91 (34.1)	21 (23.1)	70 (76.9)	
Respondent's occupation				
Working	140 (52.2)	25 (17.9)	115 (82.1)	0.838
House wife	47 (17.5)	10 (21.3)	37 (78.7)	
Student	50 (18.7)	7 (14.0)	43 (86.0)	
Unemployed	31 (11.6)	5 (16.1)	26 (83.9)	
Respondent's education level				
Up to primary	33 (12.3)	1 (3.0)	32 (97.0)	0.043
Secondary	98 (36.6)	22 (22.4)	76 (77.6)	
Tertiary	137 (51.1)	27 (19.7)	110 (80.3)	
Husband's education level				
Up to secondary	69 (28.8)	12 (17.4)	57 (82.6)	0.697
Tertiary	170 (71.8)	33 (19.4)	137 (80.6)	
Respondent's religion				
Catholic	77 (28.7)	17 (22.1)	60 (77.9)	0.261
Non- catholic	191 (71.3)	33 (17.3)	158 (82.7)	
Mode of transport				
Car	192 (71.6)	38 (19.8)	154 (80.2)	0.348
Foot	76 (28.4)	16 (21.1)	60 (78.9)	
Time taken to access postnatal care (minutes)				
<10	97 (36.2)	19 (19.6)	78 (80.4)	0.618
10-14	66 (24.6)	12 (18.2)	54 (81.8)	
15- 24	76 (28.4)	17 (22.4)	59 (77.6)	
25 and above	66 (24.6)	9 (13.6)	57 (86.4)	

except respondent husband education level, respondent's religion, and mode of transport and time take to get to the facility were significantly associated with age. Primiparous women were more likely to be aged less than 30 years and those who were married were less likely to be aged less than 30 years old. Respondents with less than 5 occupants in their home were more likely to be less than 30 years of age. Women who attained up to primary education level were less likely to be less than 30 years of age. Overall 29.1% of the participants had husbands who had attained up to secondary level of education, 28.8% were catholic, 71.5% used a car to get to the facility and 21.2% took less than 10 minutes to get to the facility. Altogether, 18.7% of the respondents had knowledge on postnatal care. Tables 2 to 4 show factors associated with knowledge on postnatal care. None of the factors except respondent's education level were associated with knowledge. Respondents who had attained up to primary level of education were 87% (OR= 0.13; CI 95% [0.02- 0.97]) less likely to have knowledge compared to respondents who had attained higher level of education.

Discussion

Most of the respondents (81.3%) did not have knowledge on postnatal care. The results also show that the majority of women did not know what postnatal care is with regard to, postnatal care timing, activities conducted in postnatal clinic and the benefits of utilizing postnatal care services. Knowledge on postnatal care was only significantly associated with respondent's education level.

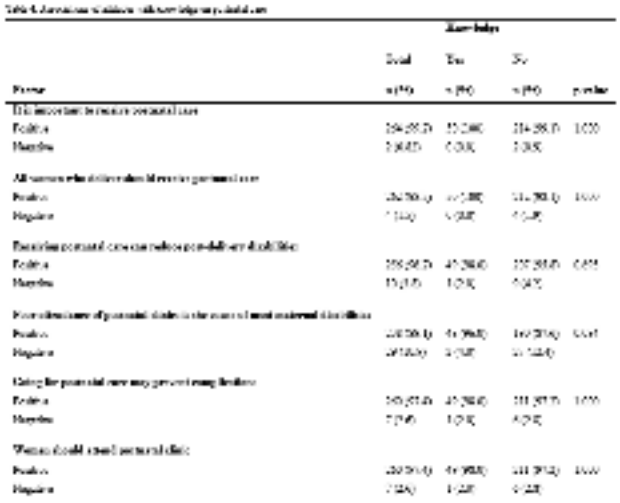
Although Information, Education and Communication (IEC) are given by health personnel every time before the postnatal clinic is conducted, women with primary

Table 3 Associations of history of previous and current pregnancy with knowledge on postnatal care

		Knowledge		
	Total	**Yes**	**No**	
Factor	**n (%)**	**n (%)**	**n (%)**	**p value**
Antenatal attendance				
Yes	267 (99.6)	50 (100)	90 (41.3)	1.000
No	1 (0.4)	0 (0.0)	128 (58.7)	
Number of antenatal visits				
1	4 (1.7)	1 (2.1)	3 (1.6)	0.086
2	25 (10.8)	3 (6.4)	22 (12.0)	
3	52 (22.5)	5 (10.6)	47 (25.5)	
4	81 (35.1)	23 (48.9)	58 (31.5)	
5 and above	69 (29.9)	15 (31.9)	54 (29.3)	
Place of delivery				
Home	7(2.6)	1 (2.0)	6 (2.8)	0.944
Hospital	211 (78.7)	40 (80.0)	171 (78.4)	
Clinic	50 (18.7)	9 (18.0)	41 (18.8)	
Mode of delivery				
Spontaneous virginal delivery	221 (82.5)	40 (80.0)	181 (83.0)	0.612
Caesarean section	47(17.5)	10 (20.0)	37 (17.0)	
Birth attendant				
Nurse	83 (32.2)	13 (27.1)	70 (33.3)	0.703
Midwife	116 (45.0)	23 (47.9)	93 (44.3)	
Doctor	59 (22.9)	12 (25.0)	47 (22.4)	
Complications in previous pregnancies				
Yes	41 (15.3)	8 (16.0)	33 (15.1)	0.557
No	125 (46.6)	20 (40.0)	105 (48.2)	
Not applicable	102 (38.1)	22 (44.0)	80 (36.7)	
Chronic diseases				
Yes	77 (28.7)	9 (18.0)	68 (31.2)	0.063
No	191 (71.3)	41 (82.0)	150 (68.8)	
General condition of mother				
Weak	42 (15.7)	7 (14.0)	35 (16.1)	0.270
Ill	53 (19.8)	14 (28.0)	39 (17.9)	
Well	173 (64.6)	29 (58.0)	144 (66.1)	
General condition of baby				
Well	251 (93.7)	48 (96.0)	203 (93.1)	0.747
Unwell	17 (6.3)	2 (4.0)	15 (6.9)	
Postnatal attendance				
Yes	152 (93.7)	29 (100)	123 (96.1)	0.585
No	5 (3.2)	0 (0.0)	5 (3.9)	
Source of information				
Clinic	204 (77.9)	38 (76.0)	166 (78.3)	0.531
Media	22 (8.4)	3 (6.0)	19 (9.0)	
Others	36 (13.7)	9 (18.0)	27 (12.7)	

level of education are less knowledgeable than women with tertiary education attending

the same postnatal care clinic. This could be because of women with low education level find it difficulty or do not grasp the information given compared to women with higher education level. The other reasons could be because of high level of ignorance associated with low education level women,



cultural beliefs shared among women from their respective areas of residence and socio-economic factors. For instance, women attending postnatal clinic late may miss the IEC because they go to the facility on foot and takes them more time than those who own cars or those who can afford to pay taxis fare. Similar results were obtained in a study done in Kasama which state that educated women were more likely to understand health education messages better than their illiterate counter parts [6]. Poor maternal knowledge, attitude and practice on cord care were associated with young, poor mothers of low education who had acquired knowledge from the health workers [9]. It was stated in another study that poor knowledge, attitude and practices were associated with young postnatal mothers, low education and who had acquired knowledge from other health workers [10]. However, two studies were conducted in Mazabuka, Zambia among male and female residents which reflect different results about level of knowledge. A study done among female residents reveal that the majority of the women had low knowledge, 50% of those mothers could not define postnatal care, 18% gave correct but not complete definitions and only 23% gave correct definitions. These results indicated that although some mothers had knowledge about postnatal care, they did not have total knowledge on postnatal [11]. A study among male residents indicated that most men were knowledgeable [12]. From these results, it was established that education level is an important factor associated with knowledge on postnatal care. Improving knowledge on postnatal care services will ultimately improve utilization of postnatal care services. In the current study, few women had knowledge on postnatal care and education was associated with PNC. There were no considerable limitations in this study. There is need to change the Information, Education

and Communication (IEC) materials to carter for the less educated such as pictorial presentations during postnatal care clinics.

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RESEARCH ARTICLES

Prevalence of adolescent overweight or obesity among secondary school students in urban Ndola, Zambia and associated factors

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Overweight and obesity are the fifth leading risk for global deaths and is on the increase among adolescents in developing countries. Zambia is also affected by adolescent obesity epidemic, but the context of obesity and overweight has been under explored in younger age groups. The study aimed to determine the prevalence of overweight and obesity among adolescents in Urban Ndola, Zambia and identify its correlates. A secondary school based cross sectional study was undertaken in selected schools and face to face interviews were conducted with students using structured questionnaires. Associations were established using the Chi-squared test and the Fisher's exact test, where appropriate. The level of statistical significance was set at the 5% level. In determining independent factors associated with overweight/obesity, a multivariate logistic regression was conducted. Adjusted odds ratios (AOR) and their 95% confidence intervals are reported. Of the 400 participants from urban Ndola, Zambia, 7.0% (2.1% of males, 11.5% of females) were overweight/obese. Sex and transport were significantly associated with the outcome. Male respondents were 58% less likely to be overweight/obese compared to females (AOR=0.42; 95% CI [0.24, 0.72]). Compared to respondents who used a car as mode of transport, those who walked or used a bicycle were 38% less likely to be overweight/obese (AOR=0.62; 95% CI [0.41, 0.93]). The observed rate of overweight in the current study has not reached at an alarming rate but measures to control it such as involving students in physical activity must be instituted.

Introduction

Overweight and obesity are defined as abnormal or excessive fat accumulation that presents a risk to health. A crude population measure of obesity is the body mass index (BMI), a person's weight in kilograms divided by the square of his or her height in meters. The body mass index is the standard measure of overweight and obesity for children two years and older [1-4]. A person with a BMI of less than 18.5kg/m^2 is underweight, 18.5 to <25.0kg/m^2 healthy weight, 25.0 to <30.0kg/m^2 overweight and over 30.0kg/m^2 is obese.

Adolescent obesity is one of the most serious public health challenges of the 21st century [5-8]. The problem is global and it is steadily affecting many low and middle-income countries particularly in urban settings.

Adolescent obesity is associated with a higher risk of premature death and disability in adulthood. Overweight and obese children are likely to stay obese into adulthood and more likely to develop non-communicable diseases like diabetes, cardiovascular diseases and certain cancers at a younger age. Overweight and obesity, as well as other related diseases, are largely preventable. Prevention of childhood obesity therefore needs priority [5-8].

The fundamental cause of child hood and adolescent overweight and obesity is an energy imbalance between calories consumed and calories expended and are affected by various genetic, behavioral and environmental factors [9,10]. Global increases in this epidemic are attributed to a number of factors including; a global shift in diet towards increased intake of energy-dense foods that are high in fat and sugars but low in vitamins, minerals and other healthy macro-nutrients; a trend towards decreased physical activity levels due to the increasingly sedentary nature of many forms of recreation times, changing modes of transportation and increasing urbanization.

BMI measurement programs may be conducted for surveillance and screening purposes. BMI surveillance programs assess the weight status of a specific population (e.g.; students in a school, district or state) to identify the percentage of students who are potentially at risk for weight related problems. Surveillance data typically anonymous and can be used for many purposes including identifying population trends and monitoring the outcomes of interventions. BMI screening programs assess the weight status of individual students to identify those at risk and provide with information to help them take appropriate action.

Over the past three decades the prevalence of overweight and obesity has increased substantially [9]. Globally, an estimated 170 million children (aged less than 18 years) are now estimated to be overweight [10]. The highest prevalence of childhood overweight is in the upper-middle – income countries, and when taken as a group, low-income countries have the lowest prevalence rate. However, overweight is rising in almost all countries, with prevalence rates growing fastest in lower-middle-income countries [11]. Globally WHO estimates that 43 million children are overweight and obese and 81% of them live in developing countries. The number is expected to rise to about 60 million over the next decade [12].

Like any other country in Africa, Zambia is also affected by adolescent obesity epidemic,

but the context of obesity and overweight has been under explored in younger age groups. Understanding the current situation and trends will provide useful insights that will assist health professionals and policy makers in decision making and developing future research agenda. Studies carried out on overweight and obesity in Zambia have focused on the adult population and survey information about adolescent obesity does not exist. The study aimed to determine the prevalence of overweight and obesity among adolescents in Urban Ndola, Zambia and identify its correlates.

Methods

The study was conducted in Ndola urban district among school-going adolescents. This study was a cross sectional study.

StatCal program in Epi Info version 7.1.3.3 was used to determine the sample size. A sample size of 400 respondents was determined using a population size of 9500, a prevalence of 50% (as no estimate existed) within 5%, and a design effect of 2. Cluster sampling was used to group the 24 schools in urban Ndola according to their location. Simple random sampling was used to select 5 schools that would participate in the research. From each school, 80 students were randomly selected to participate in the survey.

A questionnaire used to collect the information. The questionnaire captured age, gender, levels of physical activity, type of diet, height and weight.

A stadiometer was used to measure heights of participants in centimeters. Weight was recorded to the nearest 0.1 kg using a standard digital scale.

The body mass index (BMI) was calculated using the formula: BMI=weight in kg/height

Table1: Sample description

Factor	Total n (%)	Males n (%)	Females n (%)	p value
Age (years)				0.017
11-15	152 (100)	61 (40.1)	91 (59.9)	
16-20	248 (100)	130 (52.4)	118 (47.6)	
Residential area				0.387
High density	285 (100)	140 (49.1)	145 (50.9)	
Low density	115 (100)	51 (44.3)	64 (55.7)	
Overweight/obese				<0.001
No	372 (100)	187 (50.3)	185 (49.7)	
Yes	28 (100)	4 (14.3)	24 (85.7)	

in meters squared. BMI was categorized into overweight/obese or non-overweight/non-obese. Associations were established using the Chi-squared test and the Fisher's exact test, where appropriate. The level of statistical significance was set at the 5% level. In determining independent factors associated with overweight/obesity, a multivariate logistic regression was conducted. Adjusted odds ratios (AOR) and their 95% confidence intervals are reported.

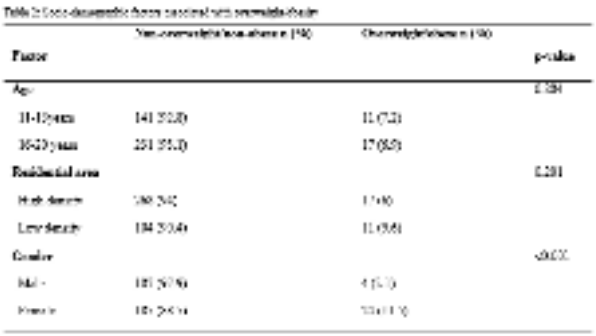
Ethical considerations

Ethical clearance was sought and granted by the Tropical Diseases Research Centre (TDRC) ethics committee based at Ndola Central Hospital of Zambia. Permission to conduct the study was obtained from the Zambia District Education Board Secretary (Ndola). Verbal consent was obtained from participants of consenting age and assent from headmasters for participants who were below consenting age.

Results

There were 400 participants of which 191 (47.8%) were males. Of the 191 male participants 2.1% were overweight/obese and of the 209 females, 11.5% were overweight/obese (p <0.001). The age and residential area distributions were similar between males and females (Table 1).

Socio-demographic factors associated with overweight in bivariate analyses are shown in Table 2. Only gender was significantly



associated with the outcome (p<0.001). Physical factors that were associated with overweight/obese are shown in Table 3. Mode of transport (p=0.009) and type of diet (p=0.020) were significantly associated with the outcome.

In multivariate analysis only gender and transport remained significantly associated with the outcome. Male respondents were 58% less likely to be overweight/obese compared to females (AOR=0.42; 95% CI [0.24, 0.72]). Compared to respondents who used a car as mode of transport, those who walked or used a bicycle were 38% less likely to be overweight/obese (AOR=0.62; 95% CI [0.41, 0.93]).

Discussion

In the current study the overall prevalence of overweight/obese was 7.0% (2.1% of males, 11.5% of females). Sex and mode of transport were significantly associated with overweight/obese.

The rate among females in the current study is comparable to that of females in Malawi of 14.4% but that of males in the current study was much lower than the one observed in Malawi of 15.9%. Notably, there the rates vary between gender across regions. While in the current study, females had a higher rate than males, there was no significant difference in the same region in Malawi. Meanwhile, in West and North Africa, males had higher rates than females. Further, generally, the rates in the current study were

lower than those observed in West [Benin (females=14.0%; males=19.9%); Mauritania (females=17.9%; males=23.5%); Ghana (females=18.3%; males=33.8%)] and North [Egypt (females=9.9%; males=15.7%; Morocco (female=17.1%; male=29.3%)] Africa [15].

Table 3: Physical factor specific rates for overweight/obesity

Factor	Non-overweight/non-obese n (%)	Overweight/obese n (%)	p value
Physical activity			
Doing sport			0.069
Yes	257 (94.8)	13 (5.2)	
No	135 (90)	15 (10)	
Hours a week			0.229
< 7hrs per week	324 (92.3)	27 (7.7)	
>7hrs per week	48 (98)	1 (2)	
Mode of transport			0.089
Walking/bicycle	226 (95.8)	10 (4.2)	
By car	146 (89)	18 (11)	
Number of meals per day			
< 3 meals	57 (87.7)	8 (12.3)	
>3 meals	315 (94)	20 (6)	
Type of Diet			0.020
Healthy	82 (98.8)	1 (1.2)	
Unhealthy	290 (91.5)	27 (8.5)	
Skip breakfast			0.360
Yes	206 (92)	18 (8)	
No	166 (94.3)	10 (5.7)	

Female gender was associated with overweight in the current study partly because female adolescents tend to be less active than males. Female adolescents tend to stay at home with less physical activity) to help out with household chores compared to males who are physically active as demanded by their societal roles. The finding accords that of Kruer et al [16] who observed that during adolescence males are generally more physically active than females. Another explanation for females to be overweight is that females in our study may regard bigger body image to be favorable than a lean body, especially during the era of the HIV/AIDS epidemic in which more females than males are infected with the virus [17]. A lean body may be associated with HIV. Yet another explanation for gender difference in overweight relates to sexual maturation. During adolescence sexual maturation demands more energy and since females mature earlier than males, females tend to be more overweight than males [18].

Driving to school was associated with overweight in the present study. Similar findings have been reported elsewhere. Wen et al [19] reported that participants who drove to school were associated with overweight. In another study, students who cycled to school were associated with lower odds of being overweight [20]. Cycling to school is associated with lower BMI and lower odds of being overweight or obese. In a large population-based study of Danish adolescents it was observed that walking or cycling to was associated with lower likelihood of being overweight [21]. Sedentary lifestyles have been associated with unhealthy outcome and physical activity must thus be encouraged to avoid diseases associated with inactivity.

There are a number of limitations attributed to the study. Measurement bias could have arisen in determining the level of physical

activity. There could have been bias in choosing the type of diet by pupils as the foods contained in the unhealthy diet is generally associated more with affluence. The number of meals taken per day by a pupil could not be verified and as such may compromise on the findings.

In conclusion, the observed rate of overweight in the current study has not reached at an alarming rate but measures to control it such as involving students in physical activity must be instituted

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RESEARCH ARTICLES

Hearing Loss among Multi-Drug Resistant Tuberculosis patients on Kanamycin in Ndola Teaching Hospital, Zambia: Study of ototoxicity and practice

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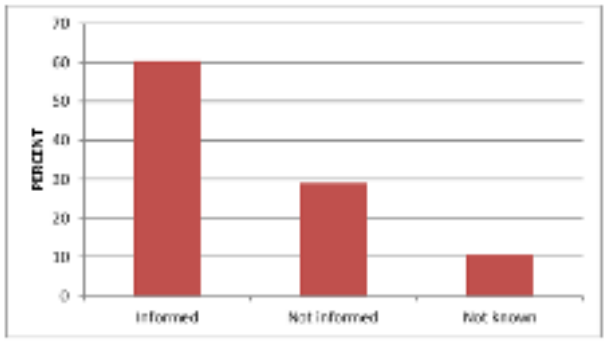
Multi-drug resistant tuberculosis is of public health importance. The purpose of this study was to determine the magnitude of hearing loss among multi-drug resistant TB patients being treated with kanamycin in Ndola Teaching Hospital, Zambia. This was a one year prospective descriptive study conducted among 38 MDR TB patients who received kanamycin injection for a maximum of eight months and tested by high frequency audiometer for at least two times. Out of 38 patients, 11 (29.0 %) were female and 73.7% were aged between 15 and 44 years. Of the 38 patients, 29 (76.0%) were HIV positive. Altogether, 35 (91.1%) patients on kanamycin had abnormal hearing assessment, 30 (86.0%) had clinical hearing loss and the other 5 (14.0%) only had high frequency loss on the audiogram without functional hearing impairment. No significant association was observed between gender and ototoxicity (p=0.861). Among patients with clinical hearing loss, 2 (7.0%) had mild, 5 (17.0%) had moderately severe, 16 (53.0%) had severe and 7(23.0%) profound hearing loss. A total of 11 (29.0%) patients were not aware of possible hearing loss. The study has shown a significant proportion of patients who get MDR TB treatment end up with significant hearing loss.

Introduction

Tuberculosis has remained a challenge to both global and Zambia public health. There is significant progress in treating Tuberculosis (TB) both globally and in Zambia, however the number of drug resistant TB has also been significantly increasing globally [1]. Zambia had the incidence of TB of 545/100,000 by the year 2006 with prevalence of 1.8% and 2.3% drug resistant Tuberculosis (DR-TB) in new and previously treated TB, respectively, based on 2001 drug resistance survey. This translates to approximately 265 new cases of multidrug resistant Tuberculosis (MDR-TB) [2] and it was reported that the MDR-TB cases were

the most frequent accounting for 49% of the total DR-TB [1].

Ototoxicity is defined as medication-induced auditory and/or vestibular system dysfunction those results in hearing loss or loss of balance [3]. Current international DR-TB guidelines and expert opinion provide limited detailed advice regarding the monitoring, classification and management of hearing loss.



A consensus is lacking. The World Health Organization (WHO) simply states that hearing loss should be documented and compared with baseline results if audiometry is available. If hearing loss is detected, options include changing from an aminoglycoside to capreomycin, decreasing the frequency/dose, or discontinuing the suspected agent if this can be performed without compromising the regimen. No mention is made in the guidelines of how hearing should be tested, how frequently it should be performed or what classifies as hearing loss [2,4].

Incidence of ototoxicity ranges from 7 to 90% in different regions of the world [5-16]. The wide variation observed in several studies is attributed to the different methodology, ways of measuring hearing, aminoglycosides used and guidelines used to identify hearing loss.

The main ototoxic drugs in Ndola Teaching Hospital used for the treatment of drug-resistant TB are kanamycin and capreomycin for a length of eight months. Despite the wide use of kanamycin to the patients with multi drug resistant Tuberculosis patients in Zambia, no study has been done before to assess the burden of hearing loss or guidelines put in place for the patient receiving treatment of multi drug resistant to assess their hearing. Hence, the objective of the study was to determine prevalence of ototoxicity and associated factors among multi drug resistant TB patients treated at Ndola Teaching Hospital.

Methods

This was a hospital prospective descriptive study conducted among MDR tuberculosis patients who received initial dose of kanamycin for eight months. The patients were tested for at least two phases. Phase one was before or within two weeks of use of kanamycin and the phase two were after

several months of using kanamycin at Ndola Teaching Hospital Tuberculosis Ward.

Audiometry findings were considered under three categories; 'normal' defined by patients with pure tone audiograms showing air-conduction thresholds up to 20 ± 5 dB HL at all the tested frequencies from 125 Hz to 8000 Hz with air-bone gap of ≤ 10 dB; 'high frequency loss' (HFL) was defined by (1) a 20 dB or greater decrease at any of the five frequencies; 4000, 6000, 8000 ,10,000 and 12,000Hz, (2) 10 dB or greater decrease at any two adjacent frequencies in above range, (3) loss of response at all the three frequencies (4000, 6000,8000,10,000 and 12,000 Hz) where responses was previously obtained; and 'flat' (FLAT) when in addition to HFL, above criteria will be also fulfilled in the frequencies ranging from 250 to 3000 Hz basing on American Speech-Language-Hearing Association guideline (ASHA). All the pure tone threshold shifts was recorded at each frequency tested with reference to the baseline pure tone threshold at the same frequency. All the patients in MDR TB treatment were tested for renal function and HIV per hospital protocol.

Ndola Teaching Hospital is a third level hospital which serve almost half of the country. It is the one of the two Multi drug resistant TB treatment centers in Zambia. Convenient sampling was used to recruit patients from the patient registries at Ndola Central Hospital treatment center on a daily basis during the whole time of the study. The duration of recruitment of subjects was one year. A structured questionnaire was used to collect information on socio-demographic characteristics, ototoxic drug(s) used, HIV status, history of dizziness, loss of balance and vertigo, tinnitus, hearing loss, otoscopic examination findings, tympanogram and audiogram. These activities were done by the Principal investigator and the qualified audiology technician.

In determining the knowledge of the TB health workers, a questionnaire comprising the following questions was used: knowledge of drug used in the management of multidrug resistant Tb; Ototoxic drugs used in the MDR-TB management; Ear disorder symptoms; When to refer a patient to audiologist; Protocols and regulation that are in place to monitor the ototoxicity; and Involvement of Audiologist in The TB management Team.

Data were analyzed using STATA version 14. The categorical variables were summarized in frequencies with respective percentages. The Chi-squared test was used to assess association between exposure

factors and the outcome at the 5% significance level.

Inclusion and exclusion criteria

All patients who were confirmed by culture and sensitivity to have multi drug resistant TB and on treatment or scheduled to start treatment with kanamycin were included in the study. Patients who were excluded from the study included: patients who had used the aminoglycoside for a month or more in the past six month prior to the start of study, patients with renal failure, patients with hearing loss prior to the start of the study, patients who received concomitant administration of other ototoxic drugs, patient with other ear pathology like otitis media which can affect hearing of a patient and uncooperative patients.

Ethical consideration

The investigator introduced himself to each individual patient and gave explanation on what the study was about before asking the patient to participate in the study. Only patients who gave written/verbal consent were enrolled for the study. Patient interview was conducted privately with only the investigator and the patient. All the otoscopic examinations, tympanometry and audiometry tests did not harm patients. These tests were done to any patient with suspected hearing loss per Ndola Teaching Hospital treatment protocol. The patients' information and results were handled confidentially. Patients who were found to have otology problems during the study, they were managed per existing Ndola Teaching Hospital and Ministry of Heath Protocol.

The proposal was reviewed by the Scientific, Technical and Advisory Committee Tropical Diseases Research Centre (TDRC). Ethical clearance was granted by the TDRC Research Ethics Committee, Ndola, Zambia.

Results

A total of 38 patients were recruited in the study of whom 11 (29.0%) were female. Half (50.0%) of the participants were in the 35-44 years' age group (Table 1).

Table 1. Baseline characteristics of study participants (n=38)

Factor	Frequency	Percent
Sex		
Female	11	28.9
Male	27	71.1
Age (years)		
16-34	9	23.7
35-44	19	50.0
45+	10	26.3
HIV status		
Positive	29	76.3
Negative	9	23.7
Total	38	100

Out of the 38 drug resistant TB patients enrolled for this study and screened for hearing loss, 35 (92.1%) had hearing loss.

In this study, we found that about 46.0% of the participants had severe hearing loss, and

up to 20.0% with profound hearing loss. Altogether, 80.0% of patient with ototoxicity had severity between moderately severe to profound (Table 2).

Table 2: Severity of hearing loss

Severity	Frequency	Percent
High Frequency hearing loss (HFL)	5	14.3
Mild (21-40DB)	2	5.7
Moderately severe (41-60DB)	5	14.3
Severe (61-91DB)	16	45.7
Profound (>90DB)	7	20.0
Total	35	100

Out of the 38 patients who were enrolled for this study, only 23 (60.5%) were informed of the risk of ototoxicity prior to commencement of kanamycin (Figure 1).

In this study, none of the factors included in the analysis was found to be significantly associated with hearing loss (Table 3).

Through observation on the practice on the treatment of MDR TB, we found that not all patients were assessed for baseline audiometry. Also, we observed that incase of hearing loss the dose was reduced to acceptable lower dose. The minimum score in the questionnaire given to health workers to assess their knowledge on ototoxicity was 75.0%.

Discussion

In the present study, we found that 35 (92.1%) patients who were on kanamycin injection developed hearing loss. The proportion of patients who developed hearing loss in this study is higher than most of the studies done in Africa and outside Africa [5-16]. The difference observed could be attributed to the difference in audiology test used whereby some study only used convention audiometry which only tests frequencies from 125 Hz to 8000 Hz leading to miss patients with hearing loss in frequencies above 8000 Hz. Also in our study only kanamycin was used throughout the treatment of MDR TB patients while in other studies the less ototoxic drugs like capreomycin and akamacin were used. In our study we had a large proportion more than 76.0% of HIV patients compared to most of the studies which on its own is a risk factor of developing hearing loss. Other risk factors which we couldn't rule out like genetic predisposition could influence the number of patients with hearing loss.

Table 3: Factors associated with hearing loss

Variable	Hearing status (Ototoxicity)		
	With (n)	Without (n)	P-value
Age group			0.571
18-34	8	1	
35-44	17	2	
45+	10	0	
Sex			0.861
Male	10	1	
Female	25	2	
HIV status			0.103
Positive	28	1	
Negative	7	2	

Health workers who were assessed for knowledge on ototoxicity due to MDR TB treatment, all of them had at least 75.0% of knowledge about MDR Treatment ototoxicity. However, when MDR TB patients interviewed, more than 28.0% did not get any kind of information of possible hearing impairment as a result of medication for MDR TB before the commencement of treatment. All the time the audiologist was consulted in case of MDR TB patient suspected to have hearing loss, tinnitus or loss of balance and the option of reduction of dose of aminoglycoside in all cases that confirmed to have ototoxicity. NTH MDR TB center only use Kanamycin as a treatment of MDR TB for the reason that it is a cheapest ant MDR TB drug despite being the most ototoxic. Because of that, it is impossible to follow the recommendation by WHO of changing Kanamycin to a lesser toxic ant MDR TB drug like capreomycin to patients with hearing loss. Also, it was found that Baseline audiological evaluation, which is supposed to be done prior to commencement of kanamycin, was not consistently done as well there were no protocol in place for regular check-up of hearing status of patients once commenced kanamycin.

In conclusion, the study has shown a significant proportion of patients who get MDR TB treatment ends up with significant hearing loss, insufficiency protocol on monitoring hearing status of patients, lack of other anti MDR TB drugs to opt in case of ototoxicity and inconsistency in informing patients of possible hearing and balance loss due to the medication.

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OUTBREAK REPORT

Meningococcal Meningitis Outbreak at a Boarding School, Kabompo District, Zambia 2015

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On 6th July 2015, the Zambian Ministry of Health received reports of cases of meningococcal meningitis (MM) at a boarding school in Kabompo District. MM is caused by Neisseria meningitidis. We investigated the outbreak to describe epidemiological characteristics, confirmed aetiology, and determined potential risk factors.

We reviewed medical records for six reported suspected cases of MM. Cerebrospinal fluid from patients was analysed for presence of N. meningitidis. We interviewed patients, and compared occupancy level against available bed space. A suspected case was a student with fever ≥38○C and headache, neck stiffness, or altered consciousness from 20th June – 17th July. A probable case was a suspected case who was a close contact of a confirmed case. A confirmed case was a suspected or probable case with N. meningitidis detected in CSF.

All six case-patients were boarders aged 14-21 years. Three case-patients died. Overall school attack rate was 0.9% (6/683); 1.4% (6/443) among boarders. Clinical characteristics included: headache, fever, neck stiffness, vomiting, coma, and confusion. N. meningitidis serogroup W135 was detected in two cases. Two dormitories had >100% occupancy.

Continued surveillance, health education, and potential vaccination of boarding students should be considered. Crowding may have contributed to the outbreak.

Introduction

Meningococcal meningitis (MM) is a bacterial infection of the meninges caused by *Neisseria meningitidis,* and transmitted from person to person. Meningococci are classified according to serologic typing based on the biochemical composition of the capsular polysaccharide. There are six serogroups (A, B, C, W-135, X, and Y) that are known to cause almost all worldwide life-threatening disease. Patients often present with fever, rash, meningeal signs (headache, stiff neck) and, altered mental status

MM is fatal in approximately 50% of cases if appropriate treatment is delayed [1 -3]. The Zambian Ministry of Health has prioritized MM as a notifiable disease reported in the Integrated Disease Surveillance and Response (IDSR) [4]. The literature reveals two documented community-based MM outbreaks among children in Zambia: one in 1974-75 in Kitwe, and another in 1992 in Lusaka [5]. In both outbreaks, children and young adults <30 years old were the most affected. Another commonality in both outbreaks was overcrowding. The Kitwe outbreak was attributed to overcrowding, and similarly almost 90% of cases presenting at University Teaching Hospital (UTH) came from highly populated areas of Lusaka [5]. Although no prior literature was found on MM cases at colleges or boarding schools in Zambia, students at educational facilities are known to be at increased risk for meningitis due to close social interactions [1,6].

Outbreak

On 6th July, 2015 the directorate of Disease Surveillance Control & Research (DSCR), Ministry of Health of Zambia, received notification from Kabompo District Community Medical Office (DCMO) of six suspected cases of MM, including three deaths. Cases were reported through IDSR from facility to the DCMO.The sudden deaths reported from 20th June through 3rd July, 2015 from Kabompo Secondary School in Kabompo district caused the community to panic and accused the headmaster of inciting witchcraft. They then vandalized the boarding school, breaking window panes and doors, causing the student body to vacate the premises out of fear.

The Ministry of Health assembled an investigation team to support the Kabompo District response to the outbreak. The team included ZFETP residents, an epidemiologist, and an infectious disease specialist. The team travelled to Kabompo District on 12th July 2015 to assist other health professionals already at the scene.

The team investigated the outbreak to describe the epidemiological characteristics, confirm the aetiology of the outbreak, and to generate hypotheses for MM risk factors.

Methods

This was a retrospective descriptive study based on data extracted from medical records of students from Kabompo Secondary School who were admitted at Kabompo District Hospital between 20th June and 17th July 2015. Kabompo District Hospital is a 1st level hospital offering preventive, promotive, and curative services. Kabompo district is in North Western Province of Zambia, and is 1,267 km from the capital city Lusaka. The

cases were reported through the IDSR weekly reporting. The six case-patients were students from a district boarding school with 683 registered students, of which 443 were boarders, and 240 were day-students. The boarders lived in seven dormitories where they either shared bunk beds, or slept on mattresses on the floor.

Case definitions

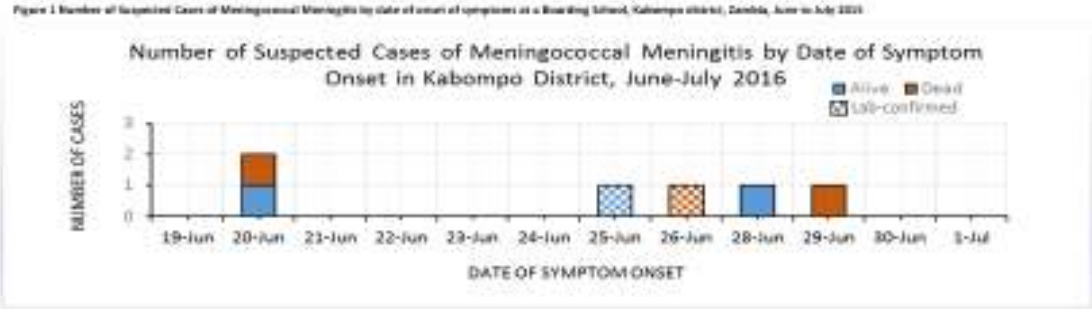
We defined a *suspected case* as acute onset of fever (≥38°C) and one of the following signs: headache, neck stiffness, or altered consciousness from 20th June – 17th July 2015 in any student or close contact to a student of Kabompo Secondary School. A *probable case* was a suspected case that was epidemiologically linked to another clinically compatible case, but did not have laboratory confirmation. A *confirmed case* was defined as a suspected or probable case confirmed by identification of the causal pathogen (*Neisseria meningitidis*) from CSF.

Data and laboratory specimen collection

We reviewed the medical records for the six reported cases for symptoms, date of disease onset, hostel of residence, and laboratory specimen collected. We interviewed two discharged patients from their homes using a structured questionnaire to capture exposure history. Additionally, we visited all seven school dormitories where we observed, and recorded bed space allocation, and compared it to the number of students living in each dormitory. We also spoke to school officials about general conditions, and policies regarding boarding and off-campus populations.

Prior to the arrival of the investigative team, a senior resident medical officer collected one CSF and five blood specimens from six students with suspected MM who were hospitalized at Kabompo District Hospital. Malaria test by Giemsa staining was performed on four out of five blood specimens, and one out of five was performed by Rapid Diagnostic Test (RDT) SD Bioline.

Due to lack of culture facility and specific transport medium for CSF (trans Isolate) at the district laboratory, two smears were prepared from 1–2 mLs of CSF, which was collected in one plain tube container. The dried smears and the remaining portion of the CSF in the container were packed according to guidelines outlined in World Health Organization Laboratory Biosafety Manual of 2004 [7]. The specimens were shipped from Kabompo district to Solwezi General Hospital, a level 2 hospital, for Gram staining and culture. Four days later the same CSF



sample was then sent to the national reference laboratory at University Teaching Hospital (UTH) in Lusaka for serotyping. One other CSF specimen was collected upon admission at UTH from a student who discharged himself from Kabompo hospital against medical advice. At UTH, CSF processing for cell count and Gram staining was carried out following standard microbiological methods [8,9,10]. Inoculated Mac Conkey agar plates were incubated overnight at 37°C in aerobic atmosphere, while blood and chocolate agar plates (Oxoid – UK) were incubated at 37°C in 5% carbon dioxide (CO2) [11,9]. Detection of soluble antigens and identification of *Neisseria meningitidis* was performed using Pastorex™ Meningitis complete kit (Bio-Rad) whose sensitivity is 100% and specificity of about 97 – 100% .The testing was done following manufacturer's instruction [12]. Chemical composition of the CSF was measured using Cobas Integra 400 plus chemistry analyzer (Roche Diagnostics).

Data analysis

The data obtained from the record review, questionnaires, and laboratory results were entered into Epi Info version 7 to calculate attack rates for the general school population and boarders.

Ethical considerations

Zambia has a waiver for ethical approval of outbreak investigations under the Ministry of Health's directorate of DSCR. However, oral consent was obtained from the patients interviewed after explaining to them that participation was voluntary and their identifying information would remain confidential. Oral permission was also sought from the hospital administration to review the patients' medical records.

Results

Epidemiological results

Six cases of MM occurred during an outbreak in Kabompo District Boarding School, between 20th June and 17th July 2015. Three deaths occurred (one male, two females),

resulting in a case fatality rate of 50%. The overall school population attack rate was 0.9% (6/683), and all case-patients were boarding students, with an attack rate of 1.4% (6/443). The age of the case-patients ranged from 14 to 21 years, with a mean of 16.3 years. Four (67%) of the six case-patients were male (Table 1). Clinical characteristics included headache, fever, neck stiffness, vomiting, comatose, and confusion (Table 1). All six cases were admitted to Kabompo District Hospital and treated with intravenous gentamycin and benzyl penicillin, chloramphenicol and erythromycin, and some were treated with antimalarial.

Table1. Demographic, Clinical, and Laboratory Characteristics of 6 Meningococcal Meningitis Cases in a Boarding School, Kabompo District, Zambia, June – July 2015

Characteristic	Number
Category	
Male	4
Female	2
Deaths	
Male	1
Female	2
Age group in years	
10 – 14	1
15 – 20	5
Class	
9th	1
10th	2
11th	1
12th	2
Clinical characteristics	
Headache	6
Fever ≥38°C	4
Sore throat	4
Neck stiffness	5
Vomiting	2
Confusion	1
Laboratory results	
CSF positive for *Neisseria meningitidis* W135	2
Malaria positive by Giemsa stain thick smear	3
Malaria positive by RDT SD Bioline	1

Cases occurred between 20-29 June, 2015 (Figure 1). The first case-patient presented to Kabompo hospital on 20th June 2015 around 03.45hrs and the second case on the same date later in the day 2015. Four days after the third and fourth cases, two more case-patients were seen on the 30th June (fifth case) and the 3rd of July (sixth case) (Figure 1)

Environmental results

Two dormitories had greater than 100% occupancy, and all cases were in the 3 dormitories with the highest occupancies (Table 2). One dormitory had 72 sleeping spaces occupied by 100 students (139% occupancy), where all sleeping spaces were mattresses on the floor. In all other dormitories, the students slept in bunk beds (one per bunk bed)

Laboratory results

Two CSF samples (3rd and 4th cases) were positive for *Neisseria meningitidis* serotype *W135* with the Pastorex™ Meningitis kit.

Both CSFs were clear colourless on macroscopic examination, and no polymorphonuclear cells were seen upon microscopic examination of stained Gram smears prepared directly from the specimens. There was no growth of any bacteria after 24 to 48 hours incubation. One CSF sample that was sent for chemistry analysis showed elevated protein levels 0.59g/L (Ref range:

0.20-0.4 g/L), low glucose levels 1.83 mmol/L (Ref range: 2.20-4.20 mmol/L) while chloride was within the reference range 122.0 mmol/L (Ref range:120-130 mmol/L). Three out of five (60%) blood slides examined for malaria parasites were positive.

Discussion

At the time of this investigation, there was no prior description of a MM outbreak in a boarding school in Zambia. Reports in other countries have documented the increased risk of MM among boarding schools where students live in close proximity, and are therefore more vulnerable to the spread of infectious disease [1, 6]. Because this outbreak was located at a secondary boarding school, the age distribution of cases was higher (mean age of cases was 16.3 years) than in prior community-based outbreaks in Zambia and other countries where more infants and young children were affected [5, 3, 13]. All six cases were among boarding students, as opposed to day students, and it appears that being a boarder may have been a risk factor for developing MM, although this was not statistically evaluated. MM is typically spread via droplets, long periods and close social interactions, and living in crowded conditions may increase the risk of transmission of MM [17, 2].

The school's student housing policy stated that 75% of the school population should be boarders, and at the time of the outbreak, only 65% (443/683) of the school population were boarders. Although the school was not at maximum boarder capacity, overcrowding did occur in two dormitories. Because the school's housing policy grouped students by grade and gender, students were distributed unevenly in dormitories, and the junior girls located in Dormitory A was at 139% of its maximum occupancy (Table 2). All six cases from this outbreak were housed in over-crowded or near-crowded hostels, and two of the three deaths occurred in Dormitory A (Table 2).

Table 2: [illegible]

Dormitory	Sleeping capacity[1]	Sleeping arrangements	Occupancy: No of students in dormitory	Occupancy %	Cases (n)	Deaths
A - Girls	72	Mattresses on the floor	100	139	2	2
B - Boys	[illegible]	Bunk beds	[illegible]	154	1	0
C - Boys	72	Bunk beds	[illegible]	[illegible]	3	1
[illegible] - Boys	[illegible]	Bunk beds	[illegible]	[illegible]	0	0
[illegible] - Boys	58	Bunk beds	[illegible]	[illegible]	0	0
[illegible] - Girls	58	Bunk beds	[illegible]	[illegible]	0	0
[illegible] - Girls	72	Bunk beds	[illegible]	[illegible]	0	0
TOTAL	[illegible]		443	100	6	3

[1] [illegible]

Fear and panic among the boarding students over the sudden deaths of three students contributed to a delay in seeking treatment for the 6th case-patient who was laboratory confirmed. Medical records revealed the case patient's symptoms began on the 26th of June, but he was not admitted to the hospital until six days later when he became comatose.

Another case-patient discharged himself from the district hospital against medical advice, so that he could stay with his parents in Lusaka. The parents brought this case-patient to the national reference hospital because he continued to suffer from his symptoms.

This outbreak exemplifies several challenges in diagnosis and microbiologic confirmation of outbreaks in rural Zambia. First, only one CSF specimen tube was collected at Kabompo district hospital, instead of the recommended 2-3 tubes according to MoH standard operating procedures for hospital laboratories [10]. The district hospital had no capacity to perform the necessary microbiology procedures, thus the CSF specimen was transported to a level 2 hospital 365 km away, arriving more than 13 hours after collection, without appropriate transfer medium. Finally, the level 2 hospital received the sample, refrigerated it overnight, and did not process it until more than 12 hours after receipt. All of these non-adherences to standard protocol made it unlikely that organisms would have survived to be cultured.

Among the five specimens tested for malaria, four specimens tested positive, including one death in a case-patient who did not have a lumbar puncture done. All the cases were treated with antimalarial combined with one or two antibiotics. The recommended treatment for MM include ceftriaxone or penicillin (five-day course) given parenterally with oral rifampicin or ciprofloxacin upon discharge to ensure elimination of organisms from the nasopharynx [3]. In this outbreak, only three out of six (50%) patients were treated with penicillin. The rest were treated with gentamycin, erythromycin and chloramphenicol, but none were given rifampicin or ciprofloxacin upon discharge. The fact that a lumbar puncture was not done on all the cases to identify MM also indicates a diagnostic problem.

According to Zambian Ministry of Health Malaria treatment guidelines, combining malaria treatment with antibiotics is a recommended regimen for severe diseases [15]. Although health workers at Kabompo District Hospital adhered to the country's treatment protocol, they should have also been aware of the possibility of co-infection in patients presenting with fever. A delay in diagnosis, and treatment of bacterial co-infections with appropriate antibiotics, can result in poor outcomes [16].

This outbreak investigation has limitations in completeness and generalizability. None of the six cases were available for interview or

medical examination by the investigating team because half had died (3), and the rest had returned to their homes outside of the district. Thus, the investigators relied on medical records, which often had missing and incomplete laboratory data, to classify the cases. Second, the small size of this outbreak limited our ability to identify, and quantitatively analyze risk factors for developing MM. Third, only two CSF specimens were collected and analyzed, and although both were positive for *Neisseria meningitidis*, we cannot exclude the possibility that the other four cases might have been misdiagnosed as MM. Finally, we were also limited in pursuing a broader community investigation of the source of infection, and identifying potential additional cases due to the heightened public anxiety around sudden student deaths, vandalization, and subsequent school closure.

Recommendations and Conclusions

One does not have to wait for future outbreaks and fatalities to consider implementing preventative public health interventions for MM among boarding schools. First, there is need for enhanced surveillance by school authorities and local hospital staff to regularly screen boarding school students, and to identify early signs and symptoms of MM. Health workers should not assume malaria to be the final diagnosis for all fevers, and should be re-oriented to the treatment guidelines for malaria. The DCMO should create an emergency response plan to control the spread in a future outbreak, by giving prophylaxis to close contacts of cases.

Students should be annually sensitized to the causes and risk factors for MM to avoid fear and panic in the event of a future outbreak. Given the known association of MM with student living in dormitories, personal hygiene education including cough etiquette should also be encouraged in order to reduce MM transmission. School authorities should review hostel conditions and better utilize their existing dormitory space for girls to make sure overcrowding will not exacerbate transmission.

Although there is not enough data in this outbreak investigation to analytically determine whether crowding in dormitories was a key risk factor, future research should examine crowding in closed settings as a transmissibility factor. Additional research is required to develop appropriate strategies to prevent and control this highly infectious disease.

In the long term, the Zambian government should strengthen continued surveillance in order to detect, understand, and predict the

changes in the epidemiology of meningococcal diseases and consider prioritizing boarding students for vaccination against MM. This precaution has been taken in other countries and would greatly reduce the risk of MM among boarding students in Zambia [17]. In addition, diagnostic microbiology capacity must be built in rural laboratories to enable quick confirmation of disease, so that appropriate treatment can be administered as soon as possible.

Authors' contributions

Loveness Moonde, Ernest Kateule, Dr Muzala and Dr Malama were involved in conceptualization and design of the study, data collection and drafting/finalization of manuscript. Loveness Moonde, Ramya Kumar were involved in analysis, interpretation, and finalization of the manuscript. Rene Kapinga contributed on laboratory tests done on the cases at Kabompo District Hospital John. Mwaba contributed to laboratory analysis done at UTH. All authors have read and agreed to the final version of this manuscript and have equally contributed to its content.

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Competing interests

The authors declare no competing interests.

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