Tanzania Public Health Association
(Chama cha Afya ya Jamii Tanzania)

THE PROCEEDINGS OF THE 32ND ANNUAL SCIENTIFIC CONFERENCE

Health in all policies for sustainable development goals

St. Gaspar Conference Centre, Dodoma, Tanzania
November 30-December 3, 2015

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Foreword

The 32nd Tanzania Public Health Association Annual Scientific Conference was held in Dodoma under the conduct of the Dodoma Region Chapter, from the 30th November to 3rd December, 2015. The theme guiding the Conference was **"*Health in all Policies for Sustainable Development Goals*".** The four-days conference, brought together a total of 200 participants not only from all over Tanzania. This is with the objective of sharing and exchange experiences on issues related to public health pertinent to the theme. A total of 40 scientific papers were presented on different topics of the main theme which for convenience was categorised into five broad subthemes:

These were (i) Health, poverty and food insecurity; (ii) Closing the knowledge do gap in health planning and decision making; (iii) Non-communicable diseases and Sustainability of health systems; (iv) Health systems; (v) Reproductive Health; and the majoriy of those papers and conference recommendations form the major part of this report.

TPHA working within the Tanzania Health Policy, Vision 2025, the National Srtategy for Growth and Reduction Povety (NSGRP), and Health Sector Strategic Plan III 2009-2015 and other sector strategies and guidelines, is playing a part in taking stock of the myriad of factors that contribute to ill health in our communities and bearring in mind that health outcomes are influenced by many actors and not Ministries of Health alone. This demands that for Sustainable Development Goals, we need "Health in All policies both public and private actors. "TPHA found it appropriate to address in this conference, the social determinants of health and SDGs implementation with the aim of drawing from participants, new insights depicting more practical and effective options for public health interventions in the future.

National policies, strategies and programmes adopted by the Ministry of Health and Social Welfare (MoHSW), also have impact to the general public health development in the country. The Tanzania Development Vision 2025 document identifies public health as one of the priority areas contributing to a higher-quality livelihood for all Tanzanians. Furthermore, the National Strategy for Growth and Reduction of Poverty, popularly known as *MKUKUTA*, embraces the Ministry's commitment to the implementation of the SDGs. *MKUKUTA* takes on board all cross-cutting issues of gender, environment, HIV/AIDS, disability, children, youth, elderly, employment and settlements, all of which are well spelt out under the MDGs. In this regard, the health of the population depends on multi-sectoral approach; Health in all Policies. TPHA reiterates its commitment to work hand in hand with MoHCDGEC officials and other key actors across the sectors and development partners in accomplishing the concept of Big Results Now. This is with intent to instil accountability and discipline in implementation of public health interventions to meet our intended goals of a healthy nation for economic growth and better livelihood.

The active participation of members and invitees in this Annual Scientific Conference is testimony beyond any doubt that the public health agenda is a pinnacle of change to achieve the health sector goals. The presentations have revealed that the SDGs, there is still needed extra efforts to obtain community realization and their active engagement in solving public health challenges facing them in their daily life.

Sustainable development requires concerted action of us all to address the challenges we are facing. We need to proactively pre-empty future epidemicsby concerted action of health promotion, prevention, control and prompt treatment or isolation of infectious conditions. (The case of ebola or Dengue fevers).

Whatever perspective, after this Scientific Conference, we hope that the presentations as compiled in these proceedings will increase understanding of public health challenges prevalent in our communities today and the lessons learnt during implementation of the sustained MDGs. The achievements will pave way for TPHA to renew its commitment to marshal through its mission to improve the health of all Tanzanians, especially those at risk, and to increase the life expectancy. We need to support the government and partners in health development in translating HSSP IV-2015-2020 to implementation at all levels.

Welcome Statement by the National Chairman

Faustin Njau
Tanzania Public Health Association, Dar es Salaam, Tanzania

Guest of Honour, Hon. Chiku A. S. Galawa,
Regional Commissioner, Dodoma
Representative of the Regional Administration, Dodoma,
The Regional Medical Officer,
Other Government Leaders and Managers protocol observed,
Tanzania Public Health Association (TPHA) Executive Committee Members,
Representatives of Non-Governmental and Civil Society organizations,
Development Partners, - Present
Conference Participants,
Ladies and Gentlemen,
Good morning,

Dear Guest of Honour,
We in the Public Health fraternity are deeply delighted with critical leadership post of Regional Commissioner of the Dodoma and your interest in Public Health matters. I take this opportunity to convey our heartfelt congratulations to you Madame for being a member of TPHA.

Chama cha Afya ya Jamii Tanzania, tulifurahishwa sana na hatua ya Mheshimiwa Rais, Mheshimiwa J.P. Magufuli kwa kutoa kipaumbele kwa afya ya Jamii. Tunampongeza sana kwa kuficha bajeti ya sherehe ya wabunge na kununua vitanda vya wagonjwa Muhimbili, na kutenga siku ya Uhuru kwa watu wote kufanya usafi na jitihada ya kupambana na kipindupindu. Ameungana nasi, tunamuunga mkono.

TPHA values very highly the special relationship and harmony that exists between the Region and the TPHA, pushing forward a common cause of advancing public health in the country at large as part of a rapidly globalized world. The recent calamities with Ebola in West Africa and its spread elsewhere, and the ongoing cholera epidemic in the country are wake-up calls for our systems to be constantly vigilant, prepared and responsive: TPHA reiterates its commitment to work hand in hand with the government officials and Partners multilevel in designing the approach and actions to handling the emergency preparedness and response call to mitigate the impact of the epidemics.

On this note may I introduce the participants to this conference

1. Arusha/Manyara Chapter
2. Dar-es-Salaam Chapter
3. Dodoma Chapter (Dodoma, Tabora) our host
4. Iringa Chapter (Iringa, Njombe)
5. Kilimanjaro Chapter

6. Lindi/ Mtwara Chapter in making
7. Mbeya Chapter (Mbeya)
8. Morogoro Chapter
9. Musoma Chapter
10. Mwanza Chapter (Mwanza, Simiyu, Geita, Kagera)
11. Shinyanga Chapter
12. Singida Chapter
13. Tanga Chapter
14. Pwani Chapter

It is also our tradition to invite individuals with an interest to advance and safeguard public health from various disciplines and from college students as a way to recruit new members. Allow me to express our gratitude for the very positive support we have continued to receive from the government and, the permission to various health officials to participate in this conference. Your valued voice in advocating for public health in general, focus on primary care and unleashing 'the power of prevention' gives us the pulse to galvanize towards reaching greater heights in safeguarding the health of the general public in Tanzania in a resource constrained environment. The TPHA is aware of the key positions held by regions and LGAs, geared towards making a real impact to the health of the nation through primary health care and engaging the citizens.

Last year we tackled the same subject of "Social Determinants of Health and Millenium Development Goals Achievement". I welcome you all to this 32nd Annual Scientific Conference and Annual General Meeting of the TPHA whose theme this year is dedicated to **"Health in All Policies for Sustainable Development Goals".**

Looking forward to your fruitful deliberations.

Asanteni Sana

Opening speech by the Honourable Regional Commissioner of Dodoma at the 32nd Annual Scientific Conference of the Tanzania Public Health Association and Annual General Meeting at St. Gaspar Hotel and Conference Centre Dodoma, on November 30, 2015 – December 4, 2015

National Chairman-Elect of Tanzania Public Health Association, Dr. Faustin Njau,
Regional Administrative Secretary
Regional Medical Officer - Dodoma
District Commissioner, Dodoma
Municipal Development Director – Dodoma
District Medical Officer, Dodoma
Distinguished Invited Guests
Conference Participants
Ladies and Gentlemen

May I express my sincere gratitude for the invitation extended to me to officiate at the opening of the Thirty Second Annual Scientific Conference and Annual General Meeting of the Tanzania Public Health Association (TPHA). It is indeed a great pleasure for me to get this wonderful moment to be among fellow public health stakeholders. May I therefore take this opportunity, on behalf of the government and on my own behalf, to thank the Conference Organizers for giving me the privilege and honour to officiate in this important conference!

Mr. Chairman, I would like to congratulate you, together with your Management Team and the entire membership of the Association for hosting this – your 32nd scientific conference in Dodoma Municipality – the Seat of the Government. Over the past 34 years your Association has done exceptional work in health promotion, public health awareness raising activities and advocacy work on important issues that challenge the health of Tanzanians. Your Association is unique in Tanzania, as there are scarcely any who can boast of such illustrious achievements for that length of time, and who have endured through tough times along their history of existence. The demand for your kind of work is greater currently, than ever before, especially since the advent of globalization of market forces, and free trade including that of health care and other social services. TPHA should not only extend its work to include rigorous policy analysis, but also that of monitoring and evaluation of health and related policy and programme implementations in this country, to ensure good governance and proper accountability of resources is followed through as planned. By doing so, your Association will enhance “results based management” in all that we plan and do, and focus on the outcomes and impacts of our efforts, rather than going through the motion of implementation without assessing the direction we are going towards, in efficiency and effective ways. Currently we have a national Epidemic of Cholera, very challenging and has taken tall on innocent lives and a huge morbidity on the population. It is expected that you will deliberate on this to show way out of the epidemic.

Mr. Chairman,
I have been informed that this is a five day conference, that brings
together stakeholders from all over Tanzania, and even from outside our borders, to share information on many issues related to and inter-linked with public health, and to exchange experiences and ideas on the theme: **"Health in all Policies for Sustainable Development Goals"** – *Post MDGs*. Tanzania is currently undergoing radical changes in its socioeconomic development with associatied challenges in the health sector. The local prevailing circumstances in Tanzania under which we operate are no longer predictable for long periods, considering the public health policy and practice in the country, the available financial, material and human resources, as well as the competing priorities under which we must deliver public health services. Taking stock of how we are performing is a legitimate desired move to achieve the goals we have set ourselves to accomplish. The myriad of factors that contribute to ill health in our communities are ever changing and not stagnant, just as the world around us is rapidly changing. Your notion of addressing the ""Health in all Policies for Sustainable Development Goals achievement is a timely consideration, that would give way to new insights for more viable and effective options to health interventions. I am looking forward to the outcome of this conference, and the government is keen to get your conference recommendations, which I believe will include how best to evade futurue Cholera oubtbreaks and similar maladies.

Mr. Chairman,
I have also been told that TPHA is now 34 years old and doing quite well in carrying out its mission and fulfilling its vision of promoting public health and advocacting for sound public health policy and good practices. I commend your Association for having weathered the recent economic down turn, and continued its important work even under these constraints, where many local associations have found mere survival quite difficult. The resource competition from International NGOs, who are better provided for by their partners at home, and also better placed in competing for the scarce resources that others are vying for, is formidable, but I urge you to hold fast, and the government will do its level best to assist in any way within our reach.

I have also been informed of your Association's objectives cut across sectoral boundaries, thus giving you a leverage for furthering collaboration between public and private sectors in health as well as cross-cutting health related issues, like the "*Sustainable Development Goals (SDGs) and addressing NCDs*". I know that TPHA has always been in the forefront in networking with other NGOs in the health and other sectors, when dealing with policy makers and implementers. I am challenging your Association to take the lead in not only fostering but intensifying *across sectors collaborative partnerships* and networking with as many key stakeholders as it takes to bring about the necessary change in health outcomes. The SDGs and addressing NCDs in particular they address reduction of the burden of disease due to Non-communicable and communicable diseases as they present a formidable challenge. Think of the current Cholera Epidemic and its threat to the health of the nation and the ecomony. It is formidable. It is the current prevailing environment in which we must operate, and no matter what the circumstances, I urge TPHA to take up the emerging opportunities to remain abreast, and support the processes and eventual outcomes.

Mr. Chairman,
I wish to congratulate your Association for a long list of noteworthy achievements, which include, among others, publications of numerous proceedings from its previous conferences and reports, some of which I have wintessed here. I am duly impressed that you have your latest conference proceedings of last year, held in Stela Maris Bagamoyo, already printed. This is impressive and I spur you on!

I am aware that TPHA was involved in conducting successful advocacy initiatives towards the signing and ratification of the Framework Convention of Tobacco Control (FCTC) in Tanzania in 2004. I have also learnt with appreciation, that this Association worked very closely with the Ministry of Health ad Social Welfare while developing the tobacco products regulation act (TPRA) 2003, the implementation of which it has keenly followed in subsequent period, including provision of educational materials and monitoring closely on its review and implementation. On this issue, I have been informed that there is unfinished business of developing of implementation guidelines for the Tobacco Products Control Law (TPRA, 2003) to date. I will personally follow up on this matter, as we know that many young people are enrolling in the undesirable habit of smoking and endager their young lives, when what they need most is protection from substance abuse. I also challenge TPHA to persue this issue further, especially since you invested so much time, resources and effort in the advocacy for the law to be enacted. If not enforced, it remains inactive and not protective to the society, while the lives of many vulnerable groups are endangered. For Dodoma, I have issssued instructions to regulate the sale and use of alcohol and specifically prohibiting sale and brewing at households to protech the health and lives of the children.

TPHA was also instrumental in helping the Ministry of Health and Social Welfare to clarify on health sector reforms and put in place the Public Private Partnership (PPP) strategy through organizing DMOs meetings and active participation in the PPP Technical Working Group (TWG) activities. In addition, TPHA was instrumental in formulating and finalizing the Service Agreement template which is currently used in the PPP implementation. I am aware that TPHA – Through PPP – Technical working group you are waking on PPHF and the Federation of Associations. I will urge you to proceed and accelerate this undertaking.

The government will be very supportive of these efforts, which will lead to multisectoral action in addressing health issues along the Continuing of care. These commendable achievements should be intensified to promote healthy life styles throughout our society.

Mr. Chairman, I am glad to be here today, to share this occasion in which your "Dodoma Chapter", is hosting your important annual event. May I join the rest of TPHA membership to congratulate you and the chapter leadership and members for managing to organise your conference in St. Gaspar hotel venue which is one of the best in Dodoma. I do hope that more Chapters will be established in other regions which do not yet have one. I have also been informed of vigorous membership recruitment efforts in the other regions. Notable is Singida region, Bukoba, Iringa etc. I am certain that establishing a chapter in these areas will help us monitor issues of environmental conservation and the like, in the context of ongoing economic development, across the country.

The Association's advocacy and awareness creation activities are certainly needed most at the community level, and having local chapters is one of the most effective ways of facilitating better interactions with the needy. While I commend this effort, let me challenge you to establish more regional chapters each year and instead of just one once in a while, you should intensify efforts to launch more new chapters each passing year, including in the five newly created regions. This way, you can bring public health knowledge and practice closer to the communities in reasonable time, where it is needed most, as that is where the inequality gaps in both access and availabilty of health care services are more glaring and difficult to bridge. The social determinants of health are inherent part of the social, cultural and economic life of an individual, household and community. The cholera epidemic can only be re-dressed through revisiting the social determinants and community action.

Mr. Chairman,
All the work TPHA has accomplished and that which is in progress is complementary to what the government does and needs to be done, and these efforts should be intensified to continue bridging the existing gaps where the formal sector has less equitable reach than desired. Having been informed that you have a network of 14 Chapters country-wide, and expecting to establish more is encouraging. I believe that your Association has a good chance to strengthen community level activities to catalyse behaviour change for healthy life-styles in our society countrywide. I challenge you to raise your visibility so that you are seen country wide, and at all levels of the Tanzanian society. We have cholera epidemic which is a litmus test for household and community action to abate it.

Mr. Chairman
The objective of TPHA's 32nd Annual Scientific Conference is to assess the status and scope of the "**Health in All Policies**" for SDGs and how these affect the achievement of our vision 20025. Your choice of theme and topics for sharing and discussion during the five-day event is encouraging. I believe this sharing of experiences and cross fertilization of ideas and concepts will bring out inspiring innovative ideas with which to move forward into action. Indeed, community based approach that is coupled with cross-sectoral collaboration geared towards a more holistic approach in addressing the prevalent social determinants of health in any location is the best hope we have in bridging inequalities, which have so far eluded our traditional systems. I understand that some SDH elements demand more radical structural changes, such as Health in All Policies in formulating evidence based national policies that protect vulnerable groups in the society against the impact of these determinants. I trust we shall work together on these issues to bring about change in our lifetime. The socio-cultural elements surrounding reproductive and maternal health need more collaboration if they can benefit our efforts to improve Maternal and child health.

To me personally, and on behalf of the government, this forum provides an ideal springboard to jump start the mult sectoral collaborations and partnerships, given your association's inherent nature as a multi-disciplinary body, by which status it has already set the right grounds for smooth cross – sectoral dialogue to start the ball rolling immediately, into the awareness raising and advocacy work, and to facilitate the much needed paradigm shift, from the status quo to new mind set, and remove the traditional sectoral barriers among key potential stakeholders. The resurgence of cholera epidemic and

other National and International threates to life and living actests to these facts and action needed.

The formal health sector has been undergoing human and other resource constraints in recent years, and the people of this country deserve better from us public health practitioners. The people of Tanzania expect and the Ministry of Health and Social Welfare to plan strategically, to make decisions based on scientific evidence and to implement programmes, monitor and evaluate impact based on scientific basis as is the norm. TPHA 's close working relationship with the government and partners continues to provide reliable support and initiatives. In this complex subject of "*Health In All Policies for Sustainable Development Goals*", The public institutions will have to come together to address common issues, by getting outside the traditional boundaries, where initial coordination and bringing together of key staekholders will be an essential pre-requisite to working together for a common good.

I therefore, challenge you to play your part dilligently, and together, let us serve this country well, by ensuring quality service provision and intense and wide dissemination of accurate health information geared towards health promotion and disease prevention as per your mission and vision. More intense advocacy and awareness and IEC activities will be needed to just get the traditional system overhauled, in order to build the needed collaboration and partnerships. Your work is crucial in building up the essential synergies and integration.

The Government will give your association whatever assistance it can in creating conducive environment for your work, and more hand in achieving your goals, which indeed, are our common goals. Together, we need to improve on the disparities of public health care provision between the urban and rural settings, especially reaching the rural communities where the majority of our population live. TPHA, with your net of Chapters, are well placed to take this role effectively. I believe that if TPHA could work very closely with our Department of Health Promotion, Education and Communication, we can enhance own house synergy to ehance effectiveness in reach of our target audience, the community.

Mr. Chairman, Dististiguished Participants, Ladies and Gentlemen.
It is my hope that in the next five days that you will be here, you will work hard and come up with sound recommendations that the goverment can use for improving our current policy decisions and programme implementation that will greatly improve public health practice in Tanzania.

Let me conclude by wishing you fruitful deliberations. With these few remarks, it is now my honour and privilege to declare the 32nd Annual Scientific Conference and Annual General Meeting of the Tanzania Public Health Association officially open.

Thank you for your attention

Key note address: Health in All Policies

Elihuruma Nangawe
Tanzania Public Health Association, Dar es Salaam, Tanzania

Introduction

Various international declarations and commitments that Tanzania has subscribed to have been and continue to advance the call, "Health for All" (WHO), poverty reduction/ eradication and MGDs (UN Millennium Declaration), and sustainable development (UN SDGs). Health has remained a core recurring issue in the various international commitments: Programmatic interventions picked up momentum while principles (Equity, Participation, optimizing technologies for efficiency and effectiveness, and working across sector mandates) gained ground rather slowly. Stock taking during the past two decades of determined effort saw countries pushing for strengthening health systems (coining of six building blocks), rededication to PHC, promoting partnerships for Health, advocacy for evidence based approaches, restructuring to decentralized mechanisms (D by D) and learning approaches such as by applying pilots on Social Accountability and results-based financing. Health in All Policies (HiAP) has been much talked about and not yet put to rigorous practice in Tanzania.

Renewal of Health for All Policy

Tanzania's performance towards HFA has been steadily improving from the decentralization of health planning and management to districts and rapid expansion of primary care facilities to reach every Ward with a Health Center and every village with a Dispensary (MMAM 2007-2017 program). Health indicators have registered improvements in child health but neonatal mortality, maternal mortality, and in a number of regions stunting have remained as pointing challenges. There have been gains in reduction of HIV prevalence, but the need to get cracking on incidence is seen from ongoing transmission among at risk populations.

Intensive drive from favorable investments in Malaria has improved coverage of insecticide treated bed nets, RDT enhanced diagnoses and treatment of Malaria using ACTs. Water and sanitation still pose as challenging areas evidenced clearly by water washed, water borne and fecal-oral transmitted diseases (Diarrhea, Dysentery, Cholera). The foregoing picture calls us to action in renewing the HFA policy by examining nodes where its intent has been failed. In particular, the long time it is taking to work on genuine community involvement in health planning and management. Utilization of Health Facility Governing Committees is still sub-optimal. There is a centralization tendency at the districts.
Work on HIV and AIDS has shown difficulties of working effectively with other sectors. A new approach for reaching to other sectors is needed.

- New challenges that emerge as a consequence of worldwide changes in the demographic, technological and epidemiological situation called for The renewed HFA policy declaration that asserts that the health and well-being of people is the ultimate aim of social and economic development.

The HFA agenda

Ethical concepts of equity, solidarity and social justice underpin the new policy. The wide ranging spectrum of health care encompasses

(a) pure public goods, for example, immunization and other preventive care, health promotion,
(b) diseases due to lifestyles and unhealthy behaviour or special risks, such as smoking, alcohol or drug abuse, pollution of all kinds, injuries and accidents;
(c) socio-medical care of the elderly and chronically ill;
(d) diseases of the type "statistical certainties", such as those related to age (peri-natal conditions, prostrate conditions, degenerative conditions etc), gender (consequences of rape or sexual violence, FGM and its influence on safe delivery) or poverty (stunting, water borne and water washed diseases etc); and
(e) all other diseases that occur throughout the lifespan of each individual and may be termed "chance occurrences".

Making HFA tangible at country requires us to define problems and constraints of putting in place practice of HiAP. We cannot achieve HFA without health supportive and health protective policies. The principle of multi-sectoral collaboration has been scarcely achieved at effective footing: Will HiAP be the anti-dote?

What is HiAP?

According to the WHO, simply intends to encourage a practice whereby health implications are considered and health supportive policies are underlined as a key tenet in various sectors. Health in All Policies (HiAP) is "*an approach to public policies across sectors that systematically takes into account the health implications of decisions, seeks synergies, and avoids harmful health impacts, in order to improve population health and health equity.*" (http://www.who.int/ipcs/saicm/hiap/en/). Examples to clarify scope of HiAP.

Reducing global health risks through mitigation of short-lived climate pollutants have been covered in a recent publication (www.who.int/entity/phe/publications/climate-reducing-health-risks/en/ - ISBN: 978 92 4 156508 0). Short-lived climate pollutants (SLCPs), including black carbon, methane, and ozone, are responsible for a substantial fraction of climate change as well as for a significant proportion of air-pollution related deaths and diseases that kill some 7 million people per year. (WHO).

Health benefits of acting on pollution include (a) reduction pollution-related ill-health respiratory conditions of acute nature; (b) indirectly from reduced ozone and black carbon effects on extreme weather and agricultural production (affecting food security); (c) Other types of health benefits that are not associated with air pollution but may accrue as a result of certain SLCP mitigation actions, such as improved diets or more opportunities for safe active travel and physical activity. Examples of sectors involved include: Urban planning, Transport, Household energy and building design, Food production and consumption, Power generation, Industry, and Waste management. Our TPHA has to have deliberate move to examine policies in these sectors to determine the extent to which they have or have not any health protective elements. Where gaps are found we have to advocate for moves to address the gaps.

Emerging and re-emerging diseases versus effective application of International Health Regulations

Emerging and re-emerging infectious diseases have become a much larger menace under the unique conditions of the 21st century, with its unprecedented volume and speed of international travel and the radically increased interdependence among nations. An emerging disease is one that has appeared in a population for the first time, or that may have existed previously but is rapidly increasing in incidence or geographic range. In the 21st Century health threats of emerging and re- emerging diseases include Viral Haemorrhagic fevers (e.g. Ebola, Rift Valley fever, Marburg Fever), H1N1, H5N1, Severe Acute Respiratory Syndrome, Lassa, and Plague. These diseases have been reported in AFRO region, whereby 80% of them have been linked to animal sources in the past 20yrs. There is need to use One Health concept (OH) to detect, prevent and control these diseases. According to recent consultations on OH concept the new threats are being driven by population pressure, Food security, Economic growth, climate change and globalization.

General measures to deal with these life threatening diseases include

- ✓ Strengthening and integrating wildlife surveillance in overall **OH** agenda.
- ✓ Strengthening laboratory diagnostic capacities at all levels.
- ✓ Establishing structures and partnerships for One Health.
- ✓ Advocating for resource mobilization.
- ✓ Implementation of IHR (2005)
- ✓ Strengthening disease surveillance and response

Health benefits of action against these diseases include (a) Averting catastrophic epidemics and pandemics, (b) Attaining national health security, (b) Assuring global health security (c) Assuring citizens of health protection. Sectors closely involved here are Livestock. Wildlife conservation, Agroforestry, Immigration and Home Affairs, Transport and Communications.

What to focus on in order to benefit from the HiAP approach

It is important to internalize that all sectors have a health dimension to act upon in terms of policy. We should focus on how to take advantage of sector mandates and examine their policies extent to which they are health compliant. Health impact assessments of all policies and laws irrespective of the sector shall have positive and far reaching impact for the country's citizens and non-citizens alike. The WHO CCS of 2009-2014 recommended health impact assessments but a question remains as to how far this health beneficial measure was translated into practice?

Moving forward there is a need to address the following:

- Organizational home for HiAP in Tanzania (MKUKUTA? MOHSW – Public Health activists?)
- Who shall do advocacy?
- Who shall engage in HiAP research?
- Who, how and when to monitor HiAP, development, action, sustenance.
- TPHA shall continue to be policy advocates but now adding HiAP context.
- How to build stronger partnerships and alliances (opportunities in Federation of Health Professional Associations, PPP) taking HiAP on board as a core agenda.

An overview of the harmful use of alcohol and its public health and social impacts: the role of Tanzania Public Health Association in pioneering intervention

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Introduction

According to the World Organisation (WHO, 2014) Global Status Report on Alcohol, 3.3 million deaths are attributable to the harmful use of alcohol annually, and although there are regional differences in consumption and its consequences, there is a clear increasing trend in the low and middle income countries. The bulk of the alcohol attributable deaths and disability is accounted for in relation to major Non-communicable diseases, including liver and heart diseases, several types of cancer, unintentional and intentional injuries, road traffic crashes and subsequent deaths and disabilities. Emerging research evidence shows a substantial contribution of alcohol harmful use to interpersonal violence and infectious diseases, especially HIV and TB. Alcohol harm to others had been unappreciated in previous years, but in recent decades, scores of studies have shown beyond doubt that alcohol consumption substantially raised the risk of interpersonal violence, especially close partner violence against women and children. In turn, the raised level of interpersonal violence contributes adversely to infectious disease transmission. This is a current theme in the UNDP – WHO dual effort seeking to strengthen integration of policies addressing reduction of harmful use of alcohol, interpersonal violence and infectious diseases interventions to enhance multiple positive outcomes. The wide spectrum of alcohol attributable health burden and social vices seriously impede social and economic development at individual, household, community as well as at national levels. In recognition of the problem, The World Health Assembly, 2010, passed a resolution endorsing a Global Strategy to Reduce the Harmful Use of Alcohol. This essentially represents a collective commitment by WHO and its Member states to sustain action in reducing the alcohol - related disease burden, through appropriate policies and action that restrict alcohol production, distribution, marketing, sales and consumption in their respective countries. Better awareness of the actual harmfulness of alcohol use is one way of addressing the problem. TPHA has a role to play in conducting IEC activities and raising public awareness well as advocacy work for a national, evidence based alcohol policy that safeguards public health and protects against social vices attributable to alcohol and drug intoxication.

Alcohol Use: its health and social impacts

Alcohol is the most widely used psychoactive substance in the world, and Tanzania is no exception. Alcohol and drug abuse create social, health, and other costs of huge proportions, although in the case of alcohol, the resulting impact is largely ignored and not often highlighted in most societies. In the USA, more than 14 million people nationwide have alcohol problems in any given year. The situation in most developing countries like Tanzania is not known because of paucity of accurate data.

According to WHO, 2011, alcohol can cause different **cancers** of the lip, tongue, throat, oesophagus and liver cancer increasing proportionally with the amount of alcohol consumed. In the same report, it is stated that, even moderate alcohol consumption can cause breast cancer, and again, the risk increases with the amount consumed. Alcohol has actually been ranked as the fourth major risk factor for the main NCDs globally, the group of diseases currently on rapid increase to unprecedented levels in low and middle income countries, while the health care systems are ill prepared to handle this extra huge burden. A number of disease conditions are wholly attributable to alcohol, which include alcoholic psychoses, alcohol-dependence syndrome, as well as some diseases affecting the nerves (alcoholic polyneuropathy), the heart (alcoholic cardiomyopathy), the stomach (alcoholic gastritis), and the liver (alcoholic liver cirrhosis). Alcohol contributes to causing depression, and alcohol dependence and other **mental conditions.** The extent to which different drinking habits can affect the risk of major chronic disease development has been estimated for men and women, as presented by WHO, 2011 report; Ref. http://www.greenfacts.org/ Copyright © GreenFacts page 10/54).

Furthermore, emerging evidence shows that harmful use of alcohol contributes to the health burden caused by communicable diseases such as HIV/AIDS and sexually transmitted infections (Morris, et al..,2006) and tuberculosis. According to TACAIDS report of 2009, men who drink alcohol have an HIV prevalence rate of 3 times higher than those who do not drink (20% Vs 7%)", whereas women who drink alcohol have an HIV prevalence rate of 2 times higher than those who do not drink (14% Vs 7%). (TACAIDS 2009).

Alcohol attributable social harm related to someone other than the user, has been largely neglected in the past. This includes alcohol related interpersonal violence, such as intimate partner violence and violence against children in the home, especially substantial in the low income countries of the world where the social and economic status of women is extremely low and violation of human rights is common.

Unintentional injuries alone account for about one third of the 1.8 million deaths, while neuro-psychiatric conditions account for close to 40% of the 58.3 million DALYs. This burden is not equally distributed among the countries (WHO, 2011). Various aspects of global alcohol drinking and patterns of consumption have been reviewed by Rehm et al. (2003). In spite of all the evidence, alcohol is still widely marketed and in many developing countries, there is a lack of stringent regulations to protect the most vulnerable groups in the society.

In May 2010, the World Health Assembly endorsed The Global Strategy to Reduce Harmful Use of Alcohol, which represented a collective commitment by WHO and Member states to sustain action in reducing the alcohol - related disease burden. The proponents caution that, to succeed in implementing this strategy demands that, people in each affected country must find ways to mobilize political will and ensure adequate financial and human resources for the purpose. The effort requires all concerned parties to be involved including Government, non- governmental organizations and professional associations and play their respective key roles in the reduction of alcohol related harm at all levels. Each WHO member country including Tanzania, are the key implementers of the alcohol strategy, in their specific contexts.

The WHO Global Strategy to reduce harmful use of alcohol outlined polices and measures which national governments can adopt for national and community implementation. The strategy also outlined ten target areas of emphasis, defining workable policy options for each. The target areas are: (i) leadership awareness and commitment (ii) Health services response, (iii) Community Action (iv) Drink and driving policies countermeasures, (v) Availability of alcohol (vi) Marketing of alcoholic beverages (vii) Pricing and taxes (viii) Reducing the negative consequences of drinking and alcohol intoxication (ix) Reducing the health impact of illicit alcohol and informally produced alcohol and (x) Monitoring and Surveillance. It would seem illogical to pick just one entry point to address the whole mountain of the complex alcohol use related problems. Similarly, it would also seem incredibly overwhelming to visualized handling the wide spectrum of these issues. On the other hand, any effective intervention will need multiple approaches, by a mechanism that involves effective coordination and collaboration of a multi-sectoral nature, for interventions to yield tangible results.

In short, if strategies addressing the above issues are put in place and implemented effectively, the society will go a long way to reducing **public health and social harms of alcohol use in the population.** As such, one needs to begin the process somewhere, with consultations of key stakeholders on way forward. TPHA has started the process and looks forward to collaborative partnerships that will be well coordinated towards a common goal of reducing alcohol harmful use effects on the society.

Alcohol situation analysis and efforts towards alcohol attributable harm reduction

TPHA joined partnership with IOGT-NTO Movement Institute of Sweden in 2011, when an alcohol project was piloted on situation assessment. This was a baseline study on alcohol availability, consumption, knowledge, attitudes and perceptions regarding alcohol use and its effects. The study also looked at possible association of alcohol intoxication with violence against women in the participating communities, of three districts of Monduli, Mkuranga and Mbulu. Some of the key findings, among others in the three districts, were: that the highest alcohol use prevalence was found in Mbulu district; where both males and females associated alcohol consumption with Violence Against Women generally, although the latter wasn't the highest association factor.

The rates of perceived magnitude of alcohol related violence against women "VAW", varied by district, and statistical comparison of contributing risk factors showed that being female was a risk factor for violence to varying levels in different communities as follows: 1.6 times in Mkuranga, 2.5 times in Mbulu and 2.6 times in Monduli; partner taking alcohol was 4.9 times in Mkuranga, 3.7 times in Mbulu and 4.2 times in Monduli whereas level of education contributed significantly to increased violence in Mkuranga, but not in the other two districts. This study corroborates evidence from scores of studies that document evidence of association between alcohol use and increased violence against women in different societies. Public health and social development contexts are discussed for intervention promoting inter-sectoral approach at community and national levels.

In the same baseline study of three districts, it was also reported that higher proportion of Mbulu respondents showed considerable harmful drinking patterns. Further confirmation on this was obtained from qualitative data, through focus group discussions and indepth interviews, where both community members and their

leadership were concerned about the harmful drinking pattern in their communities, and the level of interpersonal violence as well as family neglect attributed to alcohol use habits.

In 2013, a further mini survey investigated what factors contributed to the alcohol situation in this area in 2013, where it was found that there was little alcohol regulation in the study communities, as alcohol selling points were all over the residential areas, in residential premises, general commodity shops, bars, grocery shops and roadside kiosks. A similar scenario was also found to prevail in the Sinza Ward of Dar-es-Salaam where a small pilot study was done in two Wards in September, 2014. The Key findings here were, as the situation in Mbulu, high alcohol availability and easy access, and relatively high rate of harmful drinking pattern. In both areas, the main findings included extremely dense outlet of alcohol beverages selling points, including individual residential homes, grocery stores and bars, restaurants as well as general merchandise shops, many of these were opened from morning till night; and customers included the youth; the sellers stocked all sorts drinks, including hard liquor or spirit packaged in plastic sachet popularly called *"viroba"*. The packaging of sachets or viroba, has really revolutionized the drinking of alcohol, especially in the youth, who can obtain it easily, affordable and easy to conceal and carry around. This scenario has also been reported in Malawi by *Hoel et al*…(2014), regarding the context and consequences of this particular packaging in consumption by young people.

The third study was conducted in December 2014, also done in Mbulu and several other sites in four regions of the Mainland. This work was commissioned to a Consultant, assigned by the partner organizations dealing with the alcohol problem in Tanzania. As an Alcohol Situation Assessment - ASA venture, the survey generated a wider range of baseline data and among the key findings was high prevalence of youth initiating alcohol drinking – up to 36% start before they reach 18 years in Mbulu, but in the 5 study areas, the average was 46% started before they were 18 years.

In the Sinza and Goba, survey of September, 2014, the key findings regarding indiscriminate alcohol selling was reported, without site or time restrictions. That over 62.4% alcohol sellers operated in ordinary shops, and only 33.6% sold in bars and grocery, there was an outcry in all studies, of youth being seriously affected by sachets and therefore called for intervention. The findings are alarming because of increasing alcohol marketing and advertising in the media, and also the increasing penetration of the alcohol industry in the African Region during this decade (Jernigan & Babor, 2014).

Many stakeholders' meetings and workshops have been conducted; several Parliamentary advocacy & lobbying meetings have been held, but more of such actions are needed to raise awareness and stimulate action.Currently concentrating on the Community based approach in Mbulu selected sites, and today, we shall present some information on the concerning the situation of harmful alcohol use in the project area, collected as baseline for CBA intervention monitoring over a period of time. In this area, there is also high rate of domestic conflicts associated with alcohol consumption.

Highlights of the symposium on "Harmful Use of Alcohol: Its Health and Social Impacts in the Tanzanian Society"

1. There is an alcohol consumption epidemic globally, but this is apparently escalating rapidly in many developing countries like Tanzania
2. Alcohol is legal in Tanzania, and there is inadequate regulation to safeguard against its excessive use and subsequent health and social impacts, thus we should advocate for alcohol use control, and education the public on its real harmfulness in the short and long term, to both the consumers and the surrounding society; alcohol can be lethal when consumed excessively
3. Alcohol is a psychoactive substance, it is an intoxicating substance that may produce alcohol / drug dependence in some consumers, so there is a need to protect the vulnerable groups, especially the children and the youth
4. We need to ACT NOW! To address the escalating alcohol consumption and its resulting social and health impacts in the community
5. To do so – we need to be adequately informed; thus during this symposium, we want to share some pertinent information on the alcohol as a recreational substance, what health harms it causes, and what social vices are attributed to its consumption and dialogue on ways and means to promote healthy lifestyles and prevent its public health and social harms attributable to it

Sharing accurate information and experiences as much as possible, is important in order to get the real picture of what harm alcohol can do to the individual consumer, to the household, as well as those people who live with them, or in their surroundings, as alcohol harms to "others", in the form of social vices that are caused by those who get intoxicated account for significant social problems. These happen at individual, household and community levels, but the impact reaches beyond their respective communities, and can be short term or life long.

We need evidence based national alcohol policy that engages all sector. Alcohol is a cross-cutting issue, it is dangerous substance that lulls the victim in the short term, but can shame, maim, and kill them in the long term or lead them destroying others. Currently, the alcohol industry – both local and multi-nationals are aggressively marketing their products, recruiting more people to enroll in its consumption, and especially the young, affluent and upcoming.

Public Health practitioners, in whatever field and stratum of the society are called to do their part in reversing the current epidemic, what is going on in our communities with regard to alcohol use / abuse is alarming, this is a wake up call for us to take action now! Before it gets too late.
Today, we are going to share pertinent information, we want each one of us to take it up, to digest it and to resolve to do something about it. By the end of this event, we want us to have some action to take us forward, in our different capacities, as individuals, as groups, and as representatives of institutions.

In addition to the conventional paper presentations, there are two witnesses, who will present cases of alcohol social harms which are experienced in the community, one from the Social Welfare Officer at the Kinondoni Municipal Council, and the second, from the community at Makumbusho, where many cases

of alcohol related violence to women and children occur and a Community Based Organisation that is assisting in various ways, will share their experiences with us. These are particularly sobering stories, which bring home the message, and we hope to stir response and action to save the future generations.

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Alcohol use prevalence among two primary school pupils in Mbulu District, Tanzania

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Abstract: Growing alcohol use is a major public health and social concern in Tanzania, with increasingly substantial exposure to childhood and adolescence initiation. Although the Law of Child Act, 2009 prescribes child protection from alcohol drinking environment, there is little evidence of its enforcement. This study was conducted in Mbulu District, Tanzaniato to determine alcohol use prevalence among primary school pupils and establish baseline indicators for evaluating intervention through Community Based Approach (CBA). This cross sectional study used a combination of quantitative and qualitative methods. Appropriate Social science tools were used, including focus group discussions (FGD) with a gender context, interviewer administered questionnaires. Two primary schools of Harka and Waama participated, involving pupils from standard four to six. A total of 233 pupils (aged 9-18 years) participated. About 43% of the pupils had *"ever taken alcohol"*; 59% were living with someone who used alcohol; and 20.3% had assisted in preparation and/or selling of alcohol. Out of 34 alcohol sellers asked if they sold alcohol to youth, 18.1% affirmed they had, while 81.9% had never. In conclusion, alcohol "*ever use*" prevalence of 42.2% of 233 school pupils was established in Mbulu District.

Introduction

Alcohol is a psychoactive substance with dependence-producing properties. It is classified as a depressant, which means that it slows down vital functions (Alasdair Forsyth, 2000). In this context, alcohol is a drug that reduces a person's ability to think rationally and distorts his or her judgment. People start drinking alcohol for different reasons, some do so to reduce frustrations, emotional factors, as alcohol tends to offer short time relief, when it blocks the emotional pain felt by the victim (Andersson, 2008). Others get enrolled into alcohol use through social and cultural influences, where friends and those one identifies with are themselves drinkers, and to be part of the group to avoid feelings of isolation and exclusion, one joins their drinking buddies to belong to the pack. Others join the drinking groups because of loneliness. However, young people also start experimenting with alcoholic beverages due to enticing and glamorous advertisements which are everywhere now, in cities and townships and through the new modes of ICT (Casswell, 2012). Others blame poverty for starting to drink, just to forget one's own condition for the moment, whereas others consider it a way of relaxing from tensions and as a form of entertainment. Whatever is the reason for enrolling into alcohol use, some people do not go into regular use whereas others do so and often may become problem drinkers. Among the risk factors for alcohol dependence are: drinking in adolescence, drinking in the elderly population, a history of childhood abuse, psychiatric disorders such as depression, anxiety, psychotic disorders, personality traits, behavioral disorders and lack of impulse control and genetic predisposition. For this reason, it is best to prevent children and youth from early recruitment into alcohol use in order to protect them from the aftermath, whose direction cannot be determined.

Alcohol is the most frequently used intoxicating drug globally, with varying usage patterns across cultures and traditions. The highest consumption prevalence of alcohol is recorded in the industrial countries, including Europe, Russia and the USA. In some cultures, use alcohol with meals regularly whereas in others it is often taken as recreational drink at social occasions or even during traditional rituals. According to WHO (2011) the worldwide per capita consumption of alcoholic beverages in 2005 equaled 6.13 litres of pure alcohol consumed by every person aged 15 years or older. A large portion of this consumption – 28.6% or 1.76 litres per person – was homemade and illegally produced alcohol, also known as "'unrecorded alcohol".

Similar to the global scenario, alcohol is more widely used intoxicating drug in Tanzania compared to tobacco by about two fold (Mbatia et al.,2009). Andersson (2004) stated that many people in Tanzania especially those in power and politicians often deny that there is an alcohol problem in the country, and would insist that narcotic drugs are a real problem instead. It is also known that homemade alcohol is abundant in most districts of Tanzania, and especially in rural settings, where it is believed that over 80% of alcohol consumed is homemade (Kilonzo, 1989). This may have changed somehow over the last two decades, although the World Health Organization shows constant levels in the consumption status of unrecorded alcohol in recent times (2003-2005) and 2008 to 2008) (WHO, 2014). Such evident stability could be due to scarcity of records rather than actual observation of unchanging situation in production and consumption of unrecorded alcohol. It is also plausible that due to increasing penetration of industrial alcohol, more consumers take more industrial products now than they did before, compared to the majority who consume unrecorded products.

According to WHO, 2014 Global Status Report – Country Profiles, Tanzania per capita annual consumption of alcohol of adults 15 years and above is on the increase, and currently estimated at 7 litres of pure alcohol. While this information relates to industrial products, no such data is available for the informal alcohol, which in some societies is consmed by over 80% of the population, including children and youth, depending on their cultural norms and environment they live in. Homemade alcoholic beverages provide cheap and affordable products to many community members in low income sections of the society, and more so in rural settings. On the other hand, homemade alcoholic beverages are considered more harmful, posing increased risk to consumer's health because of unknown toxic byproducts, impurities and / or contaminants from unhygienic conditions of preparation, storage and packaging and when being used. The greater majority of Tanzanian alcohol consumers use unrecorded or homemade alcohol, as every district has one or more commonly produced homemade brands of beer, wines and illicit spirits (Mbatie et al., 2009).

An estimated 3.3 million annual deaths were attributed to the harmful use of alcohol (WHO, 2014). Out of this estimate, a significant proportion occurs in the young age groups, and currently, alcohol use is the third leading risk factor for poor health globally. Underage drinking is a global problem. Since the large burden of alcohol attributable diseases is found in the group of chronic – noncommunicable diseases which develop over relatively long time, often long after the initiation of alcohol use, most victims remain unaware of the link of the problem to the drinking habits which may have started earlier in life. This is poorly documented

in most developing countries. On the other hand, alcohol use short term effects are largely experienced in the youth and adolescents, where harmful patterns of alcohol consumption are often the norm and its consequences dire. Systematic research work in developed countries constantly inform on the trends and magnitude of alcohol use harmful effects in the society, focusing on youth and other vulnerable groups to inform policy and programmes. Unfortunately, such practice is lacking in most developing countries like Tanzania, where alcohol use is rapidly increasing.

Due to its psychoactive nature and dependence-producing properties, alcohol is especially harmful to the developing brain of young people, where it poses serious developmental impairments of varying degrees. According to Zeigler et al. (2005), in the USA, on average, youth take their first alcoholic drink at age of 12 years, when they are still regarded as children. These authors further state that underage are more susceptible to immediate consequences of alcohol use including blackouts, hangovers, and alcohol poisoning. The same age group is highly vulnerable to neurodegeneration of the regions of the brain responsible for learning and memory, leading to impairment of brain activity and learning deficit. Heavy episodic or binge drinking impairs study habits and erodes on the development of transitional skills to adulthood. While in most developing countries, there are strict policies and laws to protect children from exposure to early initiation to alcohol and tobacco use, such provisions are clearly lacking in Tanzania. Consequently, children are starting to drink alcohol at an early age thereby exposing themselves to untold harms, and especially those related to the development impairment in their brain and normal intellectual capacity maturation. This is an area that needs urgent public health intervention, first to first understand the magnitude of the problem and factors contributing to that, and then to design appropriate and effective prevention / protective measures as a matter of priority. This study was conducted in Mbulu District, Tanzaniato to determine alcohol use prevalence among primary school pupils and establish baseline indicators for evaluating intervention through Community Based Approach.

Materials and Methods

Study area

The survey was conducted in Uhuru Ward of Mbulu district, Manyara Region in northern Tanzania. The district lies between latitude 3.80° and 4.50° S, and longitude 35.00° and 36.00° E. Most of it lies on the Rift Valley escarpment, at altitude ranging from 1000–2400 m. Its physical geography varies from semi-arid and sub-humid climates that receive annual rainfall of <400 mm and >1200 mm, respectively. The long rainy season extends from March to mid-May and the short rains extends from November to December. Relative humidity ranges from 55 to 75% and mean annual temperature ranges from 15 to 24°C.

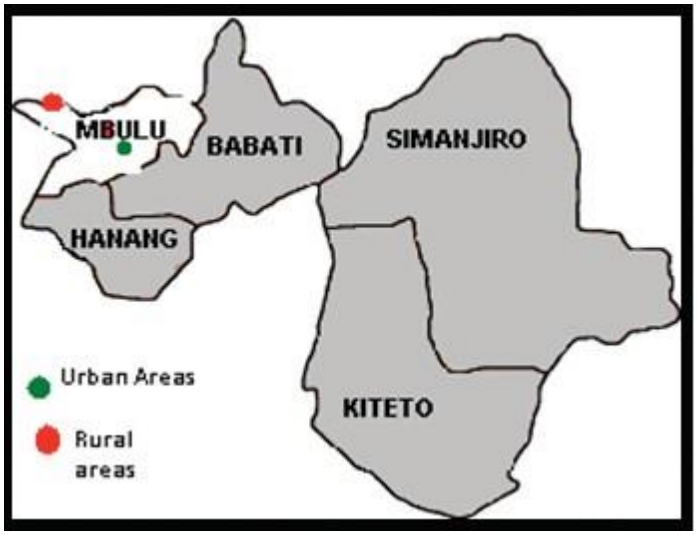

Figure 1: Manyara Region showing district boundaries and position of Mbulu district, (white area) with study sites shown as spots in clear background

Economically, the district is almost entirely rural where peasant subsistence agriculture and livestock keeping are predominant income generating occupations, estimated to involve 96% of the total population. The per capita income of the district is estimated to be between Tanzanian Shillings 500,000/- to 600,000/=. Administratively, the district is divided into 5 divisions with a total of 32 wards, 110 villages and 473 sub-villages.

Methods

This study involved school pupils from the only two schools located in the Uhuru ward target for CBA pilot, namely Harka located in the urban section and Waama in the rural section. Written permission was sought from the Local Government Authorities, to conduct the survey preceding introduction of CBA. Oral consent was obtained from the Ward and respective School Administration to relevant collect information. Pupils could decide participating or otherwise. Interviewer administered questionnaire was used to collect relevant information from school pupils and alcohol sellers. A convenience sampling method was used for both school pupils and alcohol sellers. Data was collected on paper form in the field and countercheck daily. It was later entered, verified and cleaned using Epi data version 3.1 and later analyzed using Strata Version 13. The results presented in this paper are only those of the primary school pupils and some cross reference to other relevant groups as relates to underage drinking.

Results

Demographic characteristics

There were 120 (51.5%) female respondents, and 113 (48.5%) males from both schools. Sex distribution by school, 104 (49.8%) females from Harka, and 16(3.4%) from Waama; and 105(50.2%) males from Harka and 8(33.3%) from Waama (Figure 1). Overall, there were slightly more female than male participants, and the majority came from Harka school. The age distribution of respondents from the two schools ranged from 9-18 years as follows: (i) 9-10 years were 32(11.0%), 11-12 years were 108 (45.9%), 13-14 years were 84 (38.8%) and 15-16 years were 8(3.8%) and age 18 years was 1(0.5%).

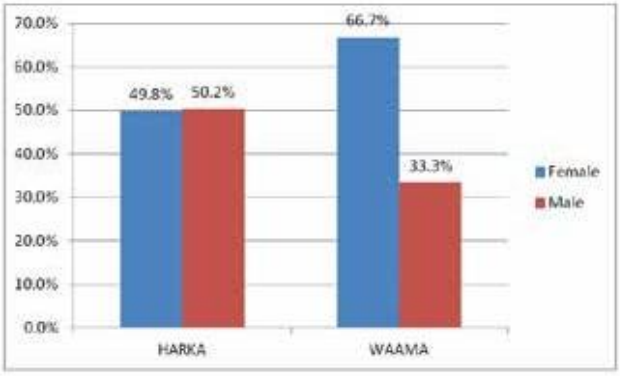

Figure 2: Sex distribution

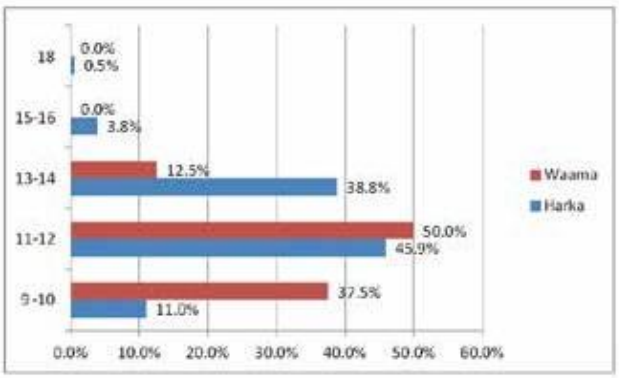

Figure 3: Age distribution

A total of 207(88.8%) pupils were cared for by their parents, while 26 (11.2%) were under the care of guardians other than the parents. Of those who reported to be under the care of their parents 186 (89%) were from Harka while 21(87.5%) were from Waama. Only a few of the students in the study comprising of 23(11%) and 3(12.5%) from Harka and Waama respectively, indicated that they were under the care of guardians other than their parents. The majority of Harka participants 176 (85%) and 20(83.3%) of Waama respondents lived at home while the rest said that they lived with relatives.

Alcohol consumption

When asked if they had *ever tasted alcohol*, slightly more than half 134(57.8%) answered not having tasted it, while 98 (42.2%) said yes they had ever tasted alcohol. It was also observed that, of those who answered in the negative, with regards to having ever taken alcohol, 114(54.8%) were from Harka; and 20 (83.3%) were from Waama school. Of those who "ever *tasted alcohol"*, 94(45.2%) were from Harka and 4(16.7%) from Waama (Ta

ble 1).

Table 1: Alcohol Consumption and frequency of alcohol consumed

Name of Schools		**Harka**	**Waama**	**Total**
Have you ever tasted Alcohol in your life?	YES	94(45.2%)	4(16.7%)	98(42.2%)
	NO	114(54.8%)	20(83.3%)	134(57.8%)
How many times have you used alcohol in the last six Months?	Two times	23(24.7%)	2(50%)	25(25.8%)
	Once	53(57.4%)	0(0.0%)	53(54.6%)
	Four times	1(1.1%)	0(0.0%)	1(1.0%)
	Three times	8(8.6%)	2(50%)	10(10.3%)
	>4 times	8(8.6%)	0(0.0%)	8(8.2%)

Those who took alcohon on their own decision were 33(34%); others reported to have been influenced by their parents were 22(22%), by their relatives were 20(20%), influenced by others - guardians 7(7%) or friends were 16(16%), a total of 65 (66.3%) were influenced by others to take alcohol the first time (Figure 4).

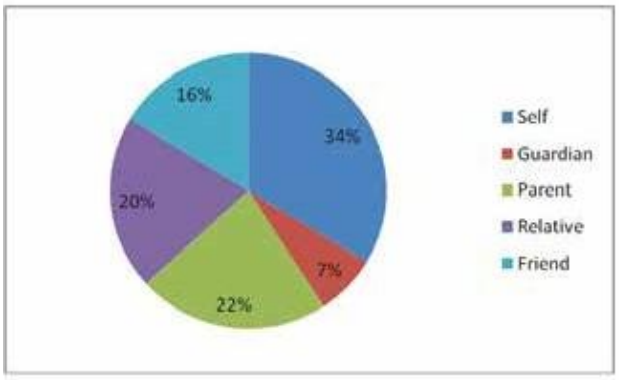

Figure 4: Who influenced respondent to initiate alcohol use

Out of 100 alcohol users who participated in the study, 73(73%) were parents and/or guardians of children under 18 years while 28 (28%) said they were not. In another group of 34 alcohol sellers asked if they had children under 18 years, it was revealed that, 26 (76.5%) were parents or guardians of children aged below 18 years while 8(23.5%) were not.

When asked the source of alcohol, 53 (56%) respondents from Harka said their homes were the main and so did 3(75%) from Waama. Other sources mentioned by both school respondents were clubs 12(13%), from friends 11(12%) and 19(20%) from other places. When 34 alcohol sellers were asked to indicate how many times they sold alcohol to the youth and children: 18 (52.9%) respondents claimed they never sold to youth or children, while the rest 17 (47.1%) sold to minors at least sometimes or even a few times.

Absenteeism from school related to Alcohol Use

Five (5.4%) out of 94 pupils from Harka who ever used alcohol reported to have ever missed school as a result of alcohol consumption; while 89 (94.7%) had not missed school. No participant from Waama reported to have ever missed school due to alcohol use. Regarding frequency of missing school due to alcohol use, 1(20%) reported to have missed school once, 2(40%) reported to have missed school twice, and 2(40%) reported to have missed school for more than four times due to alcohol use.

Amount of Alcohol Consumed

When asked on how much they could drink in a session, the findings revealed that, the majority of the respondents 59 (62.8%) consumed half a litre during one sitting; followed by 33(35.1%) reported one litre and 2(2.1%) reported to consume two litres. Thirty-one (34.4%) reported consuming one litre while 57(63.3%) reported to consume half a litre of alcohol; from Waama school, 2(50%) consumed one litre while 2(50%) consumed half a litre of alcohol.

When pupils were asked on how much they took to feel drunk: It was reported by the majority 77 (85.6%) that they got drunk using half a litre of alcohol; but few 11(12.2%) got drunk on one litre; one 1(1.11%) reported to get drunk on two litres while another one got drunk on three litres of alcohol.

On minors assisting parents and guardians in preparation and /or selling of alcohol showed the following results: 47 of 233 (20.2%) assisted; 39 of 209 (18.7%) pupils from Harka and 8 out of 24 (33.3%) from Waama school assisted in the alcohol preparation and/or selling process. Out of those assisting, 31 respondents claimed that they had been forced to assist while 12 pupils said they assisted voluntarily.

On the frequency of pupils assisting in the alcohol preparation and sale: showed that majority of those 21(58.3%) of the children from Harka had assisted in the preparation of alcohol at least four times in the last six months preceding the survey compared to 1(12.5%) from Waama who reported the same (Table 2)

Table 2: Absenteeism from school due to participation in alcohol preparation

		Harka	**Waama**	**Total**
Have you ever missed school because of assisting your parent or guardian in Alcohol preparation or Sale?	YES	29(74.4%)	6(75%)	35(74.5%)
	NO	10(25.6%)	2(25%)	12(25.5%)
If Yes; How many times in the last six Months?	Two Times	1(10%)	1(50%)	2(16.7%)
	Once	5(50%)	1(50%)	6(50%)
	More than four Times	4(40%)	0(0%)	4(33.3%)

Respondent living with persons who use alcohol and experience of violence when alcohol has been used

With regards to pupil's living arrangements with persons who use alcohol, it was shown that majority of respondents lived with persons who consumed alcohol. From Waama, 20(83.3%) pupils from Waama compared to those from Harka 118(83%) reported to that they lived with that they lived with persons who consumed alcohol.

Assessment of Violence attributed with living with person who uses alcohol was done by asking the respondents if they had been abused by persons who they lived with as a result of alcohol consumption. Results from this showed that 70(35.4%) from Harka and 3(68.4%) from Waama had been abused by persons who consumed alcohol against 128(64.6%) from Harka and 6(31.6%) who reported not to have been abused by person who consumed alcohol.

Table 3: Use of alcohol among care givers and alcohol use related abuse

Name of the School		Harka	Waama	Total
Do you live with a person who consumes alcohol	YES	118(56%)	20(83%)	138 (59.5%)
	NO	90(43.3%)	4(16.7%)	94(40.5%)
If yes has that person caused a quarrel as a result of using alcohol?	YES	83(70.3%)	15(75.0%)	98(75.0%)
	NO	35(29.7%)	5(25.0%)	40(25.0%)
Have you ever been abused by a parent/guardian/relative after the person consumed alcohol?	YES	70(35.4%)	13(68.4%)	83(68.4%)
	NO	128(64.6%)	6(31.6%)	134(31.6%)

In the figure above, as revealed by the findings persons who had consumed alcohol and were living with the respondents had caused a quarrel as a result of alcohol use. Majority 98(75.0%) reported to have had a quarrel while only 40(25.0%) said that they had not experienced a quarrel. The analysis on the various forms of abuse that were reported by the pupil from person who had consumed alcohol (Table 4). The most common form of abuse by persons who consumed alcohol as reported by the respondents was "battery" 54(65.1%), followed by being insulted 25(30.1%) and the those who reported being denied food and other forms of abuse were equal in number 2(2.4%) each.

Table 4: Acts of Abuse Experienced from person using alcohol

Form of abuse experienced from parent/ guardian or close relative	Harka	Waama	Total
Denied food	2(2.9%)	0(0%)	2(2.4%)
Being Beaten	46(65.7%)	8(61.5%)	54(65.1%)
Being Insulted	20(28.6%)	5(38.5%)	25(30.1%)
Other form of abuse	2(2.9%)	0(0%)	2(2.4%)

The analysis of the use of alcohol among 30 pupils who are known to the respondent revealed that, 126(55.8%) of did not know of pupils who used alcohol whereas 100 (44.2%) knew of a pupil who used alcohol. On the number of times that pupils were known to have consumed alcohol, the results further revealed that those who were known to have consumed alcohol more than four times were 33(34.0%), followed by 19(19.7%) who were reported to have consumed alcohol one time, whereas there was no difference in number 15(15.5%) between those students who were known to have consumed alcohol two times, four times and three times (Figure 5).

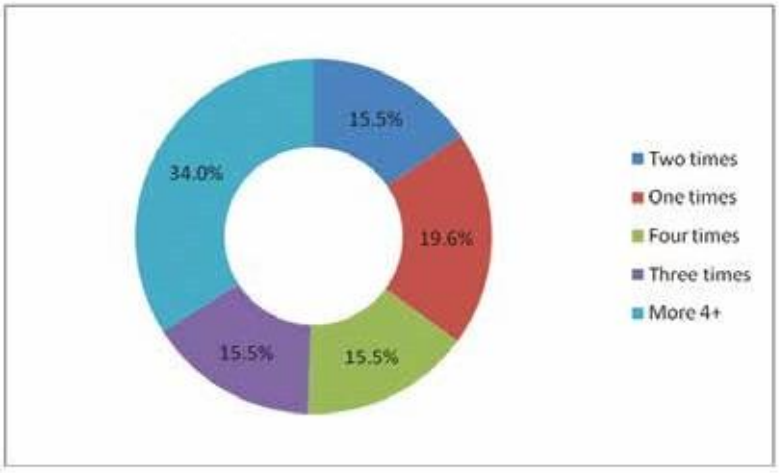

Figure 5: Use of alcohol and frequency among pupils

On the question of pupils attending school after consuming alcohol, the following findings were obtained: the majority were from Harka, 26(35.1%) indicated more than four pupils did so, followed by 24 (32.4%), who implicated one pupil, followed by 10 (13.5%) who indicated one pupil, then 8(10.8%) who reported that they knew 4 students and lastly 6(8.1%) who knew of three students. Those from Waama indicated that they knew of either one 3(75.0%) or more than four pupils who had attended school after having used alcohol (Figure 6).

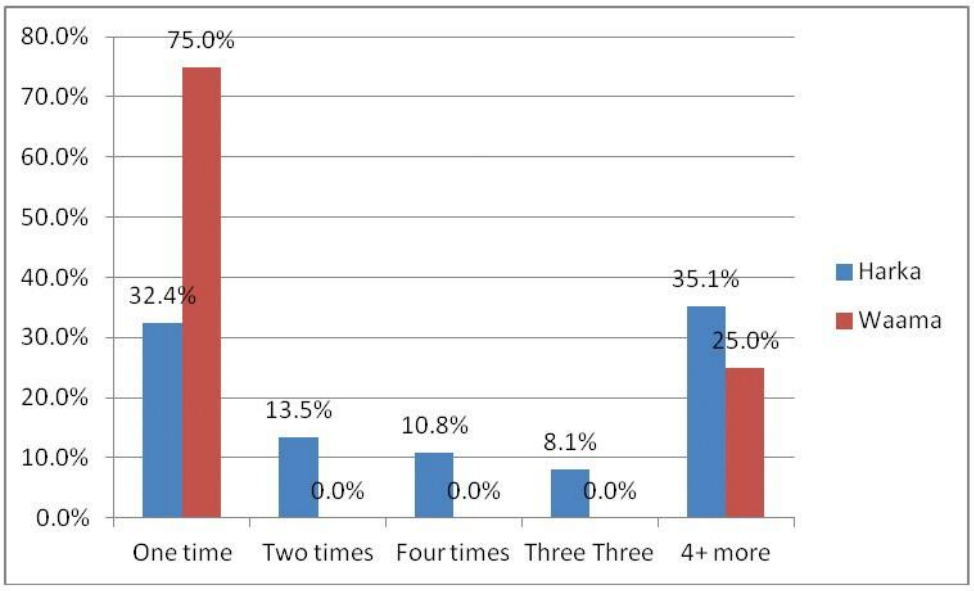

Figure 6: Number of pupils known to attend school after consuming alcohol

The findings revealed that slightly over half 120(51.7%) of the pupils had knowledge on the harmful effects of alcohol in school while 112(48.3%), indicated that they did not know of any harmful effects of alcohol use in school.

Discussion

The findings showed high prevalence of 42.2% and that some of those were already using alcohol more frequently and or in relatively high consumption volume which indicates harmful use pattern. Such findings call for action to address the alcohol use problem in the study communities. As already stated, alcohol is an intoxicating substance with dependence producing properties, and it is known that the earlier in age one starts alcohol use, the more likely one can develop alcohol use disorders. It is also known that, although many more people initiate alcohol use, some stop taking it, others may continue its use occasionally and yet many others who continue taking it, progressively consuming higher quantities and develop harmful habitual use, which over time, may progress to harmful patterns, alcoholism and /or alcohol dependence. The experts state that alcoholism and alcohol dependence are not a state of destination, but rather a progressive problem.

The effects of harmful use of alcohol are more serious on children because they are young and are still developing and use of alcohol affects all aspects of children's lives negatively putting their future in jeopardy. Youth who start using alcohol before the age of 15 are six times more likely to become dependent on alcohol than those who begin drinking at age 21 according to a recent CDC report. In additional to this alcohol affects the brain development and impairs brain function including memory and learning, that translates to poor performance in school, risky general and sexual behavior among others negative effects.

This survey among primary school pupils in Mbulu district has exposed the high prevalence ofalcohol ever use in the underage, where many of those who live with underage also use alcohol. It was also found that some pupils were using alcohol more frequently. Risk factors associated with early exposure to

alcohol access and availability include parents and guardians making and or using alcohol themselves, and children assisting in the preparation and selling, that alcohol was plentiful in the environment where they lived and went to school. It was also found that some alcohol sellers have sold their products to minors, and this indicates that the Law of the Child Act of 2009 is not being observed.

In the study area, many people use homemade brews, usually done by women at home. It was reported that some pupils assisted in preparation and selling. Some of those who assisted in alcohol preparation and selling were obliged to assist whereas others claimed to have done that voluntarily. This is not surprising because, by making alcohol in the home, and children being part of the household labour force, their assistance in such circumstances will be expected as alcohol provides them with extra income to buy their domestic needs. The findings also indicate that out of 100 alcohol users asked if they had children under 18years, 73.3% of them were either parents or guardians of minors. The main source of alcohol was said to be home, but also other outlets. Out of 34 alcohol sellers interviewed, 18.1% confirmed that they sometimes sold alcohol to minors. On the initiation to alcohol use, respondents were largely influenced by others in the pupils life, including friends, parents and guardian. The majority of pupils reported alcohol source as home, whereas some sellers affirm selling alcohol to minors. In any case, in Tanzania, there are no personal identification documents that would show the customer's age, and therefore checking for age of legal purchase would not have been practical, were it to be enforced. These observations match well with a study conducted in the USA showed that most of the alcohol that is consumed by the children is sourced from adults and most parents dramatically underestimate the use of alcohol particularly their own parents drinking.

From the report of the Tanzania Global School –based Student Health Survey of 2008, where 2,176 primary school students from Dar es Salaam were surveyed, the majority were aged 12-15years, mostly from Standard V and VI, prevalence of current alcohol use in the past 30 days was reported at 5.1%, with 6.2% for males (ranging from 4.1-8.2%) and 3.9% females (ranging from 2.7-5.2%). And among the current users, 37.9% drank one of more drinks per day on the days they drank. They got the alcohol they drunk from stores, shops or street vendors. These findings regarding source of alcohol differs from the current findings due to the more urban city environment compared to the rural setting of Mbulu, where more homemade beverages are available and economically easily accessible.

Slightly above half of the students had knowledge of the harmful effects of alcohol while the rest did not have. Decision makers, politicians, social workers and company leaders turn a blind eye to this problem by considering alcohol to be one of the pleasures on life. Children grow up in families seeing alcohol being consumed regularly and little is done to inform them about the harmful effects of using alcohol.

Alcoholic beverages are largely produced at home and sold at residential premises, without much formal control. As communities are undergoing cultural and transition, there is a considerable loss of traditional support system where in the old days, a child's welfare and wel beaing were the concern of whole community, and now that has largely disappeared without an alternative substitute in the form of relevant protective policies and laws; alcohol availability and access have been really facilitated beyond care and protection

of the vulnerable groups. Affordability- *Viroba*; Conflict of interest from stakeholders on the reduction of alcohol availability and access as some who are running this or related businesses also happen to be those in power; there is also deficiencies in the democratic practice and inadequacies in the governance system.

There is relatively low recognition of the real harmfulness of alcohol use in the population, as well as in the administrative structures of the Tanzanian society, thus taking a less serious consideration to the wide spectrum of health and social problems attributable to alcohol use. The recent avalanche of alcohol glamorous media advertisement and the industry's aggressive marketing, couple with generous contributions to government coffers

The study achieved its main of collecting alcohol use status in the underage in Uhuru Wards through school survey, as an estimate of alcohol use prevalence in youth and adolescents prior to piloting CBA intervention. The findings revealed the main source of alcohol used by this age group, and the risk factors for influencing youth to start alcohol use were established, as home making of traditional brews, involving children as well as many parents and guardians themselves using alcohol. From complimentary information on alcohol selling outlets, it was learnt that few licensed facilities are in the pilot area, but there were many more groceries and shops and homes that provided alcohol to their neighbourhoods. Also the issue of liquour packaged in sachets that are available all over and at all times of day and night made it difficult to observe alcohol selling and drinking times in any place within the target communities.

The availability and access of alcoholic goods in the target area is simply overwhelming. While community based approached for informing and empowering community action to reduce alcohol selling and use, the current situation calls for a stronger intervention through the local government authorities at the District Council level. The lower administrative structures can then be empowered to do monitoring and active surveillance.

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The community knowledge of alcohol induced Violence against Women in Northern Tanzania

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Abstract: This study aimed to assess the knowledge of alcohol-induced violence against women within the Iraqw communities in Northern Tanzania. A cross-sectional survey was conducted, combining both qualitative and quantitative methods. Quantitative data were collected through the administration of semi-structured questionnaires to one individual, regardless of sex, per household. Qualitative data were gathered through in-depth interviews with selected key informants. A total of 428 individuals participated in the survey. The findings revealed that violence against women was prevalent and widely tolerated within the community. The majority of respondents (90%) associated alcohol abuse with an increased likelihood of violence against women. The study also identified that being a woman doubled the chances of experiencing violence, and having an intimate partner who drinks alcohol increased the likelihood of suffering violence by 3.7 times. The Iraqw people perceive alcohol abuse as exacerbating violence against women perpetrated by intimate partners.

Keywords: women, violence, alcohol, Iraqw, Tanzania

Introduction

Violence, as defined by the World Health Organization (1996), refers to the intentional use of physical force or power that threatens or inflicts harm, injury, psychological distress, mal-development, or deprivation upon oneself, another person, or a group/community. This definition aligns with the United Nations' Declaration on the Elimination of Violence against Women (A/RES/48/104) from 1993. According to the declaration, violence against women encompasses any gender-based act that results in or is likely to result in physical, sexual, or psychological harm or suffering. This includes acts such as physical, sexual, or emotional abuse by intimate partners or family members, sexual harassment and abuse by authority figures, human trafficking, forced labour or sexual exploitation, and harmful traditional practices like forced or child marriage, dowry-related violence, and honour killings.

Globally, it is estimated that 35 percent of women have experienced some form of violence in their lives (Devries et al., 2013). A ten-country study commissioned by WHO on women's health and domestic violence revealed that between 15% and 71% of women reported experiencing physical or sexual violence by an intimate partner. Disturbingly, a significant number of women reported that their first sexual experience was non-consensual. Additionally, between 4% and 12% of women reported being physically abused during pregnancy. Shockingly, around half of the female homicide victims in 2012 worldwide were killed by their intimate partners or family members. These acts of violence often go unreported, with under-reporting being more prevalent in developing countries like Tanzania, where human rights abuses are widespread and culturally accepted.

Sexual assaults against adolescent and adult women have been referred to as a silent epidemic due to their high prevalence and low reporting rates to authorities (Koss and Gaines, 1993). There are several reasons for the under-reporting of sexual assault cases. Many victims fear not being believed or face derogation and stigma, which research has shown to be valid concerns (Abbey et al., 2001).

Society often underestimates the impact of alcohol on behaviours, actions, and brain chemistry. Some individuals may turn to alcohol or drugs as a means to escape stress, sadness, depression, appear more confident, or numb negative emotions such as guilt, shame, anger, or loneliness. These behaviours are often supported by various myths. Regardless of the reasons, alcohol intoxication is associated with irrational behaviours (WHO, 2002; 2004).

While some abusive men attribute their violent behaviour to substance abuse, it is important to note that not all men who abuse alcohol become violent. However, it is known that nearly half of those who commit acts of violence against their partners also struggle with alcohol abuse. These individuals may resort to violence as a means to release stress, anger, or frustration, to avoid confronting painful issues, shift blame, or exert control.

Alcohol or drug use is not only a risk factor for potential offenders but also increases the vulnerability of women to become victims of violence. Impaired judgment due to intoxication can lead a woman to engage in risky behaviours or hinder her ability to escape dangerous situations promptly. In some cases, drinking may occur before an act of violence takes place, or it may be used as a coping mechanism following an act of violence.

Rationale of the Study

Effort to counter violence against women globally encourages initiatives that focus on identifying, quantifying, and addressing the issue, including collecting data to understand the scope and types of violence in different settings. In Tanzania, there is a lack of systematic data on the problem, despite violence against women being pervasive and culturally accepted in patriarchal societies across the country. This study aims to explore the community's knowledge of alcohol-induced violence against women in Northern Tanzania. The research questions addressed are: Does the community associate alcohol with violence against women? What is the perceived contribution of alcohol to violence against women? And what factors are associated with violence against women in the study community?

Methodology

The study was conducted in the Iraqw community of Mbulu district, Northern Tanzania. The district is divided administratively into 32 wards, 110 villages, and 473 sub-villages/hamlets. According to the National Bureau of Statistics (2013), the district had a population of 340,000, mostly comprising the Iraqw ethnic group.

The population density is approximately 56 persons per square kilometre, and the average household size is 6.3 persons. The Iraqw community predominantly resides in rural areas, relying on crop farming and livestock keeping as their primary economic activities.

The Iraqw community was chosen as the study population because of their strong traditional beliefs and cultural norms regarding gender roles and other lifestyle habits. However, there is limited written information on violence against women specifically related to alcohol use. Anecdotal evidence suggests that alcohol intoxication facilitates violence, particularly against women and children, within the Iraqw community.

Study Design

A cross-sectional survey was conducted to collect data, employing both quantitative and qualitative approaches. Questionnaires were used to gather quantitative data, providing numeric descriptions of various aspects related to the study. Key informant interviews were conducted to gather qualitative data, enabling a deeper exploration of concepts that quantitative methods might not capture adequately.

Purposive sampling was used to select three wards (Haydom, Kainam, and Uhuru) perceived to have high rates of alcohol consumption from the list of 32 wards in Mbulu district. Two villages were randomly selected from each ward, and two hamlets were randomly chosen from each selected village. At least 30 households were randomly selected from each selected hamlet, resulting in a total of 428 households participating in the study. Whenever possible, interviews alternated between male and female respondents within households.

In-depth interviews were conducted with community leaders, religious leaders, school teachers, traditional healers, and community health workers. District leaders, including the District Medical Officer, District Planning Officer, District Health Officer, District Nursing Officer, community development officer, education officer, and cultural officer, were also interviewed.

Data Analysis

Data were organized and analysed using SPSS software. Descriptive and inferential statistics were performed for quantitative data, while qualitative data were analysed thematically.

Results

Association of alcohol and violence against women

The study found that the majority of respondents (95.6%, N=428) believed that alcohol intoxication increases the likelihood of violence against women, while only 3% disagreed. This association was consistently observed across different locations, sexes, and age groups (Table 1).

Key informants, including district officers, expressed their views on the association between alcohol consumption and violence against women. They acknowledged that alcohol abuse contributes to various forms of violence, including marital conflicts, divorces, economic instability, and negative health impacts on women and children.

Table 1: Association of alcohol drinking and violence against women in the community

Variable	Associated		Not Associated		Don't Know	
	Freq. (N)	Percent (%)	Freq. (N)	Percent (%)	Freq. (N)	Percent (%)
Ward						
Haydom	137	96	3	2	2	1
Kainam	136	95	4	2	2	1
Uhuru	136	94	6	4	2	1
Sex						
Male	178	94	7	3	4	2
Female	231	96	6	2	2	0.8
Age Group						
< 25 yrs	35	97	1	2	0	0
25-44yrs	232	96	5	2	4	1
45-64yrs	100	94	5	4	1	0.9
>=65	42	93	2	4	1	2

When asked about the extent to which alcohol intoxication contributes to violence against women, 48% of respondents agreed that it has a very large contribution. Rates varied slightly among different wards, with Haydom at 34%, Kainam at 30%, and Uhuru at 35%. A large contribution was reported by 22% (Haydom: 26%, Kainam: 25%, Uhuru: 48%), and a moderate contribution was reported by 25% (Haydom: 41%, Kainam: 45%, Uhuru: 13%). Only 3% of respondents believed that alcohol had little contribution to such violence (Table 2).

Table 2: Extent to which alcohol intoxication contributes to violence against women in the Community

Level	Haydom	Kainam	Uhuru	Number (%)
1 = To a very large extent	71(34)	62(30)	73(35)	206(48)
2 = To a large extent	25(26)	24(25)	47(48)	96(22)
3 = Average	44(41)	48(45)	14(13)	106(25)
4 = Not much	0(0)	4(0)	7(64)	11(3)
5 = It doesn't contribute	1(20)	3(60)	1(20)	5(1)
6= I don't	1(25)	1(25)	2(50)	4(1)
Total	142	142	144	428

Perceived contributions of alcohol to violence against women

Regarding the extent of exposure to violence for women married to alcoholic husbands, over 51.3% of respondents indicated it was to a very large extent, 29.4% to a large extent, and 16.1% to a moderate extent. Only 1.6% believed it was to a small extent (Table 3).

Community leaders, such as traditional healers and religious leaders, also associated alcohol consumption with violence against women. They highlighted the negative impact of alcohol on relationships, emphasizing that drunk individuals often mistreat their wives and neglect their needs.

Table 3: Personal opinion on the extent to which a woman married to an alcoholic spouse is exposed to violence

Level	Haydom	Kainam	Uhuru	Number (%)
1 = Very large extent	72 (32.7)	70 (31.8)	78 (35.4)	220 (51.3)
2 = Large extent	34 (26.9)	45 (35.7)	47 (37.3)	126 (29.4)
3 = Moderate	33 (47.8)	22 (31.8)	14 (20.2)	69 (16.1)
4 = Small	2 (28.6)	2 (28.6)	3 (42.9)	7 (1.6)
5 = It doesn't happen	1 (33.3)	2 (66.7)	0 (0)	3 (0.7)
6= I don't know	1 (25)	1 (25)	2 (50)	4 (0.9)
Total	143	142	144	429

Among the children surveyed, the majority (27/31) recognized the association between alcohol consumption and violence against women. They described instances where alcohol-fuelled aggression led to abuse and mistreatment of women. Only 4 out of 31 children did not perceive such an association.

Factors associated with Violence against Women in the study community

Results in Table 4 revealed an odds ratio of 2.5 for being female and 3.7 for having an alcohol-drinking partner.

Table 4: Factors associated with violence against women in northern Tanzania

Factor		Frequency	% Mistreated		Crude OR	*p*-value
			Within groups	Between groups		
Biological Sex	Male	183	20.2	28.9	1	
	Female	233	39.1	71.1	2.5	0.00
	Total	416	30.8	100		
Age group	45+ years	143	37.8	42.2	1	
	< 45 years	273	27.1	57.8	0.6	0.026
	Total	416	30.8	100		
Partner takes alcohol	No	269	22.7	50	1	
	Yes	117	52.1	50	3.7	0.00
	Total	386	31.6	100		
Marital status	Live together	313	31.3	78.4	1	
	Live apart	60	45	21.6	1.8	0.041
	Total	373	33.5	100		
Education status of interviewee	Above Primary	26	34.6	7.3	1	
	Primary	280	32.1	72.6	0.9	0.797
	Informal	100	25	20.2	0.6	0.328
	Total	406	30.5	100		
Education status of the partner	Above Primary	25	32	8	1	
	Primary	222	31.5	70	0.98	0.962
	Informal	70	31.4	22	0.97	0.958
	Total	317	31.6	100		

The results suggest that being female doubled the likelihood of experiencing violence, while having an alcoholic partner increased the likelihood by 3.7 times (Table 4). The findings provide strong evidence of the association between alcohol consumption and violence against women within the Iraqw communities in Northern Tanzania.

Discussion

Alcohol has numerous harmful effects on public health, society, and the economy. It not only poses risks to the users themselves but also to others who may be victimized by intoxicated individuals. For example, drunk driving leads to fatal accidents, and many people suffer abuse at the hands of intoxicated individuals, such as husbands who habitually batter their spouses. This is due to alcohol's inhibitory effects, which can cause intoxicated individuals to victimize those around them.

According to the World Health Organization (WHO), over 500,000 people were killed in a single year due to interpersonal violence related to alcohol use. Women and children, who are often vulnerable, are among the victims of alcohol's harmful effects. In some cultures, these acts of violence may be concealed or justified, allowing perpetrators to escape responsibility and blame. This phenomenon is reportedly common in Tanzanian society.

In this study, respondents acknowledged the relationship between alcohol use and violence against women. Some participants firmly believed that alcohol, rather than personal behavior or male dominance, was the primary factor contributing to violence against women in their communities. However, it is important to note that while alcohol abuse and violence often co-occur, one does not directly cause the other. Alcohol or drug use can increase the risk and severity of violence but does not establish a causal relationship (Temple et al., 2009; Roberts 2009). For instance, individuals with a quick temper or low tolerance to frustration may be more likely to express their anger physically or verbally after consuming alcohol. The lowering of inhibitions under the influence of alcohol may lead to impulsive actions. Similarly, someone who tends to express anger in sexually controlling ways may commit sexual assault or rape while intoxicated, whereas they may exhibit more restraint when sober (Fazzone et al., 1997; Heron 2009).

Despite the arguments surrounding alcohol-associated violence against women, the study participants overwhelmingly perceived an association between alcohol consumption and episodes of violence against women. The majority of respondents, regardless of gender, district, or rural/urban residence, recognized this association, with only a small percentage expressing uncertainty or denying the link.

Alcohol exacerbates the problem of violence against women in communities where heavy drinking is prevalent. The consumption of alcohol can lead to impaired judgment, increased aggression, and reduced inhibitions, which can escalate violent behaviours. This is particularly concerning in societies where traditional customs and cultural norms subordinate women and perpetuate gender inequality.

In these communities, local authorities often uphold these traditional practices, further perpetuating the acceptance of spousal mistreatment. This means that even women who are financially well-off or belong to higher social classes are not immune to experiencing violence within their relationships.

Tragically, many women suffer severe consequences, including death or resorting to suicide, as a result of persistent domestic violence and psychological torture inflicted by their husbands. In cases where alcohol is involved, these acts of violence are often socially excused and dismissed, both by the broader community and sometimes even by the victims themselves. There is a harmful perception that being under the influence of alcohol somehow justifies or mitigates the responsibility for such abusive behaviours.

This societal tolerance and normalization of violence against women in the context of alcohol use create a dangerous cycle that perpetuates the mistreatment of women. It is crucial to address not only the issue of alcohol abuse but also the underlying cultural and social factors that contribute to gender inequality and violence against women.

Conclusion

There is a clear association between alcohol consumption and violence against women in many communities, including those in Tanzania. Alcohol intoxication has been found to increase the likelihood of spousal abuse and other forms of violence against women. It impairs judgment, fuels aggression, and lowers inhibitions, leading to harmful behaviours.

Acceptance and social excusing of abusive behavior when alcohol is involved create a dangerous environment where victims are often blamed or dismissed. It is crucial to challenge and change these harmful attitudes and norms.

Addressing the issue of alcohol abuse and violence against women requires a multifaceted approach that includes education, awareness campaigns, policy changes, and support services for victims. Efforts should also focus on challenging traditional gender roles, promoting gender equality, and empowering women.

By addressing both alcohol abuse and the underlying social and cultural factors, there is hope for reducing and eventually eliminating violence against women and creating safer and more equitable communities.

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The magnitude of domestic violence against women and its impact on women's health in Dodoma Region, Tanzania

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Abstract: Domestic violence against women (DVAW) by their male partner is a very common problem and a major public health concern. It affects women's physical, reproductive and mental health and as such, it has the major impact on women's morbidity and mortality. This study was conducted with the aim of determining the magnitude and the impact of domestic violence on women's health in Dodoma Region, Tanzania. A cross sectional, household survey using quantitative approach was conducted in Dodoma region in October 2013 to April 2014. Multi-stage sampling technique was used to select the participants and a total of 750 women, who had ever had a male partner were interviewed about their experience of physically, psychological and sexually violent acts from their male partners. The lifetime prevalence of physical, psychological, sexual and any form of domestic violence were 44.4%, 48.7%, 20.4% and 58.1% respectively. Among ever abused women 49.5% had physical health effects, 40.3% psychological health effects and 38.9% had reproductive health effects. DVAW is a serious health and human rights problem affecting majority of women living in the Dodoma Region, Tanzania. The wider public health impacts of domestic violence in Tanzania should be thoroughly assessed and much effort should be done to stop domestic violence against women.

Keywords: domestic violence, women, intimate partner, Tanzania

Introduction

Domestic violence (DV) is defined as a pattern of abusive behaviors by one partner against another in an intimate relationship such as marriage, dating, family, or cohabitation (Shipway, 2004). It is also known as domestic abuse, spousal abuse, battering or intimate partner violence (IPV) (Krug et al., 2002). This study was only focused on Domestic Violence Against Women (DVAW) by their male partner occurring within the household. DV against women is a global and a major public health problem involving the violation of women's health and women's rights at its core (Tjaden & Thoennes, 2002).

Domestic violence against women may be physical, sexual or psychological; physica1 violence is manifested through physical aggressive acts such as kicking, beating, slapping, biting or strangling (Krantz & Moreno, 2005), while psychological violence may take a form of humiliation, economic restrictions, preventing a woman from seeing family/friends and other forms of controlling behaviour (Krug et al., 2002). On the other hand, sexual violence entails such things as forced sex through the use of physical force, threats and intimidation, forced participation in degrading sexual acts, denial of the right to use contraceptives or use of measures to prevent contraction of venereal diseases (Boyle & Jones, 2006).

The prevalence of DV against women varies globally and within countries. Worldwide, on average, partner violence affects nearly one in three women (30%) within their lifetime (WHO, 2013). The rate ranging between 23.2% and 37.7% for different global WHO regions, higher estimates of 37% are being found in the WHO African region (WHO, 2013). The prevalence of IPV in African countries ranged from approximately 26.5% to 48% (Roman & Frantz, 2013). According to Bamiwuye and Odimegwu (2014), the overall prevalence of any form of intimate partner violence (physical, sexual or emotional) ranged from 30.5% in Nigeria; 43.4% in Zimbabwe; 45.3% in Kenya; 45.5% in Mozambique; 53.9% in Zambia and 57.6% in Cameroon. In South Africa, almost half (42.4%) of men had been physically violent to their women intimate partners (Jewkes et al., 2011).

Like other countries in sub-Saharan Africa, the violence to women by their intimate partners is widespread in Tanzania. It is reported that more than one third of all women (39%) in Tanzania have suffered from physical violence at some point since age 15 (NBS and ICF Macro, 2011). The consequences of violence are multiple and very destructive for the women and the society in which they live. The studies have shown that it affects women's physical, reproductive and mental health (Fikree & Pasha, 2004). DVAW may cause many health problems, even including the death of women (Campbell et al., 2002). According to TDHS 2010, Dodoma Region was the most affected region in the country whereby the prevalence of physical violence to women was reported to be 71%. (NBS and ICF Macro, 2011).

Despite all this information on the prevalence of DVAW in Dodoma Region, there are inadequate studies to explain the pattern of DVAW and the health impact on women in Dodoma Region. Therefore, apart from the magnitude of DVAW, this study seeks to identify and understand better the health impact of DV on women.

Methods and Material

Study area, design and population

The study was a cross sectional, population-based household survey, exploratory in nature, where by quantitative approach was used. This study was conducted in 4 districts of Dodoma Region (Dodoma Municipality, Kondoa, Bahi and Kongwa) out of the seven districts in Dodoma Region. Dodoma Region was selected due to the fact that among Tanzania regions, Dodoma Region was found to have higher number of women affected by spouse violence (NBS and ICF Macro, 2011). Those women aged 18 years and above, with an intimate male partner and those who have had a male intimate partner and agreed to consent were involved in the study.

Sample size and sampling process

A multistage cluster sampling procedure was employed in the selection of the survey population. At the regional level, four districts were selected, Dodoma Municipality was purposively selected. Kondoa, Bahi and Kongwa districts were randomly selected. The wards were stratified into rural and urban, the villages or streets and then households were randomly selected. At the household level, one eligible woman was selected for the interview by using simple random sampling giving a total sample size of 750 women.

Data collection and Data Analysis

The standardized WHO violence against women questionnaire (WHO, 2005) was modified and used as a tool for data collection. The eligible women were questioned at length about any history of domestic violence and were asked about the types of violence they experienced from their male partners, and for those who were ever been abused were asked about health consequences they have ever experienced after being abused. The data from questionnaire were entered into the computer using Microsoft Excel program and software package for Statistical Package for Social Sciences, version 22 (SPSS, Inc., Chicago, IL) was used for analysis.

Ethical consideration

The ethical approval was obtained from the University of Dodoma Humans Ethics Committee. The permission to conduct the study was obtained from the Regional and District authorities. The WHO safety and ethical guidelines for conducting research on domestic violence (WHO, 2001) was followed. All research assistants were carefully selected, and since gender violence is a very sensitive issue, the research assistants were all females and they received special training on the gender equality issues and violence against women before the study.

Results

A total of 750 women were included in this study. The average age of women was 36 years old (SD=11.3) and the majority of respondents were above 24 years old and 65.2% (n=489) of them were married. Among the four districts, Dodoma Municipality had highest percent of respondents (37.6%) followed by Kongwa (24.1%), Kondoa (20.3%) and Bahi (18.0%). Furthermore, 122 (16.3%) had no formal education and 21.6% had education level above primary education. However, the employment status of respondents indicated that the main employment was peasantry (43.3%).

The magnitude of DVAW in Dodoma Region

Among 750 women, 436 (58.1%) of respondents reported to have experienced some type of domestic violence from their male partner during their life time (life time prevalence), while less than half 314 (42%) of respondents have never experienced any type of domestic violence in their life time (Figure 1).

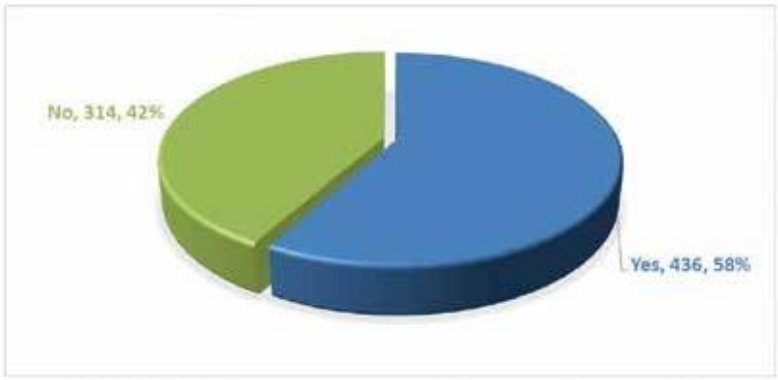

Figure 1: Lifetime prevalence of domestic violence in Dodoma (N=750)

Regarding types of Domestic Violence experienced by women (figure 2), psychological violence reported to be the most common type of abuse reported by 48.7% (365/750) followed by physical violence by 44.4% (333/750) and sexual violence by 20.4% (153/750). Some women experienced more than one type of violence.

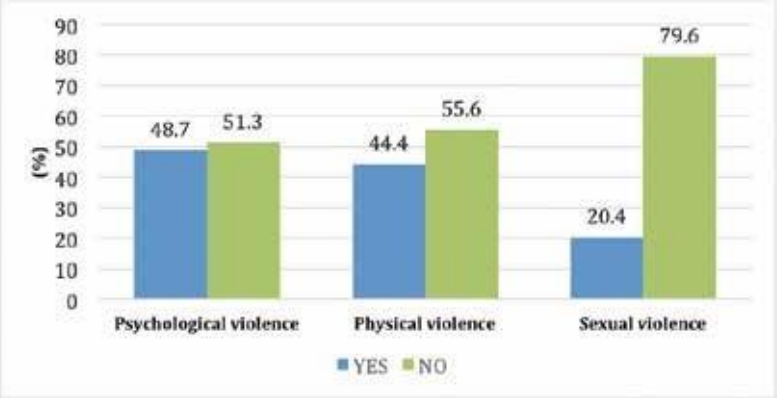

Figure 2: Different types of domestic violence experienced by women

Consequences of domestic violence on women health

A total of 436 women who had ever experienced different types of partner violence were asked about the health effects, they had experienced following being abused by their intimate partners. Each woman was asked about different symptoms/complaints and the victim replied with either 'Yes' or 'No' response. The health effects were then classified into physical, psychological and reproductive effects (figure 3). Among ever-abused women 49.4% had physical health effects, 40.3% psychological health effects while 38.6% had reproductive health effects.

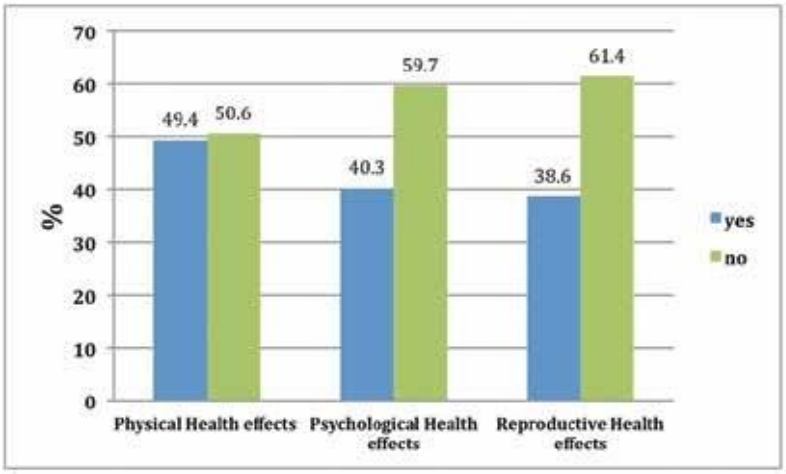

Figure 3: Overall physical, psychological and reproductive health effects of domestic violence.

Discussion

The results of this study show that out of 750 interviewed women, more than half (58.1%,) were found to have a history of being abused either physically, psychologically or sexually by their husbands or other intimate male partners at some point in their life. The rate appears to be higher than the current prevalence reported by WHO, whereby 30% of ever partnered women globally reported experiencing at least one form of partner violence in their lifetime (WHO, 2013). More so, the prevalence of partner violence reported in the present study is higher than the reported prevalence elsewhere in Tanzania. For instance, in Dar es Salaam and Mbeya regions, the prevalence was 56% and 41.3% respectively (Garcia-Moreno et al., 2006) and in Moshi urban District the prevalence was 21% (McCloskey et al., 2005). The possible reason for the higher prevalence in Dodoma might be due to the presence of cultural norms that support intimate partner violence and the acceptance of the practice. Also, Dodoma Region is considered to be among the most rural and under-developed regions in Tanzania. The region remains relatively poor and the poverty has been proved to be among the risk factors for DV among women. The same could be explained in North Western Ethiopia, whereby the prevalence was also very high (78.0%) (Semahegn et al., 2013). Likewise, the existence of DV in Dodoma is supported by the media which report that every day at least a woman is being beaten somewhere in the country.

In Dodoma Region DVAW was the common cause of health problems among women. In the present study, majority of women reported having different health effects as results of being abused by their partner. Most women complained having physical effects, followed by psychological effects and lastly was reproductive health effects as a result of sexual violence. The findings of this study are supported by a hospital-based study conducted in Dodoma Region, Tanzania in 2014, whereby among the intentional injury cases admitted in surgical ward in the Dodoma regional hospital, the injuries that resulted from partner violence were the most mentioned, and the majority of these cases were females (Mwashambwa et al., 2015). Several health problems associated with domestic violence could be either as a result of direct effects of the physical violence acts, such as bruises, knife wounds, broken bones, pain and headaches (Black, 2011). Other health consequences come as the result of the impact of domestic violence on the various body systems such as cardiovascular, gastrointestinal, endocrine and immune systems through chronic stress or other mechanisms (Braiding et al., 2005; Crofford, 2007; Leserman & Drossman, 2007).

Therefore, living with violence affects a woman's sense of self-esteem and her ability to participate in the world (Heise & García-Moreno, 2012). Such an environment has also profound impacts on a woman's physical, mental and reproductive health (Fikree & Pasha, 2004; WHO, 2007).

Conclusion

This study confirms that the domestic violence against women is a serious health and a significant Public Health concern affecting the majority of women in Dodoma Region as well as in other places. The study also provides the clear evidence that the personal history of violence is an important risk factor of poor health of women. Given these results, much effort should be done to stop intimate partner violence. While the society may view these types of violence as an acceptable means of resolving family conflicts, there is a growing awareness of the harmful effects of this behaviour and a growing commitment to foster gender equity within families and communities.

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A review on alcohol use and control legislation in Tanzania

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Abstract: This paper intends to review a few of the legislation which are of primary importance in the use and control of alcohol consumption in Tanzania. Alcohol consumption has been understood as the root cause of a plethora of social-economic problems emanating from excessive drinking of alcohol. The types of drinks containing alcohol and packed in different attractive containers include the industrial products beers, whisky, brand and wines and the locally brewed without formal packaging like the illicit gongo, mbege, and machicha. In many parts of the world, drinking alcoholic beverages is a common feature of social gatherings. The importance of alcohol lies in the fact that today alcohol is consumed by men and women, young and old and all are having different perceptions on the health hazards emanating from drinking it. Companies in alcohol business, more than often, are interested in maximizing their profit and target the population segment in communities who are mostly dynamic, energetic and who easily adapt to new initiatives and life style. The Government has enacted Laws which intend to control the use of alcohol among the communities to safeguard health and prevent social and behavioral conflicts from happening. Local Government Authorities (LGAs) are empowered to ensure that the laws are enforced to control the sale and use of alcohol in a particular area. Village Leadership oversees the implementation and enforcement of Government policies and legislation. The main challenges observed in this review are that the legislation do not adequately address the potential risk factors for alcohol use and control and their enforcement is far from adequate. It is therefore of great need that the success to fight against alcohol use calls for urgent, deliberate measures to be taken to amend some of the existing Principle Legislation particularly, the Intoxicating liquors Act, the Public Health Act (PHA) and the Tanzania Food Drugs and Cosmetics Act (TFDA),. These laws need to be amended so that they can incorporate sections covering risk preventive measures and enact Regulations specifically for controlling alcohol use in the country.

Introduction

In Tanzania the legislation dealing specifically with alcohol control is the Intoxicating Liquors Act, 1968. Under this Act, liquor is defined into two, that is, first group defines what can be termed “industrial” liquor while the second group of alcohol is Local liquor. Several legislation exist which touch the prevention and control of the underlying determinants of chronic diseases but the laws as they are today do not exhaustively safeguard the population against exposures to health risk factors one of them being alcohol. It has been observed that in some parts of Tanzania, for example, people drink alcohol all the time although the Intoxicating liquors Act has categorised permissible hours and places during which alcohol can be taken. [4]

The consumption of alcohol carries a risk of adverse health and social consequences related to its intoxicating, toxic and dependence-producing properties. In addition to the chronic diseases that may develop in the bodies of those who drink large amounts of alcohol over a number of years, alcohol use is also associated with an increased risk of acute health conditions, such as cancer, injuries including

from traffic accidents. In this paper a few selected sections from the following three Acts will be briefly discussed – the Intoxicating Liquors Act, 1968; The Public Health Act, 2009 and the Tanzania Food, Drugs and Cosmetics Act (TFDA), 2003.

The Intoxicating Liquors Act of 1968

The Legislation provides for the control of manufacture, sale and importation of alcohol products through licensing and prescribing standards for alcohol related products. In addition, the legislation has provisions to restrict sale of alcohol products to minors and also prohibits employment of minors in areas where alcohol is served and restricts the number of alcohol distillers in a certain area and the amount produced by each. Although licensing is effected by Local Government Authorities, the laws have not been fully enforced to check the quality of the liquor products. The "indusrtrial" liquor is defined as wine, beer, porter, cider, perry hop beer or any liquor containing more than two percentum by weight of absolute alcohol except bona-fide medicine … Local liquor includes *pombe*, fermented asali, tembo, ulanzi and all liquors … of a kind prepared by the indigenous people of Tanzania which contain more than one percentum of absolute alcohol ….) Looking at this law critically it is obvious that the "definition" is obsolete because ever since it was enacted there has developed many different types of liquor in both groups in terms of preparation, packaging and alcohol concentration.

The law prescribes fourteen and five intoxicating liquors and local liquors licenses respectively which the Intoxicating liquors Licensing Board under Local Government Authorities can issue to clients. The conditions that are attached to the conduct of the liquor business to the different licensees leaves much to be desired both to the licensees and the law enforcers because the conditions are not only vague but also overlap. Packaging of liquor in plastic containers has today challenged the drinking behavior and times scheduled in the law. For example, sachets of different sizes (50-200 mls) containing whisky, brandy are today on the market sold in shops and kiosks are portable and can be drunk anytime, anywhere and this definitely defeats the whole purpose of prescribing time for opening liquor selling outlets.

The Act contains a section which allows shops to sell tobacco, cigars, holder cigarettes and matches without a trading licence. This is a weakness in the law like alcohol tobacco is risk factor to health. Much as the Act prohibits the supply of alcohol to persons under 16 years of age, the general penalty prescribed to offences of this type is deplorable, which is not exceeding 2,000/= for first offence and 4,000/= for any subsequent offence. The penalty by any measure today is lamentable compared to the risks caused by alcohol to health of man. Although the law has defined the term liquor, it has not interpreted the term alcohol and this is observed as a deficiency leading to failure to determine the amount of alcohol that a drinker should take in a day.

The Public Health Act (PHA), (2009)

The law was established to provide for the promotion, control and maintenance of public health with a view to ensure the provision of comprehensive, functional and sustainable public health services to the general public. In essence, therefore, it encompasses most environmental health risk factors of non-communicable diseases. Part III of the Act bears the Title - Notification and Control of Communicable

and Non-Communicable Diseases, but there is not a single section under this part which provides either for the notification or control of NCD. This is a serious omission in the PHA that needs to be rectified to ensure that NCDs are recognised and notified nationally. Under the First Schedule listing the National notifiable diseases which are reported weekly, malnutrition is the only NCD risk condition included. Also, lacking in the PHA is the provision of Physical activity for the promotion of good health and prevention of NCD. The Act should further provide regulations to promote physical activity in schools, work places. Regulations under this Act should also make it mandatory for Local Councils to provide adequate Open space, recreational areas and play grounds for public use.

The Tanzania Food, Drugs and Cosmetics Act 2003

Establishes the Tanzania Food Drugs and Cosmetics Authority (TFDA). The authority has mandate to control the licensing and manufacture, importation and sale of food, cosmetics and drug (medicines) products in the country and provides product registration for all goods in this category. Under this Act liquor containing alcohol is understood to be food. Furthermore, TFDA has the mandate to prohibit sale, importation or manufacture of foods/alcohol that do not conform to prescribed food standards and provides a platform for population interventions to reduce fat, salt and sugar content in pre-packaged foods and their products. Together with the Tanzania Bureau of Standards (TBS), TFDA can regulate food quality standards to compel the manufacturers to include nutritional information on the label to enable the purchaser to know the nutritional values of the food she/he is buying. TFDA using powers vested to it can play an important role to prevent sale of alcohol in containers enhancing overdrinking of alcohol for example sachets and regulate the sale and manufacture of liquor that may affect the health of man.

Why legislation on alcohol control?

Legislation is a vital component of Health Promotion process if prevention and control of the use of alcohol is to succeed. It has been repeatedly demonstrated that taking legal measures can effectively limit exposure to alcohol risk factors [3]. Consequently, formulation and implementation of relevant legislation in the fields of alcohol use may considerably limit road traffic accidents, and increase food safety and safe workplace environment.

Tanzania NCD Strategy goal is to reduce the burden of NCD on the Tanzanian people by taking integrated action. It is anticipated that the legislation addressing NCD issues should be integrative [10]. The legislation should provide for the control of all those areas which facilitate the occurrence of NCD and not alcohol alone in order to promote preventive interventions embedded in the national NCD strategy. The strategy takes into account the WHO Global Strategy on Diet, Physical Activity and Health and the WHO Framework Convention on Tobacco Control [10].

Weakness in the current legislation

The current legislation observed are neither addressing the NCD direct nor to alcohol the related risk factors. The Laws are fragmented, scattered and are not focussed to alcohol and its consequences to health. Enforcers of the different legislation, being officers in LGAs, do so without understanding the relationship between alcohol risk factors and the occurrence of NCD.

Conclusion and Recommendations

The main challenges observed in this review are that the legislation are solitary and and provide a narrow path for integrating activities leading to the control of the use of alcohol in the country. Consequently, the legislations do not adequately address alcohol as a potential risk factor to human health but are centered more on controlling the business of intoxicating liquors. The war against alcohol should, therefore, be supported by comprehensive legislation controlling risk factors, preventing the onset of disease, recurrence of disease, progression of disease, prevent disability and prevent early or painful death.

Therefore, the success to fight alcohol use, deliberate measures should be taken to amend the existing Principle Legislation particularly the PHA, TFDA, and the Intoxicating liquor Act and stiffer penalties should be instituted as a deterrent measure to offenders. The amended laws should incorporate preventive measures against alcohol use. Empowerment of LGA staff and establishing multi-sector committees is of paramount importance to strengthen enforcement and follow up on challenges related to harmful use of alcohol.

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Maximizing the quality and performance of existing health workforce in Tanzania

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Abstract: It is documented that Tanzania's health system is faced with severe shortages, inadequate mix of medical skills and a geographical imbalances of health workforce. This has been a long term challenge in the performance of the health sector in the country. The evidence shows that some people may not need to seek health care unless they are sure of availability, accessibility, quality of human resources for health in health facilities. Therefore, the objective of this paper is to assess the possibility to maximize the quality and performance of available health workforce in Tanzania. An online literature search was conducted from multiple databases and aggregators including Google scholar, PubMed and Google advanced search. In addition, the websites of the World Bank, World Health Organization and Tanzania Ministry of Health Social Welfare were visited. Findings show that, with appropriate motivation to health personnel, supportive supervision, on job training and fairly performance appraisal may improve the performance of existing workforce. The findings also show that with integration of competences in pre and in service training, working together with professional associations and fair employment packages will enhance performance of existing workforce. While the need for more staff is necessary for effective delivery of quality health care, adequate performance of existing health workforce is important. The government at all levels has to improve the management of human resources for health by handling their welfare carefully and correctly.

Key words: Human Resources for health, appraisal, Tanzania

Introduction

Human resources for health are very important for the proper function of the health care system in any country (Willcox et al., 2015). The availability of health workers in sufficient numbers, with adequate skills, and with the motivation needed in order to provide high quality services is a crucial factor for the functioning of any health system (Jimba, Cometto, & Yamamoto, 2010). Tanzania is faced with a serious shortage of health workforce and poor health worker's performance. The available health workforce has low work motivation, high rates of absenteeism and under performance (URT, 2012). This situation is likely to affect the achievements of sustainable development goals. There is also a lack of personnel with relevant skills for the success of programmes that intend to reach the sustainable development goals (URT, 2014).

The Ministry of Health Tanzania recorded a shortage of health staff since independent, with a very high increase between 1994 and 2002, when the government implemented civil service reforms (URT, 2014). In 2005, the issue of human resources for health in Tanzania was declared a crisis. The Ministry of Health claimed that the health workforce crisis has reached a state of emergency (URT, 2014). The health worker crisis is showing up in shortage of personnel, geographical imbalances in the availability of health workers, and weak productivity and performance at health facilities (Exavery et al., 2013). Tanzania government has made efforts to solve the problem of shortage of human resources for health. The strategic plan was

launched in for the purpose of solving the problem of human resources for health crisis and scaling up human resources for health etc. The Mkapa Fellowship Programme (voluntary bonding) represents a new attempt to create an incentive scheme for taking up rural posts (URT, 2010). However, more strategies were aiming at expanding the workforce rather than effective utilization of the existing workforce. The need for better utilization of existing personnel is more important because the strategies to increase the number of health staff to required staffing level is yet to be achieved.

The problem of shortage of health workers is expected continue in the future due to various reasons, e.g. emerging of non-communicable diseases, increased demand for health care due to population growth, political demand to have health facility (dispensary) in every village, health centre in every ward and hospital in every district. Existing health workforce is mal-distributed. Many workers prefer to work in urban than in rural area. The most affected health facilities are dispensaries which are located in rural areas (URT, 2014). Poor performance of health staff can be due to a number of factors like, too few staff, staff do not adhere to guidelines and standards, not fulfilling the need of the community, unclear expectation, shortage of skills, equipment and facilities, medical supplies, or lack of motivation which are fuelled by failure of health system (Dieleman & Harnmeijer, 2006). There is inadequate staffing of health facilities, a high degree of absenteeism, and low productivity of the staffs that were present and inadequate supervision in peripheral Tanzanian health facilities (Manzi et al., 2012).

Therefore, the purpose of this paper is to explore the best practices that can be used to improved quality and performance of the existing workforce in the Tanzania. This paper will provide ideas for policy makers; managers and health workers in general who have a responsibility or interest in what can be done to improve access to health through more effective human resources policies, planning and management.

Materials and Methods

A review was done on online published grey and peer reviewed literatures to describe how quality and performance of existing health workforce can be maximized in Tanzania. Type of literatures included: reports, guidelines and policies on human resources for health from the Tanzania Ministry of Health and Social Welfare, and other organizations like WHO, United Nations Development Programme and World Bank reports. The search words used in combination were: 'human resources for health', 'Tanzania health workforce', 'workforce performance', 'human resources performance appraisal', 'health workforce in Sub Saharan Africa', 'performance and healthcare workers and lower middle income countries', 'health workforce and healthcare reforms'.

The search involved both libraries and international journals like Pub Med, internet base like Pub med, Google, Science Direct, Cochrane, WHO, library accessed to search for literature. Grey literature was searched only via Google search. The electronic searches were done between March and July 2015. In order to have the right literature, the selection criteria were set, the literatures were included only if the study reported information that is related to health workforce management, motivation and performance. Otherwise the literatures were excluded from the study. The literatures were checked for relevant information for this study. A thorough reading was done and notes were taken using an excel sheet, and then the synthesis was done by using the concept mapping technique.

We reviewed various literatures in order to understand better the best practices that can be used by health managers to maximize performance health workers. We used analytical framework adopted from USAID, 'Human Resources Performance Management cycle' (Figure 1). Human resources performance management cycle point out that health workers need to have clear roles with aligned tasks. In carrying out their responsibilities, objective performance feedback from colleagues and supervisor's fair evaluation from supervisors, and operating with some rewards and recognition, have proven to influence the commitment and ownership that health workers demonstrate in their roles. Framework helps managers and health worker teams to collaboratively institute practices that address performance factors and monitor their effectiveness.

Figure 1: Analytical framework: Human Resources Performance Management cycle (Source: USAID, 2014)

Results and Discussion

We analysed and discussed various factors that influence human resource performance by using a Human Resources (HR) Performance Management Cycle framework developed by USAID ASSIST project. By going through this perfrormance cycle and Effective management of human resources at various levels will influence health worker motivation (Bonenberger et al., 2014). in order to gain employee commitment Budryk, (2015)suggest that it is important to set clear goals for employees that require effort to achieve but are reachable. In addition, employees should know how they fit into the bigger picture of the organization mission and how their works helps the organization accomplish its goals (Fallon, 2015).

Findings show that in Tanzania every health worker have job description but in reality they perform other tasks depending on circumstance, for example a medical attendant can do all the work of a clinical officer (Bradley et al., 2013). In that sense staff at primary health care may get too busy and do complicated and complex services, may become stressed and be unhappy with their team (Mbaruku et al., 2014). Because of health staff shortage especially in rural areas stakeholders have to agree on some related task delegation to lower health worker cadres. The findings show that clinicians were more likely to support task shifting than policy and programme leaders, perhaps motivated by their front-line experiences (Mbaruku et al., 2014). A study in Malawi provides further evidence that task-shifting often occurs without policy support and takes place in an environment where there are competing demands, inadequate training and resources, and inadequate supervision structures as a result of non-integrated, disease-specific programs (Smith et al., 2014).

Rustagi et al., (2015) suggest that harmonizing policy and programme managers' views with those of clinicians regarding task shifting will be important to formulate and implement clear policy. For successful task shifting, findings show that improved training and supervision were important methods to minimize potential risks and maximize potential benefits of task shifting. In a study by Rustagi et al., (2015) interviewees most generally stated improved training and improved supervision would ensure that non-physicians provide high-quality of care. They found that improving the communication between health workers and clearly defining the tasks of all cadres of health workers, encouraging broad participation ensured a positive team dynamic. This was a result of improved job aids and improved working conditions.

The competencies are sets of measurable skills, knowledge, behaviours, and personal attributes critical to successful performance. Employees must have the right competencies in order to complete a job satisfactorily. In any work setting, the capacity to perform means having available the competencies, the resources, and the opportunity to complete the job. If employees are missing these, the work will not get done and the results will not be achieved. To improve workers performance managers need to ensure that practitioners have all the skills they need to perform the tasks required to work in the environment in which they work (Nancarrow, 2015). In Malawi, health facilities with scarcity of health workers, available health workers improved their performance by build a networking with the district hospital (Hare et al., 2015). In addition, networking with communities will also result in improved work performance (Lunsford et al., 2015).

Regular feedback and evaluation of workers performance has been linked to improved knowledge translation, sustainability of the programme and greater effect on staff outcomes (Moran et al., 2014). Feedback and openness influences workplace trust relationships with colleagues, supervisors and managers, employing organisation and patients. Motivational factors identified as linked to trust include supervision, respect, recognition, appreciation and rewards, teamwork, management support, autonomy and communication (Okello & Gilson, 2015). Most of the feedback can be done during regular supervision visits. For example at district level, districts have regular supervision visits and the schedule is in place for the purpose of monthly supervision but lack of money and delay in receiving money affects regular supervision visits (Bradley et al., 2013). This problem has led to some health facilities in remote rural

area being visited once a year (Bradley et al., 2013). Similarly, lack of resources for supervision activities was also mentioned by Ndima et al. (2015). Supervision of community health workes (CHW) could be strengthened by streamlining supervision protocols to focus less on report checking and more on problem solving and skills development (Roberton et al., 2015). A previous study in northern Tanzania have shown that most of the health workers complain of lack of feedback during supervision visits by council health management team (CHMT) (Manongi et al., 2006). Furthermore when it did occur, supervision was felt to focus more on fault-finding than being supportive in nature and did not address all areas of work (Ndima et al., 2015). There were some reasons for poor supervision at the District level. The District Medical Officers complained that the problem of poor supervision was due to unplanned visits from the Ministry of Health officials with emergency issues to tackle in a short time (Manongi et al., 2006).

Findings also show that staff shortage of both in health facilities and CHMT affects effective supervision one incidence a nursing officer from the district level has to assist a nurse at the health facility instead of supervising the nurse because the nurse was overburdened (Bradley et al., 2013). The shortage of staff is affecting supervision from higher level and within the same health facility. For example in Tanzania, supervisors in Tanzania health system need to fulfil their duties as managerial and clinical duties (Bradley et al., 2013). Another challenge is the quality of supervision done. Most of the supervisions done by the CHMT do not target individual workers. Supervision is based on the pre-determined programs checklists; therefore, feedback is not given on other clinical performance. Bradley et al., (2013) suggest that enhanced feedback mechanism is very important for improved individual health worker's performance. There are also other multiple factors that affect regular supervision. Sometimes supervision is postponed due to over commitment of the CHMT members, lack of transport or lack of prioritization of the element of HRM in the routine work (Bradley et al., 2013).

Involving employees and their representatives in the evaluation and decision process will enhance commitment, measure performance and results using credible measures that employee understand and accept (Dominick & Kurowski, 2005). In a study about district health managers' perceptions of supervision in Malawi and Tanzania, the use of Open Performance Review and Appraisal System was considered fair in Tanzania , but there were some challenges in lower level cadres in articulating and quantifying their performance aims and targets (Bradley et al., 2013). As mentioned earlier, some of the duties and tasks are not outlined in the job description a health work may perform duties that are not included in performance evaluation.

Another issue related to fair evaluation is the issue of transparency. The perceived lack of a transparent system in dealing with health workers' welfare including selection best worker of the year, monetary claims and unfair reimbursement of allowances were identified as issues that contributed to low morale and poor performance (Mkoka, Mahiti, Kiwara, Mwangu, & Goicolea, 2015). Similarly, findings from Ghana suggest that fair pay will also motivate (Sacks, Alva, Magalona, & Vesel, 2015)

Another important issue in improving workers performance is fair allocation of staff and fair geographical redistribution of health workforce according to staffing level demand (Namaganda, Oketcho, Maniple,

& Viadro, 2015). To avoid complains about fair evaluation Bradley et al., (2013) suggest that CHMT members and other workers need to be trained on how to make self-performance assessment.

One of the important elements for worker's performance is reward and recognition. Some health workers are strongly motivated by being appreciated for doing a meaningful job, it sufficient that the individual worker knows his/her productivity/quality. Some District Medical Officers do not recognize the hardworking of the health workers in their districts. In a qualitative study conducted in Kilimanjaro Region Tanzania, findings showed that some workers complained that the DMOs do not recognise their hard working (Manongi et al., 2006). In some cases, where extrinsic incentive mechanisms apply, there are must be some kind of external supervision. In some cases, increasing the level of supervision may in itself be sufficient to induce higher worker effort, simply because workers want their supervisor to think that they are doing a good job (Mpembeni et al., 2015).

Some health workers are highly motivated by doing a meaningful job, it is important that individual knows his or her productivity or quality of performance. Highly Motivated workers usually adheres more strictly to clinical procedures which lead to improved quality of medical services (Marinucci et al., 2013). To recognize workers' hard working and good performance managers may provide any incentives. This has been linked with the quality of service provided. Leonard et al. (2005) find that incentives may strongly improve clinical performance. Strengthening the incentives of clinicians working in organization will also increase the probability of correct diagnosis and treatment by up to 20%. Both financial and non-financial incentives are determinants of motivation and job satisfaction (Hotchkiss, Banteyerga, & Tharaney, 2015). Some scholars suggest that Rewarding should be according to skill required and risk involved (Nancarrow, 2015).

Greenspan et al., (2013) stress that, upgrading of skill levels is not the only measure available to improve clinical performance; reward and incentive mechanisms may also be powerful mechanisms towards this end. In rural Morogoro findings show that, some health workers were motivated at individual, community and organizational level providing moral, financial, and material support, including service fees, supplies, money for transportation, and help with farm work and CHW tasks.

In the Tanzanian context, the issue of upgrading of skill was done by strengthening of continued education through upgrading of the Zone Training Centres, but findings show that this can be fruitfully by combined with incentive packages that induce clinicians to put their knowledge into practice (Greenspan et al., 2013). Similarly evidence from Uganda show that Performance based Incentives programme was motivating and therefore important in enhancing performance among staff in Uganda (Miller, Musominali, Baganizi, & Paccione, 2014).

In-service training was considered very important for the job satisfaction and retention of the health workers of medical lab professionals in seven sub Saharan countries the training should be integrated to professional development (Marinucci et al., 2013; Sacks et al., 2015). Sometimes lack of financial resources affects career advancement. Most of the health workers requested to have formal training to

acquire required skills to the District Medical Officer but their request was not successful due to financial constraints (Manongi et al., 2006).

Other challenges reported were lack of a clear strategic plan for staff career advancement and continuous professional development to improve health workers' knowledge and skills necessary for providing quality maternal health care (Mkoka et al., 2015). The problem of finance for training may be solved by prioritizing the issue of training and come up with training programme. In Uganda, Human Resource for Health Information System is a tool that is used to enable plan for career development and proper redistribution of health workforce in the country (Driessen et al., 2015). However planners should not depend on routine information which sometimes is not realistic instead they should depend on information that reflect the real situation on the ground (Durham, Pavignani, Beesley, & Hill, 2015).

Employees must be given resources they need to do their job. A key management responsibility is to ensure employees have work environment that contains the tools they need to be effective. If employees have all the competencies needed to do the job, but they lack resources to perform, the job will not get done (Thi, Thu, Wilson, & Mcdonald, 2015). Workers performance is affected by resource availability and number of available health staff (Mbaruku et al., 2014). Use of new technology in health service delivery does motivate workers to improve their performance. Findings from a study in India show that adaptation of new technology was also factors that motivate health care workers and also it reduces workload and improves quality of care. (Bhattacharya & Ramachandran, 2015)

Other factors that influence health workers performance are: Good relationship with community; availability of support system; trust; and clear communication line (Kok et al., 2015). Findings show that , health workers in rural areas were more satisfied with supportive interpersonal relationship work environment than Infrastructure satisfaction among Tanzanian health workers in primary health clinics (Mbaruku et al., 2014). Strategic partnership with communities and health systems offers the potential for accelerating progress in improving health workers performance (Naimoli et al., 2015).The performance is positively influenced by the respect of the community and good interpersonal relations (Thi et al., 2015)

There are also some factors that influence negatively worker's performance. Existence of a bureaucratic and irresponsible administrative system was reported to result in the delay in responding to the health workers' claims timely and that there is no transparency and fairness in dealing with health workers' financial claims which in turn affect workers performance (Mkoka et al., 2015). Health workers are affected by lack of monetary compensation, transportation and communication support received (Mpembeni et al., 2015). Some health workers complained that the government and management here don't plan ahead of time. They should make sure that the working environment is ok. They have to ensure medical equipment and drugs are there, but most importantly, housing for newly employed staff. When new employees come and find a house, it is hard to leave" (Mkoka et al., 2015).

Good human resources for health governance is very important for the performance of existing health workforce (Kaplan et al,, 2013) and more structured strategy of HRH management at health facility level.

Findings show that, many human resource management (HRM) practices are employed, but how well they are implemented, the degree to which they meet the expectations of the health workers and their effects on human resource (HR) outcomes vary across contexts. Front-line supervisors, such as health centre nurses and senior CHWs, play a major role in the management of CHWs and are central to the implementation of HRM practices (Raven et al., 2015). A core underlying problem with HRH governance is that health workers are unwilling to work at some rural posts. Incentive schemes (pull or push factors) are probably needed in order to overcome this problem (Mbaruku et al., 2014)

Conclusion

The problem of shortage of human resources for health in Tanzanian health system is expected to continue in the future. There is a need to maximize the performance and quality of existing health workforce so as to reach the expected health outcome. This is possible if all health managers and administrators will change their mind-set and start prioritize the issue of Human resources management in public health sector. Health worker's performance can be enhanced by using the human resources performance management cycle which is about aligning and clarifying tasks, competency development, performance feedback, fair evaluation, reward and recognition, career advancement and adequate environment.

This is possible if the managers at various levels will apply good governance in human resources for health management. A responsible administrative system which is not bureaucratic that respond to health workers claims timely and in transparency and fairly manner is important for existing workers improved performance. Fair allocation and redistribution which is necessary for equitable geographical distribution and skill mix will help the problem of workers' unwillingness to work in rural areas. Good human resource for health governance is a key to performance of existing health workforce this must be extended to health facility level.

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Health care financing for students in higher education institutions in Tanzania: From a universal health coverage perspective

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Abstract: Access to health care is crucial for the wellbeing and academic welfare of students in higher education institutions (HEIs). At the time of rising number of students enrolled in HEIs in Tanzania, this study aims to examine the health care financing mechanisms available for students in HEIs, and determine the factors for students' access to health care services based on their health insurance membership status. A multi-stage cross-sectional study of students in universities and colleges of higher learning was conducted in Mwanza and Dodoma. A questionnaire was administered to a total of 910 undergraduate students. Medical bills were mainly paid out of pocket. Students' access to health care was affected by perceived quality of health services, long waiting at health facilities, opportunity costs of seeking care, self-diagnosis, frequency and type of illness. Cumbersome procedures from health care providers and limited benefits package discouraged the usage of health insurance cards by members of schemes. Thorough investigation is needed on the extent to which students who are members of health insurance are financially protected than non-members. Interventions should be implemented to establish targeted mechanisms to enrol students from poorest households into health insurance schemes.

Introduction

Health care coverage, particularly access to health care when it is needed, is crucial for human well-being. Health care is most essential to the economy as a whole and to economic growth in particular. In developing countries, the economic returns on investing in health are estimated at 24% of economic growth between 2000 and 2011, taking into account increases in both national income and life years gained (ILO, 2014). In sub-Saharan Africa about 80% of the population does not have access to health services (ILO, 2014). In Tanzania, problem of access to health care is coupled the prevailing challenges of communicable and non-communicable diseases are prevailing. Malaria, maternal (454 per 100 000 live births), perinatal, HIV/AIDS and respiratory infections/diseases remain the leading cause of morbidity and mortality. Exclusion in accessing health care is mainly attributed to poverty, unaffordable out-of-pocket medical expenditures, and poor quality of services.

The health sector is faced with inadequate financial resources from central government to improve the delivery and accessibility of quality health services. For poor households, when a member falls ill, access to treatment is a critical issue (Stoermer, Kessy & Widmer, 2013). Healthcare seeking is influenced by different dimensions of access, such as: availability, accessibility, affordability, adequacy, and acceptability of health services (Obrist et al. 2007). Health expenditures are major contributor to poverty in Tanzania by accounting for 4.2% of the poverty head count. Apparently, poor households have to mobilize all the resources (such as money, transport facilities etc.) required to access healthcare (Stoermer et al., 2013). This usually delays seeking treatment and or treatment is not initiated if the required resources are not obtained (Obrist et al., 2013). Thus, mechanism to finance the access to health care is vital and could have a major effect on poverty (World Bank, 2011).

To redress the challenges of access to care, an emerging goal of a national health financing system is to provide universal health coverage (UHC). The objective is to improve access to services by removing barriers to care and to ensure that sufficient resources exist to enable health care providers to deliver a basic package of high-quality health care services (World Bank, 2011). UHC is defined as securing access by the entire population to needed health services without financial hardship in paying for them (WHO, 2010). Choice of approaches to take in achieving UHC should be based on each country's economic status and level of development of tax systems and health systems. Developing economies due to their low tax-base recognize health insurance model as being more feasible and applicable to their countries' needs. The most common basis for health insurance contributions is the payroll deductions and individual/ household contributions. Health insurance provides two basic functions: access to effective health care services when needed, and effective protection of family income and assets from the financial costs of expensive medical care. Countries which adopted this approach into their health systems and successfully achieved UHC include Germany, Japan, Korea, and Taiwan. Ghana and Rwanda are among countries in Africa with good shows good progress in increase health coverage through health insurance.

The Government of Tanzania recognizes the potential of health insurance as a driver towards UHC. Currently, about 6.5 million people (about 15% of the population) are covered by all available health insurance schemes. Distribution of number of beneficiary members per scheme is as follows: Community Health Funds (CHF) 3.2 Million, National Health Insurance Fund (NHIF) 2.9 Million members, Social Health Insurance Benefit (SHIB) under National Social Security Funds 0.41 Million members, private health insurance companies 0.12 Million members and micro or mutual insurance organizations 0.04 Million members (URT, 2013). This implies that most of the country population is not covered by health insurance schemes, hence either excluded from heath care or pay for services out-of-pocket.

Having realized that human capital, more so one which is educated and healthy is central to socio-economic development; therefore, health well-being is indispensable for students' success at any level of education. In recent years, higher education has become increasingly important not only for the sake of enriched lives of individuals, enhanced status and greater earning power, but also for the sake of economic prosperity as well as advancement of democracy and social justice to the society at large (Johnstone, 2006). The huge role played by HEIs in development is evident in terms of training and research. The former by producing engineers, health scientists, teachers, policy makers, technologists etc, and the later through generating knowledge to contend with issues of food security, diseases, climate change, poverty etc. In spite of this universally recognized importance, HEIs are suffering from increasing austerity, manifested in such problems as overcrowding, capacity limitations which exclude qualified students from poor families, deteriorating infrastructures, soaring tuition fees and student debts (Johnstone, 2006). This austerity may be traced to some combination of factors such as inexorably rising of scholastic costs per-student, expansion of enrolment and cost sharing. The austerity rationale for cost sharing reflects the fact that the underlying costs of higher education are shared by the government, parents and students, as well as description of global policy trend of these costs being shifted from government to parents and students (Johnstone, 2006). Under the situation coupled with rising number of students enrolled in HEIs in Tanzania, it is important to understand how students in HEI deal with costs of medical care when needed. This study

examines the health care financing mechanisms available for students in HEIs, factors affecting students' access to care in the dimensions of accessibility, affordability, adequacy and acceptability based on their health insurance membership status.

Methods

Study area

This is study was conducted in Dodoma and Mwanza Regions in Tanzania. A cross-sectional survey of four universities namely the University of Dodoma, St. Johns University of Tanzania, St. Augustine University of Tanzania and Colleges of Business Education was conducted between November and January 2014. HEIs were selected based on their varied levels of enrolment, category of ownership (public or private) and category of HEIs (university or non-university college of higher education). Regions were selected based on rapid urbanization due to establishment of universities in the respective areas.

Sampling and sample size

Multistage sampling technique involving four stages was employed in the selection of the respondents for this study. The first stage involved purposive selection of Region as described above. The next stage was selection of HEIs. Third stage was the selection of year of study from which respondents were drawn. Under this item, students in their third year of study were targeted because it was believed that they had accumulated three year's experience with regards to health seeking and access than first and second year students in the respective campuses. The fourth stage was selection of respondents from third year students. Students in HEIs usually undertake compulsory courses and classes for such courses are usually large and representative of students from different academic programmes. Such classes were targeted for the survey. Third year students attending such classes were eligible to be respondent of the study. Students were asked for their willingness to participate in the study and those who gave their consent to participate in the study were selected. This resulted in a sample size of 910 students. A self-administered was administered to seek information regarding health care seeking, access and financing mechanisms.

Data analysis

Quantitative data were analysed to produce frequency distributions and cross-tabulations. Thematic content analysis was employed to analyse interview transcripts, relevant documents and observation notes in order to identify patterns of recurring themes and sub-themes in line with the research objectives.

Results

Out of 910 respondents who participated in the study, 390 were members of health insurance schemes while 520 were non-members (Table 1). With regard to source of financing the studies, 41.3% of the respondents were either supported their studies or financed by parents or guardians; 43.6% were beneficiaries of Higher Education Students Loans Board (HESLB); 8.8% were being sponsored by their employers. Results shows that 28% of privately sponsored students were members of health insurance while 50.8% were non-members. On part of students whose studies were financed by HESLB, 45.6% and 42.1% were members and non-members of health insurance respectively.

Table 1: Source of financing the study (N=910)

Sponsor	Members (N=390)		Non-members (N=520)		Total	
Private	112	28.7	264	50.8	376	41.3
HESLB	178	45.6	219	42.1	397	43.6
Employer	69	17.7	11	2.1	80	8.8
Other	32	8.2	26	5	58	6.4

Majority (50.8%) of respondents were members of the NHIF; 26.7% were members of CHF; 17.2% were members of SHIB; and all small proportion (5.4%) were insured with private health insurance companies (Table 2).

Table 2: Students' membership per type of health insurance scheme (N=390)

Name of scheme	Members	
	N	%
NHIF	198	50.8
CHF	104	26.7
SHIB	67	17.2
Private insurance companies	21	5.4

Results showed that most of the respondents who were member of health insurance schemes visited health facilities (hospital, dispensary or medical laboratory) (members 84%, 53% non-members); direct visit to pharmacy (members 63%, non-members 72%) while self-medication were done by 64% and 66% of members and non-members, respectively (Table 3). Out of 910 respondents, 21% of students with insurance cards did sleep off the sickness, a situation which was not much different with the non-members (28%). Results also showed that 10% and 14% of members and non-members respectively sought spiritual healing after they fell sick. A few number of respondents (3% health insurance members, 7% non-members) said they had visited traditional healers in the event of illness.

Table 3: Action first taken by students if fall sick

Parameter	Members (% of responses)	Non-members (% of responses)
Visit hospital/dispensary /lab	84	53
Direct visit to pharmacy	61	72
Self-diagnosis	64	66
Sleep off the sickness	21	28
Seek spiritual care (religious)	10	14
Traditional healer/herbal	3	7

Table 4 presents the three most common illnesses affecting students in their respective campuses. Malaria (842, 92.5%), Urinary Tract Infection (612, 67.3%) and Typhoid (477, 52.4%) were frequently self-reported diseases.

Table 4: Most frequently reported diseases (N=910)

Disease	N	% of responses
Malaria	842	92.5
UTI	612	67.3
Typhoid	477	52.4

Results indicate that respondents who were non-members of health insurance schemes reported a higher proportion of visits to health facility in the event of illness per semester than members (Table 5).

Table 5: Number of visits to health facility per semester (N=910)

Number of visits	Members (N=390)		Non-members (N=520)		Total	
	N	%	N	%	N	%
At least 1 per month	132	33.8	213	41	345	37.9
At least 2 per month	66	16.9	171	32.9	237	26
Once in 3 months	158	40.5	126	24.2	284	31.2
None	34	8.7	10	1.9	44	4.8

A total of 413 (45.4%) of respondents said that they usually paid for medical bills out-of-pocket compared to 11.2% whose medical bills were covered by health insurance. 15.1% of respondents said that their medical bills were covered by out-of-pocket payments and institution through medical capitation (see Table 6 below).

Table 6: Methods of payments for medical bills (N=910)

Payment method	N	% of responses
Cash at the point of service	413	45.4
Health insurance	102	11.2
Medical capitation	116	12.7
Cash and insurance	142	15.6
Cash and medical capitation	137	15.1

Regardless of their health insurance membership status, all respondents spent some amount of money in every event of seeking medical care (Table 7). Majority 688 (74.7%) of respondents reported to spend between 5,000/= and 20,000/= per event of seeking medical care. A few 37 (4.1%) reported to spend more than 20,000/= in the event of off seeking care.

Table 7: Costs per event of seeking medical care (N=910)

Amount (TShs.)	Members (N=390)		Non-members (N=520)		Total	
	N	%	N	%	N	%
Less than 5000	121	31	112	21.5	233	25.6
5000-10,000	149	38.2	232	44.6	381	41.9
10,000-20,000	103	26.4	156	30	259	28.5
More than 20,000	17	4.4	20	3.8	37	4.1

Students' access to health care was determined through examining the dimensions of access namely accessibility, affordability, adequacy and acceptability. Table 8 below shows students perceived barriers of access to health care.

Table 8: Dimensions of access to health care (N=910)

Dimension	Members (N=390)	Non-members (N=520)
	% of responses	% of responses
Accessibility		
Long distance to health facility	44	63
Poor means of transport	32	49
Long-time taken to health facility	47.7	50
Affordability		
High direct cots for drugs and treatment	41	32
Indirect costs (transport, unofficial charges)	45.5	26.6
Ability and willingness to pay	35.7	58.5
Adequacy		
Longer waiting time	22	49
Attitude of health workers	42	36
Health workers professional ethics	49	46
Diagnosis with appropriate tool	53	60.9
Medicines unavailable	33	45
Acceptability		
No prompt treatment	74.6	56.8
Students feel welcome and cared	48.7	42.9
Students trust on the competence of the health care providers	57.1	54

Discussion

This paper sought to highlight the mechanisms for financing health care for HEIs students and factors affecting students' access to health services in the dimensions of accessibility, affordability, adequacy and acceptability based on their status of membership in health insurance schemes. First, sources of financing the studies were identified. Generally, results showed that majority of students were either sponsored by HESLB, parents or themselves. Majority of students who participated in this study were not members of any health insurance scheme. For those who were members of any scheme, many of the respondents were members of the NHIF. Their membership was either because were employed or were secondary beneficiaries of the principal member. Analysis of action first taken by respondent when they fell sick did not show significant difference between students with health insurance cards and those without insurance. The tendency of the members of health insurance to visit direct to pharmacies denies them their right to utilize membership benefits because at pharmacy services are rendered after submission pf the prescription forms from authorized hospital, dispensary or health centre. Some student did visit health facilities for religious reasons hence they sought spiritual care during sickness. Other action reported by students such as sleeping off the sickness and self-medication was fatal to their health. In terms of medical expenditures, all respondents including those with insurance cards reported to pay for varied medical costs out of pocket at the point of service.

Many of the respondents mentioned that excessive waiting time at facilities due formal procedures and long queue negatively affect insured students' expectations for quality of care. Some students would ether not seek health care, do self-treatment or not using insurance cards and hence for pay for services out- of-pocket because they fear to miss academic obligations and/or longer time taken to receive treatment. Factors for not join health insurance and or not using insurance cards among members as highlighted by respondents was inherent perception that quick medical services is through paying for medical bills by cash at point of service. Barriers to adequate use of health services included restricted usage of CHF cards as the cards were not applicable outside the regions in which were issued. Respondents also showed their concerns about the attitude and ethics of some health workers on the aspect of leakage of patient information. Apparently, such unethical behaviour of some health care workers added to barriers limiting patient access to healthcare services.

In conclusion, relatively little research has been done to examine the financing mechanisms for healthcare services among students in HEIs. Results this study provide lessons for policy makers and implementers towards efforts to achieve universal coverage in health in parallel with the implementation of the Sustainable Development Goals number four and its associated targets which aim at ensuring equal access to affordable and quality education for all at all levels including higher education. At the time of rising enrolment in HEIs in Tanzania, healthcare is crucial for the wellbeing and academic welfare of students in order for them to acquire the knowledge and skills. Quality education will be realized if students are in state of good health. Impetus is needed address non-financial barriers of access to medical services. Thorough investigation is needed on the extent to which students who are members of health insurance are financially protected than non-members. Interventions should be implemented to establish targeted mechanisms to enrol students from poorest households into health insurance schemes.

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Nonodontogenic tumours and tumour-like lesions of the oral and maxillofacial region among patients attending Muhimbili National Hospital, Tanzania

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Abstract: Nonodontogenic tumours and tumour-like lesions of the oral and maxillofacial region represent a large heterogeneous group of diverse diseases that causes difficulties in definitive diagnosis, classification and institution of appropriate management. Little is known about these tumours in Tanzania. The purpose of this study was to investigate the occurrence, the clinical and pathologic characteristics of nonodontogenic tumours and tumour-like lesions and their management. Prospective, descriptive and cross-sectional hospital based study conducted at Muhimbili National Hospital (MNH) from 1st July 2013 to February 2014. 165 patients were recruited into the study. These were then interviewed, clinically examined and the findings were recorded in special forms and analyzed using Statistical Package for Social Sciences (SPSS) for windows version 19.0. A total of 490 patients who attended the Dental outpatient department and those who were admitted in wards with oral and maxillofacial lesions were biopsied. Among these, 165(33.7%) had histological diagnosis of nonodontogenic tumours and tumour-like lesions. Ossifying fibroma was the commones benign nonodontogenic tumour affecting 23(27.4%) patients. Squamous cell carcinoma was the commonest malignant nonodontogenic tumour. Almost all benign nonodontogenic tumours and tumour-like lesions presented with swelling, followed by disfigurement and pain. Majority (90.1%) patients with malignant nonodontogenic tumours presented with swelling while others had lymphnode involvement. Conservative surgical excision was the commonest treatment modality for benign lesions while palliative radiotherapy was the commonest modality for treating malignant lesions. Generally, males were slightly more affected than females. However, benign nonodontogenic tumours and tumour-like lesions affected more females while malignant counterparts affected more males than females. Ossifying fibroma was the commonest encountered benign nonodontogenic tumour while squamous cell carcinoma was the commonest malignant nonodontogenic tumours.

Introduction

Nonodontogenic tumours of the jaw originating from bone and its mesenchymal tissue represent a large heterogeneous group of diverse diseases. They arise from orofacial connective tissues other than the dental lamina or its derivatives. Due to significant characteristics, they differ from bone tumours seen elsewhere in the skeleton and also due to their many forms yet similarity; the diagnosis of jaw tumours is often very difficult (1). The importance of nonodontogenic tumours lies in the fact that they are rare, cause disfiguring of the face necessitating subsequent reconstructive surgery (3). The diversity of nonodontogenic tomours may cause difficulties in their definitive diagnosis, classification and institution of an appropriate management. This may result into either undertreatment or overtreatment (4,5).

Classification of nonodontogenic tumours whether benign or malignant utilizes the concept of histogenesis or tissue of origin in defining them (4). Benign nonodontogenic tumours are new growths resembling the tissue of origin which have insidious onset. They are usually painless and do not metastasize. These tumours can be subclassified into fibro-osseous lesions, those containing multinucleated giant cells (central giant cell granuloma, giant cell tumour), langerhans cell disease, osteoma, osteoid osteoma, chondroma, exostosis and central haemangioma. Others include: fibrohistiocytic, lipomatous, smooth muscle, skeletal muscle, endothelial and neuronal lesions (6). Malignant nonodontogenic tumours of the jaw bones can be categorized into primary and secondary tumours. Primary tumours begin in the bone tissue while the secondary ones are metastatic bone tumors. They are rare compared with malignant nonodontogenic tumours of soft tissues which account for less than 1% of cancers in this area. Despite the infrequent occurrence of these entities, a diagnosis of malignant nonodontogenic tumour has serious prognostic implication, often signaling a treatment plan requiring major therapeutic intervention (4). Like in benign lesions, malignant nonodontogenic tumours utilize the concept of histogenesis or tissue of origin in defining them. In this classification, benign lesions have their malignant counterparts such as sarcomas. Others include lymphomas, metastatic carcinomas and squamous cell carcinoma (4,6).

Tumour-like lesions are considered to be non-neoplastic lesions which occur in the oral and maxillofacial region. They can be vascular proliferation such as pyogenic granuloma (7), reactive lesions from local irritations as in peripheral giant cell granuloma (8) or hyperplasia of fibrous connective tissue that develops in association with the flange of an ill-fitting denture as in the epulis fissuratum (9), and some hormonal reaction during pregnancy causing pregnancy tumour (10). Therefore, there is a need of studying these tumours in order to be able to know them in terms of histopathological, clinical characteristics and treatment modalities. These tumours and tumour-like lesions constitute a major health problem because affected patients usually present late in the course of the disease with advanced tumours and as a result this increases the morbidity and mortality of the disease. Several studies on maxillofacial tumours indicated odontogenic tumours to be more common compared to nonodontogenic tumours (11,12,13,14). The occurrence of nonodontogenic tumours in Africa has been seen to vary among different countries. In a Ugandan study, only 8.3% of 610 specimens were reported to have been benign nonodontogenic tumours, the most frequently diagnosed malignant lesions were Burkitt's Lymphoma (BL) (55.24%) (15). In a Nigerian study, 81.6% of tumours were nonodontogenic of which 42.5% were benign, and 39.1% were malignant (5). A study in Ghana reported 18.1% nonodontogenic tumours and tumour-like lesions (16). In Tanzania, however, a report from 148 oral and maxillofacial tumours surgically treated at Muhimbili National Hospital revealed that 31.0% were nonodontogenic tumours which included ossifying fibroma (12.8%), giant cell tumour (7.4%), fibrous dysplasia (6.1%) and haemangioma (4.7%) (17). Furthermore, Kalyanyama et al.2002 reported that 32.4% of all the oral malignancies studied were BL and the benign lesions comprised of mainly ossifying fibroma (17.6%) (18).

Nonodontogenic tumours and tumour-like lesions affect all age groups. However, there are some types of tumours seen only in specific age groups for example BL has been found to be the most common lesion in children and adolescents in tropical countries, occurring during the first decade of life (19). A study done in Iran on oral tumours and tumour-like lesions reported that 50.7% of the lesions were

benign nonodontogenic tumours and were common in adolescents (2). Unlike malignant nonodontogenic tumours, benign nonodontogenic tumours like ossifying fibroma and cemento-osseous dysplasia tend to occur over a wide age range. They present mostly during the 3rd and 4th decades of life. However, other lesions like central giant cell granuloma were often found in young adults before 30years (20).

The distribution of nonodontogenic lesions has been reported to show gender predilection. For example, a study on benign jaw tumours in Kenya reported a higher incidence of cement-osseous dysplasia in females while gender prevalence was seen to have been equal in fibrous dysplasia in the same study (3). In a Brazilian survey, a similar prevalence in nonodontogenic maxillofacial tumours was reported in 53.0% females and 47.0% males (21).

Oral and maxillofacial nonodontogenic tumours and tumour-like lesions have characteristically been documented to have a predilection for the entire facial region and they are seen commonly in oral and maxillofacial surgery practice. Studies done in Jordan (11,22) and Japan (3) revealed that the mandible was the most common site of nonodontogenic tumours. The most common site of soft tissue tumours was the lower lip (14.5%) (22).

Benign nonodontogenic tumours may initially have no symptoms until they grow much larger and involve other structures. Malignant lesions generally grow by progressive infiltration, invasion, destruction, and penetration of the surrounding tissues and may cause pain. They usually grow very fast and have an unlimited growth, therefore, attaining massive size if no intervention is attempted (23,24). They weaken the patient because of either failure to eat or because of the high metabolic rate associated with their growth (24).

Surgical modalities vary from excision, enucleation, curettage, en bloc excision or radical resection which is tailored for adequate treatment of these tumors. For small lesions involving the soft tissue, primary surgical excision can be carried out. For those lesions involving the bone, surgical excision, curettage or en bloc resection may suffice. For massive lesions involving the mandible, radical resection in the form of partial mandibulectomy or total mandibulectomy may be required (25,26).

Appropriate chemotherapy or radiotherapy is recommended for patients with malignant nonodontogenic tumours. Remission after chemotherapy is highly observed for example in BL. However, for advanced unresectable, residual or recurrent malignant lesion, radiotherapy and/or chemotherapy is given as palliative treatment (27,28). Jaw metastases are usually evidence of widely disseminated disease, and palliative treatment is aimed at eliminating pain, and preserving function. Palliation may involve surgical excision of metastatic deposits, radiation therapy, chemotherapy, or radiochemotherapy (29,30).

The management of nonodontogenic tumours and tumour-like lesions in Tanzania and many African countries, however, is more challenging mainly due to the fact that patients tend to present very late with large tumours that require extensive surgery, leaving them with large defects that lead to severe disfigurement and poor quality of life (15,18). Socio-economic factors also determine for a large part the

level of health care. This factor increases the morbidity and mortality of patients with nonodontogenic tumours and tumour-like lesions (18). Data on the prevalence of nonodontogenic tumours and tumour-like lesions is scarce both in Tanzania and around the world. It was therefore, the objective of this study to investigate the occurrence, clinico-pathological characteristics and management of nonodontogenic tumours and tumour-like lesions of the oral and maxillofacial region among patients attending the Muhimbili National Hospital in TanzaniaH.

Materials and Methods

This was a prospective, descriptive and cross-sectional hospital based study that was conducted at Muhimbili National Hospital (MNH) from 1st July 2013 to February 2014. About 490 patients who were attended to MNH with oral and maxillofacial lesions were histopathologically investigated. Out of these, 165 patients were confirmed to have had nonodontogenic tumours and tumour-like lesions and were recruited into the study. These were then interviewed using a specially designed questionnaire to obtain socio-demographic information, chief complaints and nature of symptoms. Later the patients were thoroughly clinically examined, investigated and the findings were recorded in special forms. Management was given according to the MNH protocol. The collected data were entered into a computer and analyzed using Statistical Package for Social Sciences (SPSS) for windows version 19.0.

Results

A total of 490 patients who attended the Dental outpatient department and those who were admitted in wards 19,20,23 and 24 with oral and maxillofacial lesions were biopsied during this study period. Among these, 165(33.7%) had histological diagnosis of nonodontogenic tumours and tumour-like lesions and 61(12.5%) had odontogenic tumours. The rest 264(53.9%) patients had conditions other than nonodontogenic tumours and tumour-like lesions which included cysts, inflammatory conditions and salivary gland tumours.

Table 1. Distribution of study participants according to age groups and gender

	Gender		**Total**
Age group	Male	Female	
0-9	12(7.3%)	11(6.7%)	23(14.0%)
10-19	16(9.7%)	11(6.7%)	27(16.4%)
20-29	10(6.1%)	16(9.6%)	26(15.7%)
30-39	8(4.8%)	18(10.9%)	26(15.7%)
40-49	5(3.0%)	17(10.3%)	22(13.3%)
50-59	8(4.8%)	7(4.2%)	15(9.0%)
60+	16(9.7%)	10(6.1%)	26(15.8%)
Total	75(45.5%)	90(54.5%)	165(100.0%)

The age of the 165 study participants who included 75(45.5%) males and 90(54.5%) females ranged from 1 to 95 years (mean age = 34.38years ± 21.9SD). The age group 10-19-year was the most affected. Ossifying fibroma was the commonest encountered benign nonodontogenic tumour that affected 23(27.4%) patients, majority of them in the 10-39-year age group. Squamous cell carcinoma was the commonest encountered malignant nonodontogenic tumour that affected 29(35.8%) patients followed by

nonhodgkin lymphoma in 19(23.4%) patients. Squamous cell carcinoma occurred in almost all age groups except the 0-19-year age group and it affected more males than females.

Table 2. Distribution of benign nonodontogenic tumours and tumourlike lesions according to age group and gender

Histological diagnosis	Age group and Gender														Total
	0-9		10-19		20-29		30-39		40-49		50-59		60+		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Cystic hygroma	4	1	-	-	-	-	-	-	-	-	-	-	-	-	5(5.9%)
Epulis	-	-	-	-	-	1	-	-	-	1	-	-	-	-	2(2.4%)
Fibroma	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1(1.2%)
Haemangioma	-	1	1	2	1	-	1	-	1	-	-	-	2	-	9(10.7%)
Haemangiopericytoma	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1(1.2%)
Lipoma	-	-	-	-	-	-	-	1	-	-	-	-	-	1	2(2.4%)
Lymphangiofibroma	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1(1.2%)
Lymphangioma	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1(1.2%)
Neurofibroma	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1(1.2%)
Neurofibromatosis	1	3	-	-	-	2	-	1	1	-	-	-	-	-	8(9.5%)
Periph. giant cell gran.	1	-	-	-	-	1	1	-	-	1	-	-	-	-	4(4.8%)
Pyogenic granuloma	-	-	2	-	-	2	-	-	-	4	-	-	1	-	9(10.7%)
Schwannoma	-	-	2	-	-	-	-	-	-	1	-	-	-	-	3(3.6%)
Ossifying fibroma	-	1	5	2	3	1	1	8	-	1	-	1	-	-	23(27.4%)
Cent. giant cell granul.	2	1	-	-	-	2	-	-	-	-	-	-	-	-	5(5.9%)
Chondrofibromyxoma	-	1	-	-	-	1	-	-	-	-	-	-	-	-	2(2.4%)
Fibrous Dysplasia	-	1	1	1	-	-	-	1	-	1	1	1	-	-	7(8.3%)
Subtotal	8	10	11	8	4	10	3	11	2	10	1	2	3	1	
Total	18(21.4%)		19(22.6%)		14(16.7%)		14(16.7%)		12(14.3%)		3(3.5%)		4(4.7%)		84

The mandible was slightly more affected than the maxilla by benign nonodontogenic tumours and tumour-like lesions. Almost all benign nonodontogenic tumours and tumour-like lesions presented with swelling in 83(98.8%) patients followed by disfigurement and pain. The buccal mucosa was the most affected site by 63(77.8%) malignant nonodontogenic tumours and tumour-like lesions. Majority (90.1%) patients with malignant nonodontogenic tumours and tumour-like lesions presented with swelling while 46(56.8%) patients had lymphnode involvement. Conservative surgical excision was the commonest treatment modality used for treating the patients (78.5%) with benign lesions. The commonest modalities for treating malignant lesions were palliative radiotherapy in 30(36.0%) patients.

Table 3. Distribution of malignant nonodontogenic tumours according to age group and gender

Histological diagnosis	Age group and Gender														
	0-9		10-19		20-29		30-39		40-49		50-59		60+		Total
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Dermatofibrosarcoma	-	-	-	1	-	-	-	-	1	-	-	-	-	-	2(2.5%)
Fibrosarcoma	-	-	-	-	-	1	1	-	-	-	-	-	-	-	2(2.5%)
Kaposis sarcoma	1	-	-	-	1	2	-	2	-	-	-	-	-	-	6(7.4%)
Malignant melanoma	-	-	-	-	-	-	-	-	-	-	-	1	1	-	2(2.5%)
Malignant schwannoma	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1(1.2%)
Malign. fibrohistiocyt.	-	-	1	-	-	-	-	-	-	-	-	-	1	-	2(2.5%)
Multiple myeloma	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1(1.2%)
NonHodking lymphoma	1	1	2	-	1	1	2	3	1	4	1	1	-	1	19(23.4%)
Plasmacytoma	-	-	-	1	-	-	-	-	-	-	-	1	1	-	3(3.7%)
Rhabdomyosarcoma	2	-	1	-	-	-	-	-	-	1	-	-	-	1	5(6.2%)
Sq.cell carcinoma	-	-	-	-	1	-	2	2	-	1	5	2	9	7	29(35.8%)
Verrucous carcinoma	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1(1.2%)
Osteosarcoma	-	-	1	-	3	2	-	-	1	-	-	-	-	-	7(8.6%)
Chondrosarcoma	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1(1.2%)
Subtotal	4	1	5	3	6	6	5	7	3	7	7	5	13	9	
Total	5(6.2%)		8(9.8%)		12(14.8%)		12(14.8%)		10(11.9%)		12(14.8%)		22(27.2%)		81(100%)

Discussion

This study focused on the relative frequencies of different nonodontogenic tumours and tumour-like lesions, their histopathological and clinical characteristics together with their treatment modalities. A fairly large number of these tumours were found exhibiting diversity in presentation and a very challenging management. Results revealed that males were slightly more affected by nonodontogenic tumours and tumour-like lesions than females. The male preponderance encountered in this study was in agreement with what has been reported in other African studies (31,32). However, benign nonodontogenic tumours and tumour-like lesions affected more females than males while the malignant counterparts affected slightly more males than females.

It was observed in this study that benign nonodontogenic tumours and tumour-like lesions generally affected individuals younger than 50 years of age stretching from the 1st to 5th decade of life. The occurrence of these lesions decreased with increasing age of the patients. Although young patients were affected by malignant nonodontogenic tumours, the frequency of occurrence of these lesions increased with increasing age of the study participants. The lesions were dominated by squamous cell carcinoma that affected patients belonging mostly to the 50 years and above age group while nonhodgkin lymphomas involved almost all age groups.

Benign nonodontogenic tumours and tumour-like lesions occurred more frequently than their malignant counterparts. This is in concurrence with other studies done elsewhere (5,33,34,35) which showed that there were more benign than malignant nonodontogenic tumours. They affected almost all age groups majority aged between 0-39 years. However, a decrease in occurrence of the benign lesions was noted as the age of the patients increased. This study showed that all benign nonodontogenic tumours and tumour-

like lesions presented with swelling and a few with pain. The small number of lesions which caused pain could be in line with the fact that benign nonodontogenic tumours and tumour-like lesions do not initially present with symptoms until they grow much larger and cause pressure effect to neurovascular bundles and thus pain which occurred in the few patients in this study (23). Some of the patients presented with disfigurement and this could have been the reason for coming to hospital. This is similar to findings in other studies which reported that patients presented to hospital with massive tumours either after finding that there was impairment with esthetics and vital functions or when there was infection and pain (18,33,36). In this study generally, the mandible was the most affected site by hard tissue benign nonodontogenic tumours and tumour-like lesions followed by the maxilla whereas soft tissue benign nonodontogenic tumours and tumour-like lesions were mostly encountered in the buccal mucosa and gingiva. These findings tallied with what has been reported in other studies worldwide (5,11).

Ossifying fibroma was the commonest encountered benign nonodontogenic tumour that affected more females than males with majority of them belonging to the 10-39-year age group. These results were similar to findings in another study (20) which reported that ossifying fibroma and fibrous dysplasia tended to occur over a wide age range with majority presenting during the 3rd and 4th decades of life (20). This study showed that the maxilla was very slightly more affected by ossifying fibroma than the mandible. This was contrary to another study (37) that reported that among the craniofacial bones, the mandible was the most commonly involved site, typically inferior to the premolars and molars (37). All ossifying fibroma lesions presented with a swelling and a few patients reported facial disfigurement as their concern. Clinically the lesion presented as a bony hard swelling similar to fibrous dysplasia which also presents similary. Generally, there was no single or group of clinical symptoms that was diagnostic for a particular benign nonodontogenic tumours and tumour-like lesion.

This study showed that squamous cell carcinoma was the commonest encountered malignant nonodontogenic tumour affecting about 36% of patients. Such results are low when compared to findings in another report which presented a prevalence of 50% of squamous cell carcinoma (17). Majority of patients with squamous cell carcinoma were aged 50 years and above with males having been more affected than females. This was in agreement with other studies (20,38) which reported that squamous cell carcinoma was commonly seen in the 6th and 7th decades of life with a male predominance. Majority of squamous cell carcinoma lesions presented in advanced stages. Similar results have been reported by other studies in the African continent and elsewhere (39,40,41,42). Squamous cell carcinoma was malignancy whose site of affection was so diverse that lesions were widely distributed in the oral mucosa. The commonest affected sites by squamous cell carcinoma in this study included the buccal mucosa and floor of the mouth which is in concurrence with studies done in Nigeria, Zimbabwe and India where the mandibular gingivae and the buccal mucosa were reported to have been the commonest affected sites (20,32,43). Majority of the lesions presented with ulceration, pain and involvement of the regional lymphnodes. Some of the ulcers were infected, giving offensive smell. Other affected sites in this study were the lips, tongue, lingual mucosa, mandible, maxilla and palate.

Osteosarcoma was seen in young patients aged 20-29years affecting more males and with nearly equal involvement of the mandible and maxilla. Other studies have reported similar findings (44,45). Osteosarcoma of the jaws is a challenging lesion in many ways. The tumor is very deforming because it grows very fast and to massive sizes and it occurs in an anatomical region that defines an individual the most and, therefore, any deformity here affects the individual in many areas of life. Jaw swelling, pain, teeth mobility and displacement appeared to be clinical presenting features common for osteosarcoma because all patients had similar presentation. However, with delayed treatment, disfigurement is a common feature for osteosarcoma.

A few cases of oral Kaposi's sarcoma (KS) were observed in this study affecting mainly females aged 20-39 years. Remarkably, it was revealed that all patients with oral KS were HIV positive. This favoured the diagnosis of AIDS-related (Epidemic) KS that usually develops in people infected with the human immunodeficiency virus (46). Although KS affected several intraoral sites, the palate had the highest frequency of affection. These findings tallied with studies in Kenya and India which reported the palate to have been the commonest site for KS among HIV positive patients (11,47).

Although the occurrence of lymphomas in this study was lower when compared to other studies worldwide (48) it was higher than that reported in Iran (49,50). The female predominance with a wide age range of occurrence involving all age groups are in line with findings reported in other studies done elsewhere (51,52). The most common encountered lymphoma was the nonhodgkin lymphoma (NHL). Types of nonhodgkin lymphoma that were commonly seen in this study were large B cell lymphoma and malignant lymphoma. These findings were contrary to other studies in East Africa where BL was the commonest NHL (53,54). More than a quarter of the patients with NHL in this study were found to have been HIV positive. This tallied with another study that reported similar findings (52). With the emergence of HIV infection, HIV infection-associated lymphomas are now encountered with increased frequency in the oral and maxillofacial region and have been accompanied by a distinct shift to predominantly high-grade tumours and a positive correlation with the Epstein Barr Virus (EBV) in the lesion (52,55). NHL involved multiple sites. It was found to involve the buccal mucosa, floor of the mouth, palate, mandible, lingual mucosa, maxilla and lips. Clinically it presented as a diffuse swelling with pain in a few patients and ulceration in only one patient. Research has shown that in most cases, NHL presents as a mass or an ulcerated mass and resembles squamous cell carcinoma or salivary neoplasm (51,54). Swelling, pain, numbness of the lip and pathologic fracture may be associated with bone lesions (51). Almost half of the patients had lymphadenopathy.

All malignant nonodontogenic tumours were observed involving either the mandible or the maxilla. However, these lesions besides affecting the jaw bones they also involved other several sites. Therefore, it was difficult to exactly pinpoint the site of origin in majority of the lesions.

The definitive treatment of choice for most benign nonodontogenic tumours and tumour-like lesions is surgical excision (33,36). In this study all benign nonodontogenic tumours and tumour-like lesions except haemangiopericytoma, cystic hygroma, schwannoma and chondrofibromyxoma were treated by conservative

surgical excision. Though they are benign chondrofibromyxoma and haemangiopericytoma were subjected to maxillectomy with adjuvant radiotherapy and combined adjuvant chemoradiotherapy respectively. The biological behavior of hemangiopericytoma is unpredictable. It is capable of both local recurrence and malignant transformation. Unfortunately, there are no reliable histologic criteria that can be used to predict the clinical course, thus both radiotherapy and chemotherapy seem effective and are recommended in all patients with incomplete and/or large, locally invasive tumours (4,56). Chondrofibromyxoma was subjected to multiple modes of treatment based on the fact that it has high recurrence rate and malignant transformation (4).

Wide surgical excision with either adjuvant radiotherapy and or chemotherapy was done only in a few patients with malignant nonodontogenic tumours because the patients presented late with already extensive lesions which did not warrant surgery alone. The treatment of squamous cell carcinoma is usually wide surgical excision with adjuvant radiotherapy. However, due to advanced stages of the lesions only four patients were treated using this modality in this study. The majority of patients were referred to Ocean Road Cancer Institute where they received palliative radiotherapy while others were kept on palliative chemotherapy. A few were surgically treated and sent for adjuvant radiotherapy. Palliative radiotherapy was applied in a few cases of malignant melanoma and verrucous carcinoma. This reflected the late reporting by the patients with advanced lesions and possible metastasis. Verrucous carcinoma when discovered early and promptly treated is curable. Nevertheless, delay as it was seen in the only case in this study could lead to transformation to invasive carcinoma. This patient received palliative radiotherapy because the lesion was so extensive involving both the upper and lower lips which was not amenable to surgery. Malignant melanoma patients in this study presented with disseminated disease thus surgery which is the main treatment modality was not feasible. Palliative radiotherapy in most cases is used as a treatment modality for unresectable and or advanced lesions with dissemination and aims at eliminating pain and preserving function (27,57,58).

Curative chemotherapy was used as a sole treatment modality in all patients with KS and NHL. All patients with KS underwent curative chemotherapy together with antiretroviral (ARV) therapy because of the multiplicity of the lesions, the advanced stages of the disease and immune status of the patients. This is in line with other studies done in Africa (27,28,46). All patients with NHL except one who declined treatment were treated by curative chemotherapy. Remission after chemotherapy is highly observed in patients with NHL (27,28). Wide surgical excision is the mode of treatment recommended in the management of malignant nonodontogenic tumours (20,57). However, this was not practical in this study because of late reporting by patients with advanced stages and extensiveness of the lesions. Surgery was not feasible taking into consideration the quality of life of the patients after the surgery.

Conclusion

Generally, males were slightly more affected by nonodontogenic tumours and tumour-like lesions than females. However, benign nonodontogenic tumours and tumour-like lesions affected more females while malignant counterparts affected more males than females. Ossifying fibroma was the commonest encountered benign nonodontogenic tumour and it affected more females than males. Malignant nonodontogenic tumours and tumour-like lesions affected young patients and the occurrence of these lesions increased with increasing age of the patients. Squamous cell carcinoma that dominated malignant nonodontogenic tumours and tumour-like lesions in this study affected patients aged 50 years and above while nonhodgkin lymphoma the second commonest affected almost all age groups. Majority of benign nonodontogenic tumours and tumour-like lesions were treated by conservative surgical excision alone. As a result of late reporting, only a few patients with malignant nonodontogenic tumours and tumour-like lesions were treated by wide surgical excision alone while majority of them were treated by either palliative, curative or adjuvant chemotherapy/ radiotherapy.

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Analysis of Tanzania Biosafety Regulatory System and its implications

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Abstract: Biosafety is the prevention of large-scale loss of biological integrity, focusing both on ecology and human health. The ultimate goal of biosafety is to enhance safe and responsible use of new biotechnologies, thus optimize benefits and reduce risks. Tanzania is a signatory to the Cartagena Protocol for Biosafety (CPB), which offers a set of guidelines for regulating safe handling and use of Genetically Modified Organisms (GMOs). In line with the protocol requirements, the country has developed a regulatory framework to guide development and use of GMOs in the country. This paper analyses the status of the national biosafety system and also serves to test the suitability of the framework. Specific objectives of the paper are to: i) Examine the organization and operation of Tanzania's national biosafety system, (ii) Characterize existing policies, regulations, and capacities for regulatory management and decision making (iii) identify areas for further development, and iv) Develop a set of recommendations that can increase capacities for meeting national obligations under the Cartagena Protocol for Biosafety, and foster greater biosafety awareness and understanding among stakeholders and the general public.

Introduction

The need to address world hunger and ensure food and nutritional security has long been at the forefront of the international agenda and biotechnology is one of the new innovations that can contribute to efforts of addressing world hunger (FAO, 2004; Cohen, 2005). At the 2002 World Food Summit, following several decades of unmet goals on eliminating hunger, food insecurity and malnutrition, the Food and Agriculture Organization (FAO) endorsed biotechnology as one of the tools that can address hunger and contribute to poverty reduction and food security in developing countries by increasing production and productivity in *agriculture,* forestry and fisheries (FAO 2000, FAO 2004). However, FAO and other development agencies including WHO are also aware of the concerns about the potential risks posed by genetic engineering. Genetic engineering is an advanced form of biotechnology that involves the transfer of genes within and between species. This ability to create a new living organism has generated a lot of useful products but also raised concerns/risks. These risks fall into two basic categories: the effects on human and animal health and the environmental consequences, including impacts on biodiversity.

It is on the basis of these concerns that an internationally binding Biosafety Protocol to regulate the safety of international trade in GMOs was adopted under the auspices of the UN Convention on Biological Diversity on 29th January 2000 (CPB, 2000). Biosafety is the prevention of large-scale loss of biological integrity, focusing both on ecology and human health. The ultimate goal biosafety is to enhance safe and responsible use of new biotechnologies, thus optimize benefits and reduce risks.

In a bid to exploit the potential benefits of modern biotechnology while safeguarding against potential risks, Tanzania have signed and ratified the convention on Biological Diversity (CBD, 1992) as well as the Cartagena Protocol on Biosafety (URT 2008). Countries that are a party to these International agreements are required to take appropriate legal, administrative and other measures to ensure that development, handling and utilization of GMOs is undertaken in a manner that reduces the risks to biological diversity.

In view of this, Tanzania established in 2007 a National Biosafety Framework (URT 2007) to regulate Genetically Modified (GM) introductions in the country and provide measures to address the potential environmental and health consequences of such releases. This paper analyses the status of the national biosafety system and also serves to test the suitability of the framework. Specific objectives of the paper are to: i) Examine the organization and operation of Tanzania's national biosafety system, (ii) Characterize existing policies, regulations, and capacities for regulatory management and decision making (iii) identify areas for further development, and iv) Develop a set of recommendations that can increase capacities for meeting national obligations under the Cartagena Protocol for Biosafety, and foster greater biosafety awareness and understanding among stakeholders and the general public.

Biotechnology Policy and GM Regulation in Tanzania

Tanzania is a signatory to the Convention on Biological Diversity and ratified the Cartagena Protocol on Biosafety (CPB) on 16th March 2003 (URT 2008). The CPB is an international agreement designed to regulate the trade, handling and use of any GMO that may have adverse effects on the conservation and sustainable use of biological diversity, taking also into account risks to human and animal health. The signatories to the CPB are required to establish and make certain that the national legislations are in line with the protocol requirements. To ensure that Tanzania has the capacity and capability to undertake biotechnology activities in a sound and safe manner the government developed the following policy and legal instruments:

National Biotechnology Policy, 2010

The Tanzania Government in consultation with all major stakeholders developed the National Biotechnology Policy in 2010 that provides guidelines towards safe applications of biotechnology in research and as well as the provision of biotechnology-based products and services in all sectors of the economy (URT, 2010a). The general objective of this policy is to ensure that Tanzania has the capacity and capability to capture the proven benefits arising from GM technology in a safe and sustainable manner.

The Environmental Management Act, 2004

The Tanzanian Government established biosafety regulatory system using the authority established in the Tanzania Environmental Management Act, 2004. The Act provides legal authority and empowers the minister responsible for environment, in consultation with sector ministries to make regulations, issue guidelines and prescribe measures for the regulation of GMOs and their products in Tanzania (URT 2004a).

National Biosafety Legal Framework, 2007

Enactment and operationalization of the Environmental Management Act of 2004 paved the way for the

establishment in 2007 the National Framework for Biosafety in the country. The NBF is a combination of policy, legal, administrative and technical instruments that are set in place to guide the safe use of GM technologies was established in 2007. The framework also provides mechanisms for public awareness and participation (URT, 2007).

To effectively regulate GMOs and implement the biosafety activities in Tanzania, the government published under EMA 2004 its biosafety regulation titled "Environmental Management (Biosafety) Regulations, 2009". These regulations set forth the rules, guidelines and procedures for ensuring safety of GMOs in Tanzania (URT, 2009). Using the provisions provided in the regulations, the ministry responsible for the environment established the following organs/committees:

National Focal Point for Biosafety (NBFP)

The National Biosafety Focal Point (NBFP) which is the Ministry responsible for environment oversees the implementation of biosafety issues and co-ordinate, monitor and control the implementation, and enforcement of the provisions of the National Biosafety Regulations.

National Biosafety Committees (NBC)

The NBC is an independent body of experts established to review applications on modern biotechnology. The committee is also responsible for advising the NBFP and other institutions involved in genetic engineering on policy and other biosafety issues.

Competent authorities (CA)

Competent authorities are committees established under each ministry involved in genetic engineering and are responsible for reviewing GM application and advising the NBC.

Institutional Biosafety Committee (IBC)

The Institutional Biosafety Committees (IBCs) are established in institutions involved in genetic engineering and are tasked to review GM applications and evaluate and monitor the biosafety aspects of their Institutes/researches.

The regulations also has provisions for review and approval process for GM applications for contained research, confined trials and environmental release (Figure 1); risk assessment and risk management; liability and redress; and socioeconomic assessment.

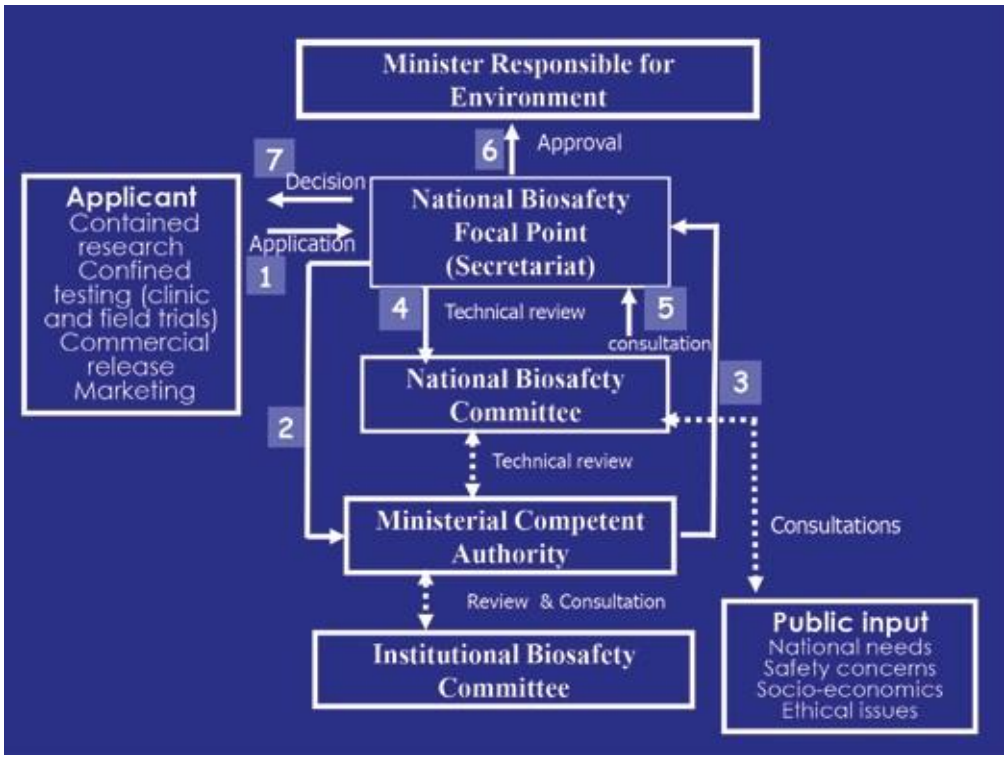

Figure 1: Decision making structure for biosafety regulations in Tanzania

Biosafety Guidelines and Manuals

To effectively implement the biosafety issues, the government using the legal authority provided by the Environmental Management Act of 2004 and Environmental Management (Biosafety) Regulations of 2009 developed the following manuals and/or guidelines:

- National Biosafety Guidelines, 2004 (URT, 2004b)
- Practical Manual for Safe Conduct of Confined Field Trials, 2010 (URT, 2010)
- Manual for Emergency Measures/ Response, 2012 (URT, 2012a)
- Biosafety Inspector's Manual for Confined Field Trial Requirements in Tanzania, 2012 (URT 2012b)
- A Guide to a Safe Conduct of Laboratory and Greenhouse Research with Genetically Modified Organisms (GMOs), 2012 (URT, 2012c)
- Manual on Procedures for Handling Requests for Applications of Genetically Modified Organisms (GMOs) in Tanzania, 2010 (URT 2010c)
- Manual for GMO Testing, 2010 (URT, 2010d)
- Manual for Risk Assessment and Management, (2010e)
- Manual for Environmental Release of GMO… (in preparation)

Biosafety Centre of Excellency

Tanzania, like many other African countries, has very limited capacity in biosafety. Very few institutions have all the capacity to successfully carry out all agreed tasks under the Cartagena Protocol on Biosafety (CPB) and the Environmental Management (Biosafety) Regulations, 2009. Given the limited capacity in place and the high level of skills needed, ranging from the safety and regulatory aspects to technical and scientific

issues, the Government established in 2009 the National Centre of Excellence (CoE). The centre would help strengthen cooperation in biosafety and provide the necessary backstopping to institutions involved in biotechnology and biosafety.

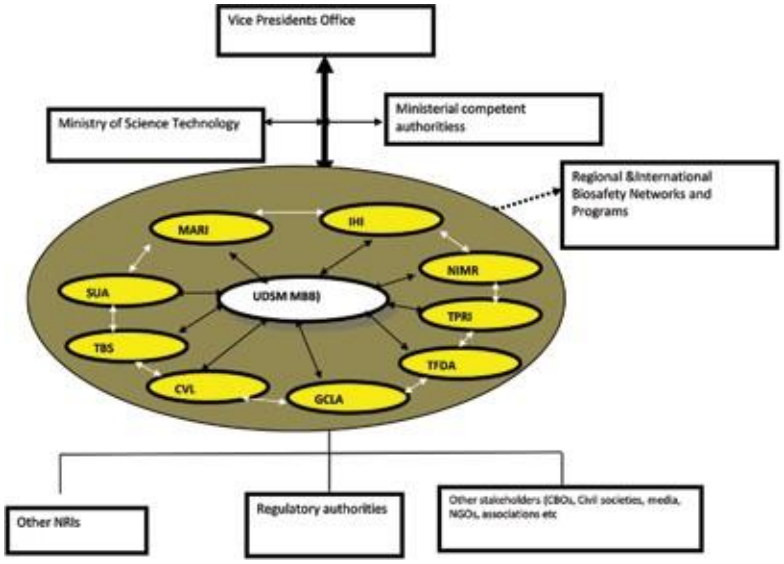

Figure 2: Organizational structure of the National Centre of Excelence

Institutions that make up the CoE are: the University of Dar es Salaam (UDSM), the Tropical Pesticides Research Institute, Mikocheni Agricultural Research Institute (MARI), the Tanzania Food and Drugs Authority (TFDA), Sokoine University of Agriculture (SUA), the National Institute for Medical Research (NIMR), the Government Chemist Laboratory Agency (GCLA), the Tanzania Bureau of Standards (TBS), The Tanzania Veterinary Laboratory Agency (TVLA) and Kizimbani Agricultural Research Institute (Figure 2).

Challenges and recommendations for further development of the regulatory system

Insufficient investment in R&D

National Agricultural Research systems (NARs) in Tanzania are constrained by inadequate investments in Research and Development (R&D). A genetic engineering research program requires capital-intensive investments in laboratory, greenhouse and confined field trial infrastructure to support GM research operations. Contained research and confined field trials are small-scale experiments that are used to collect biosafety data for regulatory dossiers. They also provide an opportunity to evaluate agronomic performance and ascertain the efficacy of the particular GM trait. Insufficient investments in R&D make it almost impossible for low-income countries like Tanzania to pursue basic research for GM crop development.

Stringent/ restrictive regulatory requirement

Highly restrictive requirements for confined field trials (CFTs) have been a common feature of developing country regulatory systems (Spielman *et al*. 2006). A common misunderstanding is that CFTs trials should be subject to essentially the same risk assessment process as for commercial releases. This misconception demonstrates that regulators, national biosafety committees, and decision makers do not appreciate that the risk mitigation measures used to confine these trials render more extensive environmental risk assessments unnecessary. The government of Tanzania should revise the legal and biosafety policies that are too stringent and/or restrictive such as the need for conducting EIA at confined field trial stage. Tanzania will benefit from future investments in biotechnology only if policies that are cost effective, efficient and pro business are introduced and implemented.

High regulatory costs

The costs associated with meeting biosafety regulatory requirements in the Tanzania are very high. The most expensive activities include EIA, meetings of regulators and allowances of the decision making bodies such as IBC, Competent Authorities, NBC and NBFP. These costs are often cited as the primary deterrent for public sector investments in agricultural biotechnology, especially in developing countries (Qaim 2009; Graff et al. 2009). High regulatory costs impede both innovation and commercialization of GE technologies by all but, in particular, hinder research in minor crops or famer preferred staple food crops. Over-demanding requirements will certainly make the approval process too expensive for local technology developers.

Lack of critical mass of skilled human resource capital

The implementation of biosafety activities in Tanzania is impeded by shortage of skilled human resources. Biosafety risk assessment and risk management is a knowledge-based activity requiring many types of expertise and access to high quality technical information about safety and environmental interactions. The members of biosafety review committees such as IBC, NBC and competent authorities are key players in the risk assessment/management process. A major shortcoming for these committees is that the large majority of their members lack the competence in biotechnology and biosafety risk assessment. Biosafety implementation is rarely taught at universities or colleges but is often passed on by experienced individuals. An inadequately trained and skilled committee may significantly slow the assessment process, which, in turn, retards technology transfers and development. The training and capacity building of local scientists in biosafety assessment is therefore critical. Government scientists, university scientists, scientists from research institutes and scientists from civil society organisations should all be part of the local scientific pool of expertise.

Requirements for additional manuals and guidelines

There is little experience in Tanzania with regard to preparing or processing applications for import, export, and transit consignments. Manuals for post release monitoring and food safety are also not available. There is therefore a need for preparing manuals and/ or guidelines for post release monitoring, food safety and handling GMO on transit, transhipment and export of GMOs.

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Life-saving skills, how helping babies breathe can make a difference one health care worker at a time

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Globally, we know that while neonatal mortality has improved over the last decade, 15,000 babies still die each day (UN, 2010). The *Lancet's* Newborn series, in 2014, inspired a global crusade to reduce neonatal mortality, among other child survival initiatives. Most regions of the world have seen a 50% reduction in this neonatal mortality rate. However, children in some areas of our world are dying at much higher rates, especially inSub-Saharan Africa, Southern Asia and Oceania.

Half of all newborn deaths occuraround the time of birth, or within the first 24 hours of life. One essential intervention that improves neonatal survival is assuring every birth has a skilled provider, competent in neonatal resuscitation, at all places where a mother chooses to birth (Joharifard, et al., 2012). There has become zero tolerance for births unattended byskilled birth attendants. Simple life-saving skill development is readily available and financial limitations should not preclude effective neonatalresuscitation. Life-saving skills are simple, inexpensive interventions in the first few minutes of a baby's life. A care provider must assure that a baby breathes, remains warm and is monitored in the early neonatal period. Vulnerable newborns who receive early care with drying, and providing respiratory support along with keeping skin to skin contact with a mother or surrogate have improved survival. *Helping Babies Breathe(HBB)*is one program that has created a successful, cost-effective global outreach proven to reduce neonatal mortality and morbidity.

In Tanzania, 8 regional hospitals were chosen for *HBB* rollout, after the training of 40 Master Trainers linked to the eight facilities. Data analysis of more than 86,000 births, documented a reductionin early neonatal mortality (ENM) by 47% and reduction of stillbirth rates by twenty-four percent. To understand the significance of this data, the numbers are reviewed, with 107/7,969 deaths pre-*HBB*implementation compared to 552/77,369 deaths post-*HBB* implementation. This represents a significant reduction in ENM from 13.4 to 7.1 per 1000 live born deliveries (Msemo et al., 2013).

Tanzania reports this remarkable progress in reducing neonatal mortality, with rates (NMR) fallingto 21 per 1000 live births (World Bank, 2014; Afnan-Holmes, et al, 2015; TDHS, 2010). This tremendous effort was accomplished by an achievement mentality for Tanzania, fostered by national resources and global support. Tanzania mobilized in 2013 *Helping Babies Breathe* to other areas of the country, outside of the initial 8 facilities. Engaging local expertise, targeting life-saving skills development, and insisting on stronger data collection, evaluation and monitoring was a formula for success. Tanzania almost reached the country'sMillennial Development Goal (MDG) 4.

The outcomewas very similar to Malawi's success, one of the world's lowest resource countries. Malawi

also created a high-impact program that was widely effective concerning newborn survival (Zimba, et al, 2012). Global country-specific information is available and updated regularly (Darmstadt, Oot, & Lawn, 2012; Crofts, et al. 2015). www.childmortality.org.

Helping Babies Breathe (HBB), a big part of Tanzania's NMR reductions, was begun by the American Academy of Pediatrics (AAP). This program' purpose was to target the second leading cause of death in newborns, asphyxia. The AAP targeted resource-limited areas for rolling out this program and collaborated with the World Health Organization (WHO), the US Agency for International Development (USAID), the National Institute of Child Health and Development and other global health partners from industry, NGO's and faith-based organizations. *HBB* has been studied as an intervention with the first study published on Tanzanian data by Msemo. The authors (Msemo et al., 2013) showed promising data on effectiveness from eight clinical sites.

The Tanzaniannational roll-out, *Helping Babies Breathe*, was studied in a prospective randomized clinical trial. In addition to the 42% decrease in early neonatal mortality (ENM: within the first 24 hours), there was a reduction in fresh stillbirths (FSB) to 24% post HBB training intervention (Msemo, et al., 2013). The program, in addition to being effective in reducing neonatal mortality, also was cost effective (Vossius et al., 2014). *Every Newborn Action Plan* (*ENAP*) will become one of the next global strategic plans to improve fetal and newborn outcomes, followed closely by *Essential Care for Small Babies*. Another initiative currently focusing on newborn survival is one released by Save the Children in2012. "A Decade of Change for Newborn Survival" link details this initiative. The project is a joint venture with India, Ethiopia and the United States. The report has been published and is available at http://www.healthynewbornnetwork.org/press-release/save-children-releases-pioneering-report-newborn-survival.

The WHO rolled out in 2014 in Ethiopia, a stepwise progression for neonatal survival with *Essential Care for Every Baby* (*ECEB*). The program will be modeled after the *HBB* program, with some health care workers lobbying for the initiative to be called *Helping Babies Survive*. Resources on the *HBB* site have been transformed to become the site for *HBB, ECEB*, and now a new program has been created for premature babies, *Helping Small Babies Survive*. This model of introducing new initiatives shows promise for other work that at its core is community-based. This population-based outreach is disseminated by motivated health care workers, including students, who understand the basic principle that every baby deserves a good start, breathing well by the first 'golden minute' of life.

The WHO and UNICEF Child Health Epidemiology Reference Group (Black et al. 2010) estimated 8.795 million deaths worldwide in children younger than 5 years. Neonatal deaths accounted for 41% of these deaths; causative factors were ranked in order of magnitude: prematurity, birth asphyxia, sepsis and pneumonia. Almost half of these deaths occurred in five countries: India, China, Pakistan, Nigeria, and Democratic Republic of the Congo.

In response to the increased need for educating health care workers on life-saving skills in Tanzania, a project was begun at the University of Dodoma in 2015, training baccalaureate midwifery students as

HBB trainers. The purpose was to disseminate the program to other health care students on the UDOM campus and then increase capacity beyond the campus and classrooms. It was discovered that students are highly motivated, first in simulation scenarios and then in clinical settings to master resuscitation skills with newborns (Daniels, et. al, 2010). Students have the abilityin class and an opportunity in clinical to see clearly that their expertise saves lives. The response of first year midwifery students who were chosen to become Trainers, has created a network of skilled HBB providers who have set up tangential trainings on and off campus. A conference workshopalso provided students with another avenue for dissemination of HBB skills to midwifery students from distant regions of Tanzania. The midwifery and nursing students had been invited to UDOM's International Public and Global health conference, with the *HBB* workshops offeredto attendees.

Similarly, a group of students fromHubert Kairuki Memorial University started an initiative, guided by a Visiting Professor Rachel Johnston from Seed Global Health and Peace Corps. The students provided numerous newborn resuscitation trainings and reached out across disciplines and across institutions of higher learning. The HKMC studentsprioritized interdisciplinary*HBB* trainings. They chose to first traindiploma nurses, who are to a great extent the ones responsible for attending the majority of Tanzanian births. The project, which is on-going, was recorded after a long afternoon conversation with one of the group spokespersons (John Nelson Mbondo, fourth year Medical Student at HCMC, august, 2015).

Merién and team (2010) reported in a prospective randomized trial that multi-disciplinary teamwork training in a simulation setting for acute emergencies improved neonatal outcomes compared to those trained only within their discipline. Low Apgar scores were significantly reduced in the groups whose care providers had been trained in interdisciplinary teams (Merién, van de Ven, Mol, & Houterman, 2010). The scores significantly decreased from 87 births/10,000 births with low Apgars to 44.6/10,000 births. The interdisciplinary workers showed improved practical skills, team performance, communication and teamwork in emergencies, when trained in interdisciplinary groups.

It is possible to combine both clinical health care education with service in an academic institution. When extending students' influence and skill through *HBB* trainings to other Tanzanian health care workers, Tanzanian families benefit (Mangi, 2009; Walker, et al., 2014). There is a perfect synergy between learning and teaching, working and serving. This initiative has been an opportunity to disseminate skills across Tanzania, in sustainable ways that are holistic, respectful and most importantly, life-saving.

A list of resources is provided after the references. These resources may to be used when teaching in the community, any health care workers who attend births. This list provides for health care workers, documents that clarify how important work their work will be concerning newborn survival, one baby at a time.

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Prevalence of diagnosed and undiagnosed diabetes in Dodoma Region, Tanzania

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Abstract: The prevalence of diabetes mellitus is increasing at an alarming rate in most places of the world. Tanzania is among sub-Saharan African countries with many people who are currently living with diabetes mellitus. However, information about diabetes in Tanzania is still scarce. The main objective of this study was to determine the prevalence of diagnosed and undiagnosed diabetes mellitus in Dodoma Region. The study was cross sectional design. Stratified sampling technique, simple random sampling and Kish Selection Table were used to select participants for the study. The study involved a total of 840 people who agreed and participated in the study. Overall prevalence of diabetes mellitus was found to be 86 (11.8%) with majority of them 61 out of 86 (70.9%) being unaware of their condition (undiagnosed). The prevalence of DM in males and females were 30 (11.5%) and 56 (12%) respectively (p = 0.615) while in rural and urban were 19 (5.3%) and 67 (18.2%) respectively (p = 0.000). More than 80% of the study population had never tested for DM before the study. Only 6.1 percent of the rural dwellers had been tested for DM before the study. About 69.4% (25/36) of the previously known diabetic patients had hyperglycaemia. The current findings indicate that, there is high prevalence of diabetes mellitus in Dodoma Region. Such high prevalence of dietary related NCDs to the region which is also affected by chronic malnutrition might indicate double burden of malnutrition and diseases in the Region. Therefore, investments in preventive measures, screening services and increasing health education are highly needed to reduce the future burden.

Keywords: Diabetes, rural, urban, undiagnosed, screening, test, Tanzania

Background

Diabetes mellitus (DM) is a metabolic disorder which is characterized by hyperglycaemia. DM has been reported to increase in most places worldwide while most of people remain undiagnosed for several years. Recently, it has been estimated that, approximately 382 million people worldwide (8.3%) have DM of whom about 46% (175 million) of them are unaware of their condition (undiagnosed). About 80% of all DM cases globally come from low-and middle-income countries (International Diabetes Federation (IDF), 2013). Previously, DM was known to be low in most African countries (IDF, 2003). However, recently the sub-Saharan Africa (SSA) has been experiencing increasing prevalence of the disease along with other non-communicable diseases (NCDs) similar to developed countries (Dalal*et al*., 2011; WHO, 2004). Rapid urbanization in SSA has been suggested to be a major determinant of the rising burden of DM in the region (Mayosi*et al*., 2009, Omran, 2005; Popkin& Gordon, 2004). According to a report by IDF (2013), 20 million people are estimated to be living with DM in SSA of whom about 62% of them are still undiagnosed. The current number of DM cases in SSA is expected to double by 2035 if appropriate preventive measures will not be taken (IDF, 2013).

Tanzania is among the SSA countries with a large number of people living with DM (IDF, 2013) and the highest proportion of undiagnosed DM, with about 79–100% of initial diagnoses being made during surveys (Aspray*et al*., 2000, McLarty*et al*., 1989; Ahran& Corrigan, 1984). According to IDF report of 2013, it is estimated that about 1.7 million people (7.8%). have DM in the countryof whom 1.28 million (75%) are undiagnosed (IDF, 2013). High prevalence of undiagnosed DM has been used widely as an indicator to show poor screening and insufficient health services for the disease (Hall *et al*., 2011). Failure to diagnosed DM early has been associated with difficulties in management of the associated disease complications which have caused many patients to die early (Metta*et al*., 2015a;Kolling*et al*., 2010; Swai*et al*., 1990; McLarty*et al*., 1990).

Dodoma Region has been recently known to be one of the fastest growing regions in Tanzania. According to The Tanzania Economic Survey 2010 (2011) and NBS (2012), the region has undergone socio-economic and demographic transformations which are marked by economic and population growth. Improved infrastructure which resulted in access to transportation, changes from manual occupational work to mechanization and shift from local traditional foods to processed foods have all had a great impact on population health status (Schulz *et al*., 2006). The socio-economic changes to previously isolated groups provides unique opportunities for analyzing the effects of lifestyle particularly regarding increase in some diseases prevalence such as DM, which is in part attributed to the transition from a native to a modernized diet and lifestyle (Hightower *et al*., 2011).

Information from the Dodoma Regional Referral Hospital shows that, recently there has been increase in the number of people who are being diagnosed with DM. Personal communication with the nurse attending at diabetic clinic revealed that majority are diagnosed when they come to hospital after experiencing one or more disease complications (Mary Muhenga, 2012). This might indicate the probability that many others are still at an asymptomatic stage and hence undiagnosed. This study was therefore designed to find out the prevalence diagnosed and undiagnosed diabetes in Dodoma Region.

Materials and Methods

Study area

This study was conducted in Dodoma Region, Tanzania. It is a region that is centrally positioned and is bordered by four other regions namely: Manyara in the North, Morogoro in the East, Iringa in the South and Singida in the West. The region is the 12th largest in the country and covers an area of 41,310 square km equivalent to 5% of the total area of Tanzania Mainland. The Region was established in 1963 consisting of three rural districts and one Township Authority. To date, Dodoma Region has a total of seven districts namely: Dodoma Municipality, Chamwino, Kondoa, Chemba, Mpwapwa, Kongwa and Bahi. Ethnic groups are comprised of Bantu speaking people (NBS, 2013). Indigenous groups include Wagogo, Warangi, Wanguru, Wazigua, Wakaguru, Wambulu and Wasagara who make almost three quarters of the total population. However, due to urbanization, many tribes from various areas inside and outside the country are represented in the region (Dodoma Region–Socio-economic Profile, 2003).

The study was conducted in three districts of Dodoma Region; namely Dodoma Municipal Council, Kondoa

and Mpwapwa. Dodoma Municipal Council was selected through purposive sampling and the two districts were selected through simple random sampling. Dodoma Municipal Council is a district which is highly populated and urbanized compared to other districts of the region. The two other districts are essentially rural with few small urban centre(s) (The Economic Survey 2010, 2011). Generally, Dodoma Region is currently growing in various aspects of development. It is among the few regions with high population (2.08 million) in Tanzania with an annual growth rate of 2.1 (NBS, 2013).

Transportation in town has been made much easier with the availability of commuter buses. The number of commuter buses has increased by 185.2% in seven years period from 2003 to 2010. Other development areas include infrastructure such as roads, national ICT, electricity supply, water and sanitation (The Economic Survey 2010, 2011). Education opportunities have also expanded significantly through an increase in the number of schools and universities. These expansions in various sectors have caused an increase in employment opportunities leading to immigration of people from all over the country and beyond to the region (The Economic Survey 2010, 2011).

Data collection

This study was a quantitative cross sectional survey. Study population were adults aged 18 years and above. A total of 727 adults agreed and participated in the study. Stratified sampling technique was used to get rural and urban wards. Simple random sampling was employed to select streets/villages, households and one participant from each selected household. Proportional allocation was used to distribute sample size in districts, wards and street/villages. Participant demographic and health information were obtained through face to face interview by using the pre-tested questionnaire that was adopted from WHO STEPS for surveillance of non-communicable diseases and adaptedfor the study environment. After the interview,each participant was then providedwith the fasting instruction for the preparation of fasting plasma glucose (FPG) measurements. Venous blood samples were used to measure FPG. FPG were measured the following day after the interview during the morning hours. Only those who adhered to the fasting instructions were eligible for FPG measurements. Glucoplus glucometer was used to measure the FPG. Control test was conducted every morning before the commencement of the exercise and after every tenth measurement. Measurement for FPG was done immediately after the collection of venous blood sample at the study site. Participant was then given his/her FPG status by a nurse. Those who were found to have hyperglycaemia (i. e FPG $\geq$ 7mmol/l) were asked to come for the second measurement on the next day. Diabetes diagnosis was based on two measurements of FPG $\geq$7 mmol/l measured on two different days. FPG of 6.1 – 6.9 mmol/l was referred to as intermediate hyperglycaemia andFPG $\leq$ 6.0 was referred to as normoglycaemia. Those who were confirmed to be diabetic were referred to their respective District Hospital for further management.

Data analysis

Data were analyzed using the statistical package for social sciences (SPSS) Version 22 for WINDOWS computer program (SPSS Inc. Chicago). Preliminary data analysis included descriptive statistics i.e; means and standard deviations for continuous data and frequencies and percentages for categorical data which describe the population characteristics while chi-square test was used to compare the difference among different groups.

Ethical consideration

Ethical clearance to conduct this study was obtained from The University of Dodoma Ethical Review Committee board. Permission to conduct the study at the site was obtained from the regional, district and ward authorities. Participants were informed about the study and those who agreed to participate were provided a written/verbal consent. Confidentiality was assured at all stages of the study from interview

Results

Females were 64.2% of the total study population. Male and female participants differed significantly ($p < 0.05$) by age, marital status, occupation status and education status. About 75% of the study population was aged 18 to 60 years. Participants aged 61 years and above accounted for 23.5% and 16.7% of males and females, respectively ($p = .041$). Forty-six percent of the study populations were peasants. About 60.8% had primary education. The main ethnic groups were Wagogo (35.9%) and Warangi (18.8%). Urban and rural populations were almost equally represented ($p = .143$) as shown in Table 1.

Overall prevalence of diabetes mellitus (hyperglycaemiameasured on two consecutive days) was 11.8% (Figure 1). Prevalence of DM was statistically significant ($p < 0.05$) associated with residence, family history of diabetes, age and occupation status for both sexes. However, the results also show that, education and marital status are significantly associated with prevalence of diabetes in males only. Prevalence of diabetes is 18.2% and 5.3% in urban and rural respectively for both sexes. Those with family history of diabetes have prevalence of 25.0%. Prevalence of diabetes is found to increase with the age for both sexes with the highest prevalence age being ≥ 61 years. Males with secondary education have DM prevalence of 25.6%. Males and females involved in household chores as their main occupation were found to have prevalence of 23.5% and 18.1% respectively. Prevalence among the male and female peasants was 6.9% (Table 2).

The prevalence of undiagnosed DM (screen detected) was 61 (70.9%) for both sexes. The prevalence of undiagnosed DM in males and females were 23 (76.7%) and 38 (67.9%) respectively ($p = 0.543$) whereas in rural and urban were 14 (73.1%) and 47 (70.1%) respectively ($p = 0.989$) (Figure 2). The findings also show that less than twenty percent of the study population had been undergone DM testing prior to study. Exposure to previous DM test was significant high among urban dwellers 122 (33.1%)thanrural dwellers 22 (6.1%) ($p = 0.000$)(Figure 3). About 69.4% (25/31) of the previous known diabetic patients were found to have hyperglycaemia. The prevalence of hyperglycaemia among the previous diabetic males and females 77.8% (7) and 66.7% (18) ($p = 0.472$) (Figure 4).

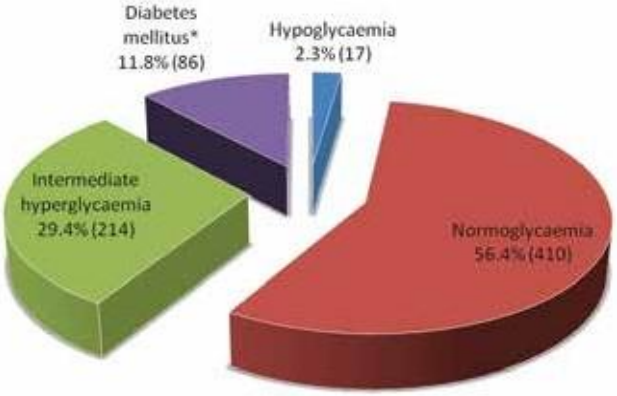

Figure 3: Fasting plasma glucose status in study population

Figure 3: Fasting plasma glucose status in study population

Table 1: Distribution of the study population by socio-demographic background characteristics

Socio-demographic characteristics	Males	Females	p – value*	Male + Female
	(n %)	(n %)		(n %)
Sex	260 (35.8)	467 (64.2)	.631	727 (100)
Age (years)				
18 – 40	90 (34.6)	184 (39.4)	.076	274 (37.7)
41 – 60	109 (41.9)	205 (43.9)		314 (43.2)
≥ 61	61 (23.5)	78 (16.7)		139 (19.1)
Residence type				
Rural	138 (53.1)	220 (47.1)	.143	358 (49.2)
Urban	122 (46.9)	247 (52.9)		369 (50.8)
Marital status				
Not married	34 (13.1)	57 (12.2)	.000	91 (12.5)
Married	214 (82.3)	282 (60.4)		496 (68.2)
Divorced and separated	8 (3.1)	40 (8.6)		48 (6.6)
Widow	4 (1.5)	88 (18.8)		92 (12.7)
Tribe				
Wagogo	95 (36.5)	166 (35.5)	.495	261 (35.9)
Warangi	43 (16.5)	94 (20.1)		137 (18.8)
Wahehe	12 (4.6)	25 (5.4)		37 (5.1)
Wamwasi	19 (7.3)	22 (4.7)		41 (5.6)
Others	91 (35.0)	160 (34.3)		251(34.6)
Occupational status				
Student	12 (4.6)	11 (2.4)	.000	23 (3.2)
Employed	55 (21.2)	58 (12.4)		113 (15.5)
Self employed	50 (19.2)	117 (25.1)		167 (22.9)
Peasants	126 (48.5)	209 (44.8)		335 (46.2)
Household chores	17 (6.5)	72 (15.4)		89 (12.2)
Education Status				
None	26 (10.0)	101 (21.6)	.000	127 (17.5)
Primary school education	160 (61.5)	282 (60.4)		442 (60.8)
Secondary school education	39 (15.0)	47 (10.1)		86 (11.8)
College/University education	35 (13.5)	37 (7.9)		72 (9.9)

** The p - value assessed by chi-square test for independence with value < 0.05 indicating significant difference between the groups*

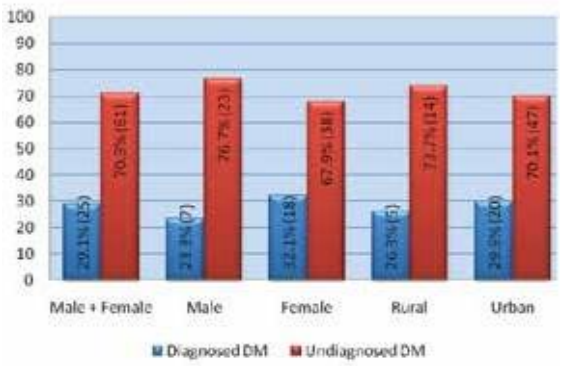

Figure 4: Prevalence of undiagnosed diabetes in study population

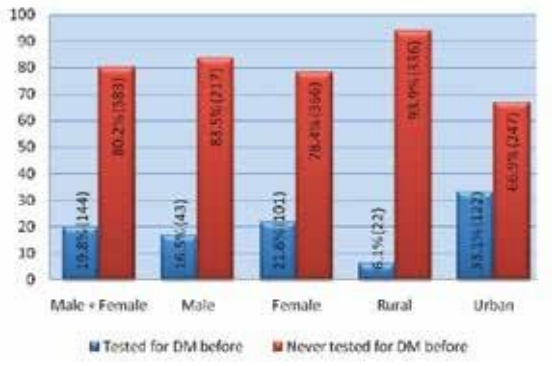

Figure 5: The proportion of study population who have had DM test prior to study

Table 2: Prevalence of diabetes mellitus according to socio-demographic background characteristics of study population

Socio-demographic characteristics		Males (n = 260)		Females (n = 467)		Males + Females (n = 727)	
		n (%)	p – value*		p- value*	n (%)	p – value*
Sex		30 (11.5)		56 (12.0)	.615	86 (11.8)	
Residence	Rural	7(5.1)	.000	12 (5.5)	.000	19 (5.3)	.000
	Urban	23(18.9)		44 (17.8)		67(18.2)	
Family history	Yes	3 (11.5)	.649	16 (32.0)	.000	19 (25.0)	.000
	No	27 (11.5)		40 (9.6)		67 (10.3)	
Age (Years)	18 – 40	5 (5.6)	.114	13 (7.1)	.001	18 (6.6)	.000
	41 –60	15(13.8)		31(15.1)		46 (14.6)	
	≥ 61	10 (16.4)		12 (15.4)		22 (15.8)	
Education Status	None	2 (7.7)	.018	10 (9.9)	.884	12 (9.4)	.192
	Primary education	13 (8.1)		36 (12.8)		49 (11.1)	
	Secondary education	10 (25.6)		6 (12.8)		16 (18.6)	
	College/ University	5(14.3)		4 (10.8)		9 (12.5)	
Occupation status	Student	0 (0.0)	.022	1 (9.1)	.052	1 (4.3)	.001
	Employed	11 (20.0)		10 (17.2)		21 (18.6)	
	Self-employment	7 (14.0)		17 (14.5)		24 (14.4)	
	Peasants	8 (6.3)		15 (7.2)		23 (6.9)	
	Household chores	4 (23.5)		13 (18.1)		17 (19.1)	
Marital status	Not married	2 (5.9)	.040	7 (12.3)	.996	9(9.9)	.551
	Married	24 (11.2)		33 (11.7)		57 (11.5)	
	Divorced/separated/ widowed	4 (33.3)		16 (12.5)		20 (14.3)	

* p – value assessed by chi-square test for independence with value < 0.05 indicating significance difference between groups

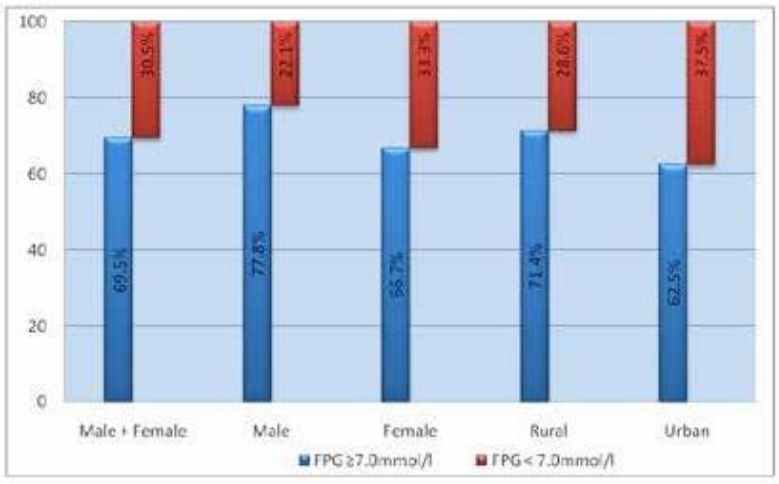

Figure 6: Fasting plasma glucose status among the study population known to have diabetesprior to the study

Discussion

The overall prevalence of 11.8% of diabetes mellitus in Dodoma Region found in this study it is surprisingly very high. It is much higher than the recent national estimated prevalence of 7.8% (IDF, 2013). The current overall prevalence of 11.8% is also higher than the ones reported from similar local studies conducted in Mwanza City (1.9%) (Kavishe*et al*., 2015), Mwanza urban (0%) (Muhihi*et al*., 2012) and Dar es Salaam urban (6%) (Njelekela*et al*., 2009). Since the overall prevalence found in this study was the result obtained from both urban and rural populations of Dodoma Region, and that it is well known that the prevalence of DM is higher in urban than in rural populations, one would have expected its prevalence to be lower than those of the Mwanza and Dar es Salaam studies which were conducted among urban populations. Differences in age composition of the study populations could beamong possible explanation. For example, the study populations of the studies that were conducted in Mwanza city and Mwanza urban were generally younger (Kavishe*et al*., 2015; Muhihi*et al*., 2012) than the study population of the current study. Another explanation could had been due to differences in methodology such that in this study, fasting blood glucose was measured at study site, i.e. immediately after the blood was withdrawn from an individual whereasin the studies conducted in Dar es Salaam (Njelekela*et al*., 2009) and Mwanza urban areas (Muhihi*et al*., 2012), the plasma was separated within 6 to 8 hours and stored (≤ -80°C) for four weeks before it was analyzed for fasting plasma glucose. WHO, 2006, recommends that measurements of fasting plasma glucose should be done immediately after sample collection otherwise care must be taken to prevent glycolysis which can result into lowering of plasma glucose level. Nevertheless, lack of local periodic DM information could be anotherexplanation for such difference. For example, the current study was carried out more than 5 years after the Njelekela*et al*., 2009 one, it may be possible that the prevalence in Dar es Salaam has since increased to about the one obtained in this study. Moreover, since the previous prevalence is also unknown for Dodoma Region, it is therefore difficult to explain the current findings with respect to the trend of the disease in Dodoma. However, regardless of the factors that might have influenced differences in prevalence that have been observed among different communities in the country, such differences observed might highlight the heterogeneity of diabetes distribution among communities in the same country. For example, studies done in China showed the presence of regional differences with Fujian Province having the prevalence of 11.5% and Shaanxi Province with a prevalence of 8% (Xu*et al*. 2013).

Expectedly, the prevalence of diabetes in this study is high in urban setting than rural setting (18.2% vs 5.3%) (Table 2). This finding is consistent with finding from previous studies in Tanzania (Kavishe*et al*., 2015;Njelekela*et al*., 2003).Similar findings have also been reported from other parts of the world such as; Ethiopia, DRC, Kenya and China by Abebe*et al*., 2014; Hightower *et al*., 2011; Christensen *et al*., 2009 and He *et al*., 2008 respectively. For example, findings from Ethiopia showed that prevalence of diabetes was 5.1% urban and 2.1% rural (Abebe*et al*., 2014). However, findings of the present study differ from the study that was conducted in Malawi which found that, prevalence of DM is high in rural than in urban areas. Oversampling of rural population in Malawi study was reported to be responsible for their findings (Msyamboza*et al*., 2014).

Consistently with the previous study (Qin *et al*., 2012; Hussein *et al*., 2003; Mohan *et al*., 2003; Swai*et. al*.,1990), the current study indicate that the prevalence of diabetes is more than twice among those who reported to have family history of the disease compare to those who did not report on family history of the disease (25% vs. 10.3% p = 0.000) (Table 2).

Similar to other studies, this study found that prevalence of diabetes is significantly higher from the age of 41 years and increases with age with the prevalence attain its peak at the age group of ≥ 60 years (Table 2). This is similar to the findings that are reported from various places in the world (Abebe*et al*., 2014; De Silva *et al*., 2012; Maher *et al*., 2011). A study conducted in Sri Lanka forexample, showed that prevalence of diabetes mellitus increases with age and attain the peak at 55 to 59 years (De Silva *et al*., 2012). In Tanzania similar findings have been observed in various areas of the countries (Swai*et al*., 1990; Ahrén& Corrigan, 1984). The increase in diabetes across the age groups is considered to be a result of long exposure to unhealthy lifestyles and diets (Williams & Wilkins, 2007). In addition, the risk factors for diabetes which are overweight and obesity are found to increase with age (Adebayo *et al*., 2014; Hajian-Tilaki&Heidari, 2007; Kamadjeu*et al*., 2006).

The fact that, prevalence of DM among males and females did not differ significantly in this study is in agreement with IDF report 2013 and the finding reported from Dar es Salaam, Tanzania (Njelekela*et al*., 2009). Other similar findings have been reported from various places of the world such as Ethiopia (Abebe*et al*., 2014), Malawi (Msyamboza*et al*., 2014, 2011), Mexico (Barquera*et al*., 2013), Uganda (Murphy *et al*., 2013), Malasyia (Mustafa *et al*., 2011), Nigeria (Oladapo*et al*., 2010), China (He *et al*., 2008) andGreece (Melidonis*etal*., 2006). The current finding is not in agreement with a study that was conducted in Tehran which showed that the prevalence of diagnosed diabetes is higher in women (10%) than men (8.1%) (p = 0.0015) (Hadaegh*et al*., 2008). On the other hand, Wild *et al*. (2004) in review paper reported that, overall prevalence is higher in men than females. However, according to WHO, 2012 report, gender may influence development of risk factors and diseasesand studies have shown that this pattern may not be same for all communities (WHO, 2012).

The observation noted in this study that increase in educational level is associated with increase in prevalence of diabetes (Table 2) is in agreement with findings reported from studies in China (Kim*et al*., 2004) and Turkey(Satman*et al*., 2002). Increase in educational level is likely to increase the socioeconomic status. Higher has been reported to be associated with higher prevalence of diabetes in Tanzania (Maletnlema, 2002). Surprisingly, this study also found that, after analyzing the data by separating sex, increase in prevalence of diabetes with increase in educational level remain to be significant to males only (Table 2). A possible explanation for this finding could be that males with highersocioeconomic status are more likely than females to engage in unhealthy eating and poor lifestyles such as eating out frequently, alcoholism etc which might predispose them to risk of developing diabetes. Previous studies in Tanzania had also shown that prevalence of behavioral risk factors of diabetes such as smoking and alcohol are more common in males than females (Njelekela*et al*., 2009; Jagoe*et al*., 2002).

Expectedly, the findings from this study had also showed that prevalence of diabetes was low among

peasants and students (Table 2). This might have been influenced by the young of the students and manual activities among the peasantry. This contention is supported by a study conducted at Muhimbili Medical Center which found that diabetic patients who reported to be peasants had higher mean age (50.8±8years) at onset of the diseases and normal mean BMI (24.0 kg/m^2) compared to sedentary people who develop the disease at younger age (42.5±8.5 years) and have higher mean BMI of 26kg/m^2 (Swai*et al*., 1990). This indicates that increase in physical activities can delay the onset of the disease even to most vulnerable people. Similarly in findings from the study that was conducted in SriLanka showed that people engaged in plantation area had low prevalence of diabetes (8.5%) compared to others like housewife (16.2%) (De Silva *et al*., 2012). The high prevalence of diabetes (19.1%) observed in this study among individuals who reported household chores as their main occupation (Table 2) is in agreement with what was found in a study conducted at Muhimbili Medical Centre. In that study, about two thirds of female diabetic patients were housewives (Swai*et al*., 1990). Similar findings have been reported in a study conducted in SriLanka (16.2%) (De Silva *et al.,* 2012). This might be caused by minimal physical exercise compare to those who work far from their homes. For example, in urban areas most of those who stay home, spend most of their time watching television hence experience reduced physical activity over time.

While marital status seems not to have an influence on prevalence of diabetes in females, in males it significantly shows that men who are either divorced or separated or widowed have higher prevalence of diabetes compared to others. Possible explanation for this could be due to Tanzanian traditions and culture in most places, that men usually are not taught to prepare meals during adult life, therefore being a widow or divorced or separated from a spouse, men are likely to increase the frequency of eating unhealthy food from outside. Women though they also face a certain degree of stress, however are likely to continue eating health homemade meals. The present finding is contrary to findings from Uganda which show that current marriagewas associated with high prevalence of diabetes for both sexes (Maher *et al*., 2011).

Another important finding from this study is the high overall prevalence of undiagnosed diabetes. Out of 86 people found to be diabetic during the study, about 61 (70.9%) were undiagnosed before (newly screened) (Figure 2). This means that there might be many individuals who live with the disease unknowingly in Dodoma Region, only to wait for one or more complications! Or, if lucky, the disease may be diagnosed when seeking medical care for other conditions (Metta*et al*., 2015a; Kolling*et al*., 2010 and Swai*et al*., 1990). This finding is in agreement with the findings from previous study conducted in Tanzania which reported the prevalence of undiagnosed diabetes to be 86.5% (McLarty*et al*., 1989). High prevalence of undiagnosed DM has been reported in other countries including Ethiopia (69%) (Abebe*et al*., 2014), China (74.1%) (Xu*et al*., 2013), Uganda (60%) (Maher *et al*., 2011), Tunisia (75%) (Bouguerra*et al*., 2007) and Guinea (70%) (Baldé*et al*., 2007). This finding is also in agreement with the 2013 report of IDF which states that at least 75% and 63% of diabetes in Tanzania and Africa, respectively is still undiagnosed. The finding is a direct reflection of inadequate health care services in Tanzania and other African countries resulting in lack of periodic population screening and lack of DM awareness by the people. This fact has also been pointed out earlier by Metta*etal*., 2015b; Kolling*et al*., 2010. Until today, diabetes services in Tanzania are provided up to district hospital level only of which mostlyare available in urban areas (Kolling*et al.,* 2010). Inaccessibility to diabetes services among people who live away from district headquarters

can also explain the slightly higher prevalence of undiagnosed diabetes in rural areas compared to urban areas obtained in the present study (73.1% vs 70.1%). High prevalence of undiagnosed diabetes in rural areas had also been reported in studies conducted fromMwanza, Tanzania which showed that, about 62% and 30% of diabetes were undiagnosed in rural and urban areas of Mwanza Region, respectively (Kavishe*et al*., 2015). Other similar findings outside the country includes; Ethiopia which showed that the prevalence of undiagnosed diabetes was 82.6% in rural areas and 63% in urban areas (Abebe*et al*., 2014) and South Africa, a study conducted in rural South Africa showed that prevalence of undiagnosed diabetes was 84.8% (Motala*et al*., 2008). Likewise, a study conducted in Uganda found the prevalence of undiagnosed DM to be high in rural areas than urban areas (60% versus 20% respectively) (Kavishe*et al*., 2015). In contrast, the prevalence of undiagnosed DM in the present study is higher than that reported from Tanzania (< 40%) by Swai*et al*., 1990. This difference could be due to the fact that the study by Swai*et al*. was conducted in an Asian community who had previously been reported as among the high risk group for diabetes (Dowse *et al*., 1991 and Ramaiya*et al*., 1991) hence people in that community might have been educated on the importance of DM screening. In addition, there are more studies that have been conducted among the Asian (Hindu) community in Dar es Salaam (Ramaiya*et al*., 1990 and Ramaiya*et al*., 1991a & 1991b) compared to other communities in Tanzania. These studies might have created awareness of diabetes among the community. These facts indicate that awareness and periodic screening can significantly lower the burden of diabetes in Dodoma Region as well. Other countries with low prevalence of undiagnosed diabetes include; Libya (11%) (Kadiki and Roaeid, 2001), Mexico (< 40%) (Barquera*et al*., 2013), Nigeria (26.5%) (Oladapo*et al*., 2010), Greece (16.2%) (Melidonis*etal*., 2006) and China (47.5%) (Zhao *et al*., 2012). The lower prevalence of undiagnosed diabetes reported in these countries could be a result of good health care system leading to improved diabetic services performance and increased public awareness of the disease. For example, a study done in rural Yoruba, Nigeria where the prevalence of undiagnosed DM was 26.5%, screening is normally done to all women attending ANC and to households where the sugar ants are frequently seen in their latrines (Oladapo*et al*., 2010). The lower prevalence of undiagnosed diabetes as a consequence of periodic diabetes screening reported from rural Yoruba could also be used to explain the lower prevalence of undiagnosed diabetes among females (67.9%) compared to males (76.7%) that was found in the present study. In Tanzania, during antenatal visit women are normally screened for glycosuria and once detected they are provided with proper counseling for proper management (Maternal Health Task Force; Harvard & Integrare 2014). This test could be an alert to women at risk hence likely for women be more aware andhence take more precaution about diabetes compared to men.

The present study also investigated on the proportion of study population who had ever been tested for diabetes prior to this study. It was found that only less than 20% of study population reported to have had diabetes test before. This indicates that less access to diabetes screening services in Dodoma Region. On the other hand, the current study found a significant difference between the proportional of those who have ever been tested in rural and urban areas (33.1% vs 6.1%). This finding reflects the disparity in diabetic health care services between rural and urban areas in Dodoma Region and most parts of the country and SSA. In Tanzania, diabetic health care services are provided at District hospitals which are mostly found in urban areas. Furthermore, most of the screening services are normally conducted during

major public events which are mostly held in urban centres. On the other hand, findings from a study conducted in rural Uganda by Murphy *et al*. (2012), found the proportion of diabetes screened prior to survey was 23.2%, 21.3% and 24.6% for both sexes, males and females respectively which is higher compared to those obtained from rural areas of the current study. This might indicate that, in rural Uganda, diabetic health services are easily accessible compared to Tanzania.

The current study also observed the glycemic status among the study sample who reported to have been diagnosed with diabetes prior to this study. Out of 36 individuals who reported to have been diagnosed with diabetes prior to this study, 25(69.4%) (Figure 4) were found to be in hyperglycaemic blood sugar status. This is in agreement to the one year follow-up study that was conducted in Dar es Salaam, Tanzania which showed that, out of 21 who were diagnosed with diabetes during the first survey of the study, 13(61.9%) were found to have hyperglycaemia one year later (Ramaiya*et al*., 1990). Similarly, a study that was conducted in China found that only 39.7% of the previously known diabetic patients had adequate glycemic control (Xu*et al*., 2013). These findings might imply that optimal plasma glucose among most diabetic patients is still difficult to achieve. This could be a result of either lack of appropriate knowledge on management of diabetes and/or inadequate diabetic care in most places. Qualitative studies that were conducted in Dar es Salaam, Tanzania showed that long distance to the health care delivery and poverty were among the reasons for failure to receive appropriate medical services by most DM patients (Metta*et al*., 2015b; Kolling*et al*., 2010). Although not significant, hyperglycemia among the previously diagnosed with DM in this study was found to be more among the urban dwellers (71.4%) where diabetic clinics are easily accessible and more available compared to rural dwellers (62.5%). This difference could have been brought up by the differences in lifestyles between urban and rural people rather than accessibility to health services. In rural areas foods are mostly eaten in their natural form composed of unrefined carbohydrates and they are mostly cooked in low fat and most of occupations involves moderate to vigorous physical activities such as walking, farming, collection of firewood and fetching water. (Unwin*et al*., 2010; Sobngwi*et al*., 2002; Maletnlema, 2002).These practices provide to people with an opportunity to a healthy diet composed of low glycemic index foods and adequate physical activities which are needed to improve glycemic status control compared to the urban people whose diet is mainly from refined carbohydrates and high fat content and physical activities had been with reduced as a result of sedentary oriented jobs like shop keeping and frequent use of motorized transport instead of walking (Unwin*et al*., 2010; Sobngwi*et al*., 2002; Maletnlema, 2002).

Conclusion

Diabetes is a health concern (epidemic) in both rural and urban areas of Dodoma, Region. High prevalence of undiagnosed diabetes indicates the burden of other non-communicable diseases in the future due to delay in management services. Investment in screening, diabetes health services and health education on the risk factors will reduce the burden of disease in the region. Health policy statement should be put into practice to enable the stakeholders act on the epidemic.

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Assessment of the state of water supply and sanitation in government primary schools in Dar es Salaam. A case of Kinondoni Municipality

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Abstract: Water, Sanitation and Hygiene related diseases remain one of the most significant child health problems worldwide. The majority of primary schools in the developing world lack the basic amenities of water supply, sanitation and hygiene education (SWASH) for the pupils and often for teachers as well. Infections such as cholera, malaria, trachoma, bilharzias and diarrhoea are on increase in our communities. The most affected ones are children; these diseases affect also the school attendance and academic performance. This study therefore sets out to assess the state of Water supply and Sanitation in Government Primary schools in Kinondoni Municipality. Data was collected by using three methods survey questionnaire, in-depth interviews and observation checklist from ten public primary schools in the study area. It used qualitative and quantitative techniques to analyse the data collected. The study found out that there is inadequate reliable water supply, water storage facilities and lack of enough improved water and functioning hand-washing facilities. Inadequate sanitation facilities and poor structural condition of sanitation facilities is a serious problem in the study area. The available sanitation facilities are poorly utilized due to pupils' background of personal hygiene, sanitation technology used at school, pupils' population, lack of hygiene education and school weakness in implementing SWASH guideline. The study concludes that although the government primary schools in Kinondoni Municipality own a variety of water sources and sanitation facilities there is generally inadequate coverage of water and sanitation facilities in the district. To increase water reliability at schools, multiple sources (water tape and deep wells) could be the best solution. Parents and pupils should be involved in SWASH program awareness and consider economic (maintenance costs) and cultural appropriateness. Establish a clear set of criteria for selecting schools that are not meeting standards to support improvement of their WASH.

Introduction

Water, Sanitation and Hygiene related diseases remain one of the most significant child health problems worldwide. Infections such as cholera, malaria, trachoma, bilharzias and diarrhea are on increase in our communities. The most affected ones are children. These diseases not only affect children's physical development but also school attendance and academic performance. The challenges of School Water, Sanitation and Hygiene (SWASH) are more pronounced in developing countries unlike the developed world. According to a report by the UN children's agency and its partners, titled "Raising Clean Hands," in sixty (60) countries in the developing world, more than half of primary schools have no adequate water facilities and nearly two thirds lack adequate sanitation (UN, 2004). Improving water supply, sanitation and hygiene in schools is crucial as it embraces the well being of school children, reduces the risk of WASH related diseases, contributes to education enrolment and performance, increases dignity and cognitive ability and reduces absenteeism. The majority of primary schools in the developing world lack the basic amenities of water supply, sanitation and hygiene education (SWASH) for the pupils and often for teachers

as well. Diseases caused by unsafe drinking water and inadequate sanitation remain Africa's most serious public health threat, causing 80% of sicknesses and killing 5,000 children every day. The lack of clean drinking water and proper toilet facilities undermines the sustainability of other critical needs, including education, economic development, nutrition, environmental health and gender equality (Africare). In Bezile the study conducted by the Ministry of Education and UNICEF (2009) the data shows that 5.4% of schools, there is no access to an improved water source (2.3% have no access to water). Moreover, 22% of school water sources are unreliable and 25% of schools report untreated source water.

In recent years, sanitation has raised up the international policy agenda. In 2002, sanitation was included in the Millennium Development Goals (MDGs), and specifically within MDG 7 Target 10 which sets the aim of halving 'by 2015. The proportion of people without sustainable access to safe drinking water and basic sanitation yet at national level in most developing countries, hygiene and sanitation do not yet receive much attention, despite important health implications (WHO& UNICEF, 2004).

In Tanzania, high rates of communicable diseases due to poor sanitation and unhygienic behaviour is experienced. The study conducted by SNV, Water Aid and UNICEF in 2009 in 16 districts covering 2697 schools in Tanzania mainland. The survey revealed that 6% of the schools had no latrines, 84% has no hand washing facilities, 86% had no water for hand washing and 38% of the schools had no water supply (SWASH Mapping Report, 2011). This critical shortage explains the continued existence of diarrhea, worms, acute respiratory infections, trachoma and dysentery which are all linked to inadequate access to water supply, improper sanitation and unhygienic behavior. The Primary Education Development Programme (PEDP) and Secondary Education Development Programme (SEDP) have all led to the increased enrollment of children in schools. This increase has mounted a huge demand for facilities particularly classrooms, chairs, laboratories, latrine and water supply. Unfortunately, water and latrine facilities did not receive equal attention like others. As a result, the situation of WASH continues to deteriorate (URT, 2012).

WASH facilities in Tanzania's schools are extremely poor. The increase of school enrolment since 2002 has put a heavy burden on existing school infrastructure and particularly on WASH facilities, which generally were already suffering from poor operation and maintenance. Many new schools and classrooms are built with no consideration for WASH facilities or if built, these rarely follow any standards (WaterAid, 2009). The provision of safe water and sanitation facilities in schools is a first step towards a healthy physical learning environment, benefiting both learning and health. However, the mere provision of facilities does not necessarily make them sustainable or produce the desired impact. It is the use of latrines and the related appropriate hygiene behaviour of people that provides health benefits. In schools, hygiene education aims to promote those practices that will help to prevent water and sanitation-related diseases as well as encouraging healthy behaviour in the future generation of adults (SWASH Guideline, 2010). Urassa (2009), Observed that subject of water and sanitation for primary schools was a great challenge to the public. Lack of water both at home and school is real a bigger problem to many people in Tanzania. Malima (2010) argued that poor state of water supply and sanitation facilities in schools is a major factor for the declining of pupils` class attendance and their ability to learn. The water supply and sanitation conditions of schools have become a public health concern in recent years. Therefore main the objective of this

research was to assess the status of water supply and sanitation facilities in government primary schools in Kinondoni district. The research work covers the assessment of the status of water supply facilities and the assessment of the status of sanitation facilities in the selected primary schools.

Methods and Materials

Study site and population

The research was carried between March and July 2013 in 12 secondary schools of Kinondoni municipality (Fig. 1). Kinondoni, which has an area of 531km2, is the northernmost of three districts in Dar es Salaam. It is found at latitude 6° 42' 43" S and longitude 39° 07' 54" E. To the east it is bordered with the Indian Ocean, to the north, and west the Pwani region and to the south Ilala district. In accordance with Tanzanian National Census conducted in 2012, the population of Kinondoni municipality is 1,775,049 up from the population of 1,083,913 in 2002, which is equivalent to population growth rate of about 5.06% annually (URT census, 2013). . Kinondoni has total of 138 government primary schools.

Figure 1: Map of Kinondoni District

The study was conducted in Kinondoni District in Dar es Salaam and its focus was to assess the water supply, Sanitation and Hygiene facilities in selected Primary schools. The area was selected purposively because population survey showed that the number of people in this district was increasing tremendously as the consequence, enrolment of primary school pupils had increased and exceeded the initial designed

capacity of Sanitation infrastructure while in other schools there were no sanitation facilities such as hand washing facilities, toilets and clean and safe waters supply at all which in turn cause the outbreak of cholera, typhoid, diarrhea, dysentery and sanitation related diseases. The schools were selected according to the criteria such as Socio-economic characteristics and size of the school. 10 schools were selected out of 138 government primary schools in Kinondoni municipality by considering the stated criteria to represent other schools (Table 1) presents the schools selected according to criteria.

Table1: Selected primary schools in Kinondoni district with its demographic Characteristics

Name of school	Ward	Boys	Girls	Total	Male teachers	Female teachers	Total
Makongo	Makongo	579	588	1167	2	32	34
Tegeta A	Goba	581	740	1321	4	17	21
Shekilango	K/nyama	188	223	411	2	22	24
Manzese	Manzese	953	897	1850	6	52	58
Mabibo	Makuburi	530	684	1115	7	37	44
Kawawa	Mabibo	1449	1475	2924	9	56	65
Kimara Baruti	Kimara	621	698	1319	4	53	57
Kawe A	Kawe	850	886	1736	8	39	47
Tandale	Tandale	877	932	1809	8	38	46
Mlimani	Ubungo	495	511	1006	7	45	52

Sampling Techniques

A total of 351 respondents participated in the study. The breakdown of this was: 1 respondent District health officer and 2 respondents (Head teacher and health teacher) as a key informant for in-depth interview and 33 pupils as respondents for the survey from each school. The key informants' interview was purposively selected due to the key position he holds. For the pupils simple multi-stage sampling technique was used. In total the study used ten primary schools and from each school 33 pupils were chosen (by lottery: 33 pupils from class 4, 5, 6 and 7). This was because pupils from class 4, 5, 6 and 7 have been in school for at least three years and therefore they have knowledge on the state of water supply and sanitation facilities of the school. Thus they were competent to make independent judgment. The ten Head teachers and ten health teachers for the in-depth interviews were got from the selected ten primary schools. Head teachers and health teachers were chosen because of the positions they hold in schools.

Study design, techniques and tools

In this study, both quantitative as well qualitative data was collected. The study employed various methods in obtaining the required information from primary schools that was selected; data collection instrument includes: A self-administered structured close-ended questionnaire survey, Observation (inspection visits), checklist (quantitative).

Data collection

Data collection was carried out at the school site during school hours with due verbal consent from respective head of schools, health teachers and pupils themselves. The self-administered questionnaire was given to pupils in either classrooms, offices or in some schools under the tree in absence of teachers.

The research team briefed on the purpose of the study and method of completing the questionnaire. Voluntary willingness from the respondents to participate in the study was sought before they were requested to fill the questionnaires. Observation (inspection visits) was done by the research team using pre-designed checklist guide by visiting into relevant school areas. These areas include pupils' latrines (both girls and boys), female and male staff latrines, and school water source facilities.

Data analysis

After collection, survey data was coded and analyzed. Editing involved examining data for errors and omissions after which, corrections were done accordingly where possible. Quantitative data from the survey was analyzed using SPSS 20.0 software. Analysis was done with descriptive statistics mode which computed frequencies, crosstabs, tables and graphs.

Results and Discussion

According to SWASH guideline (2010) all school should have a protected water source within their premises. Water source (such as shallow wells) must be at least 50 meters away from the toilets or waste water sources or drainage depending on soil condition of the area. Generally speaking, 40% of primary schools obtained their water from piped sources, 10% had boreholes with electrical pump while 10% of schools reported having rainwater available during the rainy season within the school compound, however not treating the drinking water and 40% of the sampled schools had no any water sources Most of the water sources were found within the recommended distance (400meters) from the school. However, there is inadequate and unreliable water supply for pupils in both schools. In agreement with these findings, the reviewed literature shows that study conducted jointly by WaterAid, SNV and UNICEF (2009). It has been observed that poor state of water supply and sanitation facilities in schools is a major factor for the declining of pupils` class attendance and their ability to learn. However, some schools that reported having access to piped or other protected water supply may not have water on a regular basis and not all of these schools actually have the water supply sources within the school premises. This is quite a recent study and the situation could not have changed in an instant, thus the validity of the current study findings. It is recommended that the provision of adequate and conveniently located water supply should be within 400 meters (URT Water policy 2004).It is recognized that actual level of consumption of water will vary depending on several factors, the main one being convenience of the supply for which distance traveled is one of the determinants. It is important for the school sanitation promoters to always bear in mind that facilities that are far away may discourage their use.

Despite the percentage of schools with piped water access, many of these sources are not portable. 75% of sampled schools visited report that their main water source is treated, but this figure is based on school responses not water quality analysis. Reviewed from the literature it is recommended that water supplied to schools should be of drinking water quality. Basically, school children and staff require about 5 liters per person per day in day schools, 20 liters per person per day for all residential school children and staff in boarding schools; and 5 liters per person per day for non residential school children and staff (WHO, 2009).

Table 2: Quantification of water demand needed for each school

S/N	Name of school	Total population	Estimated Water demand in (liters/d)	Available water (liters/d)	Water deficit (liters/d)
1	Makongo	1167	7,002	-	7,002
2	Tegeta A	1323	7,938	-	7,938
3	Shekilango	411	2,466	1,000	1466
4	Manzese	1850	11,100	9,250	1,850
5	Mabibo	1115	6,690	-	6,690
6	Kawawa	2925	17,550	-	17,550
7	Kimara Baruti	1319	7,914	-	7,914
8	Kawe A	1736	10,416	2604	7812
9	Tandale	1809	10,854	-	10,854
10	Mlimani	1006	6,036	5030	1006
	TOTAL		87,966	17,884	70,082
	Percentages		100	20.3	79.7

It is recommended that safe drinking water should be available throughout the school year, at least 1liter of water per day for each pupil should be provided (WHO 2010). Reviewing from the literature safe drinking water should be available throughout the school year, at least one liter of water per day for each pupil should be provided. However, the study revealed that majority of the school (50%) had no reliable water (Figure 2 and (table 2) presents the findings. The study revealed that this situation was caused by poor operation and maintenance of water supply facilities and insufficient of funds for WASH operation.

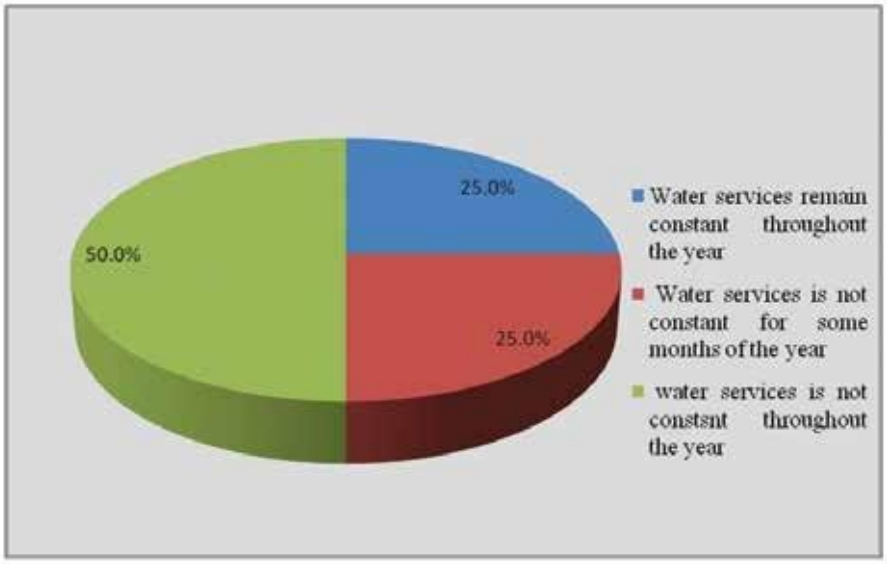

Figure 2: Water services in the sampled public primary schools in the study area

At the majority of schools visited pupils bring their own water at 72.4% of the schools visited. Other pupils have access to water collection points such as piped water fountains within the school premises (20.9%) and directly from hand pump rainwater storage tanks (6.7%). The study revealed that in Schools and their head teachers are often accountable to communities and government authorities for school metrics relating to condition of classrooms, pupil attendance, and educational performance. However, school

administration is often not held accountable for provision of safe drinking water, hand-washing facilities and soap, or adequate and clean sanitation facilities in the study area. Pupils were then asked to mention whether they face any problems in getting water from the said source. Table below shows a sizeable proportional of pupils in the sampled schools (18.1%) said that the water source is far from the school, while 50.6% of the pupils from sampled public primary schools mentioned that there is overcrowding at the sources where they collect water. Basically, it is school children and staffs require about 5 liters per person per day in day schools, 20 liters per person per day for all residential school children and staff in boarding schools; and 5 liters per person per day for non residential school children and staff (WHO 2009).

Table 3: Problems faced in getting water from the source Responses in percentages

Name of school	Far from school	Overcrowding	Poor quality	Low yield	Harassment from local community
Tandale	0.0	0.0	13.6	0.0	0.0
Kimra baruti	0.0	8.2	2.9	1.2	1.2
Mabibo	4.1	0.4	0.8	0.0	0.8
Shekilango	0.0	9.9	0.0	0.8	0.0
Tegeta A	0.0	2.5	2.5	2.5	0.0
Mlimani	0.0	7.4	1.6	1.2	0.0
Makongo	1.2	0.0	0.0	0.0	0.0
Kawawa	12.8	0.0	0.0	0.0	0.4
Kawe A	0.0	10.7	0.4	0.0	0.0
Manzese	0.0	11.5	1.2	0.0	0.0
TOTAL	18.1	50.6	23.0	5.8	2.5
AVERAGE	1.81	5.06	2.3	0.58	0.25

The water supplied must be free of pathogens and protected from contamination inside the school itself. Drinking water supplied to school should meet national standards and follow WHO drinking water quality guideline (WHO, 2004). According to SWASH guideline (2010) recommends that if water is stored in school, containers should be clean and covered, and there should be a tap from the container or way to safely remove the water without contaminating it. However the study revealed that 40% of the public primary schools visited had ground storage tanks for storing water in case the source is not supplying water, but most of the storage tanks were not properly covered hence water become of poor quality.

Some 42.8% of the school water supply facilities have been constructed within the past five years ago, while 14.3% of water supply facilities were constructed over six years ago, 28.6 of school water facilities were installed over ten years ago and 14.3% of school's water supply facilities were constructed over twenty years. Surprisingly, the age of water facilities does not significantly correlate with the condition of the facilities. Most of the water supply facilities are not working not because of aging but they suffer from poor maintenance and operations, four schools out of ten schools sampled had piped water from the municipal system, but water supply facilities were not functioning effectively. School reports cost or lack of funds as reason for currently not having water supply that are working.

In the study area three schools out ten schools visited had children with physical disabilities, however, 92% of water facilities available do not favor pupils with physical disabilities, and they get help from their fellow pupils once they need to get water from the facilities. It is recommended that water point design should be appropriate and accessible for small children and people with disability (WASH Guideline 2010).

The findings revealed inadequacy of both water supply facilities and handwashing as indicated by a sizeable proportion of 67.9% for water supply facilities and 90% for handwashing facilities. While 95% of the schools with piped water share the water supply facilities which had lead to mismanagement of the facilities Generally the findings revealed that handwashing facilities are in adequate as compared to water supply facilities. These statistics are supported by findings documented by WaterAid and other partners in 2009 indicating that the national and specifically school coverage of water facilities is quite inadequate. Basically, it is school children and staffs require about 5 liters per person per day in day schools, 20 liters per person per day for all residential school children and staff in boarding schools; and 5 liters per person per day for non residential school children and staff (WHO, 2009). Moreover, at most 95% of school connected to piped water had one tap which is shared by hundred pupils and 5% had four taps.

Based on school estimates, majority of schools visited used inadequate quantities of water (<5liters per day pupil per day). Majority (73.8%) of the pupil in the sampled public primary school responded that they consume 0.5liter per pupil per day when they at school, while 26.2% said that they use 1liter per pupil per day when they at schools. However, these schools do not meet the recommended standard of MoEVT and World Health Organization (WHO). For day primary pupils, the recommended standard of amount of water by WHO is at least 1liter per pupil per day in day schools for drinking and 5liters/pupil/day for sanitation. Drawing from the reviewed literature, the status of Water, and sanitation and hygiene report for Tanzania (2010) reports that Water, sanitation and hygiene (WASH) facilities in Tanzania's schools are extremely poor. The rapid increase in primary school enrolment since the abolition of school fees for primary education in 2002 has put a heavy burden on existing school infrastructure and particularly on WASH facilities. This could justify why there is overcrowding at many of the stated sources of water in the findings.

More still, a relative big percentage (67.6%) of pupils responded that the conditions of the water sources at their respective schools are poor. However, 28.8% of the pupils said that the water source facilities as average while only 3.6% indicated that they are in good condition. Given the big number of users, the researcher realized that the rate at which these facilities wear out is quit high and this could explain why many of the different sources of water are not in their best condition.

School heads were asked what kind of plans and mechanisms exist for operation and maintenance of the school water facilities. 60% of all primary schools with water sources visited reported that they are repairing their water sources when they break down, While 40% of the schools reported that the repair is done by other body.

The school management committees were found to take a great responsibility in providing financial support in the O&M services of water by using capitation grants major 52% of the primary schools reported Pupil Capitation Grants (PCG) as the main source of funding for school water supply, 10% of the primary school sampled reported that parents contribution as the main source of school water supply and 38% of primary schools indicates that Local Government Development Authority (LGDA) as the main funding for maintenance of water taps from which some schools get their water.

Through observation the study revealed that 60% of schools visited use concrete cemented urinals and 40% of the schools had no urinals for boys. While for teachers only 10% of the schools reported to have urinal for teachers while 90% of the schools had no urinals for teachers. They only share with boys. In the study area, the public primary schools sampled indicated fair availability and distribution of sanitation facilities especially the latrines and urinals. However, through observation, it was clear that the facilities in the study area were not in good condition. For instance, in two of the public primary sampled schools the walls looked quite old and dirty signaling that the latrines were old. Besides some of the doors that had been fixed the entrance to ensure privacy had been broken and some had been completely removed thus defeating the overall purpose.

Ventilated pit latrines are most common sanitation technology found in primary schools of Kinondoni municipality (60%). In the study area other schools have some other types of improved sanitation technology including pit latrines (20%), Flush toilet (10%) and 10% had unimproved sanitation such as pit latrines without slab. As for urinals, the majority of the schools pupils reported that they have only toilets (59.4%) while 24.2% reported that they use cemented urinals, 15.2% have soak pits. However, 1.2% of the pupils reported that in their schools, the bush is used as urinals. But through observation the finding revealed that 70% of the schools visited use concrete cemented urinals and 30% of schools had no urinals, only have toile

50% of the school toilets have been constructed within the past ten years, while 20% of toilets were constructed within the past twenty years and 30% of toilets facilities were constructed over twenty years ago. However, toilet age does not significantly correlate with the structural condition of the facilities. Moreover, on the same objective, the study went ahead to find out the general level of cleanliness and condition of the available sanitation facilities. The pupils were asked to rate the general cleanliness and the responses are as presented in the figure that follow

A sizeable proportion of pupils (3.6%) rated cleanliness of the toilets and the urinals (7.3%) sanitation facilities as good. A proportional of 67.7% rated that the general cleanliness of the toilets as poor while 28.5% ranked it at relative standards. For Urinals, 60% ranked them as being poor in cleanliness while 32.7% ranked it at average standards in cleanliness. Generally speaking the majority of the sanitation facilities are unclean which discourage the pupils not using the sanitation facilities comfortably; therefore this should not be ignored.

Adequacy of Sanitation Facilities

The findings revealed inadequacy of both toilets and urinals as presented by a sizeable proportion of 46.6% for toilets and 47.1% for the urinals and 43.2% of handwashing facilities were inadequate. Generally, the findings reveal that the urinal facilities are inadequate as compared to the toilet facilities. Through observation the study revealed that majority 90% of the schools visited in the study area had no handwashing facilities that are either installed within the toilet unit or outside near the toilet units. Reviewed from the literature, a mapping of school WASH in every school in 16 districts (2,697 schools) carried out jointly by SNV, WaterAid and UNICEF shows that, only 11% of schools surveyed meet the MOEVT "minimum" standards of 20 girls and 25 boys per drop hole. 20% of schools have more than 100 pupils per drop hole and 6% of schools have no latrines at all. The facilities that exist are frequently a barrier to those children most in need of an education. 96% of schools do not have facilities that are suitable or accessible to children with disabilities. 52% of girls' latrines did not have doors providing dignity and privacy. This finding does support the current study.

During the survey the research revealed that the number of stances available in schools is not enough for the increased number of pupils as it was reported by key informant interview that the number of pupils versus the facilities is a big problem, there is a lot of congestion (Head of school in sampled school). Generally speaking, the findings reveal that the sanitation facilities are inadequate (very few) compared to the number of pupils enrolled at schools. The deficit of toilets for both boys and girls are 81.8% and 80.3% irrespectively in the study area (table 13)

Table 4: Quantification of Toilet facilities per recommended standard by MOEVT

Name of school	Total number of pupils		Available toilets unit		Required toilets unit		Deficit of toilet unit	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Makongo	579	588	8	8	23	29	15	21
Tegeta A	581	740	3	3	23	37	20	34
Shekilango	188	223	3	3	8	11	5	8
Manzese	953	897	3	3	38	45	35	42
Mabibo	530	684	3	12	21	34	18	22
Kawawa	1449	1754	13	13	58	88	45	75
Kimara baruti	621	698	6	6	25	35	19	29
Kawe A	850	886	2	12	34	44	32	32
Tandale	877	932	3	6	35	47	32	41
Mlimani	495	511	8	12	20	26	12	14
TOTAL	7123	7913	52	78	285	396	233	318
Percentages	-	-	18.2	19.7	-	-	81.8	80.3

The values presented above indicate big deficits of sanitation facilities in the ten sampled schools of Kinondoni District. The ratios are evidently poorer in most sampled public primary schools and there is a lot that needs to be done so as to rectify the situation. The study made effort to establish the ratios showing the adequacy of sanitation facilities in the sampled public primary schools and the findings are presented in the table as follows:

Table 5: Ratios of Sanitation facilities to pupils and teachers

Name of school	Toilets				Urinals		Hand washing facilities	
	Boys	Girls	Teachers		Boys	Male teachers	Pupils	Teachers
			Male	Female				
Mlimani	1:62	1:43	1:7	1:45	1:492	1:7	1:251	1:26
Kawe A	1:404	1:72	None	None	1:808	None	None	None
Tegeta A	1:194	1:247	1:4	1:17	1:581	None	None	None
Kimara baruti	1:104	1:116	1:2	1:27	None	None	None	None
Kawawa	1:112	1:113	1:3	1:18	None	1:3	None	None
Makongo	1:72	1:74	None	1:34	1:579	None	None	None
Shekilango	1:63	1:74	1:2	1:22	1:188	None	None	None
Mabibo	1:177	1:57	None	1:44	1:530	None	1:279	1:44
Tandale	1:292	1:155	1:4	1:19	1:877	None	None	None
Manzese	1:319	1:299	1:6	1:52	1:953	None	None	None

The ratio of one hole per pupils is very high both girls and boys in schools (table 14) which cause the sanitation facilities to be dirty all the time. The national averages for the number of pupils per toilet/ urinal which is recommended by the Ministry of Education and Vocational Training are one toilet per 20 pupils for girls and one toilet per 25 pupils for boys and plus one Urinal per 50 pupils for boys. Though these schools do not comply with the recommended standards, some key informant's interviews reported that toilets are shared by two schools remain dirty always and schools didn't have facilities for teachers. The study revealed that poor state of WASH facilities was attributed to the low prioritization by both government and communities in the face of competing demands on available resources. Other reasons included weak governance structures within local government and ineffective monitoring to ensure that minimum standards are met. Poor resource management and limited financial accountability for funds allocated by local government and contributions to school committees from parents, were also contributing factors. On the other hand, national and international NGOs, the private sector and development partners were working in isolation.

The study revealed that the toilets of boys are separated from those of the girls in most of the sampled schools (99%). However, 20% of the sampled schools had no separate facilities for male and female teachers. Moreover, information from key informants interviews revealed that schools had no sanitation facilities for teachers they just go nearby teacher's house to get sanitation service once they at school premises. The study revealed that (70%) the sanitation facilities are enclosed for the privacy of the users and the user enjoys privacy when utilizing the facilities, while 30% of sanitation facilities are not enclosed for privacy of the users. Generally, most of the schools own enclosed sanitation facilities.

The study revealed that a relative big percentage (53%) of pupils reported that they are not using school's sanitation facilities. Others (13.4%) said that they only use the sanitation facilities sometimes. Only 33.3% indicated that they had no problem of using their school's sanitation facilities. Therefore, most of the pupils are not satisfied with the cleanliness of the facilities yet they go ahead and use them out of absence of alternatives. However, some of the key informants blamed the poor cleanliness of the facilities to pupils

who they said that it is caused by big number of users in the facilities and pupils who come from poor backgrounds who are not used to safe sanitation and hygiene practices. They said that in some of the latrines, walls, toilet bowls are stained with fecal matters revealing poor cleanliness by pupils especially the boys. And for the girls, urine was said to be flooding the floors of their places of convenience. These practices were said to have led intolerable smell in the sanitation facilities in most of the sampled public primary schools. Majority 55.2% of pupils in the sampled schools reported that the facilities are being misused by defecating on top, 13% said that the place is very dirty, 22.7% indicates that the even if the place is cleaned, the place will be dirty in short time and 9.1% of pupils reported that the place is kept clean as much as possible.

A proportion of 1.8% of pupils reported that there are very few people who do use the facilities even when water and soap are available, 21.8% of the pupils said that most of the pupils do not wash their hands after leaving the toilets and urinals, while 60.7% of pupils responded that no hand washing facilities are installed in their school's sanitation facilities and only 15.7% reported that they do wash some time after leaving the toilets and urinals. Most of the key informants revealed that most of the sanitation facilities constructed at schools are not provided with hand washing facilities and water at schools that had led to poor usage of hand washing facilities. Also other key informant interview reported that lack of toilet manners and poor knowledge that lead to poor utilization of the hand washing facilities that are provided at the places of convenience.

A relative big percentage (60%) of sampled schools had boys' and girls' toilets located within the school building, respectively. While 40% of the schools had boys' and girls' sanitation facilities located outside the school building. Constructing toilets within the school building should be considered as this correlates with better structural condition and cleanliness. 66.7% of schools had both male and female teacher toilets within the school building, respectively. A general term, the accessibility of sanitation facilities for pupils is relatively good. Most of the schools visited had the school toilets within the appropriate distances the classroom.

School toilets are rarely constructed to accommodate children with physical disabilities. In the study area the finding revealed that, only 10% of schools have toilet facilities that are accessible to children with physical disabilities. Toilets accessible to children with physical disabilities are rare in most of the sampled schools. In the study area two schools were reported having pupils with physical disabilities. Key informant interview reported that in school without proper facilities, children have to rely on their peers to help them when they need to use the toilet, greatly decrease their ability to be independent. Structures of the sanitation facilities were, according to observation criteria. The table below presents the findings.

Table 6: Structural appearance of the sanitation facilities (Percentages)

	Boys	Girls	Teachers
Toilet floor structure			
All in good condition	10	10	22.2
Fair condition	20	20	55.6
Poor condition	70	70	22.2
External doors			
All in good condition	30	30	66.7
Fair condition	30	30	11.1
Poor condition	40	40	22.2
Internal doors			
All in good condition	30	30	66.7
Fair condition	30	30	22.2
Poor condition	40	40	11.1
Toilet bowls			
All in good condition	10	10	75
Fair condition	10	30	5
Poor condition	80	60	30
Urinals		None	
All in good condition	5	-	80
Fair condition	10	-	5
Poor condition	85	-	15
Septic tank			
All in good condition	30	30	30
Fair condition	30	30	30
Poor condition	40	40	40
Toilet slabs			
All in good condition	16.5	30	60
Fair condition	10	15	10
Poor condition	74.5	55	30

The findings above presents that in ten of sampled schools in Kinondoni municipality the structural condition of the sanitation facilities are of poor condition thus there were visible damages reported. The components listed does not work properly the majority of the time or there is no components that had lead the users of the facilities to be in high risky because of these damages or malfunctioning. Therefore, major repairs are required or complete (re)constructions are required. It was evident that the majority (90%) of primary schools did not have anal cleansing materials in the toilets. Only 10% of primary schools in the study area provide anal cleansing materials. In most of the schools (80%) visited only teachers' toilets are provided with bucket with full of water as the anal cleansing materials. Big percentages (82%) of pupils use pieces of papers as anal cleansing materials after defecating. Only 10% use water and 8% use other material.

School heads reported that cleansing materials were mostly provided by self/users (80%), While 20% provide cleansing materials. It was reported that even the school provided cleansing material from its own resources, it was for teachers only. Schools rarely bought toilet papers for the entire school community.

"We sometimes provide toilet paper to the teachers. We cannot buy enough for the whole school. So we ask the children to bring their own sanitary cleansing materials" (School head in sampled school).

Observing cleanliness of floors, wall, urinals surrounding and availability of cleaning materials assessed toilet hygiene and maintenance. Toilets must be clean to be user friendly. The hygiene conditions of toilet facilities were assessed according to observation criteria. There were marked differences in terms of sanitary condition of the toilet facilities between pupils' and teachers' toilets. Majority (90%) and (80%) both boys and girl's toilet facilities were most often dirty. Only 33.3% of school teachers' toilet reported to had dirty floor while 67.3% reported to be clean. Majority 95% of the primary schools visited, the study revealed that the school's urinals had major amount of urine on the floor, hence it requires urgent intervention to rectify the situation. More over 80% of the school toilets surveyed had intolerable odor, while Teacher toilets facilities were in a good condition compared to pupils' toilets. Generally, the sanitary condition of the toilet facilities in the study area is not convincing and does not meet the required standard which was recommended by Sanitation guidelines of 2010. The study revealed that pupils and hired labor in some cases, cleaned toilet facilities and urinals. Only 20% of the schools visited hired labor to clean the toilet facilities, while 80% of the schools surveyed use pupils to clean both teachers' and pupils' toilet facilities. Some schools had adopted a duty roster system, which involved all most all pupils in cleaning of toilets. At most all schools visited the cleaning of toilet facilities were not done as a punishment to those pupils, who normally came late for lessons, misbehaved in class or those who committed minor offences while at school. This was mentioned during the interviews with school health teacher.

Various materials like detergents, soap, brooms, gloves, gumboots and water were used for the cleaning of the toilet facilities. Many schools (79%) had no cleaning materials for cleaning toilet facilities, only 21% of the schools visited had cleaning materials. Insufficient funds were often mentioned as the reason for the stop of key SWASH activities. The frequency of cleaning varied from school to school, and nearly three quarters (74%) of the schools surveyed reported that it was done at least once a day, but most often without cleaning detergents.

The survey revealed that the main source for repairs and construction of toilet facilities was reported to be the government funding, using the Pupils Capitation Grants, (PCG) and Local Government Development Authority (LGDA). In most schools surveyed there were some concerns raised by the school heads regarding to the financial capacity; accountability; technical feasibility and availability; community support as the main causative of the poor state of sanitation facilities "The funding is very irregular and late. The budget component has a problem, (Head of school in sampled school). In many of the schools visited, headteachers reported that the community was not supportive for the SWASH activities, the findings have revealed that there is positive trend towards improving the toilets facilities coverage in schools using the VIP type of construction. However, there is still need to improve on the hygiene practices while using the facilities, as clearly evidenced by the generally poor hygiene status of the toilets.

Only 10% of sampled had handwashing facilities basins equipped with running water, while 90% of schools had no handwashing facilities basins installed with running water. Moreover, the study revealed

that in most of the schools 70% had water basins with bucket accessed water but these were only found in the teachers' toilets. A relative big percentage (90%) of the schools sampled had no water basins with bucket accessed water. Despite the success of installing handwashing facilities in some schools, neither school had soap on the day the survey was conducted. The reason given by one of the schools for lack of soap provision was that the school management had no money to buy soap to supply to all pupils and even if the soap is bought it will be stolen. Handwashing facilities were typically located inside the toilets units (70%), while immediately outside the toilet (10%) and 20% were located inside the teachers' office. Handwashing facilities that are outside of the toilet unit can be beneficial for monitoring of the pupils of handwashing practices and ensuring that pupils properly use the facilities, but a method to close them should be considered for security reasons as many wash basins outside of the toilet units were reported to have been vandalized or stolen after school's hours.

There is no a standard for the number of pupils per handwashing point recommended by the Ministry of Education and Vocational Training for schools in both urban and rural settings. The study revealed that the ratio of pupils per handwashing point was high (1:465). Generally, the schools are not provided with enough handwashing facilities, in most of the schools handwashing point are not installed.

Both liquid and solid waste management remain to be a challenge in many schools. Facilities for waste management such as waste disposal bins are hardly provided in school compound. The findings revealed that dustbins were lacking in 80% of the schools surveyed upon observation. Only 20% of the schools visited had refusal bay. Moreover, the study revealed that the dustbins in most schools were not covered.

Methods of solid waste disposal were also observed. Although the school sanitation guidelines discourage burning refuse, the study found that relative big percentages (70%) of the schools burnt their solid waste within the school ground. 20% of the surveyed schools throw on the garbage dump (refusal bay) within the school grounds and 10% of the schools bury their solid waste within the school grounds. Burning method observed to be common in most of the schools surveyed. The study revealed that none of the schools visited had drainage system for removing storm water, grey water' from hand washing points and waste drinking water. More over in most schools surveyed the head of schools reported that they had no tendency of empting the toilet facilities in their schools.

Conclusion

Although the government primary schools in Kinondoni Municipality own the variety of water source and sanitation facilities. However, using the quantitative and qualitative findings from school visits and further discussions with key informant interview, the study identified the following problems; 'inadequate water supply and sanitation facilities, Poor condition of WASH facilities, inadequate financial capacity; weak community support; Poor operation and maintenances, rapid deteriorations of the facilities, unhygienic of the facilities, overcrowded, low priority of WASH activities by both governments and communities and low pupils engagement in WASH activities.

From the study following recommendations were developed. Increase the number of toilets, urinals and handwashing points to meet standards. If quantities can't be increased due to space, ensure that facilities are of high quality to reduce the loss of facility use due to disrepair. Both piped water and deep protected well should be installed to make water service to be reliable and sustainable throughout the year. This should be done by MOWI in collaboration with SWASH development partners. Establish a clear set of criteria for selecting schools that are not meeting standards to support improvement of their WASH facilities. Schools with inadequate quantity of facilities or without access to improved water or sanitation should be prioritized based on the extent of infrastructure needs. Schools with inadequate condition of facilities should be visited to assess if new facilities are needed or if capacity building for facilities management is needed. The carrying capacity of WASH facilities should be considered when enrolling new pupils to schools so as to make the balance of the facilities available at schools to avoid overcrowding. Encourage school health clubs where pupils are encouraged to get involved in WASH including monitoring WASH facilities and promoting health practices at schools and home.

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Impact of integrated control of schistosomiasis and soil transmitted helminthes over five years in Kome island, Sengerema district, Tanzania

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Abstract: Integrated control strategies are important for sustainable control of schistosomiasis and soil transmitted helminthes (STHs), despite their challenges for their effective implementation. With the support of Good Neighbor International in collaboration with NIMR, integrated control applying mass drug administration (MDA), health education using participatory hygiene and sanitation transformation (PHAST) and improved safe water supply has been implemented in Kome island over 5 years for controlling schistosomiasis and STHs. Baseline survey for schistosomiasis and STHs was conducted before implementation any integrated control strategies, followed by four cross sectional follow up surveys conducted among randomly selected sample of school children and adults in all 10 primary schools and 8 villages, respectively, in Kome islands. Those follow up surveys were conducted for impact evaluation after introduction of control strategies interventions in the study area. Five rounds of MDA have been implemented from 2009 along with PHAST and improved water supply with pumped wells in Kome Island as other control strategies for complementing MDA. A remarkable steady decline of schistosomiasis and STHs infection was observed from 2009 to 2012 with significant declining trend in their prevalence and significant declining trend as well in the proportion of individuals with heavy infection of *S. mansoni*, and thereafter infection rate has remained low at sustainable control. By third follow up survey in 2012, *S. mansoni* infection prevalence was reduced by 90.6% and hookworm by 93.3% among school children while in adults, the corresponding reduction was 83.0 % and 54.5%. Integrated control strategies have successfully reduced *S. mansoni* and STHs infection status to a low sustainable control. This study further suggests that monitoring and evaluation is a crucial component of any large-scale STHs and schistosomiasis intervention.

Key word: Integrated control, intestinal schistosomiasis, hookworm, Tanzania

Introduction

Schistosomiasis (particularly due to *Schistosoma mansoni* infection) and soil transmitted helminthes (STHs) are serious public health problems in the Lake zone in an area of Lake Victoria basin along lake shore and

its associated islands in Lake Victoria as among of the most affected areas in Tanzania(McCullough,1972). Despite that fact no serious large scale control program has been implemented in the integrated manner and sustainable way in these affected areas; most previous attempted integrated control programme conducted elsewhere in the Lake Victoria basin either has been mainly a small scale one (Odongo-Aginya et al., 1996) or solely mass drug administration (MDA) with no other control strategies (The United Republic of Tanzania 2007).

Schistosomiasis and STHs control program typically have been mainly focusing on the provision of preventive chemotherapy (praziquantel and albendazole) as advocated by WHO (WHO, 2006) and in the Lake zone school children have been mainly being targeted (The United Republic of Tanzania, 2004) until recently.. Although praziquantel (PZQ) is playing an important role in controlling schistosomiasis particularly in much of sub-Saharan Africa which is in the early stages of concentrating on morbidity reduction (Savioli et al., 1997), it is unlikely alone to have a lasting impact on transmission (Savioli et al., 1997; WHO 2002); therefore other complementary control strategies are needed. .

With the support of Good Neighbor International (GNI) in collaboration with National Institute of Medical Research (NIMR), Mwanza Centre, an integrated control program of schistosomiasis and STHs in the Lake zone was established. The control strategies of schistosomiasis & STHs that have been employed for this integrated control programme in Kome island since 2009 includes: Community-wide MDA (PZQ & ALB) for STH and schistosomiasis targeting people of all ages (4 years and above) administered annually which started in 2009, construction of pumped wells for provision of alternative safe water supply since around 2010 and provision of health education among adults community members using participatory hygiene and sanitation transformation (PHAST) approach since early 2011.

The parasitological and morbidity baseline survey of intestinal schistosomiasis and STHs was conducted before implementing the mentioned control strategies in February, 2009. Monitoring of the impact of the first round of MDA intervention by cross-sectional survey was done in March 2010, 13 months post MDA intervention, followed by other consecutive cross sectional follow up surveys conducted almost annually up to fifth one in July 2013 for monitoring of the other rounds of MDA and other control strategies (PHAST and improved water supply). This work reports a comparison trend of infection status (infection prevalence and intensity) during the baseline, and consecutive five follow-up surveys post MDA along with PHAST and improved water through constructing pumped wells as other control strategies over five years to assess the impact of integrated control strategies on intestinal schistosomiasis and hook worm infection status.

2.1 Study area and population.

Kome island is a 5th largest island (after Ukerewe, Rubondo, Ukara and Maisome) in Lake Victoria of 49% of the lake surface controlled by Tanzania. According to the 2002 National census, the Kome island had a population of 38,062 with average growth rate of 2.9%(–NBS, 2002). The source of water for drinking, washing and other chores is the Lake Victoria, natural wells and streams. The lake harbours the snail intermediate hosts for *Schistosoma* mainly *Biomhalaria choanomphala* and *Biomhalaria sudanica*

(McCullough,1972). The highest transmission areas of Lake Victoria are in the eastern (in Mara region) and south western part (in Mwanza and Geita regions) of Lake Victoria, particularly in the islands.

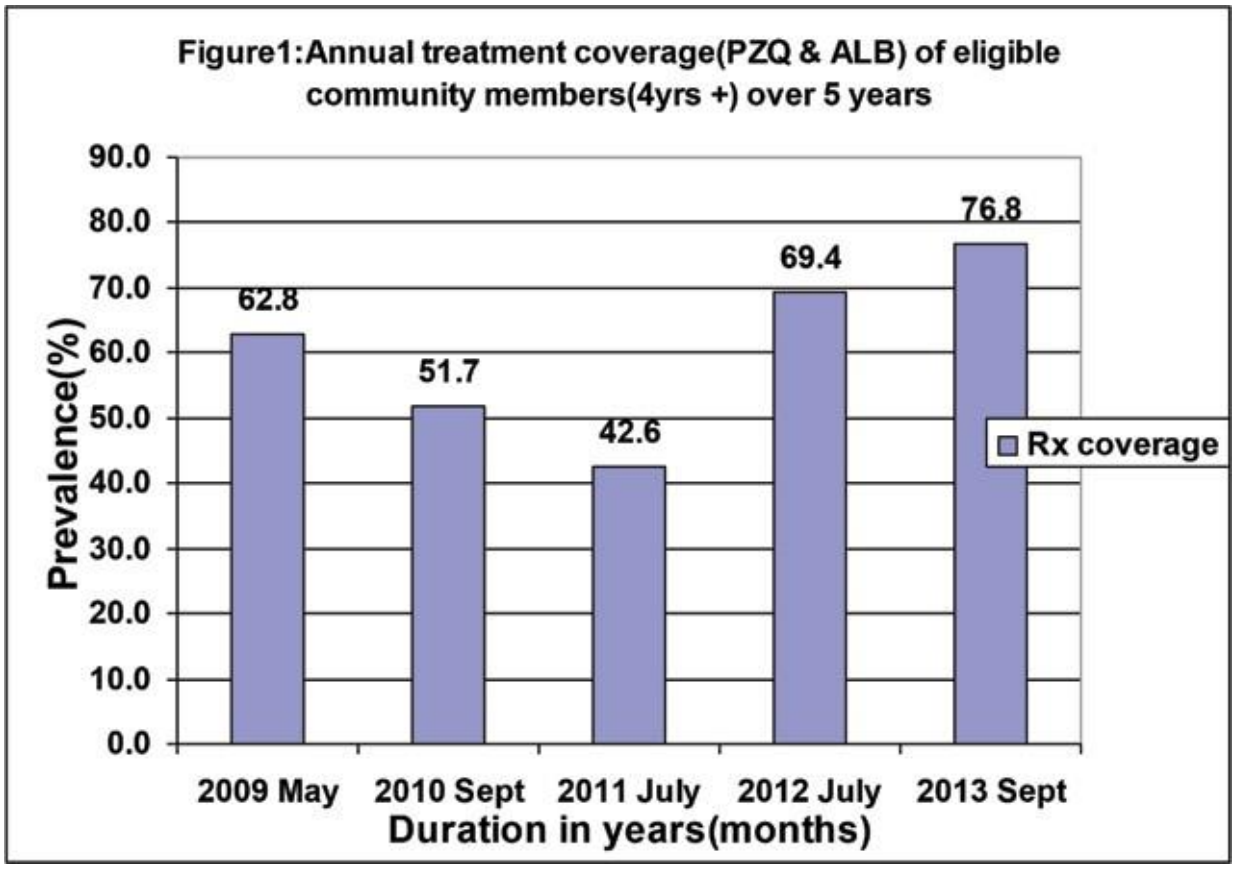
Study design and sampling procedure

This was a rather before-after intervention study design involving all inhabitants in Kome island. After the baseline survey in February 2009 before implementation of any interventions, thereafter each round of MDA interventions were evaluated by follow up parasitological and morbidity surveys which were conducted almost annually for impact evaluation, where the last fifth survey was carried out in July 2013. Before the surveys and intervention implementation, meetings were held in each village and primary schools where the purpose of study was explained. About 50 -100 adults participants each from 8 villages (all villages in Kome Island) where about 150 - 200 children each from 12 primary schools for each annual cross-sectional survey, has been randomly selected and recruited for participating in these follow up cross sectional surveys.

Interventions implementation

MDA is among the important control strategies that have been implemented in Kome island for morbidity control. All community members (4 yrs and above) were administered with PZQ and ALB; only ALB were administered among children aged between 2 to 4 years. During the initial three rounds of annual MDA (2009, 2010 and 2011) exercise was rather health service based delivery where health care providers in assistant with village health workers (VHWs) and research teams from GNI and NIMR-Mwanza administered the drugs. However, this approach was found to be much costly and unlikely to be sustainable; therefore the rest other two rounds of MDA in the community were delivered through community direct treatment (CDT), where trained community drug distributors (CDDs) were responsible for administering drugs (PZQ and ALB) among their fellow adult community members. For school children at schools, trained primary school teachers (1 male and 1 female) in each primary school administered drugs for their school children.

To date fifth rounds of MDA using PZQ and ALB have been carried out among all eligible community members (2 years and above); the first one was in May 2009, followed by other four consecutive annual MDA and their respective treatment coverage as shown in figure 1. A fourth and fifth rounds of MDA using CDT improved remarkably the treatment coverage from 42.6% (of previous third round) to 69.4% and 76.8%, respectively.



Key: Rx = treatment

Health education (HE) is among another control strategy also applied for integrated schistosomiasis and STHs in this control programme. Implementation of PHAST started after the main training workshop of Community Owned Resource People (CORPS) on PHAST on June-July, 2010 and started early 2011 and took about 18 months, whereby at least one adult family member from each household participated.

This was among control strategies particularly for schistosomiasis control at least to minimize the lake water activities associated with the risk of acquiring schistosome infection. To ensure all inhabitants have alternative easy access to safe water supply, construction of pump wells were planned at least for each sub-village to have one pumped well. The construction started in late 2009, and by mid 2011, almost half (twenty three) of targeted pumped wells were already completed in construction.

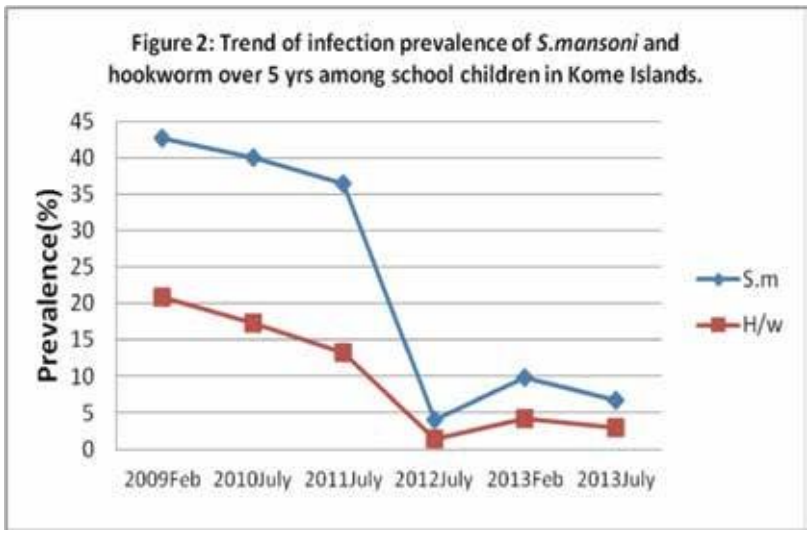
Data collection, material and methods

Participants were given container to collect stool specimen; only single stool sample were collected from pupils and adult community members. Collected stools were processed in duplicate by the Kato-Katz techniques using a 42.7 mg template (WHO, 1993) and microscopic examination of prepared Kato slides for *S. mansoni* and STHs (hookworm, *Ascaris lumbricoides*, *Trichuris trichiura* etc) ova was carried out at the field, and egg count were done for S.mansoni and hookworm. Preliminary analysis indicated that *Ascaris lumbricoides* and *Trichuris trichiura* infection in the study areas was <5% and therefore eggs of these species were not counted. To test for quality control, 10% of the slides were re-examined by supervisors (Korean research team)

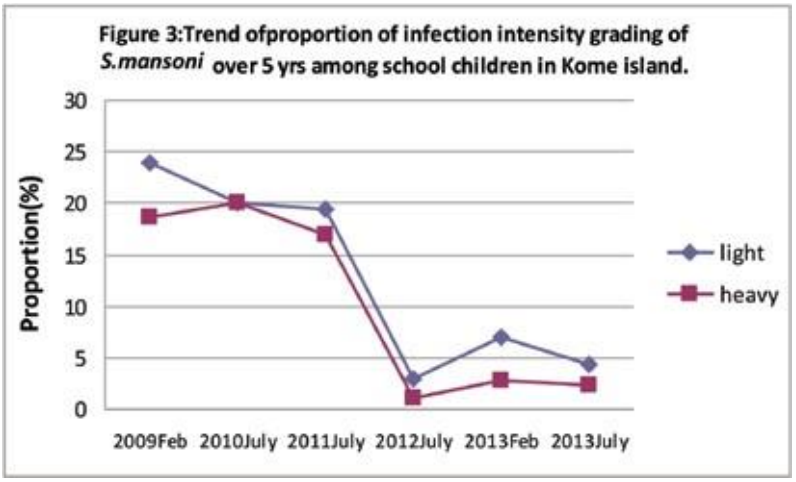
Data analysis

Data entry was done using CSpro (Borland International, Scotts Valley, CA, USA) or excel and a double entry system was used for quality control. Data was transferred to STATA version 8 software (Statacorp 2000, Texas; USA) for analysis. Analysis was done by generation of some frequency tables, cross tabulations and calculation of prevalence. Intensity (*S. mansoni* and hookworm) was determined by taking the average number of ova of both slides and then multiply by 24 to obtain egg per gram (epg) of feces. Mean of egg count for *S.mansoni* and hookworm was determined using arithmetic mean. Intensity of *S.mansoni* infection was classified into 2 categories: light infections (1—99 epg), heavy infection (≥100 epg). A non-parametric test for trend was performed to test for a trend of decreased prevalence of *S.mansoni* and hookworm, and proportion of infection intensity grading of *S.mansoni* with time (months/years).

Results

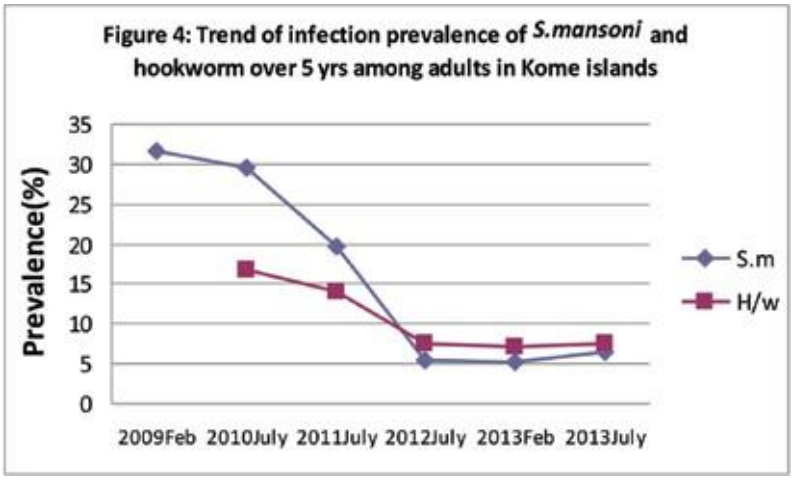


Key: S.m =*S. mansoni*; H/w = Hookworm

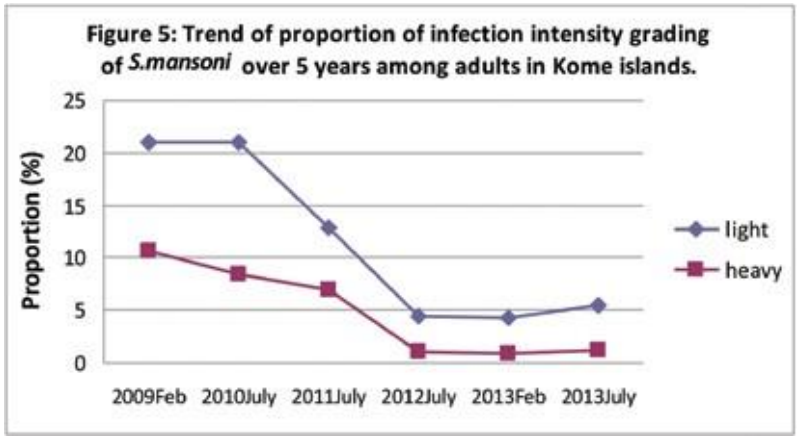


Key: light =light infection (1—99 epg); heavy =heavy infection (≥100 epg)

As shown in the figure2, there has been a consistent decline in prevalence of *S.mansoni* and hookworm infection among school children with time from February 2009 to July 2012; and this trend declining in prevalence of *S.mansoni* and hookworm with increasing in years from 2009 up to 2012 was modest significant for both; *S.mansoni* (non-parametric test for trend: z = -1.8, P = 0.072), and for hookworm non-parametric test for trend: z = -1.8, P = 0.072 (Figure 2). Almost similar significant declining trend was also observed for proportion of the intensity grading of *S.mansoni* infection (light and heavy infection) which were almost at same level during the baseline and initial subsequent follow up surveys; light infection (non-parametric test for trend: z = -1.8, P = 0.072), and for heavy infection non-parametric test for trend: z = -1.6, P = 0.11 (Figure 3)(Figure 3). By third follow up survey in July 2012, *S.mansoni* infection prevalence among school children was reduced from 42.7% at the baseline in February 2009 to 4.0% (Pr value =0.0000) in July 2012, with an overall reduction of 90.6%. The corresponding reduction for hookworm was from 20.9 % to 1.4% (Pr value = 0.0000) with overall reduction of 93.3%.



Key: S.m =*S. mansoni*; H/w= Hookworm



Key: light =light infection (1—99 epg); heavy =heavy infection (≥100 epg)

As for adult, similar trend of steady decline in prevalence of *S.mansoni* and hookworm infection rates (Figure 4) was also noted, particularly from 2009 to 2012. A similar significant declining trend was observed for the prevalence of *S.mansoni* (z = -2, P = 0.046) from February 2009 to February 2013,

and of hookworm from July 2010 to July 2012 (z =-2 , P = 0.046) (Figure 4). Almost similar significant declining trend was also observed for proportion of the intensity grading of *S.mansoni* infection (light and heavy infection), where proportion of heavy infection was much less (ie almost half as much as light infection) during the baseline and initial subsequent follow up surveys; light infection (non-parametric test for trend: z = -1.73, P = 0.083), and for heavy infection non-parametric test for trend: z = -1.73, P = 0.083 (Figure 5). Among adult significant reduction in infection prevalence was also noted from baseline and third follow up survey; *S.mansoni* infection prevalence was reduced from 31.7% to 5.4% (Pr value =0.0000), with an overall reduction of 83.0%. The corresponding reduction for hookworm was from 16.7 % in July 2010 to 7.6 % in July 2012 (Pr value =0.0001) which is equivalent with overall reduction of 54.5 %. However remarkable steep decline in infection prevalence was much more observed for *S.mansoni* from February 2009 to July 2012.

Other STHs

Other STHs occurred at very low prevalence during the baseline survey as follows: *Trichuris trichiura* (2.0%), *Ascaris lumbricoides* (0.6%) and *Strongloides stercolaris* (0.1%) among school children while in adult *T. trichuira* were 1.8%, *A. lumbricoides* (0.5%) and *S. stercolaris* (0.5%). Despite that other STHs occurred at low prevalence, but by 2012 July prevalence of either any other STHs (*T. trichuira, A. lumbricoides* and *S. stercolaris)* were also marked reduced from 2.5% during the baseline in 2009 to 0.3 % during the follow up in 2002, equivalent to 88% reduction rate.

Discussion

Integrated control of schistosomiasis and STHs has contributed to the significant reduction of the prevalence of *S.mansoni* and hookworm in Kome island and kept their prevalence low at sustainable control level. *S.mansoni* and hookworm infection rates in school children and adult had been maintained at a low sustainable control level (5 -10%) from 2012 July to 2013 July, after 5 rounds of MDA. During that period (2009 to 20012), intensity of *S.mansoni* and hookworm infection among adult and school children showed a tendency of decreasing after 3 rounds of MDA and also of being maintained at reasonable control level of below 10 epg. Apart from MDA intervention, the decline to such a sustainable control level might also be attributed to other integrated control strategies (Health education using PHAST approach and improved water supply through pumped wells construction) implemented in this integrated control programme along with MDA.

Schistosomiasis and STHs during baseline survey and subsequent cross-sectional follow-up surveys carried out almost annually showed remarkably steady decline in infection rate particularly from 2009 to 2012, and thereafter remained low at sustainable control post integrated control strategies. This finding is in line with previous studies(Uchoa et al., 2000; Freeman et al., 2013; Xu et al., 2013; Strunz et al., 2014; Grimes et al., 2015) which showed remarkable decline in infection status with integrated control strategies. Our results are in accordance with these studies, suggesting that integrated control strategies as implemented in Kome islands (Sengerema district) is highly effective in reducing schistosomiasis and STHs in a Lake Victoria islands and onshore communities as highly endemic areas for intestinal schistosomiasis and STHs.

Slow decline after 1st and 2nd follow up surveys, compared with steep decline after 3rd follow up survey might be due to the delay in taking off other control strategy (health education-PHAST, supply of alternative source of water) and declining treatment coverage (from 62.8% in the first round of MDA to 42.6% in the 3rd round of MDA). However, there after introducing CDT, the treatment coverage improved to the justifiable level (70 -75%). Implementation of PHAST started around early 2011 and by mid 2011, and about half (23) of targeted pumped wells were constructed.

So far this is a first large scale integrating control of schistosomiasis and STHs covering such large population in Tanzania particularly for *S.mansoni* in the Lake Victoria basin, being implemented in such integrated manner with MDA along with health education and improved water supply as common advocated control strategies (WHO 2002; Utzinger J, Bergquist R et al. 2003). Previous integrated control programe in the Lake Victoria basin has been mainly small scale one covering small population(Odongo-Aginya et al., 1996). Lower rate of implementation of integrated control strategies in our local setting may be attributed to its challenges in the implementation. Resources for transmission control such as provision of safe water and sanitary facilities which are required to limit infective water contact and contamination of the environment particularly in country with poor resources in sub-Saharan Africa like Tanzania, to some extent proves difficult due to poor infrastructure and inadequate resources in these countries. Unfortunately, in our intervention, all control strategies in integrated control programmes were not able to start simultaneously; the one started a little bit late (ie PHAST) and the other was incomplete (ie constructed pumped wells). In case these control strategies had started earlier and completed as it anticipated, probably impact on schistosomiasis and STHs control would have been much higher than as was observed.

Although chemotherapy has been the backbone of previous control programmes, and remain important control strategies for morbid control (Savioli et al., 1997; WHO, 2002) however dependence on chemotherapy alone is not sustainable. Complementing MDA with other preventive measures, focused on clean water, adequate sanitation, and health education, are essential features of any long-term strategy for control and elimination of schistosomiasis. Recently, there are also an increase in emphasis by WHO (WHO 1993; WHO 2002) and other worker (Utzinger et al., 2003) on the role of health education, safe and adequate water supply, and sanitation to complement chemotherapy as an option for sustainable long-term effects on morbidity control.

The treatment coverage was not optimally enough (at least 75% and above) as was anticipated .This mainly might be attributed to the high mobility of Kome inhabitants as has been noted by others (Appleton, 2000) in most islands in Lake Victoria. Majority of inhabitants in Kome island are mobile population involved with fishing activities to move to small islands for fishing activities and other related business during 'Dagaas' (*Rastrineobola argentous*) fishing seasons. Other likely contributing factor for the lower treatment coverage is the method of health based delivery of MDA during the previous three rounds of MDA as this approach was not ideal to attract clients for MDA; this approach didn't provide ample time for capturing such mobile individuals likely not to be around during MDA exercise.

Despite challenges of implementation of integrated strategies, we came across in this control programme, significant impact on reduction of *S. mansoni* and STHs (particularly hookworm) was achieved with this integrated control programme. Integrated control strategies have successfully reduced *S. mansoni* and STHs infection rates in Kome island to a low sustainable control. If resources allowed, chemotherapy is highly recommended at least to be supplemented with one or more control strategies ie health education, water supply, sanitation and focal intermediate host snail control where is feasible. This study further suggests that monitoring and evaluation is a crucial component of any large-scale STHs and schistosomiasis intervention programme as also recommended by WHO (Montresor et al., 1999).

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Integrated community directed treatment of schistosomiasis and soil transmitted helminths in Bwina ward northwestern Tanzania

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Abstract: Schistosome and soil-transmitted helminths (STH) infections are recognized as major global public health problems, causing severe and subtle morbidity, including significant educational and nutritional effects in children. Although effective and safe drugs are available, ensuring access to these drugs by all those at risk of schistosomiasis and STHs is still a challenge. Community-directed treatment (CDT) has been used successfully for mass distribution of drugs for other diseases such as onchocerciasis and lymphatic filariasis and has shown to be a cost-effective strategy for reaching most affected communities. This study aimed to evaluate the feasibility and effectiveness of the CDT strategy in the control of schistosomiasis and STHs, in Bwina ward, Chato district, Northwestern Tanzania that is highly endemic for both infections. Pre-treatment prevalence of Sshistosomiasis mansoni in 2012 averaged 58% (range 48-68%) in the three communities that make the Bwina ward. Treatment coverage in the three villages ranged from 78.9% in Bwina to 87.6 % at Mulumba as per community drug distributors (CDDs) records. One year after, the CDT exercise coverage increased ranging from 83.4% to 94.7% at Mbuye and Mulumba respectively. Overall reduction of S. mansoni were 71.2% in school children (from 40.6% to 11.7%, p value= 0.000) and by 68.9% among adult (from 32.2% to 10.0%, p value= 0.0000). The reduction in prevalence of hookworm and Ascaris lumbricoides were 60.1% and 83.3% respectively. This study shows that CDT is an accepted and effective strategy in the mass treatment of schistosomiasis and STH infections in resource constrained communities in the district and may be useful in similar communities in Tanzania. A controlled trial comparing CDT and school based mass drug administration to demonstrate their relative advantages are discussed.

Introduction

Schistosome and soil-transmitted helminth (STH) infections cause a huge burden of disease many parts of the world, particularly where health resources are most limited [1]. Despite the fact that praziquantel, an effective treatment for *Schistosoma* infection, has been available for more than 30 years [2], it is only recently that governments through their national schistosomiasis control programs have begun to distribute praziquantel widely on a population-based, mass treatment basis [3–5] with fewer than 5% of the infected population being treated[6]. The World Health Organization (WHO) and other bodies are

actively working to increase global coverage levels.

There are an estimated 239 million people infected with one of the major schistosomes [8], with more than 90% of the cases occurring in sub-Saharan Africa [9]. Almost 300,000 people die annually from schistosomiasis in Africa from pathologies to the liver (in the case of Schistosoma mansoni and S. japonicum infections), and to the bladder and kidneys (in the case of S. haematobium infection) [10].

Compared with any other age group, preschool children and school-aged children tend to harbor the greatest numbers of soil transmitted helminths and schistosomes resulting into anaemia, stunted growth and diminished physical fitness as well as impaired memory and cognition thus poor educational performance, reduce school attendance [13, 14]. Hookworm and chistosomiasis are also important disease during pregnancy, causing neonatal prematurity, reduced neonatal birth weight, and increased maternal morbidity and mortality [16]. The coinfections have synergistic effects, such as increased transmission of malaria, HIV and increased susceptibility to infection with these pathogens [18–23].

In East Africa Schistosomiasis mansoni is largely associated with Lake Victoria [9]. A study in Kenya showed that prevalence levels among school children along the Lake shores ranged between 29-94% [10].in schools located less than 1 kilometer from the lake were positive for S. mansoni infection. This prevalence decreased with increasing distance from the lake [9]. In Norh Westen Tanzania, Western Kenya and Southern Uganda, schistosomiasis is largely associated with Lake Victoria [9-11].

To improve access to treatment at affordable and sustainable costs and, where possible, to improve existing programs, community-directed intervention (CDI) has been presented as an alternative strategy for control of schistosomiasis and STHs. The CDI approach has been tried in several settings [15-18] and has worked successfully in many countries for the African Programme for Onchocerciasis Control (APOC) [19-21] as well as for lymphatic filariasis control along the Kenyan coast [22,23].

Most individuals at high risk of morbidity do not have access to treatment because of the paucity of health infrastructure, lack of awareness about the disease, or cost. Therefore it is pertinent to evaluate if CDI would increase access to treatment among community members as well as increase coverage in school age children. We used the CDI approach for treatment against schistosomiasis and STHs in Bwina ward in north Western Tanzania, a peninsular area along the shores of Lake Victoria highly endemic for schistosomais and STHs, to test CDI acceptability and effectiveness in reducing disease prevalence and burden.

The strategy to control these diseases is high coverage, long-term mass treatment with praziquantel (PZQ) for schistosomiasis and albendazole (ALB) for intestinal helminths infections, drugs proven safe for mass treatment [24, 25]. Community-directed treatment (ComDT), where the community is responsible for organising and administering treatment to its members, is feasible and effective in onchocerciasis control [26]. The main strategy of the schistosomiasis and soil-transmitted helminths control programme in Tanzania is school-based treatment. However, other groups at high risk of morbidity, such as non-enrolled

children and pregnant women also need to be treated. The control of schistosomiasis and intestinal helminths infections in other high risk groups could be CDT.

Methods

Study area

This study was conducted in a rural peninsular ward of Kagera region north Western Tanzania. The ward has 3 villages. This study area borders Lake Victoria where no records of earlier surveys on schistosomiasis and soil transmitted helminthiasis were available.

Study design

Trained CDDs conducted the village census to determine the number of praziquantel and albendazole tablets required in his/her allocated area. Each pair of CDDs was assigned an average of 20 households. Household heads were consented for inclusion of their home compounds in the census in preparation for drug distribution. The census was conducted by CDDs using pre-designed census forms.

Prevalence survey

Parasitological surveys were conducted by the research team. Pre-treatment prevalence levels of *S. mansoni* infections, STH infections. Prevalence of infection in school age children at Bwina primary school in July 2010 was used as a proxy to estimate baseline community prevalence and subsequent treatment coverage [27,28] . The initial parasitological survey in February 2012 was followed by two post-treatment surveys, one in February 2013 and eight months later in October 2013. Selected children from Mbuye, Bwina and Mulumba primary schools in the ward were included in the study following consent by parents and assent by the children. To assess parasite infections at each survey time, children were asked to provide a single stool sample. Two slides were prepared from each stool sample using the Kato-Katz method and each slide was read by an experienced microscopist.

Community drug distributors (CDD)

The CDDs were lay persons from the study area who volunteered for this role. CDDs were trained to administer informed consent during census and drug distribution exercises, to distribute the drugs, and to report back to the health facility and researchers. CDDs were trained for conducting a census by the research team and local health workers. The CDDs obtained consent from household heads for the census and of all community members for treatments in the door-to-door drug distribution. The research team administered all other consent, including that for the baseline survey among parents and parasitological survey in children. In schools, children were treated for the helminth infections at their respective schools.

Drug distribution

Praziquantel and albendazole were used for the integrated treatment of schistosomes and STH infections, respectively, among residents aged ≥ 5 years, using trained community drug distributors (CDDs). Drug distribution treatment was recorded in forms designed for the census, allowing for easy follow-up by the CDDs. Doses of drugs were distributed door-to-door to individuals based on their height, excluding

children under 5 years old. We used colour coded tablet pole [29,30] for easy determination of drug dosage by the CDDs.

Training and capacity building

Communities were first mobilized and sensitized to elect community volunteers, known as community drug distributors (CDDs). These CDDs were trained about essential elements of disease transmission for schistosomiasis and STH, health benefits of treatment and the methods for control of these diseases. They were also practically trained on how to register the target population, deliver health education messages and determine and deliver praziquantel (PZQ) doses using a tablet pole [29,30]. Finally, the CDDs were given guidance on when and where to refer cases for further management of side-effects during mass treatment campaigns. At least two CDDs per sub-village were trained.

Data analysis

Pre-treatment and post-treatment prevalence and infection intensity levels were compared using Chi-square and nonparametric t-tests. P values < 0.05 were considered significant.

Ethical considerations

This study was reviewed and cleared by the Medical Research Coordinating Committee of the National Institute for Medical Research and permission was obtained from Chato District ad Bwina Ward as well as School head teachers. The project was then introduced to the community during community meetings. During these meetings, health education was provided to the community. Community members identified two CDDs per sub-village.

Results

Community census

Bwina ward had 3 villages, each was sub-divided into sub villages for our drug distribution convenience, and about 78 home compounds. A total of 160 community dug distributors (CDDs) were selected to serve the whole Ward. A pair of CDDs, male and female, were mandated to serve twenty households. Results from the census exercise completed by CDDs in June 2012 indicated that there were 3167 in Bwina, 3881 in Mulumba and 3447 in Mbuye community members bringing the total population eligible for treatment to 10,495. A total of 452 children from all three schools were e recruited for the study.

Disease Prevalence

We conducted two mass drug administration rounds, one in May 2012 and the second one in May 2013. Overall reduction of *S.mansoni* prevalence was 50% among school children ranging from74% to 24% (Table1) and among adults it was 32% ranging from 66% to 34% (Table 2).

Table 1: Prevalence of schistosomiasis and hookworm among school children in Bwina ward, Chato district, north western Tanzania

School	Stool test	Sm+	%	Hw+	%	Sm+	%	Hw	%
Mbuye	150	99	66	57	38	33	22	17	11
Bwina	155	133	86	67	43	40	27	19	12
Mulumba	148	105	71	68	46	37	25	16	11
Total	453	337	74	192	42	110	24	53	12

The reduction in prevalence of hookworm was 30% among school children ranging from 42% to 12% whereas the one among adults was 44% ranging from 27% to 12%.

Table 2: Prevalence of schistosomiasis and hookworm among Community members in Bwina ward, Chato district, north western Tanzania

School	Stool test	Sm+	%	Hw+	%	Sm+	%	Hw+	%
Mbuye	43	24	56	10	24	14	33	5	12
Bwina	48	37	77	13	28	17	35	6	12
Mulumba	46	29	63	14	31	16	35	6	14
Total	137	90	66	37	27	47	34	17	12

Treatment coverage

Treatment coverage for praziquantel and albendazole was assessed from CDD registers. Treatment coverage was calculated as the total number of persons treated divided by total eligible population (persons over 5 years of age) and expressed as a percentage. Mean CDT coverage in the three schools in the ward increased from 78% in 2012 to 82% in 2013 with ranges starting from 76% to %79% and 79% to 84% in 2012 and 2013, respectively (Table 3).

Table 3: CDT coverage among School children in Bwina ward Chato district, north western Tanzania

School	No. pupils	Covered	%	No. pupils	Covered	%
Mbuye	646	504	78	652	541	83
Bwina	621	490	79	636	534	84
Mulumba	587	446	76	604	477	79
Total	1854	1440	78	1892	1552	82

Treatment coverage in the three communities increased from 85% to 91% ranging from 79- 88% and 90-91% in 2012 and 2013 respectively (Table4). This is in accordance with community drug distributors (CDDs) and government records.

Table 4: CDT coverage among community members in Bwina ward, Chato district, north western Tanzania

School	Expected 2012	Covered 2012	%	Expected 2013	Covered 2013	%
Mbuye	3447	3017	86	3544	3206	90
Bwina	3167	2503	79	3256	2963	91
Mulumba	2905	2556	88	3091	2875	93
Total	9519	8076	85	9891	9044	91

Side effects

Praziquantel is generally safe and usually only causes minor side effects that usually resolve with minimal management. Side effects following treatment were recorded during treatment by CDDs. Reported side effects were rashes, diarrhea, nausea, abdominal pain and vomiting all totaling to 591(41%) and 604 (39%) among school children in 2012 and 2013 respectively. The rates of adverse events were lower among adults 1226 (13%) and 1098 (12%) in 2012 and 2013 respectively.

Discussion

The control of schistosomiasis and other neglected tropical diseases (NTDs), both by global sponsors and governments in endemic regions, has been to use school-based mass treatment for controlling schistosomiasis in highly endemic areas. However, it is recognized that this approach leaves out other members in the community who are also infected and who may be contributing to continued transmission. In recent years, community based treatment has been taken as an alternate approach though community- level programs at the primary level in most of African areas have inadequate health care infrastructure [31]. Community directed intervention (CDI) has been evaluated and found to be highly successful in reaching persons at risk of disease within the community [32]. The approach emphasizes the significant role of community participation, thus ownership of the project, as the fundamental factor that has been responsible for the success of APOC. Many studies have shown that the use of lay or community health workers who are trained in a short period in preventative health care, showed promising benefits [33]. In a study by Ndyomugyenyi and Kabatereine [18], integrated CDI achieved higher treatment coverage (85%) for praziquantel and mebendazole compared to a school-based treatment approach (79%) for children aged 5–14 years. However, more controlled studies comparing the CDI and school-based mass-drug administrations in endemic areas are needed.

In the current study, the CDDs visited all compounds in Bwina. The effectiveness of CDI coverage was influenced by several factors. Prevalence reduction rates of the helminths was negatively affected by absence of alternative source of water other than the lake, occupation that is fishing and farming that are practiced without protective gear that enhance reinfections. Moreover there was very low (10%) latrinisation in the whole ward. The absence of latrines in most households coupled with low level of community health education have a serious implication to continued helminthic infections and reinfections.

Coverage depended on several factors including the small size of the project area as the peninsular ward has only three villages. Other factors include high motivation of CDDs and commitment of community leaders. Set back to the effectiveness of the study was due to ineligibility of some individuals due to drunkardness, pregnancy and chronic illness. Refusal of certain participants in taking the drugs was attributed to misconceptions, rumours about adverse events and escaping and cheating on the part of school children that they have taken the drugs at home through CDT.

These results from the reported study further confirm that praziquantel is well tolerated, causing only minor side effects. However, community wide rumors on drug reactions can adversely affect well organized mass treatments. To help alleviate fears of drug reactions in communities and promote MDA compliance, large-

scale control programmes should include pharmacovigilance studies as part of ongoing monitoring and evaluation strategies. Detailed pharmacovigilance data that are disseminated back to the community will provide accurate information to communities about the exact nature, extent and cause of side effects as well as help to discriminate true side effects from other underlying conditions and exaggerated rumors about drug reactions.

Conclusion

This study shows that CDI is an accepted and effective strategy in the mass treatment of schistosomiasis and STH infections in resource constrained communities in the district and may be useful in similar communities in Tanzania. CDT is more effective than school based mass drug administration. However, sustained efforts should be continued so as to suppress steadily the reinfection rate of these parasites. The impact of the two rounds of drug distribution in such endemic area confirms the feasibility of using CDTI for the control of helminth infections in similar communities. The effectiveness and feasibility of CDT further confirms that integrated delivery of different health interventions are possible in rural areas of Africa [16,19].

Competing interests

The authors have no interests to declare.

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