

The Southern African Journal of Medical and Health Sciences

SAJMHS



A Journal of the Lusaka Apex Medical University

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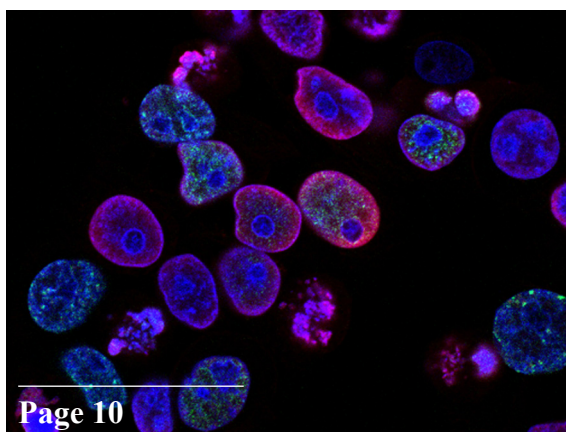
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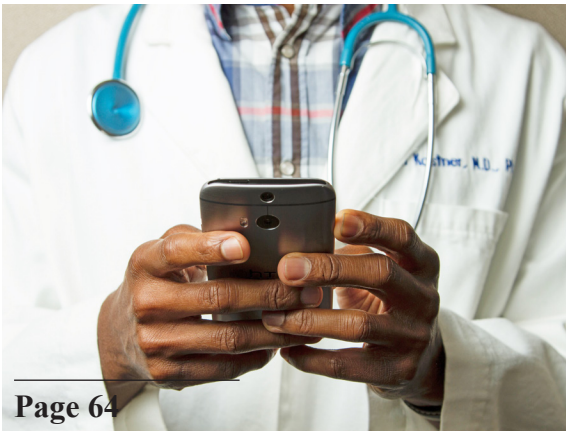
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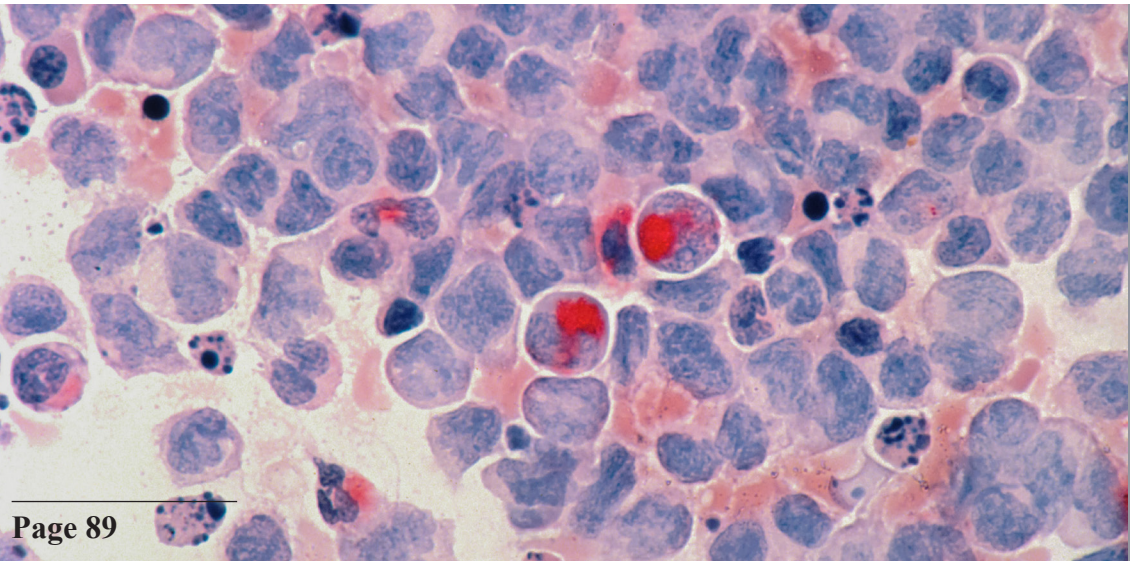
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Editorial

We are delighted to introduce the journal of Southern African Journal Medical and Health Sciences of the Lusaka Apex Medical University. This landmark event has been made possible by the able editorial team led by Dr. Oswell Khondowe. The journal will publish topics of medical and health science interest to all branches of the health profession. In addition to publishing original research, the journal will publish reviews, systematic reviews, conference proceedings. Manuscripts should be sent to the Editor in Chief, Dr. Oswell Khondowe via email sajmhs@lamu.edu.zm. Editorial enquiries and correspondence should be addressed to the Journal Technical Editor Ms Olga Shinondo using the same email address. All enquiries concerning advertising space or rates should be addressed to the Technical Editor. The journal will be published quarterly by the Lusaka Apex Medical University. The Lusaka Apex Medical University grants editorial freedom to the Editor in Chief of SAJMHS. The views expressed in the journal are those of the authors and may not necessarily comply with LAMU policy. SAJMHS respects authors and shall provide timely feedback. This work is copyright under the Berne Convention. In terms of the Zambian Copyright and Performance Rights Act of 1994, no part of this work may be reproduced or transmitted in any form or by any means, electronic or mechanical without written permission from the publisher.

I applaud the Lusaka Apex Medical University for its Decision to launch this open-access publication: SAJMHS. As one of its inaugural Editorial Board members, I am inspired to launch our new journal, Southern African Journal of Medical and Health Sciences, and to welcome you all to this inaugural issue. The SAJMHS journal's editorial team comprises local and internationally respected pool of researchers bringing together different areas of expertise in health sciences and medicine. Since our goal is to promote a broad and exhaustive approach, the journal will welcome special issues on cutting-edge topics proposed by leading scientists who can volunteer to act as guest editors. The journal's guidelines to authors provides key issues concerning manuscripts for submission.

External and internal board members and reviewers have vast wealth of experience and include experts in different fields of medicine, health, research and statistics. Sir Alimuddin Zumla, one of the members of the International Advisory Board is a professor of infectious diseases and international health at University College London Medical School. He specialises in infectious and tropical diseases, clinical immunology, and internal medicine, with a special interest in HIV/AIDS, respiratory infections (including COVID-19 and Tuberculosis), and diseases of poverty. He is known for his leadership of infectious/tropical diseases research and capacity development activities. He was awarded a Knighthood in the 2017 Queens Birthday Honours list for services to public health and protection from infectious disease. In 2012, he was awarded Zambia's highest civilian honour, the Order of the Grand Commander of Distinguished services - First Division. In 2020, for the third consecutive year, Zumla was recognised by Clarivate Analytics, Web of Science as one of the world's top 1% most cited researchers. In 2021 Sir Zumla was elected as Fellow of The World Academy of Sciences.

Prof Cheryl Nikodem is a South African renowned researcher. She is a midwife with a PhD in Nursing (Midwifery and Neonatal). She has vast experience in research, publishing and has won several grants and awards. She recently completed a Law degree. Prof. Nikodem serves as expert witness in maternal and neonatal health related legal cases. She has been a Clinical Research Associate for clinical trials and non-clinical trials since 1995. She teaches in good clinical practice, research methodology, clinical trial epidemiology, Cochrane systematic reviews and grant proposal writing. She has excellent research skills, clinical and theoretical, from developing proposals to analysing data and writing for publication. Prof Nikodem also mentors PhD and Masters students.

Prof. James Mwansa is an Associate Professor in Medical Microbiology and Director of Research, Post-graduate and Statistics at the Lusaka Apex Medical University, Zambia. He has vast experience in investigation, identification, and emergency response to epidemic infectious diseases and has published widely in local and international journals. Since 1998, he has been involved in the development of Control programs for Neglected Tropical Diseases (NTDs) in the WHO African region including, Schistosomiasis, soil transmitted helminths, and lymphatic filariasis and other NTDs and evaluating new diagnostic tests towards the elimination of the NTDs. He supported the mapping of NTDs in Botswana, Ethiopia, South Africa and Zambia, Ethiopia and also the development of NTD Master Plans to eliminate NTDs for various African countries including Botswana, Kenya, Lesotho, Malawi, Rwanda and Zambia and as a WHO Temporary advisor. Prof mwansa supported the development of the Zambia Ministry of Health, 2002 to 2005, 2013 to 2017, and 2019 to 2023 NTD master plans and participated in updating the Zambia 2021-2026 Master plan. He was a member of the WHO/AFRO Regional Programme Review Group (RPRG) from 2014 to 2018 and a WHO consultant in 2014 Enhancing Neglected Tropical Diseases (NTD) Laboratory Support in the WHO African Region and currently a member of the Zambia National Ministry

of Health NTD programme consultant. He has been a consultant Medical Microbiologist in clinical diagnosis and management of opportunistic (HIV) infections and Hospital Infection control specialist at the University Teaching Hospital (UTH) National Reference Laboratory. He collaborated with Dr. Nilanjan Lodh since 2012 in developing rapid diagnostic techniques for Schistosomiasis specific DNA detection from urine sediment.

Prof. Modest Mulenga has over 100 publications. He was recently appointed Deputy Vice Chancellor-Research and Innovation at the Lusaka Apex medical University. He is a former Senior Research Advisor for the USAID Evidence for Health project that supports government building research capacity in health care programmes. He is also a former Director, Chief Executive Officer and Principal Health Researcher of the Tropical Diseases Research Centre (TDRC) in, Ndola, Zambia. The TDRC is the main national health research institution in Zambia which is mandated to conduct research in major diseases of public health importance. He has served on a number of national and international advisory committees or research councils. He played a key role in the setting up of the National Public Health Institute and the Copperbelt University- School of Medicine. Prof Mulenga led a team that accomplished the designation of TDRC as SADC accredited regional malaria reference laboratory for surveillance and control of malaria in the region. He is a guest writer and editor for various journals including the Lancet Infectious Diseases, PLOS Neglected Tropical Diseases and others. He held a sizable portfolio of research programme grants for disease control through research and surveillance. He reviews research papers for the WHO-AFRO, and was recently nominated to be an Editor for the newly established Health Sciences Journal for AU-ASRIC.

Professor Peter Mwaba a consultant physician is currently serving as the Chief Executive Officer and is the immediate past Dean of the faculty of Medicine at Lusaka Apex Medical University, the position he had held for two years. Professor Mwaba's career spans over 29 years and has progressively combined roles as a Clinician, Academician, Researcher and Administrator. Before his appointment as Chief Executive officer and Dean, Peter had served as Permanent Secretary for the Ministry of Health and Home Affairs for close to 7 years. Professor Mwaba served as the Managing Director of the largest health institution in Zambia, the University Teaching Hospital (UTH) for three years. Previously he held the positions of head of department of Internal Medicine at the UTH and Senior Lecturer at University of Zambia (UNZA) School of Medicine, where he trained 15 physicians as specialists and also supervised research projects for many post graduate students. He is also a visiting Lecturer at the University College London Medical School. He has also previously served as a Research fellow at the University College London Medical School Center for Infectious diseases and International health. Professor Mwaba also distinguished himself as a Researcher especially on TB and HIV with over 136 publications tied to his name. He has written book chapters including one in the famous Manson's Textbook on Tropical diseases. He has numerous awards including the Albert Chalmers medal where he became the first African to achieve this feat in 2005. Peter has special interest in capacity development and his main focus has been in diseases of poverty particularly HIV and tuberculosis. He has been one of the Directors of the UNZA-UCLMS project. Professor Mwaba serves on several national and international Technical committees and several Boards of Directors. He is involved in the training of masters and PhD students. Prof Godfrey Biemba is currently Director and Chief Executive Officer for the National Health Research Authority (NHRA) and Adjunct Research Assistant Professor at Boston University School of Public Health, USA. Among his academic and professional qualifications are: A Bachelor of Medicine and Bachelor of Surgery from the University of Zambia, a postgraduate Diploma in Tropical Medicine and Hygiene from Liverpool School of Tropical Medicine and Hygiene, Liverpool, UK, and a Master of Science Degree in Public Health from the London School of Tropical Medicine and Hygiene, London, UK. Prof Biemba has over 34 years' experience in the health sector as a medical practitioner, researcher, and public health manager. The focus of his past 28 years of his time has been conducting various types of health related research, ranging from clinical trials to community based evaluations, impact evaluations of public health programs, situational analyses in the areas of malaria, health systems, orphans and vulnerable children, water, sanitation and hygiene (WASH), road safety, maternal, neonatal, and child health, and HIV/AIDS. His public health research has involved the use of various quantitative and qualitative research methods. In addition to conducting his own research, he has spent a lot of time building research capacity through teaching and mentorship of young scientists conducting clinical trials,

Prof. Everist Njelesani is a founder member of the Lusaka Apex medical university, Professor of Internal Medicine and the Vice Chancellor at the Lusaka Apex Medical University. He was the Director of the Tropical Diseases Research Centre, Ndola, Zambia between 1981 and 1984. He was the President of the East Central and Southern Africa College of Physicians (ECSACOP), Internal Medicine between 2016 and 2019. He served as the WHO Representative for the World Health Organization African Region, WHO's Office, Free Town, Lagos/Abuja, Harare, Sierra Leone, Nigeria, and Zimbabwe between 1992 and 2007. Prof Njelesani served as the Permanent Secretary and Director of Medical Services in the Ministry of Health (Government of the Republic of Zambia) between the

years 1984 and 1991. He is the Founding Chairman for the Zambia National Health Research Authority and Founding President for the Zambia College of Physicians (ZACOPH). He has vast experience in research.

Prof Godfrey Biemba is currently Director and Chief Executive Officer for the National Health Research Authority (NHRA) and Adjunct Research Assistant Professor at Boston University School of Public Health, USA. Among his academic and professional qualifications are: A Bachelor of Medicine and Bachelor of Surgery from the University of Zambia, a postgraduate Diploma in Tropical Medicine and Hygiene from Liverpool School of Tropical Medicine and Hygiene, Liverpool, UK, and a Master of Science Degree in Public Health from the London School of Tropical Medicine and Hygiene, London, UK. Prof Biemba has over 34 years' experience in the health sector as a medical practitioner, researcher, and public health manager. The focus of his past 28 years of his time has been conducting various types of health related research, ranging from clinical trials to community based evaluations, impact evaluations of public health programs, situational analyses in the areas of malaria, health systems, orphans and vulnerable children, water, sanitation and hygiene (WASH), road safety, maternal, neonatal, and child health, and HIV/AIDS. His public health research has involved the use of various quantitative and qualitative research methods. In addition to conducting his own research, he has spent a lot of time building research capacity through teaching and mentorship of young scientists conducting clinical trials, community based trials, including cluster randomized trials, health systems research and Protection of Research Participants (Research Ethics), Good Clinical Practice (GCP) in the conduct of research. He has been a clinical trials study monitor and has sat on data safety monitoring board (DSMB). He has supervised and mentored masters and PhD students in public health related theses. He has also played a key role in the development of research policies and strategies in Zambia, including the setting of the first national health research agenda in Zambia in 1999 as he was the first of the three authors of a document called "Zambia national health research agenda: National health research priorities and recommendations for action (1999)" under the then Central Board of Health (CBOH) Zambia. Recently he led a team of experts to develop the second National Health Research Agenda (Priorities) for Zambia. The document is entitled, 'The Zambia National Health Research Agenda 2018-2021: Setting the direction for evidence based decision making without leaving anyone behind.' He also led a team of experts in early 2008 to develop the first Guidelines for Research in Traditional Medicine in Zambia, adapted from guidelines from the World Health Organization. In 2017-2018 he led another team of experts and stakeholders to update the document entitled, "Guidelines for Research in Traditional, Complementary, and Alternative Medicine in Zambia."

Prof Biemba has been a Research Assistant Professor of Global Health at Boston University School of Public Health (BUSPH) from 2008 to 2017 and Country Director of the Zambian Center for Applied Health Research and Development (ZCAHRD) Limited from 2010 to 2017. From September 2017, he was appointed Adjunct Research Assistant Professor of Global Health at Boston University School of Public Health. In October 2017, he was appointed Director and Chief Executive Officer of the National Health Research Authority (NHRA) in Zambia. The NHRA is a statutory body responsible for regulating and promoting all health related research in Zambia, which includes registering and accrediting researchers, research institutions and research ethics committees or institutional review boards. He has over 80 publications, out of which 49 are peer reviewed articles published in international peer reviewed journals. As of August 5, 2019, he achieved a ResearchGate Publications Score of 31.17. His research gate h-index is 17 (excluding self-citations). His Google scholar citations h-index is 19 and i10-index is 23.

Huib Cornielje is a Dutch physiotherapist and researcher who developed a comprehensive CBR program in the 1980s during his time as rehabilitation manager at a rural hospital in South Africa. As head of the training unit of the Institute of Urban Primary Health Care (IUPHC) in Alexandra township, he initiated an urban CBR program in the 1990s. Since 1999 he has served as director of Enablement Ltd., which focuses on capacity building, research, and innovation in the disability-inclusive development sector. He was senior lecturer at the University of Applied Sciences Leiden.

Prof. Nina Emaus is a Norwegian researcher at UiT The Arctic University of Norway (UiT), Tromsø. She has successfully supervised several PhD students and has over 130 publications in peer reviewed journals with more than 3480 citations. She is a UiT, Faculty of Health representative for Global Health and was a member of the Norwegian volunteer service (the newly established "FK") between 2000 and 2006.

Janet Njelesani, PhD, OTR/L, is an Assistant Professor in the Department of Occupational Therapy, New York University, USA. She is an occupational therapist with a PhD in Rehabilitation Science and Global Health from the University of Toronto. Janet's research investigates how the fields of occupational therapy, global health, and international development intersect to mediate participation for persons with disabilities. Her current research explores school violence against children with disabilities in East Africa. To her research, Dr. Njelesani brings a breadth of both clinical and consulting expertise, having worked as a clinician for over 15 years and through her role providing disability and rehabilitation technical advice to Governments, United Nations agencies, and international non-governmental organizations.

Dr. Oswell Khondowe holds a PhD in Physiotherapy, Masters in Adapted Physical Activity (KULeuven, Belgium, MSc in Physiotherapy (UWC, South Africa), BSc in Physiotherapy (UWC, South Africa) and is the Dean for the Faculty of Health Sciences at the Lusaka Apex Medical University. He worked at Stellenbosch University as a lecturer and researcher between 2008 and 2015 before joining the Lusaka Apex Medical University. He is a trained Good Clinical Practice trainer (Vienna, Austria) and was a member of the Health Research Ethics Committee at Stellenbosch University in South Africa between 2014 and 2015. He teaches Research methodology and Epidemiology at the Lusaka Apex Medical University. He is a board member of several organizations in Zambia including the Special Olympics Zambia, Cancer Zambia and National Stroke Aid. He was the founder Technical Editor for Journal of Community and Health Sciences, a journal of the University of the Western Cape between 2004 and 2008. He is currently the chairperson for the Lusaka Apex Medical University Biomedical Research Ethics Committee. He has published in local and international journals. He is also a reviewer for several medical journals. Between 2010 and 2013 he was a researcher and trainer for Good Clinical Practice and anthropometry on the Promise Pep/ANRS 12174 study. The PROMISE PEP study was a randomised double-blind placebo-controlled multi-centre trial that measured the efficacy of prolonged peri-exposure prophylaxis (PEP) with lamivudine (3TC) to prevent HIV-1-transmission through breast milk and death in children born to HIV-1-infected mothers not eligible for HAART and having benefited from WHO-recommended enhanced perinatal antiretroviral (ARV) regimens. It was a collaborative study conducted in four African countries including Zambia, South Africa, Burkina Faso and Uganda. The collaboration was between the School of Public Health at the University of the Western Cape, the University of Montpellier France, University of Bergen Norway, Centre Muraz, Burkina Faso, University of Zambia and Makerere University, Uganda.

Dr Lydia Hangulu is a Zambian academician with a Bachelor's degree in Environmental Health, a Masters; Doctorate in Health Promotion and also completed her Postdoctoral Fellowship. Currently, she is serving as Head of Department for Public Health at Lusaka Apex Medical University in Zambia. She is a social researcher with research interests focusing on infection prevention and control, healthcare waste management in home-based care settings, HIV/AIDs, tuberculosis and diabetes, adolescent health as well as neonatal and maternal health employing multi method approaches. Dr Hangulu has a trail of publications in international high impact journals. Dr Hangulu is a Team Leader for Zambia, a part-time consultant with Africa Community Development and Research Centre (ACDRC) since 2015. As a consultant, she has evaluated programs, conducted baseline surveys, situational assessments, needs assessment surveys, feasibility studies that focus on Sexual and Reproductive Health for adolescents and adults, HIV management, maternal, neonatal and child healthcare, infection prevention as well as water and sanitation issues. She also provides research services such as proposal writing, building capacity of health interventions and facilitating health education programs from inception to execution. In her work, she embraces gender, disability, culture, environment in-order to contribute to issues of community development. Additionally, she is very flexible and adaptable to fit comfortably in other technical fields of development where social research, documentation or process facilitation skills are required. Dr Hangulu has affiliations with Brown International Advanced Research Institutes (BIARI) program; University of Cologne under the DAAD Dies-Progrant writing program; the African Population Health Research Center in Nairobi, Kenya under the ADDRf program; a member of the Golden Key International Honor Society, the Health Professional Council of Zambia and the Association of Schools of Public Health in Africa (ASPHA). She is also a member of Lusaka Apex Medical University (LAMU) Biomedical Research Ethics committee. Dr Hangulu is one of the team leaders on an implementation science research project known as a 'DIPLOMATIC Study' in Zambia, which focuses on access to antenatal care and ultrasound scanning services for pregnant women which aims at reducing prenatal and stillbirths among women of child bearing age within healthcare facilities in Zambia in collaboration with Zambia Ministry of Health; University of Liverpool; Lusaka Apex medical University, University Teaching Hospital, Levy Mwanawasa University; University of Malawi; Malawi Epidemiology and Intervention Research Unit.

We are inspired by the mission statement of the university: To contribute to the provision of diverse public health workforce as a Centre of Excellence, through education, service and research in order to facilitate the improvement of the public health status of the population in Zambia, the surrounding region and the world as a whole. This cannot be achieved without ensuring that important information reaches practitioners, policy makers and health service recipients. The open access platform ensures that stakeholders including researchers, practitioners and the public have access to information.

The Southern African Journal of Medical and Health Sciences will be freely available to everyone, and articles will be published as soon as they have been accepted, copy-edited, and type-set online. By providing rapid access to high-quality scholarship, we seek to establish better connections among diverse audiences in Southern Africa and beyond in the field of medicine and health sciences. The journal will be supported by publication fees for authors and other partner institutions. The rates are low to allow authors have their manuscripts published. Our goal is to ensure that this journal becomes a top journal in the region for dissemination of rigorous research in the areas of medicine and health sciences.

We look forward to your submissions and support of the journal.

Prof. Peter Mwaba

LAMU CEO and Editorial Board Member

Bacteriological Quality of Beef and Hygiene Practices of Food Handlers in Butcheries in Kasama District, Zambia

Sara Hanyinza¹, Kunda Ndashe^{1*}, Ruth Mfuné², Emmanuel Chirwa³, Abigail Chilimunda¹, Grace Mwanza⁴, Bruno Phiri⁵, Bernadette Mumba¹, Maron Mubanga⁴ and Bernard Hang'ombe⁴

1. Department of Environmental Health, Faculty of Health Science, Lusaka Apex Medical University, P.O. Box 31909, Lusaka, Zambia.
2. Public Health Unit, School of Medicine, Copperbelt University, P.O. Box 21692, Ndola, Zambia
3. Department of Biology, Faculty of Premedical Sciences, P.O. Box 31909, Lusaka Apex Medical University, Lusaka, Zambia.
4. Department of Paraclinical Science, School of Veterinary Medicine, University of Zambia, P.O. Box 32379, Lusaka, Zambia
5. The Central Veterinary Research Institute, Ministry of Fisheries and Livestock, P.O. Box 33980, Lusaka, Zambia

*Corresponding author: ndashe.kunda@gmail.com Tel: +260967903076 (Kunda Ndashe).

Abstract

The most common health risk associated with consumption of beef is microbial contamination, therefore the study was aimed to assess the level of bacterial contamination of beef and evaluate the hygienic practices in butcheries in Kasama district. Beef samples were collected from participating butcheries and a structured questionnaire was also administered to the food handlers. Microbiological quality of the beef samples was determined by Aerobic Plate Count (APC), Faecal Coliform Count (FCC) and bacterial isolation such as *Salmonella* spp and *Staphylococcus aureus*. The APC results revealed 40.7% of the butcheries sold meat in good bacterial condition (<4 Log₁₀ cfu/g) while 40.7% and 18.5% were critical (4-5 Log₁₀ cfu/g) and non-acceptable conditions (>5 Log₁₀ cfu/g), respectively. The FCC revealed that 74.1% of the butcheries sold meat in good bacterial conditions (<2 Log₁₀ cfu/g), while 14.8% and 11.1% were critical (2-3 Log₁₀ cfu/g) and non-acceptable conditions (>3 Log₁₀ cfu/g), respectively. *Staphylococcus aureus* was isolated from 37% of the butcheries, none of the outlets recorded *Salmonella* spp. Overall, the microbial quality of most (74.1%) of the market ready beef in Kasama district was acceptable for human consumption. Regular bacteriological monitoring and maintaining hygiene in the sales outlets and distribution chain is mandatory.

Key words: Bacteriological quality, beef, hygiene practice

Introduction

Meat and meat products in many parts of the world constitutes a bigger part of a typical human diet for reasons such as health, economy and culture (Pighin et al., 2016). It is a known fact that Beef contain protein, lipids, vitamins and trace elements and is an important source of proteins to humans and it is very popular in Zambia among many households who can afford it. Beef can be accessed at retail shops, butcheries, selected farms and open markets and can be a potential source of many pathogens such as bacteria (Zhang et al., 2010). It is a very perishable commodity because of its rich nutrients that supports microbial growth (Ukut et al., 2010). The water activity of beef, approximately 0.99, is suitable for microbial growth thereby supporting proliferation of bacteria that attach and establish themselves on meat (Kinsella et al., 2006). The microbiological contamination of carcasses occurs mainly during removal of hides, evisceration, processing, packaging and storage and distribution at slaughter houses and retailed outlets (Abdalla et al., 2009).

Microorganisms that contaminate meat do not only predispose it to spoilage but are also frequently implicated in the spread of foodborne illness (Humphrey et al., 2007). During slaughter and processing, all potentially edible tissues are subjected to contamination from a variety of sources within and outside the animal (Datta et al., 2012). The pathogenic microorganisms that are implicated in contaminating meat and its products include; *Salmonella* spp., *Shigella* spp., *Campylobacter jejuni*, *Campylobacter coli*, *Yersinia enterocolitica*, verotoxigenic *Escherichia coli* (*E. coli*) and *Listeria monocytogenes* (Little et al., 2008; Meyer et al., 2010; Warren et al., 2007). *Staphylococcus aureus* contaminates beef through unhygienic handling of the meat and its products by butchery staff as this organism is a normal flora on the skin of humans (Kebede et al., 2016).

Contamination of beef with *Salmonella* spp., *Campylobacter jejuni*, *Campylobacter coli*, *Yersinia enterocolitica*, and verotoxigenic *Escherichia coli* (*E. coli*) is an indication poor evisceration (Nouichi and Hamdi, 2009) while *Shigella* spp being found in gastrointestinal tract of human indicates poorhand hygiene among the handlers (Ahmed and Shimamoto, 2014). Meat and their products when contaminated can serve as vehicles of pathogens to consumers (Bhandare et al., 2007) and also reduces the shelf life of the product (Nychas et al., 2008).

Several researchers have reported disease outbreaks due to consumption of contaminated beef and by products (Kadariya

et al., 2014; Mead et al., 2006; Newell et al., 2010). Some diseases such as shigellosis (dysentery), salmonellosis, gastroenteritis (due to *E. coli*), and staphylococcus intoxication have been attributed to the consumption of contaminated beef (DuPont, 2007).

Monitoring levels and presence of microorganisms in meat is an important step in good management practice of butcheries and beef value chain

(Poumeyrol et al., 2010). Potential safety and quality in raw meat products can be estimated with the use of indicator microorganisms including aerobic plate count (APC), coliform count (CC), *E. coli* count (ECC) (Kim and Yim, 2016). Aerobic plate count provides an estimation of the total bacterial population, therefore higher APC usually relates to poorer quality of meat and reduced shelf life (McCain et al., 2015). Coliform count provides an estimation of faecal contamination and poor sanitation during the processing of raw beef (Al-Mutairi, 2011). High CC generally correlates with higher levels of foodborne pathogens of faecal origin (Milios et al., 2014).

In Zambia, a number of studies have been conducted to assess the bacteriological quality of poultry meat (Chishimba et al., 2016; Shamaila et al., 2018; William et al., 2012). However, there are limited reports on the microbiological quality of raw beef that is market ready. This study was conducted to assess the level of bacterial contamination of beef and furthermore evaluate the hygienic practices of butcheries in Kasama District in northern Zambia.

Materials and Methods

Study design and sample population

A cross-sectional study was conducted from March to April 2017 in Kasama district, Northern Province of Zambia. Kasama district is the provincial capital of the Northern Province with an estimated population of 231,824 people (2010 Census of Population National Analytical Report). The study population included 27 butcheries which were legally registered to the local municipality during the time of the research. These 27 butcheries were located in 4 townships mainly Mulilansolo, Lukupa, Kupumaula and Buseko.

In order to estimate the number of raw meat sample to collect for the study the formula below was used:

$$n = \frac{Z^2 p(1 - p)}{e^2}$$

Where, n = sample size, Z = score (1.96 at 95% confidence level), P= prevalence of beef contamination in previous study [19%; (Zhao et al., 2001)], e = margin error (0.05). We calculated 161 meat samples and therefore 6 samples were collected from each of the 27 butcheries.

Sample and Data Collection

Each beef sample weighed approximately 100g and were aseptically removed and placed in a sterile sample bag and frozen immediately. The beef was collected from display refrigerator of the participating butcheries and transported to the University of Zambia, school of Veterinary Medicine, Paraclinical Sciences bacteriology laboratory within 24 hrs of collection.

Furthermore, questionnaires seeking information on the source of the beef, hygienic practices and basic meat management in the abattoir were administered to the personnel managing the participating butcheries.

1.1. Microbial Analysis

At the laboratory, 25 gram of each meat sample was weighed out, ground and then homogenized in 225 ml of phosphate buffer saline. The homogenates were used for all the microbiological analyses.

1.1.1. Determination of Total and Faecal Coliform Count

One mL of the homogenate was serially diluted in an aseptic condition and used for the enumeration of microorganisms. Ten-fold dilutions of the homogenates were made as described by Fawole and Oso, (2001). The serially diluted homogenates of the meat samples were inoculated on aerobic plate agar (Himedia, India) by pour plate method for total coliform count (TCC) and MacConkey agar (Himedia) for faecal coliform counts (FCC). The plates were incubated at 37°C aerobically for 24 hours.

The mean number of colonies counted for all count types was expressed as log₁₀ colony forming units per gram (cfu g⁻¹) of sample. The expressions “good condition, critical condition, unacceptable” were used to determine quality of the samples according to the microbiological criteria for fresh beef meat of the Food and Agriculture Organisation (FAO) (Heinz and Hautzinger, 2007).

Isolation of Pathogens

Salmonella spp

One ml of each initial homogenate of meat sample was thoroughly mixed in 9ml buffered peptone water (Himedia, India) and incubated for 20 hours at 37° C as pre-enrichment for Salmonella. From each pre-enriched sample, 1ml of the pre-enriched sample was used to inoculate 10 ml of the selenite-cysteine medium (Himedia, India) and incubated for 7 hours at 37° C (SC). Bacterial isolation was achieved on xylose lysine deoxycholate (XLD) (Himedia, India) at 37° C for 24 hours. The colony characteristics were observed and Gram staining was performed and bacteria that were identified as presumptive Salmonella spp were further inoculated Triple sugar iron agar (TSI) agar (Oxoid, UK) and SIM agar (Oxoid, UK), which were incubated at 37°C for 18hours. Other biochemical tests for the salmonella spp isolates included; Urease, citrate and Methyl Red Voges Proskauer (MRVP) media (Oxoid, UK).

Staphylococcus Aureus

The meats homogenates were mixed with equal volumes (60ml) of buffered peptone water (Himedia, India) and thoroughly mixed for 5min. A50-ml aliquot of the mixture was enriched in an equal volume of double-strength enrichment broth (Trypticase soy broth supplemented with 10% NaCl and 1% sodium pyruvate). After 24 hours of incubation at 35°C, the enrichment broth was streaked on Baird-Parker (Himedia, India). Following 48hours of incubation, three to six presumptive Staphylococcus aureus (black colonies surrounded by 2- to 5-mm clear zones) were transferred to Trypticase soy agar plates followed by confirmation by a tube coagulase test (Remel, Lenexa, KS).

Results

Bacteriological quality of beef from butcheries in Kasama district

Following the Food and Agriculture Organisation (FAO) microbiological standards of fresh meat (Heinz and Hautzinger, 2007), it was reported that as regards the

aerobic plate count 40.7% of butcheries sold meat in good bacterial condition ($<4 \text{ Log}_{10} \text{ cfu/g}$) while 40.7% and 18.5% were critical ($4-5 \text{ Log}_{10} \text{ cfu/g}$) and non-acceptable conditions ($>5 \text{ Log}_{10} \text{ cfu/g}$), respectively (Table 1). With the faecal coliform evaluation, 74.1% of the butcheries sold meat in good bacterial conditions ($<2 \text{ Log}_{10} \text{ cfu/g}$), while 14.8% and 11.1% were critical ($2-3 \text{ Log}_{10} \text{ cfu/g}$) and non-acceptable conditions ($>3 \text{ Log}_{10} \text{ cfu/g}$), respectively.

From the meat samples analysed, *Salmonella* spp was not isolated from any of them while *Staphylococcus aureus* was isolated from 37% of the butcheries (Table 1).

Table 1: Summary of Microbiological standards of fresh meat

	Number of Butcheries [Percent]
Aerobic Plate Count Log_{10}	
Good condition ($\text{Log}_{10} <4 \text{ cfu/g}$)	12 [40.7]
Critical condition ($\text{Log}_{10} 4-5 \text{ cfu/g}$)	11 [40.7]
Not acceptable ($\text{Log}_{10} >5 \text{ cfu/g}$)	4 [18.5]
Faecal Coliform Count Log_{10}	
Good condition ($\text{Log}_{10} <2 \text{ cfu/g}$)	20 [74.1]
Critical condition ($\text{Log}_{10} 2-3 \text{ cfu/g}$)	4 [14.8]
Not acceptable ($\text{Log}_{10} >3 \text{ cfu/g}$)	3 [11.1]
Isolation pathogens	
<i>Salmonella</i> spp	0 [0]
<i>Staphylococcus aureus</i>	10 [37]

Hygiene Practices and Management of Food Handlers in the Butcheries

The butcheries in Kasama district purchased their beef carcasses from slaughter facilities within and outside the district. Results of the study revealed that 55.6% of

outside the district while 33.3% purchased from the local slaughter slabs and 11.1% from both sources (Table 2).

The two types of cold storage facilities recorded in the study were domestic deep freezer and walk in cold room which represented 92.6% and 7.4%, respectively (Table 2).

On average all butcheries stored beef in cold storage facilities for 11 days before it was purchased completely by consumers. The storage period ranged from 1 to 30 days (Table 2).

Table 2: Summary of risk factors associated with meat quality in butcheries

RISK FACTOR		RESPONSES		
Source of Beef Carcasses	Within District [No. (%)]	Outside District [No. (%)]		Both
	9 (33.3)	15 (55.6)		3 (11.1)
Cold storage facilities in butcheries	Domestic deep freezer [No. (%)]	Walk in cold room [No. (%)]		Total [No. (%)]
	25 (92.6)	2 (7.4)		27 (100)
Duration of beef storage in cold facilities (day)	Mean	Min		Max
	11	1		30
Frequency of cleaning contact surfaces	Mean	Min		Max
	7	1		15
Type of Cleaning Agent used	Detergent [No. (%)]	Disinfectant [No. (%)]		
	23 (85)	4 (15)		

The average frequency of cleaning the meat contact surfaces such as tables, cutting surfaces and countertops was 7 times per day. The minimum frequency of cleaning was 1 and the maximum was 15(Table 2). The contact surfaces of the butcheries were cleaned using either detergents or disinfectants, the former being the most common (85%) and the latter being the least (15%), respectively.

Discussion

The study revealed a varying level of bacterial contamination of the beef sold in butcheries of Kasama district. Aerobic plate count (APC) being a measure of microbial qualityof the meat showed that 18.5% of the the butcheries in Kasama district sourced beef carcasses from slaughter facilitie

butcheries had beef that was in unacceptable conditions (>5 Log10 cfu/g), while 40.7% was in critical condition (4-5 Log10 cfu/g) and the remaining 40.7% was in good condition (<4 Log10 cfu/g). Presence of microbes in high numbers (APC >7 log CFU/cm2) fast tracks the spoilage of the meat. The high APC values were similar to the findings reported by Salihu et al (2013) in Nigeria and thereby predisposing the beef to easily spoilage (Salihu et al., 2013).

The study findings showed that 11.1 % of the butcheries had meat with faecal coliform counts of unacceptable levels (>3 Log10 cfu/g).These findings are in agreement with those of Datta et al., 2012 and Haque et al., 2008 who found high total coliform counts(>3 Log10 cfu/g) on sampled raw beef and goat meat respectively in Bangladesh (Datta et al., 2012; Haque et al., 2008).

Therefore the results of the study suggest that this 11.1% of the beef that is sold in Kasama district is of poor bacterial quality and has a high likelihood of predisposing the consumers to foodborne infections. Concern should then be raised on the levels of hygienic practices during evisceration in the slaughtering process of beef carcasses, as the presence of faecal coliforms on the beef suggests that the puncture of gastrointestinal tract.

Staphylococcus aureus was isolated from beef in 37% of the sampled butcheries. *Staphylococci* are normal flora of the skin and upper respiratory tract in man and animals hence they can easily contaminate all foods types. If environmental conditions (e.g., time, pH, and temperature) during the production or storage of the food product are suitable for the growth of *S. aureus*, this microorganism produces enterotoxins which results in sub-acute gastroenteritis (Normanno et al., 2005). This finding is therefore a possible indicator of unhygienic handling of meat by the butchery personnel. It must be noted nonetheless, that low levels of *staphylococci* are expected to exist in all food products of animal origin or those that are directly handled by humans, unless heat processing is applied to effectively destroy them (Gracey and Collins, 1994). *Staphylococcus aureus* counts of 10^5 - 10^6 cells per gram are required to produce a pathogenic dose of enterotoxin that will lead to foodborne illness and the count of the bacteria was not determined in the study (Schelin et al., 2011).

A study of the beef value chain in Zambia revealed that larger meat processors transport carcasses from abattoirs in refrigerated trucks while small local butchers, however, transport meat from the abattoirs directly to the butchery in vans that lack refrigeration and sanitation (Lubungu et al., 2015). Therefore, the findings of the study indicating that 55.6% of butchers in Kasama purchased beef carcasses from abattoirs outside the district therefore reveals the likelihood of further contamination during transportation.

Proper refrigeration assures an inherent quality, while high temperature will exacerbate the quality deterioration related to spoilage by common psychotropic bacteria. From the study it was reported that the butcheries stored beef carcasses for an average of 11 days before they were completely sold off, which is longer than the recommended 3 to 5 days (Nychas et al., 2008). It was observed in the study that approximately 93% of the butcheries used domestic deep freezers for the storage of beef carcasses while only 7% had walk-in cold rooms. Light temperature fluctuation ($\pm 5^\circ$) is normal in the freezer and refrigerator but this difference can be even greater depending on how frequently the door(s) is open and closed.

A freezer that is constantly open cannot properly cool food. Temperature fluctuations during cold storage have been reported to promote the growth of psychrophiles and mesophiles (Dave and Ghaly, 2011). Even small increases of a degree or two can result in an enormous increase in bacterial growth (Gill and Gill, 2010). High meat surface temperatures not only encourage psychrotrophic bacteria to grow exponentially, accelerating the rate of discoloration and spoilage, but also provide ideal conditions for the growth of foodborne pathogens such as *Salmonella* (Gill and Gill, 2010). Therefore the use of domestic freezers for storage of beef may have an effect on the quality of the meat sold and its shelf life.

It was further observed that few butcheries (15%) used disinfectants to clean the contact surfaces compared to those who used various types of detergents (85%). Periodic cleaning and sanitation, which includes disinfection of butchery premises, counters and equipment is an integral part of good hygienic practices. These inadequate cleaning practices expose meat to contamination by pathogenic microorganisms, leading to adverse public health concerns.

Conclusion

The detection of *Staphylococcus aureus* and a seemingly high enumeration of both total and faecal coliforms in beef in butcheries and low hygiene standards raises concerns on the food safety management systems. The public health fraternity both from the local municipality and Ministry of health with the mandate to uphold food safety standards ought to engage all member of the beef value chain to ensure that the product being sold to consumers is wholesome and will not serve as vehicle for food poisoning.

Acknowledgement

We would like to recognize that this was a study undertaken by Ms. Sara Hanyinza as partial fulfilment for Bachelor of Science Environmental Health of Lusaka Apex Medical University (LAMU). We wish to express our gratitude to the staff at Kasama District Health Office, for technical support rendered during sample collection. We could like to thank the academic staff of LAMU, faculty of Health Sciences for the support and contribution towards the research. Finally, we are indebted to the butchery owners and their staff who allowed us to conduct the research in their premises, to them we say thank you.

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Reinforcing Indigenous Communal Healing (ICH) as a Sustainable Health Science and Practice in Africa

“Indigenous evidence-based practice”

*Abel J Pienaar¹ and Khauhelo S Mahlatsi

1. Professor & Associate Dean Faculty of Nursing and Midwifery, Shifa Tameer-e-Millat University, Islamabad, Pakistan.

2. University of Venda, South Africa

*Corresponding Author: +923011049463, abel.pienaar@gmail.com, abel.scn@stmu.edu.pk,

Abstract

There has been a gap in the scientific nature of health sciences in indigenous communities for a long time (WHO, 2013) and colonial-hegemony still enjoys centre-stage in Africa's health delivery system. Without acknowledging its efficacy, indigenous healing is generally depicted in the daily discourse of highly appreciated and regarded African scholars in utterances like “African Indigenous Knowledge must be proven scientifically” or “The research on indigenous knowledge systems must be reviewed by a virologist (‘real scientist’) to ascertain its scientific and scholarly rigor”. The previous dialogue generally invites a senseless cacophony where western-dominant scientists critique classical African scientific work through western science lenses without considering the unique African scientific domain. Hence their repressive assertions on what constitutes sciences. Contrary to what my elongated experience as an African indigenous scholar has revealed, it is noted that being African is currently viewed as a fashionable label, rather than an authentic lifestyle. However, the mentioned label occurs without the appreciation of the full amour of Africaness, Africanology or Africanity if new terms are to be coined to express one's being unreservedly African in deeds and spirit despite the potential backlash. Evidently this longitudinal research executed by the Seboka research team elicit a critical scholarly discourse led by trigger questions to reinforce African Indigenous Communal healing as a health science and practice in its own right.

Keywords: African, indeginous, communal healing, health science

Introduction

It is disheartening to note that amidst indubitably and undoubted evidence that indigenous healing is universally used around the globe for numerous reasons known to the indigenous community (WHO, 2013), colonial hegemony still enjoys centre-stage in Africa's health delivery system. Without acknowledging its efficacy, indigenous healing is generally depicted in the daily discourse of highly appreciated and regarded African scholars in utterances like "African Indigenous Knowledge must be proven scientifically" or "The research on indigenous knowledge systems must be reviewed by a virologist ('real scientist') to ascertain its scientific and scholarly rigor". The previous dialogue generally invites a senseless cacophony where western-dominant scientists critique classical.

African scientific work through western science lenses without considering the unique African scientific domain. Hence their repressive assertions on what constitutes sciences. Mapara (2017:1) refers to such misplaced research views and practices as "lukewarm research into indigenous knowledge systems" Definitely a correct evaluation for western research, but uttered on the wrong platform. *Whose evidence and sciences are we talking about?* And when people march for science on Earth Day, whose science are they marching for? Is it not the entrenchment of hegemony of only western science as the only science? A science not in service of humanity but of individuals' financial benefit?

Contrary to what my prolonged experience as an African indigenous scholar has revealed, it is noted that being African is currently viewed as a fashionable label, rather than an authentic lifestyle. However, the mentioned label occurs without the appreciation of the full armour of Africaness, Africanology or Africainity if new terms are to be coined to express one's being unreservedly African in deeds and spirit despite the potential backlash. Most scholars like Green (2012) claim to be African or write from Africa, but sadly only a few are prepared to uphold the order of a genuine African phenomenon. Therefore, it is generally complex for most western-dominant African scholars to accept that African Indigenous Knowledge System (AIKS) is a science in its own right, without the need to be authenticated by western sciences as Green suggests when he makes reference to India (2012, 1). What further fuels this is the fact that most African scholars continue to serve this denialism against African indigenous sciences backed by an eloquent and intransigent colonial hegemonic perception and drive.

On the other hand, it is common knowledge and practice that Africans through their governments promote several health declarations and promulgate them as policies in their health systems. These have their genesis in promulgations such as the Alma Ata Declaration (1978) that was instituted to promote primary health care as a valuable health approach and the Millennium Development Goals - MDGs (2015) that dismally failed according to the 2015 report and now the Sustainable Development Goals (2015) where it is clearly stated that the health care must be community centred, meaning that it must be the community's choice. However, and tragically, most Africans still remain in denial and are unmoved by this reality.

In endeavours to counter this denialism of African Indigenous sciences some African indigenous scholars are currently embarking on an educational journey to relearn the science domain in Africa. An example of such a journey that has been embarked on can be seen in works like the book edited by Ngulube (2017), *Handbook of Research on Theoretical Perspectives on Indigenous Knowledge Systems in Developing Countries*. Further contributions to the African science domain is the deliberate development of African indigenous research methodologies namely the use of the Lekgotla in data-collection (Pienaar, 2013) and "Learning and Asserting an African Indigenous Health Research Framework" (Pienaar, 2017).

Subsequently this paper aims to elicit a critical scholarly discourse led by trigger questions to reinforce African Indigenous Communal healing as a health science and practice in its own right.

Methodology

The researchers applied a Desk Research Review to collect secondary data from all the research completed by the Seboka Research Team from 2008 to 2017 and other applicable literature to illuminate the discourse at hand (Whitehead, 2005). According to Whitehead (2005) Desk Research refers to secondary data or information that can be collected without fieldwork. The mentioned method is frequently carried out where the data exist and if it is the most cost-effective method. For the discourse in this paper the primary data obtained through research existed already.

Purpose of the Review

The purpose of this review was to demystify learned myths that African indigenous knowledge is not a science by revitalizing the African science domain as well as to reinforce Indigenous communal healing as a science in Africa. The Desk Research Review endeavoured to:

- Demystify the meaning of the concept science;
- Illustrate the scientific revitalization of African indigenous sciences in healing;
- Apply the competences of practitioners in African Indigenous knowledge to promote inclusive health care;
- Critically discourse the state of colonial hegemony as a stumbling-block amongst African scholars; and to
- Reinforce Indigenous Communal Healing in Africa as a sustainable health science and practice.

Is African Indigenous Knowledge Systems a Science

The Meaning of Science

To foreground this review, a baseline concept analysis of the concept science is fundamental and is thus presented. Scholars need to understand the meaning of 'science' in order to comprehend that African Indigenous Knowledge is a science in its own right. Therefore, science practice in this domain should be judged through the lenses of African Scientific phenomena, and not from a western science perspective.

Science as a neutral concept originates from the Latin word *Scientia*, which means knowledge, skills or competence (Merriam-Webster Dictionary, 2017; Online Dictionary, 2017). Ironically noted is that this concept *Scientia* is an abstract feminine concept, whatever this assertion might elicit in the mind of an innovative scholar. It is therefore safe to deduce that the degree B.Sc. (from Latin *Baccalaureate Scientia*), means an undergraduate degree in knowledge, skills and/or competence hence the qualifier B.Sc (Chemistry). Thus the candidate obtains basic knowledge in chemistry.

Furthermore, the concept science is defined by *Oxford Dictionary* (2017) as the logical manner to generate knowledge through *identification, observation, experimentation and theory generation*. Additionally, science is also described as a practice to

acquire knowledge gained from general truths in a particular field whereas others depict it as a body of knowledge within a specific domain or a practical and or intellectual activity accompanied by logic and systematic reasoning (*Business Dictionary*, 2017). The core of the definition of the concept science is therefore knowledge, skills and competencies that are acquired through specific logical methods within a particular phenomenon or field. Nowhere is it stated in this analysis that African Indigenous Sciences must be acquired through western chemistry, physics or health practices and manners. Neither does this neutral comprehension state that western natural, social or health sciences should set the rules or methods for African Indigenous Sciences or those of any other people in other parts of the world. However, shallow scholarly statements as stated in the introduction assume paternalistic responsibility over African Indigenous Sciences. Clearly a spontaneous question should be asked "Who and what gave you authority over this sacred science domain?" Unless we place and respect African Indigenous Sciences in its original domain, scholarly engagement about this domain can become a futile exercise characterised by counter-narratives and discourses which deny us the opportunity to benefit from not only the diversity of humanity but also of the sciences that we generate.

With all due respect, it is further essential and imperative to understand that science is built on a belief (Pienaar, 2017). Scientists cannot understand geometry and the theorems in geometry when they do not accept and believe in an axiom, e.g. that a straight line is 180 degrees. Geometry as a science is built from an axiom, a basic concept with no specific meaning than just a belief. Axioms form statements and statements in turn form theorems, e.g. the theorem of Pythagoras. Equally so in the theological sciences of Christianity, the belief that Maria was impregnated by the Holy Spirit is fundamental to the belief and practice of a Christian. Hence the reproductive sciences of midwifery become irrelevant in the science domain of Christianity. Therefore, in realizing the uniqueness of each science domain it must be noted that it will be difficult to believe and practice African Indigenous sciences without the comprehension of basic principles in this phenomenon, e.g. consultation with those who were on earth before us (fore-parents).

In further engagement with the roots of most scientific domains, we appreciate that all sciences started in the meta-physical domain which is mostly beyond human comprehension. Noteworthy to mention is that the chemistry periodic table started with a dream and evolved through engagement with the dream to unfold further in the chemistry the periodic table and its modern scientific mutations.

Why is African indigenous healing scientific?

Scientific Revitalization of African Indigenous Sciences in Healing

The first formal conceptualization that underpinned African Indigenous Knowledge as a science started with the doctoral research, *The Development of an HIV/AIDS Counselling Approach for Africans*, (Pienaar, 2005, Pienaar & Uys, 2013). In this thesis the researcher found that the HIV/AIDS counselling approach prescribed by most western schools of thought is counselling that could rather be classified as an information session or health educational session and that Africans indeed have a different approach to counselling. The African approach of counselling is based on three anchors “*Ke phela bophela baka* - I live my life”; the second anchor is “*Bophelo ke thlakantsu ya monate le bosula* - Life is a bitter-sweet mixture” and the third anchor is “*Motho ke motho ka batho ba bangwe* - I am, because you are”. The counsellor uses indigenous listening and probing techniques, including spiritual and emotional techniques in this counselling approach. Through the years of application it is noted that African indigenous mental health care users experience more care and cultural congruent respect. During the same time a chapter was published to illuminate African indigenous concepts in health (Pienaar & Manaka-Mkwanazi, 2004). These two contributions formed the foundation for the concept and practice of indigenous health in some African countries.

The previous foundational work led to the successful application of the first collaborative Indigenous Knowledge Systems project for funding, which in return gave birth to a prescribed textbook, *Mental Health in Africa: An Evidence-Based Approach* (Pienaar, 2013). The author utilized his own research as well as evidence-based research of the eight master’s- and one honours students he supervised from 2010-2013 and collaborated with several western grounded researchers to publish the first work for educational purposes that advocates for the co-existence of African indigenous and Western health practices in mental health. This prescribed textbook is prescribed across the African continent.

During the research process of the post-graduate supervision, the researcher made use of cohort research supervision for the first time (2008-2010), where there was constant peer-group support and evaluation amongst the post-graduate students. This process is currently maturing in the Seboka team that the researcher leads. The cohort supervision spiralled out to the involvement of

the community, other researchers and post-graduate students. Currently it is common practice for post-graduate students who join the Seboka team to gain support from their peer group, senior post-graduate students and other collaborative researchers, as well as the community who moderates the outcome. This is a unique strategy of learning, deduced from the apprenticeship of African indigenous healing (*ukuthwasa*) that strengthens community engagement, education and research in the Seboka team.

Further research was done in African indigenous health, with specific reference to medicinal plant analysis, indigenous health practices and other broader indigenous health issues from 2007 to date. The follow-up research themes in the projects funded by the National Research Foundation and the Department of Science and Technology is the Revitalization of an existing African Primal/Primordial Health Care system in rural South Africa with specific reference to including the practice and medicine (2013-2016) as well as the current project “The Development of an African Indigenous Framework for Community Engagement, Education and Research” (AIHCER) with a follow-up in the establishment of the AIHCER theory. It is noteworthy to mention that the full process of the scholarly work focuses on long-term theory generation to establish a robust theory for African Indigenous Community Engagement, Education and Research (AIHCER) that can be built as a foundation to expand this body of knowledge in IKS. Several post-graduate students have done valuable research contributions since 2008.

Except for publications that can be used in clinical health science education, other publications that contribute to this body of knowledge are the development of research methodology and African indigenous methodology in qualitative research, (Pienaar, 2014). This methodology is broadly used for post-graduate research data-collection, especially in South Africa. The NRF commended the researcher in their review report (NRF, 2014) for the contribution in research methodology. Further methodological research is the contribution in Handbook of Research on Theoretical Perspectives on Indigenous Knowledge Systems in Developing Countries which are published as chapters four and sixteen (Pienaar, 2017; Mphuthi & Pienaar, 2017). This was an international contribution in indigenous knowledge systems.

It is worth noting that the researcher in his scholarly endeavours since 2001 has contributed and is still contributing to the broader Indigenous Knowledge Systems discourse and specifically to indigenous health sciences and community engagement (Pienaar, 2017), education (Pienaar, 2013) and research (Pienaar 2014 and Pienaar, 2017). Through his active engagements, innovative

discoveries, leading to community co-owned patents are in the pipeline through the collective scholarly work of the Seboka team and the researcher (Seboka, 2015). The research journey of this scholar is truly based on the African philosophy of I am, because you are, including of family, the community and the broader academic community, specifically the post-graduate students who worked and are still working with the researcher.

Case Study to Promote Inclusive Health Care: A Class Room Application

“Professor, when a mental health care user (of indigenous African origin) is psychotic, admitted in a mental health care establishment and the family would like to take him to a *sangoma*, the ‘purging type’, should I protect this mental health care user against the request of the family?’ In my role as a mental health care nurse, what should I do, because I am supposed to advocate for the mental health care user to receive quality mental health care?”

(Third year student of African origin)

Why is an African student questioning the indigenous health care system in Africa?

Zuyderduin, Pienaar & Bereda-Thakathi (2016) argued in their article that the educational system for nurses as lead health care professionals in Africa is predominantly based on the western educational system. This western-dominant education in Africa disadvantages the African health care users from an inclusive health care system that also recognises and respects the existence and practice of an African Indigenous System. Therefore western health care practitioners in Africa should relearn the significance of the African indigenous health care system and unlearn to judge this system without evidence.

Learning points in this case-study:

Western Health lenses:

The mental health care user is psychotic, therefore admitted as an involuntary mental health care user According to the Mental Health Care Act, therefore the rights of the health care user are seized and effectively cease to exist.

The mental health care user admitted is under the influence of psychotropic drugs (major tranquilizers) that have adverse side-effects like tardive dyskinesia and akathisia, therefore appearing ‘drunk’. The intervention therefore might be the addition of psychotropic medicine (anti-parkinsonism) to counter the side-effects (more medicine), that will cause more drowsiness.

Other intervention is reality orientation and psycho-education (support) until the health care user becomes used (addicted) to the levels of drug intoxication. This is a bad cycle of adding more and more medication and therefore enriches western-based pharmaceutical industries. Unfortunately, this can continue until death.

African Indigenous health lenses:

How do the family and an African Indigenous health practitioner view the current health challenges of the health care user? This person is medicated and has visible side effects, that make them look more drunk amongst other psychotic mental health care users, all together worsening the healing perspectives of their family.

Noting the state of the family member in the hospital (appearing intoxicated/drunken) immediately brings forward the conclusion that the health care user is intoxicated - took too much of a certain substance, therefore needs cleansing.

The choice of the healer would then be the ‘purging type’ to induce vomiting for internal cleansing. This is a process of internal cleansing or detoxification to alleviate the health care user of the excessive substance/ overdose

An intervention is therefore the use of an indigenous enema (*sipyi*) or emetic plant medicine to induce vomiting (*gokapa*) to promote internal cleansing to get rid of the toxins.

Insights to promote inclusive health care delivery:

The indigenous health team is collectively involved (family, healer) and see the health care user as intoxicated (poisoned) by the western medicine. Therefore, the first intervention that is needed is cleansing through a process of “*gokapa* (induced vomiting) and *sipyi* (indigenous enema)”

Subsequently a similar practice in western health care is done when the health care user takes an overdose of a substance either by attempting suicide or by mistake, in the case of a minor. The western practice is to provide intravenous therapy (internal

cleansing) and emetic medicine to induce vomiting to get rid of the excessive substance;

Basic Lesson - Same practice in different contexts, however – it is acceptable if it is labelled in the western context and done in a western health care establishment by western- trained health care providers.

Salient *derogatory concepts* were built into the health care jargon in colonized Africa to discredit the indigenous health care system, e.g. healer vs witchdoctor ‘purging type healer’ versus the provision of an emetic in this case; gastric lavage (western) which is the same as the manual relief system ‘spyt’; home-based-care and community health care versus primordial/primal or communal health care; midwife-led home-based care deliveries versus ‘traditional birth attendants’. Language became and still remains a weapon to disempower the African indigenous health care system, but in the meantime we overlook the theft that took place in the health care system in Africa. Africans managed most of their health care challenges at home collectively with the family, community and the healers (communal health). However, the western curative health care system necessitated hospitalization for the sick. Years after the institutionalization of the sick, a number of health care approaches, taking the sick back into the community is proposed by the western health care system totally repackaged as ‘primary health care re-engineering’. *Is this not a white-collar crime? Academic theft and piracy?*

Worth mentioning is the fact that labelling is generally chosen for Africans in a colonised system. Like a witch-doctor, instead of healer; traditional birth attendant instead of an indigenous midwife. Therefore, the health care delivery system becomes questionable without a fair and just interrogation when it is done in an African Indigenous Health care team.

A basic skill for a western trained practitioner is to explore, listen and negotiate the co-existence for an inclusive health care delivery.

What is prohibiting Africans to comprehend their indigenous health beliefs and practices?

The State of Colonial Hegemony as a Stumbling-Block Amongst African Scholars

The colonial hegemony that has continued unabated was certainly engineered by the past social injustices towards the African indigenous health care practices and seems to be ingrained in Africans of today, including those generations that did not live during this era. This is very clear when we focus on the system of colonial supremacy in South Africa where the previous political convictions, legislation, educational system and religious practices in general were anti-Africans. These political convictions were enshrined in the policies of the oppressive apartheid government, introduced in 1948, where Africans had minimal or no rights. This was further fuelled by the legislations like the Witchcraft Suppression Act no. 3 of 1957 that aimed at eradicating the indigenous health care practice in South Africa against the so-called supernatural means of healing and the witch-doctor (indigenous healer). Although the Traditional Medicines Act No 22 of 2007 was promulgated by the president, there is no evidence that the Witchcraft Suppression Act no. 3 of 1957 was repealed. It might therefore still pose a threat to the authentic practice of African indigenous healing practices

Adding to the legislation were the day-to-day practices, like the educational system that was closely monitored for contravention of the oppressive laws of the country and riddled with religious practices that benefitted the government of the day. It was common practice that the curriculum was filled with biblical or religious studies and more often than not Africans were prohibited to do subjects like mathematics and science. Therefore, the fear for these subject fields continues today where parents advise their children to refrain from these difficult subjects. This was meticulously engineered to de-culturalize the African race in Africa. However, as much as some consequences that are still prevailing, this is viewed as the past in South Africa. The current government endeavoured to change all oppressive and corrosive policies.

Current policies foregrounding the government of the day are the Reconstruction and Development Policy of 1994 and South Africa’s famous Constitution promulgated in 1996. When one peruses these policy documents you are convinced that freedom of expression and of freedom of choice, specifically to the choice of health care must prevail. Furthermore the Traditional Medicines Act No 22 of 2007 also regulates the legal freedom of African indigenous health care in South Africa. Supporting this

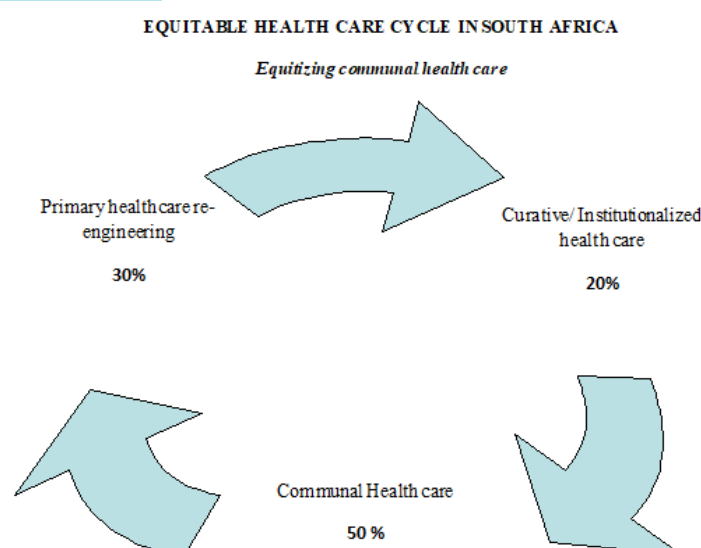
political and legal regulations are the global and national policies on the evolution of health care. These policies are the Alma Ata Declaration of 1978, the Ottawa Declaration on Health Promotion, the WHO on Indigenous Health, the Millennium Development Goals (MDGs), the Sustainable Development Goals (SDGs) and the South African Health Strategy 2014-2019. Why are these policies not winning in uplifting the health care of Africans? By comparing and contrasting these policies the main aim is to promote respect and acceptance for quality health care for all. Subsequently these policies advocate for the inclusion of indigenous communities in health care delivery to accomplish a healthy community, including the choices of health care, which is why India and China are leaders in the co-existence of various health care systems. Unfortunately, the choice or even the inclusion of indigenous health care is not promoted candidly in Africa. Despite the overt oppression of the African Indigenous Health Care System, it has stood the test of time (Pienaar, 2017). Hence we need to ask: “*What is the challenge in Africa?*”

Potentiating health care challenges is the fact that Africa is currently entering an aid threat when it comes to health care delivery. The assertion of the past president of the United States of America, Barack Hussein Obama, that Africans should stop standing with open hands and start relying on themselves invited heavy criticism from especially African leaders. However, this declaration is realized by the constant threats of the current president, Trump, who plans to reduce aid to Africa. A spontaneous question arises: What will happen to the HIV and AIDS treatment in Africa that is largely funded from America? Conversely, it is noted that 80% of Africa's flora has medicinal properties and research in this direction is growing exponentially. But a serious challenge threatens the good work, namely colonial hegemony.

It is common cause that influential South Africans are captured within the colonial hegemony, which stems from 1948. Colonial hegemony is a state where the previous imposed regulations and practices of the colonialist calibrated the being or psyche of the African human race to act within colonial regulatory and dogmatic boundaries, even when colonial oppression is long defeated. Furthermore, a colonial hegemony is an institutionalization of the spirit, mind and insight of Africans as the backward other that can only be taught to learn to become a second rate European, but will always remain sub-standard and a poor cousin of the European, who is the real human being (Kipling, 1899). It is characterized by a state of spiritual, mental and physical helplessness, even when the oppressor leaves; the formerly oppressed continues to function within the constraints of the oppressive regime. Therefore, the oppressed becomes the oppressor; hence healing is also needed in this regard. All regulations in the South African health arena have changed. We need to fight for equity in health, because equality will disenfranchise us further. Because in an equal system, those who had more, gain more and it keeps them ahead of the others. Let us take hands, not to disregard the effectiveness of the western health care system, but to explore the benefits of the African indigenous health system which has sustained generations so as to safeguard ourselves from a brewing health catastrophe.

With this critical discourse it is recommended that African indigenous communal health care, also known as primal or primordial health care take centre stage and leads the way for primary health care re-engineering in South Africa. This is a care where health care starts with the interventions of the family, moves to the neighbours (community) and then to the healer (expert health practitioner). In this process and practice, all stakeholders take responsibility for the healing process to take place.

How can we restore the equity in health care?



In this it is proposed that communal health care is equitized, and therefore given more resources to actively function in the health care system, supported by primary health care in the community. This primary health care therefore is not the umbrella health care, but a co-health care system in the community. Furthermore, less is invested in curative or institutionalised health care, because rehabilitation and end of life health care can still take place in the community setting. It is proven beyond denial that more than 80% of Africans make use of indigenous or natural health care in South Africa and this health care system has been and continues to be effective and successful. Further regulatory and practice issues are covered in the unfolding legalization of indigenous health care in South Africa.

Evidently the WHO-Traditional Medicine (TM) strategy emphasizes that indigenous medicine is readily accessible, it's situated in the community and affordable (WHO, 2013). The WHO- TM strategy links perfectly with the Primary Health Care re-engineering strategy of South Africa, because the PHC-re-engineering is to strengthen district health services (DHS), simultaneously strengthening community health services to do the basics better (National Department of Health, 2011). Hence this advocacy for the repositioning of African Indigenous Communal Health care where the community takes responsibility of each other's healing. In this set-up as already indicated, the family and community are actively involved in the healing process with the indigenous healer as an expert guiding the healing process. Therefore, it is recommended that African indigenous communal

health care is brought to an equitable level with the western health care system, where indigenous communal healing receives an equitable share of the health care budget in Africa. In such a set-up, families should also be given a voice so that they choose where they can take their loved one for care and healing.

The reinforcing of indigenous communal health care supports the National Health Strategy of South Africa (2014-2019) where the aim is to make health care more accessible, equitable, efficient, quality and sustainable. Communal health care starts in the family, moves to the community and then to the health care providers. These stakeholders work collectively to facilitate healing. Manifestly indigenous communal healing is the best option to strengthen district health services.

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A Survey of Potential Bacterial Hazards in Salad Vegetables Sold in Lusaka District, Zambia, in 2018

Chileshe Pule¹, Kunda Ndashe^{1*}, Ruth Mfuné², Abigail Chilumunda¹, Grace Mwanza^{3,4}, Bernadette Mumba¹, Lillian Mutesu Silavwe⁵, and Bernard Mudenda Hang'ombe⁶

1. Department of Environmental Health, Faculty of Health Science, Lusaka Apex Medical University, Lusaka, Zambia.

2. Public Health Unit, School of Medicine, Copperbelt University, Ndola, Zambia.

3. Department of Public Health, Lusaka City Council, Lusaka, Zambia

4. Department of Disease Control, School of Veterinary Medicine, University of Zambia, Lusaka, Zambia

5. Department of Environmental Health, School of Health Science. Rusangu University, Lusaka, Zambia

6. Department of Paraclinical Science, School of Veterinary Medicine, University of Zambia, Lusaka, Zambia

*Corresponding author: ndashe.kunda@gmail.com Tel: +260967903076 (Kunda Ndashe)

Abstract

Salad vegetables are a source of fresh nutrition and can also serve a vehicle for foodborne pathogens. This was a cross sectional study conducted in February and March 2018 aimed at isolating some enteropathogens from some salad vegetables. Ten samples of each salad vegetable (carrots, cabbage, cucumbers and tomatoes) were collected from two supermarkets and two open-markets. A total of 160 samples were collected and analysed microbiologically for presence of *Shigella* spp, *Vibrio* spp and *Salmonella* spp. The isolated bacteria were identified by conventional biochemical tests. *Vibrio* spp were isolated from all the vegetables that were collected from both the two open markets (62.5% and 72.5%) and two supermarkets (67.5% and 77.5%), with the highest isolation rate recorded in cabbages. The frequency of occurrence of *Shigella* spp and *Salmonella* spp was higher in supermarkets (50% and 65%; 50% and 15%) than in the open markets (10% and 7.5%; 10% and 35%), respectively. The present study revealed the presence of potential bacterial hazards in salad vegetables sold in both open markets and supermarkets in Lusaka district. The isolated bacterial pathogens are aetiological agents of diarrheal disease that even at low dose could be infectious for sensitive populations.

Keywords: Bacterial, hazards, diarrheal, nutrition

Introduction

In the quest for healthy life styles there has been an increase in the consumption of vegetable salads which are normally eaten without any heat treatment and sometimes with minimal cleaning with water. Salad vegetables include carrots (*Daucus carota*), cabbage (*Brassica oleracea*), cucumbers (*Cucumis sativus*) and tomatoes (*Solanum lycopers*). Researchers have demonstrated that vegetables may serve as vehicles for transmission of enteric bacteria that are responsible for foodborne illnesses [1-3]. Developed countries such as the United States and European Union reported a total of 377 and 198 fresh produce-associated outbreaks, respectively, between 2004 and 2012 [4]. Foodborne illness is a major public health concern worldwide in terms of numbers of persons affected and economic cost. Approximately one in 10 people in the world fall ill food and 420 000 die every year after eating contaminated food [5].

Zambia continues to face immense challenges with foodborne and waterborne illness. In 2017, the country experienced an outbreak of cholera in Lusaka with 3938 cases and 82 deaths (case fatality rate, 2.1%) [6]. The main source of transmission during the outbreak was contaminated water. Furthermore, several studies conducted in Lusaka have reported that many water sources such as municipal and ground water are contaminated with faecal coliforms both in urban and peri-urban townships [7-9]. Vegetables easily become contaminated with pathogenic microorganisms from farm to fork and water used for irrigation and processing post-harvest contributes to the bacterial quality of vegetables [10]. Unsafe water used for rinsing the salad vegetables before eating and for sprinkling at retail points to keep them fresh is also a source of contamination [11]. Microorganisms like *Escherichia coli*, *Salmonella* spp, *Klebsiella* spp, *Shigella* spp and other coliforms may pose serious health threats to consumers [12].

In Lusaka, local farmers use municipal and groundwater for irrigation and washing of salad vegetables post harvest. The bacteriological quality of the water is reported to be poor and therefore can serve as a source of contamination. To the best of our knowledge there exists no publication reporting the bacteriological quality of salad vegetables in Lusaka. Therefore, we conducted this study to investigate the presence of faecal bacteria (*Salmonella* spp, *Shigella* spp and *Vibrio* spp) on salad vegetables in retail sale points such as supermarkets and open markets of Lusaka district.

Material and Methods

Sampling and Sample Preparation

The present cross-sectional study was carried out during a 2-month period from February through March 2018. Salad vegetables were collected from two supermarkets and two open markets and were examined at the University of Zambia, School of Veterinary Medicine Bacteriology laboratory. The two supermarkets (A and B) and the open markets (Soweto and Mtendere) were included in the study because they are the main sources of fresh produce in Lusaka. The vegetables that were collected included carrots (*Daucus carota*), cabbage (*Brassica oleracea*), cucumbers (*Cucumis sativus*) and tomatoes (*Solanum lycopers*).

Convenience samples were taken and the sample size was limited by the cost of the laboratory testing, a total of 160 samples were collected for the study. Forty salad vegetables, 10 of each type (carrots, cabbage, cucumbers and tomatoes) were randomly collected from each participating supermarkets or open markets. From the two open markets, 8 vegetable traders (4 from each) were randomly selected from whom one type of salad vegetable was sampled. Each sample was secured in a sterile plastic bag and then transported in cooler boxes surrounded by ice packs to the laboratory, where they were analysed for potential bacterial hazards with 2 hours of collection.

The study was conducted after ethical approval from ERES CONVERGE IRB, and consent was sought from the management of the participating supermarkets and vegetable traders in the open markets.

Microbiological Analysis

An estimated 25 grams of each sample were weighed aseptically in a sterile test tube and were vortexed with 225ml of buffered peptone water (BPW) for 2 minutes. The mixture was kept for 1 hour at room temperature before analysis. *Salmonella* spp. were detected in four successive steps. Pre-enrichment in BPW at 37 °C for 20 hours, followed by enrichment in selenite broth incubated at 37 °C for 24 hours. The isolation was done on selective media xylose lysine deoxycholate (XLD) agar at 37 °C for 24 hours. Suspect *Salmonella* colonies (red colonies with black centres) were confirmed with conventional biochemical tests. Typical *Salmonella* isolates were further serotyped by using *Salmonella* O and H agglutination antisera following the Kauffman-White serotyping scheme [14].

For detecting the presence of *Shigella* spp, 25 g portions of each item were enriched in a 225 ml *Shigella* broth (Difco, Detroit, MI, US) containing novobiocin, for 22 hours at 42 °C. Enriched cultures were streaked onto MacConkey agar (Himedia, India) and incubated at 35 °C for 20 hours. Presumptive *Shigella* isolates (slightly pink and translucent) were identified by conventional biochemical methods.

For the detection of *Vibrio* spp, 25g of each sample was enriched in 225ml of alkaline peptone water (Himedia, India) and incubated at 37 °C for 6 hours. The enriched cultures were streaked on thiosulfate citrate bile sucrose (TCBS) agar (Himedia, India) followed by incubation at 37 °C for 24 hours. Suspected vibrio colonies (yellow and green) were further identified by conventional biochemical methods.

Results

The presence of *Vibrio* spp, *Shigella* spp and *Salmonella* spp in the samples was identified. The Vibrios were isolated from all the salad vegetables that were collected from the open markets (62.5% and 72.5%) and supermarkets (67.5% and 77.5%) as shown in the table. The rate of isolation of *Vibrio* spp in each type of vegetables varied, lowest and highest isolation rate of the Vibrios was recorded in cucumber and cabbages, respectively.

Shigella spp were not isolated from tomatoes and cucumbers from open markets and the highest isolation rate, 70% and 80%, of the bacterium was recorded in tomatoes collected from supermarkets 1 and 2, respectively. *Shigella* spp were isolated from all the vegetables in supermarket 1 and 2 (50% and 65%) while the bacterium was isolated from cabbages and carrots from open market 1 and 2 (10% and 7.5%) as shown in the table.

Salmonella spp isolation rate was highest in vegetables in supermarket 1 and open market 2 (50% and 35%). Cabbages and carrots from Supermarket 1 and tomatoes from open market 1 recorded the highest isolation at 70%. *Salmonella* spp were not isolated from carrots in open market 2 and supermarket 2, cucumbers and cabbages from open market 1.

Discussion

The safety of salad vegetables is based on the presence and quantities of pathogenic microorganisms they contain. This study aimed at isolating some diarrheagenic bacterial pathogens in readily available salad vegetables. The study reported the presence of *Vibrio* spp, *Shigella* spp and *Salmonella*

spp contamination of the commonly consumed salad vegetables in Lusaka district. Studies from Togo, Iran, Hong Kong, Saudi Arabia and Nigeria demonstrated the presence of coliforms and other diarrheagenic bacteria in fresh cut and salad vegetables [15-18].

From the present study, *Vibrio* spp was isolated from all the salad vegetables except carrots collected from the open markets. The frequency of occurrence of the bacterium in vegetables from open markets 1 and 2 (72.5% and 62.5%) was similar to those recorded from supermarket 1 and 2 (67.5% and 77.5%). This result differs markedly from those reported in Malaysia where vegetables from open market had a higher frequency of occurrence of *Vibrio* spp than those from supermarkets [19]. In a study by Tunung and colleagues (2010), *V. parahaemolyticus* was isolated from 20.65% of salad vegetables collected from all retail outlets in Selangor, Malaysia [19]. In Bangladesh, Rahman and Noor (2012) reported the presence of *Vibrio* spp in cucumbers, carrots, lettuce and tomatoes, which were only isolated after enrichment [20]. *Vibrio* spp are waterborne and therefore irrigation of vegetables with waste water or organic manure may serve as a source of contamination. In a study by Okafo and colleagues (2003) in Kowa and Sabon Garri, Nigeria, they reported high coliform counts in both irrigation water and vegetables and they further recorded higher frequency of isolation of *Vibrio* spp in the dry season [21]. The present study coincided with the 2017/2018 cholera outbreak in Lusaka District but it cannot be concluded that the *Vibrio* spp isolated from the vegetables contributed to the transmission of the disease as it was not identified as *V. cholerae* O1/O139.

The frequency of occurrence of *Shigella* spp and *Salmonella* spp from open market 1 and 2 (10% and 7.5%; 25% and 35%) was lower than supermarket 1 and 2 (50% and 65%; 50% and 15%), respectively. This result does not conform with common trend in other studies where open markets report more bacterial contamination of vegetables when compared to supermarkets. From the open markets *Shigella* spp were only isolated from cabbages and carrots, while the bacterium was isolated from all the vegetables sampled in the supermarkets. The higher rate of isolation of *Shigella* spp and *Salmonella* spp from the supermarkets could be attributed to storage duration of the vegetables and possibilities of cross contamination between the products as well. The environmental temperatures in the supermarkets are not low enough to prevent the proliferation of mesophiles. Furthermore, the generation time of *Salmonella* spp and *Shigella* spp is between 34 to 40 minutes and therefore storage of vegetables for more than 48hrs at environmental temperature (24 to 29 °C) will result in multiplication of the bacteria to infectious doses. In a study by

Silva and colleagues (2009), *S. enterica subsp. enterica* sorovar *Typhimurium* stored at 25 °C for 24hrs increased to population of 5 to 6 log₁₀ at generation time of 34.8 minutes [22]. The study highlighted that at environmental temperature (24 to 29 °C) *Salmonella* thrives well and therefore explaining the high isolation rates in supermarkets where the vegetables are stored for more than two days. At open markets, the traders normally buy the vegetables daily and sell them off during one work shift, and therefore they are not stored overnight.

The presence of diarrheagenic bacterial pathogens in vegetables from all retail points in the study suggests that contamination could have occurred prior to and post harvesting and during storage in the sales outlets. Other researchers have highlighted that the main sources of contamination of vegetables with enterobacteriaceae include irrigation with waste water, application of contaminated organic fertilizers, washing with contaminated water, and handling by infected food handlers and vendors [23-27]. For pathogens with no animal reservoir, such as *Shigella* spp., human faeces provide the primary source of contamination, and infected food handlers have frequently been implicated as the cause of outbreaks [28]. The high isolation rate of the enteropathogens in the study suggest high bacterial contamination of the salad vegetables which is a reflection of storage condition and how long these vegetables were kept before they were obtained for sampling. Although the quantity of the enteropathogens in the vegetables, colony forming unit per gram (cfu/g), was not determined, the presence of these enterobacteriaceae is of public health concern.

Conclusion

The present study revealed the presence of a potential bacterial hazard on salad vegetables sold in Lusaka district. The isolated bacteria pose a public health risk considering that the salad vegetables are consumed without heat treatment and with minimal washing. Vegetable salads are a significant part of urban food supplies and therefore adequate measures ought to be taken to reduce the microbial load on the vegetables. Intervention by the local authority (Lusaka City Council) and the Ministry of Agriculture is required by engaging farmers and salad vegetable traders in hygiene practices and responsible farming of vegetables to prevent pre and post harvest contamination. Furthermore, the general public should thoroughly clean salad vegetables with clean water before consumption.

Acknowledgement

We would like to recognize that this was a study undertaken by Ms. Chileshe Pule as partial fulfilment for Bachelor of Science Environmental Health of Lusaka Apex Medical University (LAMU). We wish to express our gratitude to the staff at the University of Zambia, School of Veterinary Medicine, Bacteriology Laboratory for technical help rendered during bench work sessions of the research. We would like to thank the academic staff of LAMU, Faculty of Health Sciences for the support and contribution towards the research. Finally, we are indebted to the market traders of Soweto and Mtendere markets that allowed us to conduct the research in their vegetable to them we say thank you.

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Orature as an appropriate communal-based data-collection method in an Indigenous Science context: “*Whose sciences are we talking about?*”

Khauhelo S Mahlatsi¹, Shadreck Nembaware² and Abel J Pienaar

1. University of Venda, South Africa

2. Chinhoyi University of Technology Chinhoyi Zimbabwe

3. Professor & Associate Dean Faculty of Nursing and Midwifery, Shifa Tameer-e-Millat University, Islamabad, Pakistan.

*Corresponding Author: +923011049463, abel.pienaar@gmail.com, abel.scn@stmu.edu.pk,

Abstract

The paper seeks to locate the place of an Africa-centred epistemology from a post-postmodernism view in intellectual enquiry. This innovation emerged through exploring current methodologies used in the National Research foundation and Department of Science and Innovation funded project in South Africa; namely the Seboka research team, as a case study for engagement with the knowledge economy through collaborative work with the indigenous rural communities in Africa. Against the backdrop of Africa's paradigm shift from orality to canonicity in the creation and preservation of indigenous knowledge sciences, the paper taps into the resourcefulness of verbal arts and African heritage passed down orally over the years as an age-old data collection method. The nuanced projectile between 'calabash' and 'cyberspace' notwithstanding, the paper makes a case around the need to honour and recognize African society's old retainers (the hands-on repositories and transmitters of African society's philosophies and applied existential wisdom) into the mainstream of the continent's ever-evolving research work. This ground-breaking submission that 'Western medicine is broken' occasions a platform for Africa to seek recourse to home-grown solutions – tapping into the core of African ontology – in order to provide suitable remedies, therapies, antidotes and immunity boosters best-fitted for the children of mother Africa. By extension, the paper contends that an Africa-centred approach to intellectual enquiry is not limited to health sciences only, but it encompasses all aspects of African culture, lifestyle, heritage, history, arts, dreams and aspirations. Such an acknowledgement is needful if African philosophies are to amicably co-exist with other differently constituted philosophical moorings as necessitated by dynamic imperatives of the global village. The research particularly illuminates the application of orature as a data-collection method in a communal context. This method showcases the merits of community partnership that proves its worth as key custodians and stakeholders in the generation and preservation of a priceless heritage. The latter respectfully speaks to the limitations of conventional research methods ordinarily adopted in the claustrophobic confines of university red-brick walls and ivory towers. This study notably adopts a philosophical acceptance of African culture as a rewarding entry point into the mother continent's self-contained body of knowledge.

Keywords: Orature, communal based, indigenous science

Background and Introduction

This paper is born out of a judicious distillation of the theory and praxis driving the work of the Seboka research team, in particular the three authors. The paper's submissions advance the merits of an Africa-centred consciousness as the ontology that spawns a novel epistemology mediating the gaps occasioned by bracketing out African people and their sacrosanct cultural practices from the quadrant of knowledge creation. It is quite paramount from the onset to make a case around the peculiarities that define the African cultural universe in an endeavor to ascertain the cardinal coordinates for Indigenous Knowledge Systems and their definitive place in Africa's existential dynamics.

For Seboka, the indigenous people of Africa are not mere informants for scholars' community research work, but they are active co-creators of knowledge whose practically-generated experiential wisdom ought to be accordingly acknowledged and integrated into society's mainstream system of knowledge. African communities are endowed with the capacity to create knowledge and to deploy the resourcefulness of adaptive intelligence to utilise their self-generated knowledge sustainably. The avant-garde tenets of globalisation can only make sense if they substantially accord Africa the space to define its 'place' and 'self' in the crucible of knowledge creation.

Post-postmodern scholarship has invariably found fodder in the contentious relationship between the spoken word and script, necessitating a more perceptive consideration of the oral-literate dichotomy. Coherently, on psychosocial health, Mahlatsi (2018:39) appreciated that in a KhoiSan community found in the Northern-Cape Province of South Africa there is more in the spoken word than what is being said. Vehemently, it came out that the said community listens not only with their ears by all senses (eyes, touch and smell). This speaks highly of the findings of Mahlatsi (2018:46) and that of Pienaar and Uys (2013:77) where respect and, respectful waiting thereof is found to be deep-rooted among African communities concerning what is being said, and how it is received. To put it into perspective, Pienaar and Uys (2013:77) found in their work of an African approach on therapeutic interaction in HIV and AIDS care that active and passive expression of feelings forms an integral part of *what* is being said between the counsellor and the counselee.

Hence, the subjectivities that ordinarily attend to the idea of

a teleological progression from an oral to a literate world are debunked by NgugiWaThiongo (2007:4), who submits that the term 'orature' was first coined in the 1970s by the Ugandan linguist PioZirimu to counter the predisposition to see the arts communicated orally and received aurally as an inferior or a lower rung in the linear development of literary material and scholarship. Zirimu's work yields a definition of 'orature' as the use of utterance as an aesthetic means of expression, pointing to an oral system of aesthetics that does not need validity from the literary. In Africa, indigenous knowledge system has seen critical energies reversing the tendency to subordinate orality to canonicity, foregrounding orality as a complete system in its own right. Fiona Moolla (2012:434) notes that the term 'orature' indexes orality as a total system of performance linked to a very specific idea of space and time. An aligned worldview between an oral performer using verbal art and an audience is required to understand an oral form. Care has to be taken, therefore, in the potentially totalizing practice of seeing orature as the oral analogue of literature, especially in view of the fact that orature is part and parcel of the lore media with which a society conducts profound and common cultural affairs among its members, orally.

The Seboka emblem is a testimony to the research team's appropriation of African essence and cultural worth. The insignia, consisting of a clay pot and a pride of lions on a hunt, interweaves Africa's cherished and interconnected values of collective identity, interdependence, mutuality, and brotherly group care. The clay pot summons to mind the nourishment of mother Africa, a domestic metaphor in keeping with the configuration of Africa in feminine terms, valorizing the continent as the brooding mother whose breast is full of the milk of human kindness. The dictum attending to the pride of lions, 'Di tau di senangseboka di siiwake none e tlhotsa' translates to 'A lion that goes on hunt alone and not co-exist in a pack, will always fail to catch even a limping deer.' Noticeably, success and achievement in African terms are always gauged relationally, hence the imperative lifelong philosophy of subsuming one's vulnerable individuality under the secure umbrella of the collective. This thought is succinctly captured in Africa's 'Ubuntu' philosophy, a rich definitive element of African life and essence which Pienaar (2013:1) perceptively discusses in relation to the potent axiom 'I am, because we are,' hence placing community and group care above the focus of the self.

To productively engage indigenous knowledge systems, it is vital to go beyond the dichotomy of indigenous versus scientific in order to appreciate the greater autonomy for indigenous people. MolefiKete Asante (1998) and Pienaar (2017) make out the Afrocentric framework as a revolutionary shift in thinking, a structural adjustment in the wake of black

disorientation, de-centredness and lack of agency. The philosophy of Afrocentricity as expounded by MolefiKete Asante is thus a way of answering some critical cultural, economic, political, and social questions related to African people from a definitively centred position. Establishing the ontological bearings of the African people is therefore a prerequisite to unlocking their epistemologies. Such an exercise requires a phenomenological approach that does not frustratingly make African values an appendage to any other cultural centre. Situating centres is quite vital in any attempt to locate a people's taxonomy of values and their home-grown, culture-inspired and history-specific solutions to their set of existential challenges.

For African peoples generally, the history of colonisation is a common experience, associated with epidemics of infectious diseases, depopulation and disempowerment at local, ethnic and national levels. It was also followed by a common pattern of alienation: loss of culture, loss of land, loss of voice, loss of dignity, loss of health and loss of intellectual traditions. It is thus understandable for indigenous communities to express their united commitment to their socio-economic positions, their rejection of marginality, their legitimate claim for autonomy, as well as their concerted efforts to combat diseases spawned by the material reality of historical encounters. It is, however, important to note that colonisation, socio-economic disadvantage or political ambitions are not the defining elements of indigeneity. Instead, as Kame'eleihiwa Lilikalä (1992:23) and Hoppers (2017) notes, the most significant and primary characteristic of indigeneity is a strong sense of unity with the environment – a healthy environment. This explains the assertions like 'People are the land and the land is the people' and 'we are the river, the river is us' as poignantly captured in the Whanganui River Charter (1993) whose enunciation of the ideals of the indigenous island peoples of New Zealand is comparable to the values enshrined in the cultural practices of the indigenous African people.

Crucially, one need to acknowledge the nature of the context. In defining the context which unfolded with data analysis, the researchers saw it fit that indigenous people live with a belief that people are not separate from the earth and living things, events happen for spiritual reasons (Onwu & Mosimege, 2013:11; Hoppers, 2017:5 & Kovacha, 2010). With that assertion and the principle of ubuntu premised on the adage "I am because you are" (Seboka), this process of orature as a new developing data collection method came to be an eye-opening epiphany.

Africans characteristically express an aversion to individualism.

This is because of the 'Ubuntu' philosophy and its enunciation of the merits of co-existence, collectivism and communitarian solidarity. This brotherly group care extends to man's interdependence with the ecosystem, presupposing that healing in the African perspective is a comprehensive endeavour to restore man's harmony with nature. In light of the ecological base which anchors most indigenous approaches to health, the World Health Organization (in Geneva 1999) yielded a Declaration on the Health and Survival of Indigenous Peoples which was subsequently presented to the United Nations Permanent Forum on Indigenous Issues in 2002. Affirming the links between culture, the wider natural environment, human rights and health, the Committee on Indigenous Health (2002) submits this definition of health:

It is futile to try and understand medical practice in the traditional African perspective without examining the socio-cultural, historical, political and economic contexts of health, disease and therapeutic fundamentals in Africa. In an analysis of ethnomedical studies of health, disease and cure in Africa, Feierman and Janzen (1992:xvi) argue that health and healing are part of historically continuous streams of interrelated theory and practice, and this is the departure point in any approaches to the changing contexts in which contemporary health practices are grounded. Though it has come to permeate various approaches to scholarship in the postmodern dispensation, the term 'holism' was interestingly coined by an iconic African scholar, the South African national, Jan Smuts (1926), who defined 'holism' as the tendency in nature to form wholes that are greater than the sum of the parts through creative evolution. It is notable that this understanding locates African indigenous health practice within the framework of primary health care where the term 'holistic' is used to describe approaches that take into account social considerations and other intuitive judgements. Practitioners of African indigenous health care acknowledge that struggles for health are part of society's central struggles, hence from a holistic perspective, perceptions and practices of health and healing are part of broader social, political and economic which allow for continuous reflection and readjustment vis-a-viz sustainable cultural practices in Africa.

Through orature, Seboka research fellows are involved in scholarly participatory engagement with the community, spearheading the crusade to revitalise the indigenous African health system which sustainably fares well in the wake of alternative medical explorations. As indigenous knowledge systems scholars engaging with paradoxes generated by the dominance of the western health system, Seboka researchers were brought alive to the glaring pertinent question: *Why are we undermining the indigenous health system which has stood the*

the test of time under oppression in Africa and is still going strong, whereas the dominant health care system is fraught with distortions and patients are unnecessarily harmed?" It is on this understanding that the Seboka team endeavours to revitalize the existing primal health care system which is utilized by over 80% of the population worldwide. The Seboka team reasonably acknowledges that the Western Health System, since inception, contributed to the health of Africans. However, the impeccable tenets of the original African Health System found on the continent cannot be overlooked or under-played. As such, Seboka champions the revitalization of the indigenous African Health System, proposing a rationale, equal and equitable co-existence with the Western Health System as seen in countries like China and India.

Research Methodology

Understanding Orature as a concept and application of Orature as method of data-collection

If you want people to understand you, speak their language – African proverb.

Africa at large is diverse in culture, language, traditions and customs. Hence, Seboka as a research team has always advanced Africa needs to be treated and appreciated as such. This writing piece came into fruition during data collection by the authors on an indigenous rural community in the Cape Province of South Africa. The realization for the need of a generic approach for data collection did not surface momentary but consequential, to a long lasting relationship with the very community through its affiliation with the Seboka project where the community is the main stake holder. As developing scholars together with our seasoned fellow researchers, we were stunned, at the same time contented by the complexity and the uniqueness of the context. As a result, every after session we had of data collection with the community later that day we would reflect and bounce ideas. It is at this point where we thought this is beyond the art of wording.

However, as born and practicing Africans we at the same time realized the vulnerability and how the context of this nature being abused by scholars, classical western researchers in particular.

Hence, orature as a method of data collection in qualitative research was realized during many of the community partnership

research with Seboka. Particular, a partnership with a KhoiSan community in the Northern Cape, South Africa. The Seboka researchers aim to uphold the importance and respect of the heritage of the communities in partnership. Equally important, it is submitted by Pienaar (2017:88) that evidence is authentic in its original habitat. Consequently, the researchers embarked on a culturally-collaborative process with the community of the KhoiSan, where the community is the author and the researcher is the co-author of the exploration their own resolution.

Orature is when the research is approached as a negotiated partnership, allowing the indigenous community to define for themselves the degree to which they wish to make themselves available as subjects (Mkabela, 2005:183). The indigenous communities have control of the research process which makes it easier for everyone involved to monitor progress (Mkabela, 2005:183). Strength was drawn from Ignatov (2016:1), who delineates orature as agency, authority and collectively. Agency is when one is talking to the ancestors and a way of being at peace with the the energies of the land and nature's power to act in complete cycle with humans. Authority is the powers of the universe, the energies of the land. Lastly, collectively is an expression of the land, the living, and the dead (Ignatov, 2016:1). Orature is thus a collective data collection method is inclusive of conversations, story-telling, poetry and fine arts.

It is the teachings of Kovach (2010) who argues that indigenous knowledge embodies a particular way of knowing based upon oral tradition of sharing knowledge. At the same time. Lee et al., (2015:84) maintain that the notion "storytelling" has a long standing history that is at the same time being used in many ways depending on the context. That is why oral storytelling was utilized for data collection by the researchers' in concern.

In defining the context which unfolded with data collection and analysis, the researchers' deemed it as the main that indigenous people hold a strong belief that people are not separate from the earth and living things, events happen for spiritual reasons (Onwu & Mosimege, 2013:11; Hoppers, 2017:5 & Kovacha, 2010). With that assertion and the principle of ubuntu with a premise "I am because you are" (Seboka), this process of orature as a new developing data collection method came to be an eye-opening epiphany.

Application of Orature as a method of data-collection

The researchers came to a realization of the need for data collection methods that shows the sense of understanding and respect for the African indigenous communities. This is in line with Hoppers (2017) and Mkabela (2005) where respect of indigenous rural communities' knowledge is clear at the centre and how it is collected for interpretation is clearly eminent. This is as put forth by Owusu-Ansah and Mji (2013:3), who argue that sensitivity to African realities must be shown by researchers. Hence, orature, data collection method that is specific to the culture was used because the intention was to be sufficiently detailed and sensitive to actual social contexts and to investigate the character of ordinary social activities (Owusu-Ansah & Mji, 2013:3).

Mahlatsi (2018) made use of story-telling, metaphors and conversations as the rudiments of Orature as a data collection method in a collaborative research project headed by the Principal researcher of Seboka with the community of the KhoiSan playing an equal role as the researchers. In illustration, the procedure followed a process of first understanding the role of the researcher; development of guiding questions; how data was managed; rigour of the research and ethical considerations.

Procedure followed;

It is important to realize that the authors of this article argues that there are no limitations or stringent structure of the process of making use of orature as a data collection method. Considerately, this process might also be influenced by the sampling method of the research as Mahatsi (2018) made use of theoretical sampling as guided by Glaser and Strauss (2006).

1. Role of the Researcher

Most importantly, after identifying an indigenous community to partner with, the researcher has to first build a sustainable shared trust with the said community (Pienaar, 2017:89). Fundamentally, this will be attained by prolonged engagement with the community but also resulting in cultural competence by the researcher (Pienaar, 2017:90).

The process of cultural assessment, awareness and sensitivity is plainly explained by Pienaar and Koen (2014), where the process is referred to as Cultural Congruent Management. Where firstly, there is *cultural ignorance* as a first phase, described as a lack of

interest and knowledge to familiarize with a specific culture, as a consequence to the extent that the researcher is not living with the indigenous community. Accordingly, this is attained by the researcher engaging the indigenous community and notes their ways of knowing.

Furthermore, now that the researcher is aware of the ways of living by the community, then follows a phase referred to as *cultural awareness* where the researcher explores and becomes aware of the day-to-day practices (Pienaar & Koen, 2014). Hence, Pienaar and Koen (2014), argue that at this phase the researcher is engaged in a deeper level with the community to explore their belief systems with the main purpose of appreciating the community as a unique African context.

Successively, *cultural sensitivity* follows, where the researcher shows respect by way of demonstrating empathy and understanding toward complexity of the community's ways of knowing and living (Pienaar & Koen, 2014).

All things considered, the researcher has to identify, observe, assess, explore and analyze the culture of the indigenous community so to interact effectively with the community members and accent positive attitudes toward cultural differences thereof. It is at this phase where Pienaar and Koen agree that the researcher is *culturally competent* (Pienaar & Koen, 2014).

With the above understanding, the researcher built rapport with the community with the prime initiative being to be at the centre that the community is in charge (Pienaar, 2017:90).

2. A Supple Guideline of Questions to be asked

On account to the role of the researcher, this should be developed with no bearing to the process of data collection. The primary guiding is "Ubuntu" principles – I am because you are. Importantly, the questions should be translated to the language of the community.

3. Data management

Notably, more strength in this paper is drawn from Pienaar (2017) who positions African Indigenous Knowledge is a science in its own right. Considering the previous discussion this paper argues that there's a need for the researchers to first acknowledge the context where data collection took place in the process to construct appropriate meaning from the data.

Irrespective of the choice of data analysis method, adjacent to

the role of the researcher and sets of developed questions to be asked, data management in orature should continually be rooted on collecting and appreciating the meaning of reality within its unique context.

4. Rigor of the research

Enumeration of trusting the reality of the community being researched should mainly lie within the community itself. Retrospectively, this is referred to in Mahlasti (2018) as member checking where the researcher revert back (with respect and open minded) the participants to validate if the meaning of reality matches what they indeed intended. Cohesively, the process of member checking should first start at the chief's/ community leader level and then followed by engagement with the participants.

5. Ethical issues

It is of importance that Ethics adherence centre the data collection process in vulnerable communities such as African indigenous communities. Therefore, the ethics should start with the community approval and then be escalated to a Western research platform of approval. A recorded approval (oral) from the community is also acceptable.

Conclusion

Perusing this educational-research paper, grounded in an evidence-based practice within an indigenous context, it recounts the importance of three main issues that endeavor to strengthen research. Initially it advances that the depth of the evidence in an indigenous community, resorts in the community-friendly method used to obtain the data; Secondly, the moral and ethical process followed to nurture a trust relation within a community, guaranty the authentic nature of the evidence obtained and lastly the process of science practice that is confirmed to be part of any community, whether indigenous (local) or western that 'must' be acknowledged and respected to practice appropriate sciences within such a community. An answer to the question: "Whose sciences are we talking about". Therefore, science practice in an indigenous community, should be grounded in their paradigm and judged from the community's context.

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Prevalence of Osteoporosis at the University Teaching Hospital in Lusaka, Zambia.

*Nchimunya Gwaba¹, Robson Kanongo¹, Shawn Haluzani¹

1. Faculty of Medical Radiation Sciences at the Lusaka Apex Medical University

*Corresponding author: tgwaba@yahoo.com; +260 965913947

Abstract

Osteoporosis is a global problem with a high prevalence in the developed countries and an increasing trend in developing countries. This disease poses health challenges to mostly elderly people. Scholars explain that physical limitation, fractures and associated complications of fractures makes osteoporosis a serious public health problem that results in substantial morbidity and mortality. The prevalence of this disease has not yet been established at the study site. The aim of this study was to determine the prevalence of osteoporosis among adult patients aged 40 years and above at the University Teaching Hospital (UTH) in Lusaka, Zambia. This retrospective study involved the retrieving of data from 76 patients who had bone mineral density reports. Data was coded, entered and analyzed using SPSS version 23. Both descriptive and inferential statistics were performed in the analysis of data. The study sought to establish the prevalence of osteoporosis at UTH. The study results showed that 32.9% of the patients had osteoporosis, 43.4% had osteopenia, while 23.7% had normal bone mass. Among the male patients, 47.6% had osteoporosis while 27.3% had osteoporosis among the females. However, the chi-square results at 5% level of significance showed that both men and women have an equal chance of acquiring osteoporosis ($p=0.091$). This study also showed a direct association between osteoporosis and age ($p\text{-value}=0.015$). The study established that the likelihood of being diagnosed with osteoporosis increased with age. These findings show that the prevalence of osteoporosis and its associated factors is quite high among adults above the age of 45 years. Therefore interventions for reducing and combating osteoporosis and its associated factors should be put in place and those at risk should be made aware of these measures.

Keywords: Osteoporosis, pregnancy, retrospective

Introduction

Osteoporosis is a disease that is characterized by low bone mass and micro-architectural deterioration of bone tissue, leading to bone fragility and a consequent increase in risk of fracture. It is a serious global health problem which is affecting both the developed and the developing countries and also affecting men and women alike. It is diagnosed by measuring the bone mineral density (BMD) of patients using Dual-Energy X-ray Absorptiometry (DEXA) method. Previous researchers agree that BMD is the best available means to assess bone strength and the only important tool in the early diagnosis of osteoporosis so that effective preventive and therapeutic measures can be initiated at the earliest stage (Vaasanthi, et. al, 2016). According to some researchers, BMD is a measure of bone mineral content per unit area that reflects the overall strength and brittleness of bone (Guo, et al., 2012). Determination of BMD is usually made on cancellous (spongy) bone such as the lumbar spine (Yu et al., 1996). This is because the rapid turnover of cancellous bone (versus cortical bone) makes it a more sensitive indicator of metabolic stimuli and other factors that may affect bone metabolism (Guo, et al, 2012).

The World Health Organization (WHO) recommends using the DEXA method for assessing BMD because it is rapid, safe and accurate. The BMD test determines bone density by assessing the quantity of minerals (calcium and phosphorus) that the bone contains. A dual X-ray absorptiometry (DXA) of the hip and spine is a quick, painless, low-dose X-ray that measures the density or thickness of the bones. Based on WHO diagnostic standards, osteopenia (bone mass loss) occurs when BMD is 1 to 2.4 standard deviations below the mean BMD of healthy adults of the same gender and race; osteoporosis occurs when BMD is 2.5 standard deviations (or more) below the mean BMD of healthy adults of the same gender and race (WHO, 1998; Liu, 1998).

When bone mass is lost osteopenia can manifest as bone pain and deformation of the spinal column. The continuous gradual loss of bone mass can progress to osteoporosis, which may increase the risk of fractures.

Osteoporosis is a global problem with a high prevalence in the developed countries and an increasing trend in developing countries. For instance, the estimated prevalence of osteopenia in Huzhou, China is 33.3% and the prevalence of osteoporosis is 35.3% (Guo et al., 2012). In south Brazil, it was found that 49.8% were diagnosed with osteopenia and 13.7% with osteoporosis (Silva, 2015).

This study aimed at investigating the prevalence of osteoporosis in patients who underwent BMD testing at the University Teaching Hospital (UTH) in Lusaka, Zambia.

Methods

The study population included 76 files of both male and female patients who underwent BMD testing between January and December 2019 at UTH. The patients were aged 40 years and above. The sample size was calculated using the formula below (Charan, 2013).

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Where;

- d is the desired margin error
- p is the (assumed/estimated) proportion of the adult population who underwent BMD testing at UTH.
- z is the standard normal deviate

The study estimated a 5.2% proportion. Considering: 95% (Z = 1.96) confidence interval, and 5% margin error. Therefore;

$$\frac{(1.96)^2 (1.96) \times 0.052 (1-0.052)}{(0.05)^2 (0.05)} = 76$$

Study Design

A quantitative retrospective study was used for this study

Research Site

The study was conducted at the University Teaching Hospital in Lusaka, Zambia. Prior, no such formal study had ever been done at this site and UTH was chosen because it is the only hospital in Zambia with DEXA machines used for testing BMD.

Data Collection

Bone Density Reports were randomly collected and the necessary data was got from these reports. The data collection sheet had the following sections:

- ☐ Patients demographic information: age and sex
- ☐ Osteoporosis seen or not
- ☐ Any related condition seen

Data Analysis

The data was captured on a data spread sheet. The data was quality controlled, assured and analysed using SPSS version 23. Descriptive analysis (mean, median, mode, percentages and standard deviation) of all variables was performed. Bivariate

analysis was performed using the Pearson’s chi-square test. Chi-square tests were used to determine the association of osteoporosis with sex and age of patients. Throughout the analysis, a 2-sided p-value <0.05 was considered to decide statistical significance.

Results

Age of Respondents

Table 1 below shows the measures of central tendency and dispersion on the age of respondents. The results show that the minimum age in the sample was 40, while the maximum age was 87. The mean age was 61.9 years with a standard deviation of 12.2 years. Based on the descriptive statistics shown in Table 1, most of the respondents were 12.2 years below or above the mean age of 61.9 years in this sample. This shows us that the population was not young.

Table 1. Information of respondents on age

Descriptive Statistics							
	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Age of respondent	76	47	40	87	61.9	12.2	149.8
Valid N (listwise)	76						

Sex of the Respondents

From the collected data, females constituted the largest proportion (72.4%) of study participants, male were represented by 27.6%. Table 2 below shows the background information of the study participants.

Table 2. Demographic information of patients

Demographic characteristics	Frequency	Percentage (%)
Sex		
Male	21	27.6
Female	55	72.4
Age		
40-49	17	22.4
50-59	12	15.8
60-69	24	31.6
70-79	20	26.3
85+	3	3.9
Ethnicity		
Black	71	93.4
White	5	6.6
Total	76	100

Prevalence of Osteoporosis

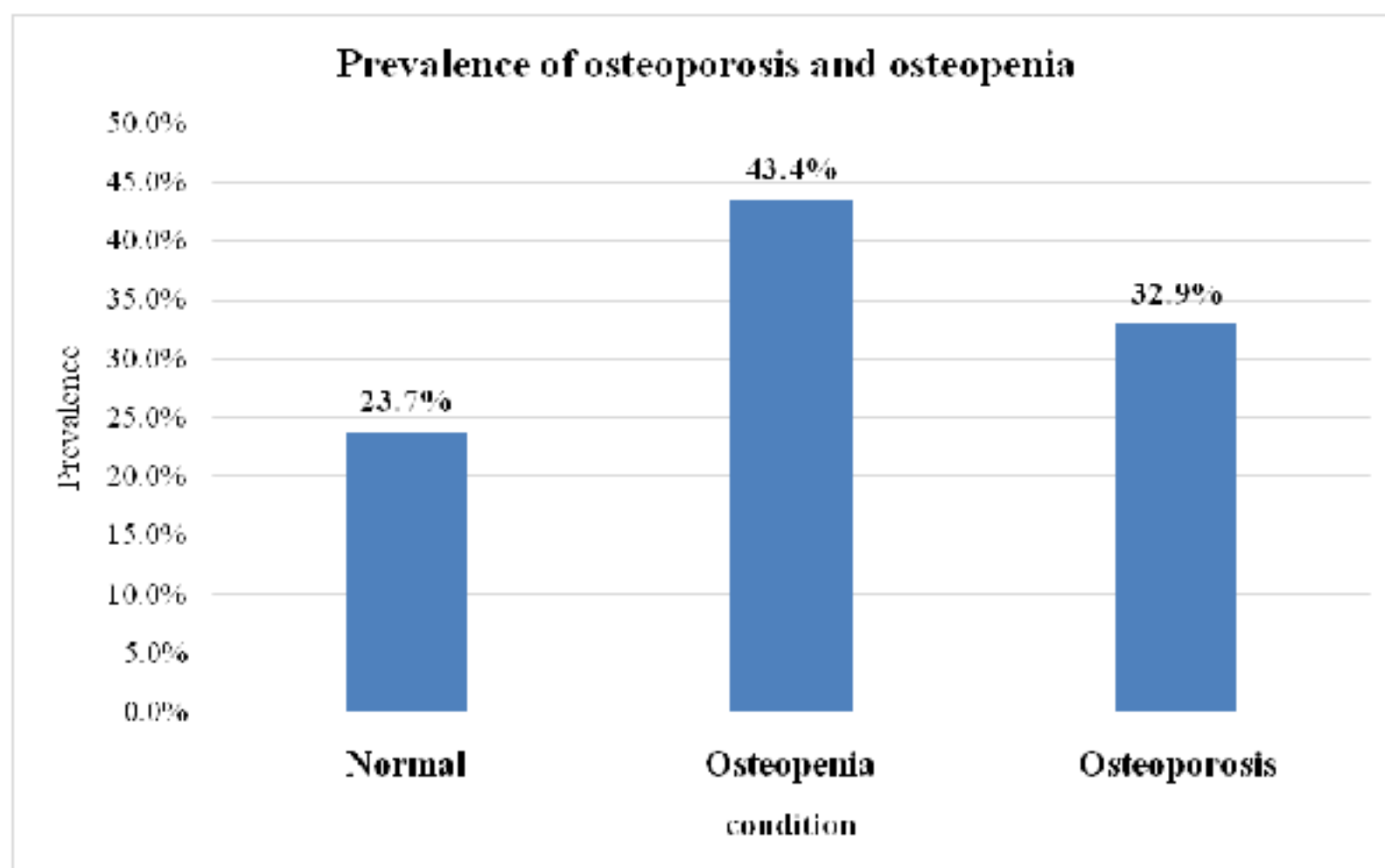


Figure 1: Prevalence of osteoporosis

The study results as depicted in figure 1 showed that 43.4% of the patients had osteopenia, 32.9% had osteoporosis, while 23.7% had normal bone mass. The study established that the prevalence of osteoporosis at UTH was 32.9%.

Association of Sex of Patients with Osteoporosis

Table 3. Percent distribution of the prevalence of osteoporosis according to sex of patients.

Background characteristics	Prevalence of osteoporosis			Number of patients	Chi-Square
	Osteoporosis present	No osteoporosis	Total		P-value
Sex					0.091
Male	47.6%	52.4%	100%	21	
Female	27.3%	72.7%	100%	55	
Total			100%	76	

The study used the cross-tabulation technique and Pearson Chi-Square test to determine if sex was a determinant of osteoporosis. Table 3 shows that 32.9% had osteoporosis, while 67.1%were not diagnosed with the disease.The results also showed that 47.6% of the males had osteoporosis compared to 27.3% of the females.

The study used Chi-Square test to establish if sex was a significant determinant of osteoporosis. The results showed that there was no statistically significant relationship between sex of respondent and osteoporosis (p-value=0.091).

Association of Age of Patients with Osteoporosis

Table 4. Percent distribution of the prevalence of osteoporosis according to age of patients.

Background characteristics	Prevalence of osteoporosis			Number of patients	Chi-Square
	Osteoporosis present	No osteoporosis	Total		P-value
Age					0.015
40-49 years	29.4	70.6	100	17	
50-59 years	33.3	66.7	100	12	
60-69 years	12.5	87.5	100	24	
70 years and above	56.5	43.5	100	23	
Total	32.9	67.1	100	76	

Table 4 shows information on the percent distribution of respondents by age. As shown in Table 4, the likelihood of being diagnosed with osteoporosis increases with age. The results in Table 4 above shows that osteoporosis is more common in the oldest age group with more than half (56.5%) of the population in this age group suffering from the disease. The results also

showed that 33.3% of the respondents in the age group 50-59 had osteoporosis, and 29.4% of those in the age group 40-49 had osteoporosis.

To establish if age was a determinant of osteoporosis, the study employed the Pearson Chi-Square test of association using SPSS

version 23. The results showed that there was a statistically significant relationship between age of respondents and osteoporosis.

Discussion

The main objective of this study was to establish the prevalence of osteoporosis at UTH. Studies by different researchers have shown that osteoporosis is very prevalent around the world. For example, it is stated that osteoporosis is second only to cardiovascular disease as a global health care problem. In a study done on Prevalence and determinants of osteoporosis in women aged 40-60 years in Kerala, India, it was found that the prevalence of osteoporosis was 17.25% (Vaasanthi, et al, 2016). Other researchers found that the prevalence of osteoporosis was 35.3% in Huzhou, China (Guo, et al., 2012).

Our study demonstrated that the prevalence of osteoporosis was 32.9%. It is evident from the findings that the prevalence of osteoporosis is high at UTH. However, these findings are slightly lower than the prevalence reported in previous studies done in the Sub Saharan Africa (SAA) by other scholars, who found that the prevalence of osteoporosis at Lagos State University Teaching Hospital, Ikeja, Nigeria was at 45% (Ale, et al, 2018).

On the other hand, the prevalence of osteoporosis (32.9%) found in this study is much higher than the prevalence reported in studies done outside Africa. For example, it was determined that the prevalence of osteoporosis in a female population in Brazil to be at 13.7% (Silva et al, 2015).

But, that study may not be a true reflection of the prevalence of osteoporosis among the adult population because it excluded the men. This study addressed this gap. The differences in the findings of the present study and the studies cited above could be due to variations in the target population and the locations in which the studies were conducted. The study done in Brazil targeted the female population only with a narrow age range (40-60 years), while this study target both male and female patients and with a broader age range (40 years and above). This may explain the variations in the findings on the prevalence of osteoporosis.

Our study also demonstrated that 47.6% of the males had osteoporosis compared to 27.3% of the females. However, this difference in percentages was not statistically significant as it showed that there is no significant relationship between sex of patient and osteoporosis (p -value=0.091). This is in contrast to other studies that reported that the prevalence of osteoporosis in females in Huzhou, China was 10-fold that in males (53% versus

5%) (Guo, et al., 2012).

In addition, our study showed that patients in the oldest age group are more likely to be diagnosed with osteoporosis (56.5%) followed by the age group of 50-59 years (33.3%), compared to patients in the youngest age group (29.4%). The study found that there was a statistically significant relationship between age of patients and osteoporosis (p -value=0.015). Thus, the findings indicate that the likelihood of being diagnosed with osteoporosis increases with age. Older patients (those aged 70 years and above) are more likely to be diagnosed with osteoporosis compared to younger patients. Therefore, there is enough evidence to conclude that age is a determinant of osteoporosis.

This is in conformity to other scholars. For example, a study found that the prevalence of osteoporosis showed a linear increase with age in the four age percentiles of the population studied (Charan et al, 2013). Furthermore, in Vaasanthi et al (2016), it was observed that in terms of differentials in age groups, osteoporosis raised steeply after 50 years (p =0.0001).

Conclusion

This study found that the prevalence of osteoporosis was 32.9. This study also found that there was no statistically significant relationship between sex and osteoporosis (p =0.091). In addition, it was established that the likelihood of being diagnosed with osteoporosis increased with age. Older patients were more likely to be diagnosed with osteoporosis compared to younger patients (p =0.015).

Recommendations

The researcher would like to recommend that older people in society should engage in regular physical exercises and medical checkup. Awareness campaign programs on physical exercises and medical checkups should be intensified at community level and the country at large, targeting both men and women. In addition, there is need to purchase more DEXA machines to be distributed countrywide, as well as train more health personnel to handle these machines. This will help to detect osteoporosis in the early stages as people will have easy access to these health services.

Furthermore, since this was a hospital-based study, community based studies may be needed to establish the countries prevalence of osteoporosis. It is also recommended

that risk factors for osteoporosis in Zambia be researched on.

Limitations

Being a retrospective study, there were challenges in accessing information that could have relevance to this study. This was due to the fact that the data used in this study could only be collected from patient's records as they appeared which in some cases could not be found or was incomplete. In future, it will be necessary to therefore carry out a longitudinal prospective study.

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Print Media Reporting of Health Care Waste Management in South Africa

Lydia Hangulu^{1,2}, Cassidy Mae Shaw¹, Oswald Khondowe², Arnold Hamapa², Olagoke Akintola¹

1. University of KwaZulu-Natal, Durban, 4001 South Africa

2. Lusaka Apex Medical University, P.O.Box 31909, Lusaka, Zambia

*Corresponding author: +260961020337, Email: lydiahangulu3@gmail.com, lydiahangulu@yahoo.com

Abstract

The media has the ability to frame issues in a way that affects the attitudes and behaviour of the public in responding to policy issues. Given the ability of the media to frame issues in a way that influences policy-making and decision making more generally, an understanding of how the media frames issues relating to healthcare waste in community-based care (CBC) in South Africa could help inform policy-making about proper healthcare waste management (HCWM). However, it is unclear how the media frames issues relating to healthcare waste (HCW) in South Africa. We did not find any single published study on this theme. Therefore, this study aimed at exploring how print media reports on issues relating to HCW in South Africa. We sought to answer the following questions: 1) How do the print media frame problems related to healthcare waste management? 2) How do the media frame options related to healthcare waste management? Using the South African media database, a total of 189 news stories were retrieved from 20 newspapers. Analysis was conducted using content thematic analysis. The media frames revealed healthcare waste management problems as caused mainly by government even if the main perpetrators are waste contractors. There has been blame on the government for delaying in developing a national policy relating to HCWM and also for having inadequate HCW disposal and treatment facilities in the country. As a result, options for addressing the issue of illegal dumping were directed at the government. Options proposed to deal with the challenges include, developing of policies and providing HCW treatment and disposal facilities in the country. The most intriguing thing about the media frames is that, there was no mention of healthcare waste from homes. This raises questions as to whether HCW from homes is even considered as a policy issue in South Africa. The failure of the print media to propose options that include waste contractors who are the main perpetrators of illegal dumping and stockpiling, could lead to half solutions that masks the real problem and focuses on palliatives instead of focusing on all levels of society: mainly the government policy-makers, implementers, government agencies; waste management contractors; health facilities; individual healthcare workers; healthcare professionals; waste workers and cleaners in the health facilities that contribute to the problem.

Keywords: Home-based care, healthcare waste, healthcare waste management, print media frames, South Africa.

Introduction

Healthcare waste management (HCWM) is a global concern and was addressed in the Rio Declaration, Principle 10, which required all States to address environmental issues, promote public participation in decision making and access to information on hazardous materials and justice on environmental matters (UNEP, 1992). Healthcare waste (HCW) results from healthcare activities in major healthcare settings like hospitals, doctors' private practices, pharmaceutical manufacturing plants, research laboratories, nursing homes and minor sources such as ordinary homes where there is care of a patient (WHO, 2014). There are two categories of HCW: (1) hazardous waste which poses risks to the environment and the health of people. This waste comprises infectious waste, sharps, pathological, pharmaceutical, genotoxic, chemical and radioactive waste. Category (2) is non-hazardous waste which is waste that does not pose harm to the environment or people. Non-hazardous waste comprise of packaging material like cud boxes, office paper, cans and leftover food from kitchens (Santhanam, Norulaini & Omar, 2011). Proper management of HCW by the generators and handlers requires them to segregate, collect, provide adequate and secure onsite storage facilities, use of appropriate transport for ferrying HCW to the disposal sites, treatment of HCW before disposal as well as managing and monitoring of HCWM activities from the point of generation to the point of disposal (WHO, 2014). The major international policies that govern HCW are the WHO manual on the safe management of waste from health care facilities (WHO, 2014; Giroult, & Rushbrook (1999); the technical guidelines on environmentally sound management of biomedical and healthcare waste by UNEP (2003), and also a guide on management of solid healthcare waste at primary healthcare centers by UNEP, 2003; UNEP & WHO 2005). In line with the international HCWM guidelines, many low-and-middle-income countries (LMICs) have developed their own policies to govern HCW. For instance, South Africa has various policies that govern HCW. Prior to democratic rule which began in 1994, environmental management was neglected and was not seen as a priority environmental health policy issue (Cock, 2007). However, the South African government's approach to HCWM changed after the democratic government of the African

National Congress assumed power. The new government has developed various pieces of legislations such as the Constitution of the Republic of South Africa Act 108 of 1996 (South African Constitution, 1996), which is the main guiding policy document aimed at preventing environmental pollution and improving health, (South African Constitution, 1996), the National Environmental Management Waste Act No.59 of 2008 (Republic of South Africa 2008); which governs all waste in the country with the aim of protecting the health of the people and the environment, the Occupational Health and Safety Act 85 of 1993, which protects the safety of all health care providers and HCW handlers (Republic of South Africa, Occupational health Act, 1993), and the National Health Act, 61 of 2003 which advocates for a structured and quality uniform healthcare system (The South African Health Act, 2003). All relevant regulations relevant to HCWM are presented in table 1.

As of the year 2000, South Africa did not have any national policy governing HCW its constitution entrusts legislative power to the national (South African Constitution, 1996), and provincial levels of government (The South African Health Act, 2003). Thus, in the absence of a national policy, most of the provincial governments in South Africa took some initiatives to develop regulations that address HCW. These regulations include the Gauteng Health Waste Management Regulations passed in 2004 (Gauteng Provincial Integrated Strategy, 2004) and the Western Cape Management Draft Bill which was published for comments in 2005 (Western Cape Management Draft Bill, 2005). Additionally, the South African Standards Act of 2008 South African Standards Act (2008) mandates the establishment of a national body that develops, maintains and promotes the standardisation of services for the management system, product testing and certification in the country. The South African Bureau of Standards was established in 1945. The Bureau of Standards developed some standards (SANS 10248) in the year 2004 to help regulate HCW in the country Standards South Africa [SANS] (2004). However, it was not until four years later in 2008 that the National Health Care Waste Management Policy was drafted (National Health Care Waste Management Policy was drafted, 2008). Since then, this policy, which is still a draft document, has been the main legislation that governs HCW management in the country and it is supposed to be implemented together with the South African National Standards (SANS) codes of practice for managing HCW (SANS CODE, 2004)

Table 1: A summary of policies relevant to healthcare waste management in South Africa

Context of the policy	Name of the policy	Summary of the policy
International Policies	United Nations 1989 Basel Convention	Controls the transboundary movement and disposal of hazardous wastes.
	WHO 1999 First Edition Global Manual on Safe Management of Waste from Health Care facilities, (revised in 2014)	Regulates all waste from healthcare facilities globally
	UNEP 2003. Technical guidelines on the environmentally sound management of biomedical and healthcare wastes	Provides proper guidelines on how to manage healthcare waste for low resource communities
South African Policies	United Nations Environmental Program and World Health Organization 2007 Manual for healthcare waste management for Sub-Sahara	Manual with guidelines on health care waste management practices that are appropriate for sub-Saharan African
	Occupational Health and Safety Act 85 of 1995	Policy developed by the Department of Labour and provides guidelines on worker health safety and training
	Constitution of the Republic of South Africa Act 108 of 1996	It provides a right to a safe and clean environment for every person
	National Environmental Management Act 107 of 1998	Provides for the polluter must pay principal
	National Health Act, 61 of 2003	The Policy advocates for a structured and quality uniform healthcare system
	The South African Bureau of standards SANS CODE' 2004	Provides for the safe and effective management of healthcare waste aimed at reducing risks to humans and the environment
	Gauteng Health Waste Management Draft Bill 2004	The bill was passed in 2004 to regulate all healthcare waste management in Gauteng province
	Gauteng 2005 Integrated Strategy and Action Plan for Sustainable Health Care Risk Waste	Gauteng Provincial policy for sustainable management of healthcare waste
	Western Cape Health Care Waste Management Act of 2008 KwaZulu-Natal Provincial Health Care Risk Waste Management policy of 2008 The Health Care Risk Waste draft policy of 2008	Policy aimed at improving healthcare waste management in the province. A policy for improving healthcare waste management in the province. The national draft policy promulgated by the Department of Environmental Affairs to regulate healthcare waste in the country

In spite of the existence of the regulations that govern HCWM in South Africa, HCWM in hospitals and clinics is a growing problem (Schalkwyk, 2013). These healthcare facilities lack funding for HCWM programmes to manage the 45,000 tons of HCW that is generated annually in South Africa. As a result, various provincial governments contract private waste management agencies to manage HCW. Additionally, it is argued that the management of HCW by contractors makes it difficult to have tangible statistics and to provide proper HCW management practices in the country (Erasmus, Poluta & Weeks 2012). To support this argument, research has shown that there is improper management of HCW from point of generation to the point of disposal in the country (Nemathanga, Maringa &

Chimuka, 2008; Simonsen et al., 1999). In addition, there are insufficient technologies for managing HCW and as such HCW is burnt in the open and buried (Raphela, 2014; Abor, 2007; Akter, 2000). Other problems identified in the literature are the lack of training for health care providers and handlers (Akter, 2000 & Schalkwyk, 2013) and waste handlers rarely use proper protective gear (PPE) (Gabela, Knight, 2010). Improper management of HCW has adverse impacts on the health of the people, animals, affects the environment (Awodele, Adewoye, Oparah, 2016). Most policies on HCWM in South Africa only emphasize proper management of HCW from major health facilities such as hospitals and clinics but do not address how HCW should be managed from minor sources such as ordinary

homes where there is care of the patients within the communities. Yet the majority of the people living with HIV/AIDS and TB as well as other chronically ill patients receive care at home with the help of community health workers (Akintola, Lavis & Hoskins, 2015; Young, Busgeeth, 2010; De Maeseneer & Flinkenflogel, 2010). The current scaling up of community-based care (CBC) services as part of the government's primary health care re-engineering initiative (Akintola et al., 2015; Akintola, Gwelo, Labonte & Appadu, 2015; Schneider & Nxumalo, 2017) calls for researchers, policy makers and stakeholders to pay more attention to the HCW that is generated in ordinary homes in the communities.

The mass media is a podium that facilitates the public's opinion and expectations about policies. Mass media acts as a channel between the government and the public (Kingdon, 1995; Daw, Morgan, Collins & Abelson 2014) that can inform the public about government's actions and policies, and can also help convey the attitudes of the public to government officials (Entman, 2010). Through framing, the media decides what specific issues to cover at the expense of others (Akintola, Gwelo, Labonte & Appadu, 2015; Entman, 2010). Framing is a process where the media defines and constructs a political issue or public controversy (McCombs, 2014). The media can get and sustain the attention of the public over policy debates through framing or using rhetoric. Media framing aims at persuading particular audiences (Nelson, Oxley & Clawson, 1997). The media can use frames to identify policy problems, their causes, consequences and policy solutions to be sought, in a way that changes the attention paid to such issues (Entman 2010; Nelson, Oxley & Clawson, 1997; Hamshaw, Barnett & Luca, 2017). For example, Daku, Gibbs and Heymann (2012) in their study on Multi-Drug Resistant and Extensively Drug Resistant Tuberculosis (MDR and XDR, TB), found that media frames of blame on the patients for spreading MDR and XDR TB in South Africa ignored the role of social drivers in the spread of the disease. They argue that, such media framing of blame on an individual could influence policy-makers to develop policies that are person centered ignoring the problems emanating from the environment/society that shape individual behaviour or experiences. Thus, the news media can also frame issues in a way that draws attention to the players who are involved in the policy process and can also highlight their role in the decision making process (Nambiar, 2004).

Therefore, the media can play a role in setting policy agendas by focusing on specific social issues at the expense of others in such a way that influences politicians, policymakers and other policy actors to adopt particular options at the expense of others (Soroka, 2002). Of interest to our study is the ability of the media

to frame issues in a way that affects the attitudes and behaviour of the public in responding to policy issues (Soroka, 2002; Boaz, 2005; Wachs, Cooky, Messener, Dworkin, 2012). Given the ability of the media to frame issues in a way that influences policy-making and decision making more generally, an understanding of how the media frames issues relating to HCW in CBC, South Africa could help inform policy-making about proper HCWM in South Africa. During the apartheid era, South Africa's newspapers had restrictions for political reasons which were only freed by the adoption of the Constitution that supported the freedom of expression and by the press the after the democratic elections in 1994 (Cook, 2007). However, it is unclear how the media frames issues related to healthcare waste management in South Africa. We found no single published study on this theme. This study therefore aimed at exploring how print media reports on issues related to health care waste management in South Africa. We sought to answer the following questions: 1) How do the print media frame problems related to healthcare waste management and 2) How do the print media frame options related to healthcare waste management.

Methods

We used the South African media (SAMedia) database, which is the only media database available at the University of KwaZulu-Natal, to search for news stories for our analysis of print media framing of HCWM. The South African media database is compiled and maintained by the Institute for Contemporary History (INCH) located at the Free State University. The institute collects and scans newspaper cuttings and periodicals daily and then categorizes and indexes them into Afrikaans and English, before uploading them onto the database. Afrikaans and English are the official languages in the country and English newspapers are read by majority of the population because Afrikaans is considered as a language of the oppressors (Lavis et al., 2012). The SAMedia database contains various South African newspaper articles from the year 1978 onwards.

Newspaper Search and Selection Strategy

We developed a search strategy in order to help us retrieve newspapers from the South African media database that were relevant to our study. Using an iterative process that involved brainstorming and trial searches of the South African media database, we developed a set of explicit inclusion criteria, which are that, all newspapers to be included in the study must be:

1) classified as a South Africa newspaper, 2) published in English the language which the researcher were familiar with and 3) cover a healthcare waste issue. A total of 20 newspapers met the inclusion criteria (see Table 2) and were included in the study.

The search covered all news stories that were available in the South African media database from 1st January, 2004 to 31 December, 2014, a ten-year period after achieving twenty years of democracy.

Table 2: Characteristics of newspapers covered in the analysis

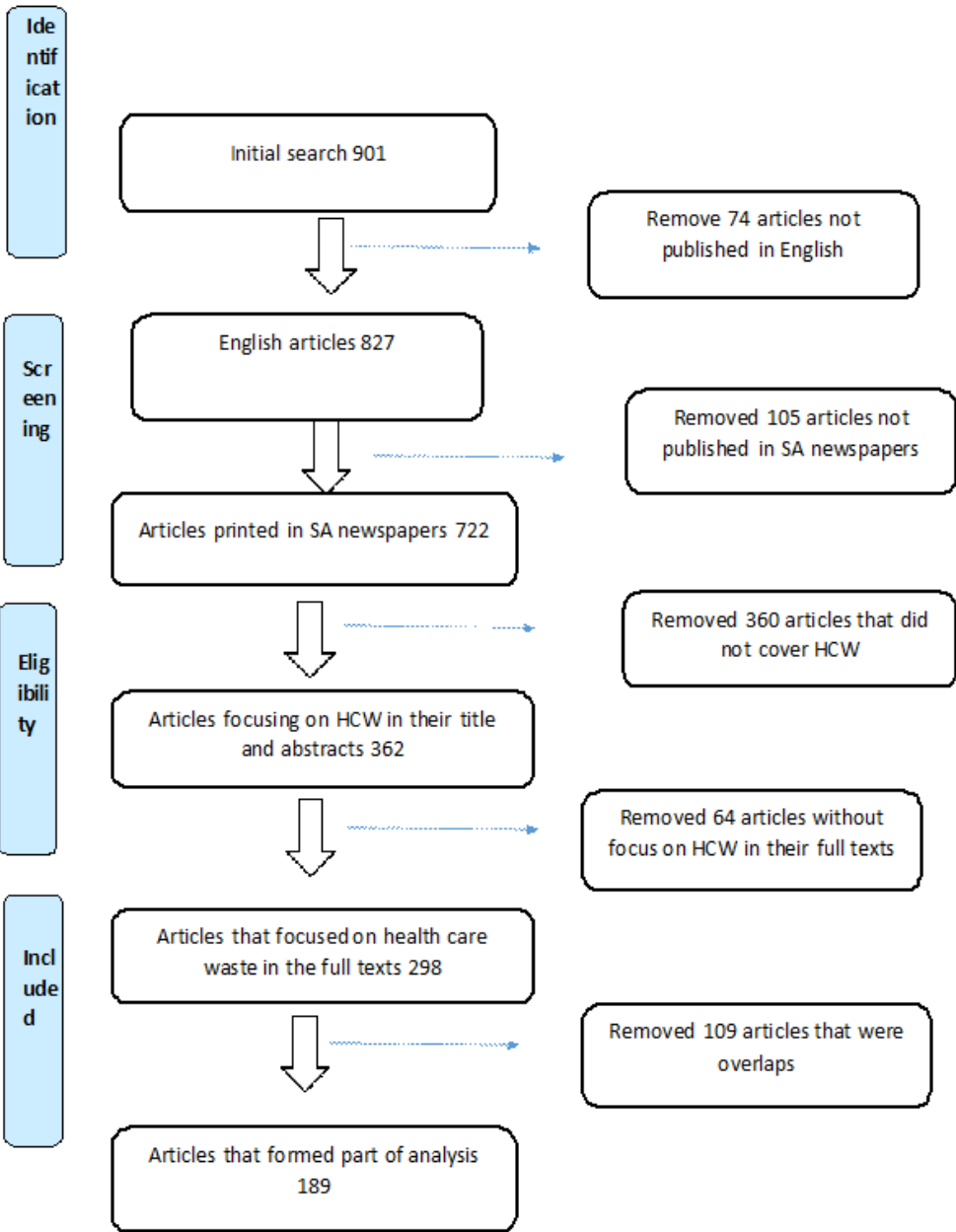
Geographical circulation of the newspaper	Name of the newspaper	Frequency	Publisher
1.National Newspapers			
	Citizen	Monday-Friday	Caxton & CTP
	City Press	Sunday	Media24
	Mail & Guardian	Weekly	M & G Media Ltd Johannesburg
	The New Age	Daily	TNA Media
	The Star	Monday-Saturday	Independent Newspapers Johannesburg
	The Sunday Independent	Weekly	Independent Newspapers Johannesburg
	The Times	Weekly	Avusa Media Ltd Johannesburg
	Sunday Times	Weekly	Avusa Media Ltd Johannesburg
	Sunday Tribune	Weekly	Independent Newspapers Johannesburg
	Sowetan	Daily	Avusa Media Ltd Johannesburg
2.Provincial Newspapers			
Eastern Cape	Daily Dispatch	Monday-Saturday	Avusa Media Ltd Johannesburg
	The Herald	Monday-Friday	Avusa Media Ltd Johannesburg
	Weekend Post	Weekly	Avusa Media Ltd Johannesburg
Gauteng	Pretoria New	Monday-Saturday	Independent Newspapers Johannesburg
KwaZulu-Natal	Business Day	Daily	BIDFM- Avusa Media Ltd Johannesburg
	Daily news	Daily	Independent Newspapers Johannesburg
	Independent on Saturday	Saturday	Independent Newspapers Johannesburg
	Witness	Daily	Media24
Western Cape	Cape Argus	Monday-Sunday	Independent Newspapers Johannesburg
	Cape Times	Daily	Independent Newspapers Johannesburg

Search Strategy for News Stories

We searched for news stories from the 20 newspapers using specific terms related to HCWM in South Africa. In our sample, we included news stories that had specific terms/concepts related to HCWM. Because we wanted to include a wide range of news stories on HCW, we searched for news stories that had used the keywords/search terms both in their titles and full texts. Relevant stories that were covered from all sections of newspapers were also selected if they met the explicit inclusion criteria. Two broad categories of concepts for the search were used. The first was: healthcare waste because this a broad concept that is widely known for describing waste that results from health care activities. The second category of concepts involved using the common terms from literature that are used in various contexts to refer to healthcare waste. These terms are clinical waste, hazardous waste, health care risk waste, hospital waste, infectious waste, medical waste, pathological waste, pharmaceutical waste, sharps, and used medical supplies.

Selection and Analysis of News Stories

We retrieved a total of 901 news stories from 20 South African newspapers. In order to remove news stories that were not relevant to the study, we developed a list of explicit exclusion criteria. First, from a total of 901 news stories, we removed 74 news stories that were published in languages other than English 827 remained. We then removed 105 stories published in non-SA news papers such as ‘The Nigerian publication’, ‘This Day’, ‘The Namibian publication’, and ‘The New Era’, 722 remained. From the SA newspapers, 360 articles that did not cover HCW were removed and 362 remained. All the 64 news stories that did not cover HCW in their full text were removed and 298 remain. We then removed 109 overlaps and 189 news stories remained for analysis. A summary is provided in figure 1.



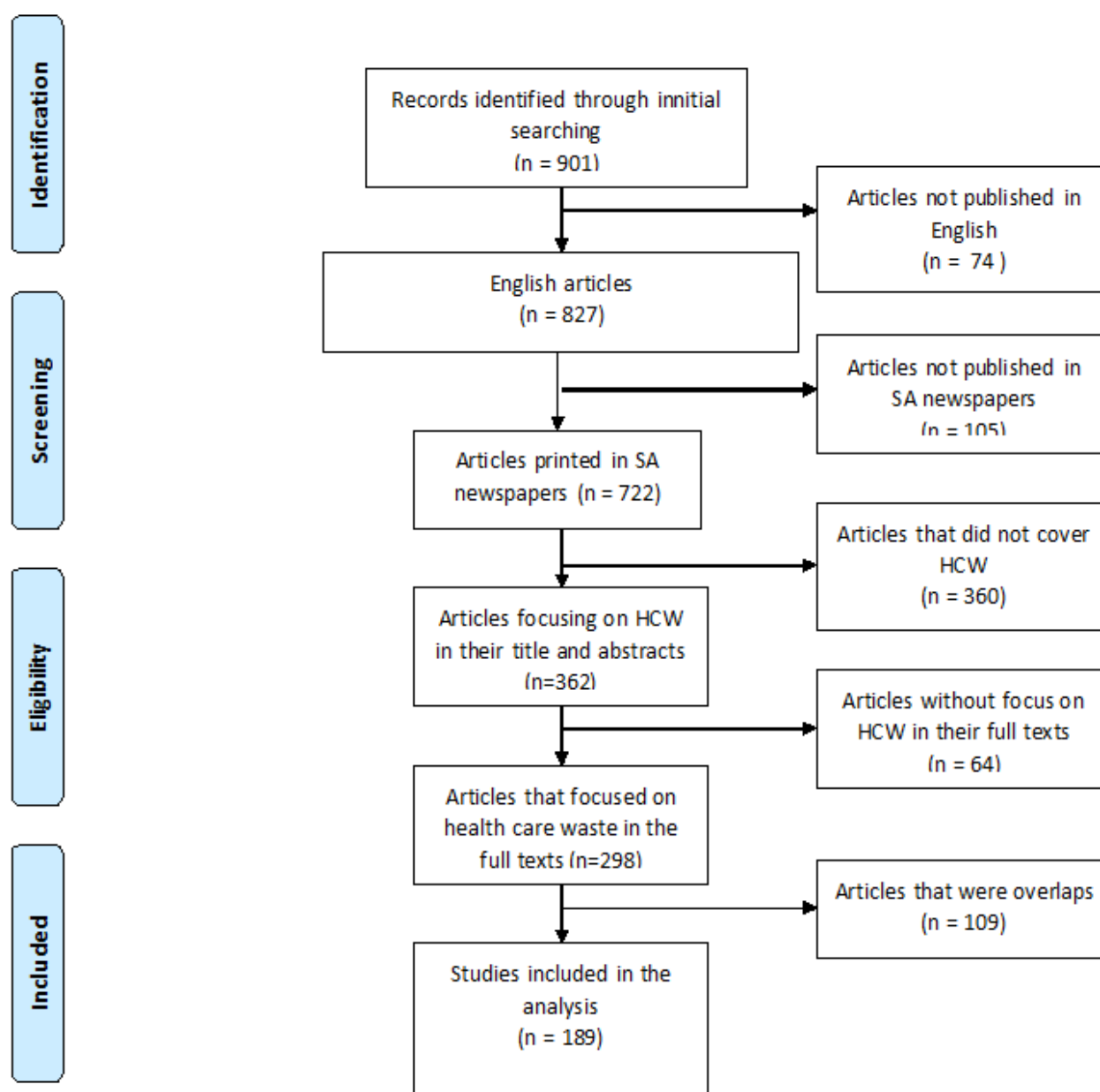


Figure 1: flow diagram showing search for news stories at each stage.

Data Analysis

We analysed the 189 news stories and adopted an approach to data analysis that struck a balance between a more structured deductive approach that uses pre-set themes and categories derived from existing theories. Thereafter, we used an inductive approach that starts with immersion in the data to generate themes. This was done because we were interested in the policy and public health relevance of media reporting of issues relating to health care waste management in South Africa. As such, we chose to draw on literature related to policy and public health systems to help develop concepts that could sensitize and guide us while conducting thematic analysis. Our analysis proceeded in two phases: in the first phase, we drew on existing literature on policy and health systems in particular, Kingdon's conceptualization of policy problems in the agenda setting process (Kingdon, 1995). We also used literature about the health policy process more generally (Lavis et al., 2012) to develop sensitizing concepts that served as prompts for our thematic analysis that followed in the second phase. Two groups

agreed upon by the two assessors (CMS and LH). These concepts were reviewed by the third assessor (OA) for accuracy. The first group of concepts dealt with issues relating to the nature of health policy problems (for example, what problems are identified? How are the problems being framed to motivate different stakeholders including policy makers? how did such information come to their attention?, at what level are the problems being defined? (i.e. who or what level of governance is responsible or should be held accountable for the problem?). The second group included concepts describing the nature of policy options proposed by the news stories to address the problems identified (i.e. what are the options being proposed and how are the options being framed, and at what level are the options being framed or defined?). In this second phase, we used the two concepts derived in the first phase as organizing categories for our data and proceeded to analyse the news stories following the six steps of thematic analysis proposed by Braun and Clarke (Braun & Clarke, 2006). Firstly, we read news stories in order to familiarise ourselves with the data. Secondly, we read the news stories a second time to identify and categorise the data into three organizing concepts: problems, their causes, and

options. In the third stage, codes were identified and generated. In the fourth step, all subthemes were identified from the codes. In the fifth stage, the sub-themes were grouped together and in the sixth stage, all themes were grouped together and presented in the results section. The analysis was conducted in an iterative manner by the two assessors (CMS & LH) and a third assessor (OA) helped in resolving discrepancies where the assessors could not reach consensus and in checking for accuracy.

Results

Characteristics of the newspapers and news stories

There were more news stories from the provincial newspapers with 56.6% than 43% from the national newspapers. The largest grouping 21.7% of news stories that were published in the provincial newspapers came from Eastern Cape, followed by 15.9% from the Western Cape, 15.3% from KwaZulu-Natal with 15.3% and least 3.7% from Gauteng province. With regards to the national newspapers, 9.5% of news stories were from The Star followed by 5.8% from the Sunday Tribune, 5.3% from The Citizen; The Sunday Times & The Times, 5.2% from City Press, 4.2% from Mail & Guardian and the least with 1.1% each were from The New Age, The Sunday Independent and Sowetan newspapers as summarized in table 3

Table 3. Characteristics of news stories on health care waste (N=189)

News Paper Source	Specific newspapers	Total	Percentage (%)
National newspapers		82	43.4
	Citizen	10	5.3
	City Press	9	5.2
	Mail & Guardian	8	4.2
	The New Age	2	1.1
	The Star	18	9.5
	Sunday Times	10	5.3
	Sunday Tribune	11	5.8
	The Sunday Independent	2	1.1
	The Times	10	5.3
	Sowetan	2	1.1
Provincial newspapers		107	56.6
Eastern Cape newspaper articles	Daily Dispatch	23	21.7
	The Herald	15	7.9
	Weekend Post	3	1.6
Gauteng newspaper articles	Pretoria News	7	3.7
KwaZulu-Natal newspaper articles	Business Day	6	15.3
	Daily News	10	5.3
	The Independent on Saturday	3	1.6
	The Witness	10	5.3
Western Cape newspaper articles	Cape Argus/Argus Weekend	20	15.9
	Cape Times	10	5.3

Publication of the news stories:

The news stories that were covered in this study were published between 2004 and 2014 as shown in figure 2. The number of news stories on healthcare waste were lower in 2006 and peaked in 2009 and dropped from 2010 to 2014 as shown in figure 2.

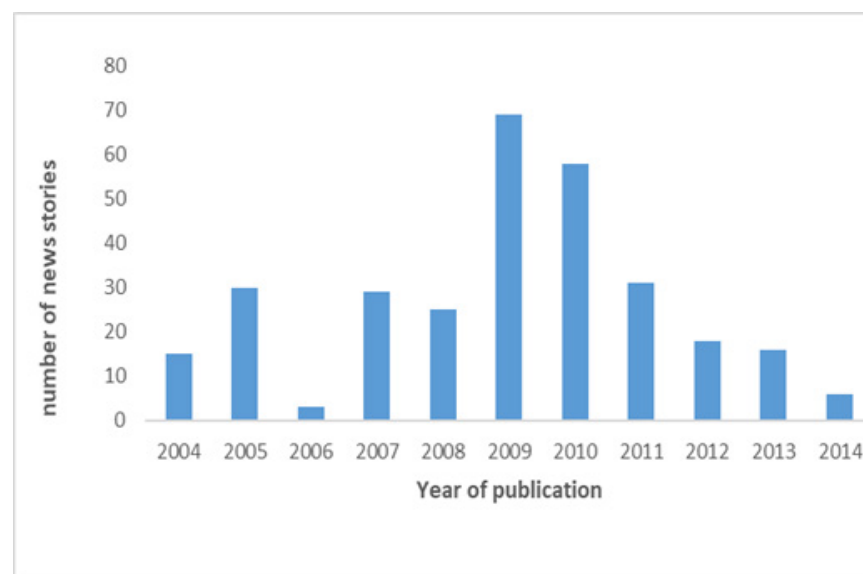


Figure 2: A Summary of news stories and year of publication

Presentation of the News Stories

The news stories will be presented under the two broad themes:
1) problems related to health care waste management and their causes; 2) options proposed for dealing with the problem.

In this section, all news stories' excerpts are italicised and presented in verbatim as written by specific newspapers. The summary of themes and sub-themes are presented in table 4 below.

Table 4: Summary of the themes generated from the news stories

Problem and causes		Options	
Problems	causes	Proposed solutions to the problems	What is already being done about problems
- Illegal dumping of health care waste	-There is lack of a national health care waste management policy; existing ones are fragmented and not implemented. -Insufficient treatment facilities -Lack of capital to handle HCW by government -Corrupt tender processes -Incompetence of contractors to handle health care waste	-Government should develop regulations or review the existing ones -Government should open more disposal sites.	-Development of a Health Care Waste Management Bill in Eastern Cape -Development of disposal sites and a waste management team was established in KwaZulu-Natal -Education awareness programmes
-Illegal storage and stock piling of health care waste	-Lack of capacity for storage of health care waste by contractors - Contractors face stiff competition and end up not honouring their contracts	-Government should monitor health care waste management.	-Raids: are conducted on the premises of the contractors. -Inspections and audits are conducted in hospitals
-Financial impropriety by department of health	Not mentioned	Not mentioned	Not mentioned
-No personal protective equipment for the waste handlers	- Incompetence of contractors to afford PPE for their workers	Not mentioned	Not mentioned
- Lack of segregation of health care waste.	-Incompetence of hospitals to segregate health care waste	Not mentioned	Not mentioned
-Use of inappropriate transport by contractors	-Incompetence of contractors to afford appropriate transport	Not mentioned	Not mentioned
-Re-use of HCW containers	a. Incompetence of contractors	Not mentioned	Not mentioned

Seven themes were identified from the news stories. The majority 36% of the news stories focused more on illegal dumping, illegal storage of HCW 21%, financial impropriety 14%, lack of PPE 11%, lack of segregation of HCW into infectious and non-infectious waste 9%, use of inappropriate transport for transporting HCW 5% and re-using of non-re-usable containers for HCW storing 4%. This information is summarised in 3.

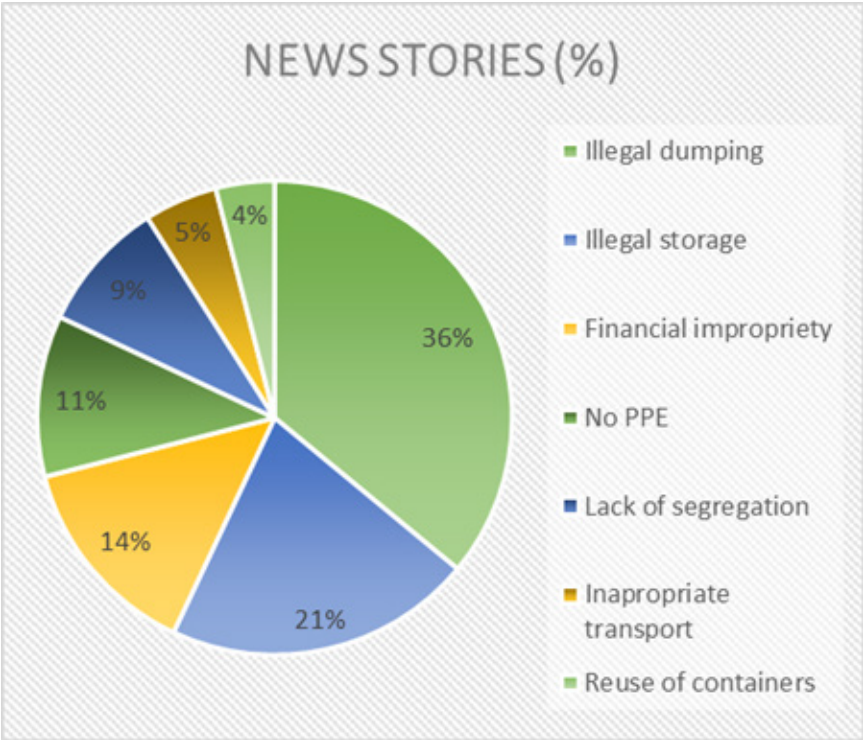


Figure 3. A summary of news stories that covered each theme

Problems and Causes

This theme will discuss the problems that are identified in the news stories, the level at which the problem is defined and who is blamed for the problem. The theme comprise nine sub-themes, illegal dumping of HCW, illegal storage of HCW, HCWM contractors operating without permits, corrupt tender processes, financial impropriety by the department of health, lack of personal protective equipment for waste handlers, lack of resources for HCWM, lack of segregation of HCW, use of inappropriate transport for HCW and re-use of HCW containers. The problems are discussed in detail below.

Illegal dumping of health care waste by waste management companies

This problem was reported by the overwhelming majority of news stories claiming that HCW is dumped on privately owned land, streets, in open veld, in municipal landfills, in residential areas and near school premises. The news stories portrayed the whistle blowers, usually residents, who discover the acts and

alert the media, the Health Department and the Municipality as heroes. Most newspapers attributed various negative consequences such as infestations of disease-causing organisms such as rats, flies and cockroaches to illegal dumping. The stench produced by the HCW is another effect highlighted by the media. Children were represented as being at risk of poor health because they were said to have been seen playing with HCW. Illegal dumps near homes were also framed as affecting landlords who claimed that prices of their properties went down due to the existence of illegal dumps close to their properties. Illegal dumps in residential areas were framed as attracting scavengers who also used such places for toileting. Waste scavengers were in turn seen as responsible for house break ins, in the residential areas.

The print media framed the issue of illegal dumping as caused mainly by the lack of a national policy to regulate HCWM in the country. The government is blamed for taking long to develop a national policy and for ‘dragging its feet’ on passing the national health care waste management draft policy into law. The blame on the government largely originates from the Democratic Alliance (DA), the main South African opposition party to the governing African National Congress (ANC). Further, news stories also emphasise that HCW is governed by provincial laws which are fragmented thereby causing a lack of uniformity in the implementation of the laws.

“The problem that we have as a country is that, currently, policies for medical waste are individually driven by nine provincial governments causing a substantial overload of regulation for service providers!...There is inconsistencies in implementing health care waste management laws in the country...”(The Saturday Weekend, 7th March, 2009)

The second cause of illegal dumping according to the news stories is a lack of financial and human capacity for HCWM at the national level.

“The total amount of waste generated in South Africa amount to 42200 tons per year but available commercial treatment facilities could only handle 31,690 tons per year...We do not have the financial capacity or skills to obtain more incinerators that cost millions of Euros...” (The Saturday Weekend Argus, 7th March, 2009)

The news stories recognized that large amounts of HCW are produced in the country yet there are only five incinerators available for treating HCW. The incinerators are only available in the Free State, Western Cape and Gauteng provinces. Therefore the provinces that do not have incinerators transport the HCW to

these provinces with the incinerators. One news story quoted a chairperson of an environmental activist group to support this claim:

“The fact that medical waste incinerators are failing is neither surprising or news...in provinces such as KwaZulu-Natal, North West, Limpopo, Mpumalanga, and Northern and Eastern Cape where no incineration capacity exists...health care risk waste is transported to Free state, Western Cape, or Gauteng to be incinerated” (The Sunday Tribune 6th March, 2011)

The news media reported that, one incinerator was built in KwaZulu-Natal province in the year 2012. The news story also portrayed the government as lacking financial capital to provide facilities needed for treating and disposing of HCW and therefore relies on private waste companies (contractors) to manage all HCW in the country. The government is also blamed for not having human resources in the Department of Health and the Department of Environmental Affairs and Tourism that can help to offer advice on how to handle and manage HCW. Hence the healthcare waste management sector is seen as being in ‘a national waste crisis’ (The Daily News 29th August, 2012). In emphasising the problem of lack of human resource, one news story reports:

“South Africa generates more medical waste than it can handle. This is a disaster! The government insists that waste must be handled properly yet there are few or no officials in the provincial departments with the expertise to offer advice on how the industry works.” (Business Day 7th March, 2013)

Thirdly, most news stories reported that the other cause of illegal dumping is corrupt tender processes. The news stories accused officials in the Department of Health, who are responsible for awarding contracts on waste management to the private companies, of corruption. The news stories framed the issue of corruption as very serious and wide spread, and as caused by lack of standards for awarding tenders to the waste management companies. They indicated that as a result, tenders are awarded based on the price that the waste management companies are willing to bid other than on their capabilities to provide HCWM services. One news story reported:

“...Policy oversights...dodgy tenders and the milky delineation of responsibility between the government and the government departments are the root of the problem (of illegal dumping)...” The Business Day, 14th, October, 2009) *“Members of the forum (the tender board) have been approached by waste disposal contractors who say: we will*

give you bigger margin if you bring the waste to our plant; there is a lack of compliance...” (The Sunday Tribune, 28th February, 2010)

It is also reported by a few news stories that due to lack of standards for awarding tenders by the Department of Health, there have been disputes between the waste management companies and the Department of Health. Some waste management companies have taken the Department of Health to court because of tender irregularities and in most cases the department has lost several court cases thereby wasting a lot of money which could have been invested in the HCWM sector. As highlighted by a political party member of one of the political parties, the news stories also claimed that because of corrupt tender processes, the companies that are awarded the contracts do not possess the requisite competencies and capacity to treat or dispose of waste appropriately.

“It costs millions to set up a plant... many of those contractors who submit contracts to process health care waste lack the capacity to do so legally...to survive you end up getting pulled into the web and it becomes a cartel with a big spider at the top” (Daily News, 3rd February, 2012)

Illegal Storage and Stockpiling of Health Care waste by Waste Management Companies

Most news stories framed this issue of illegal storage and stockpiling as a serious and rampant problem. Stories of illegal dumping are reported to the media by workers. Most newspapers also indicate that some contractors pile HCW for several weeks or months in warehouses producing a strong stench and affecting the waste workers. One news story revealed a particular waste company whose truck drivers told the news crew about the health and social impact of exposure to HCW:

“The smell of rotting human body parts is so potent; it had penetrated my skin and body. I go home at night and smell so bad that my wife makes me sleep in another room...” (The Star, 23rd February, 2009)

On the part of waste management contractors, the news stories blamed the problem of illegal storage of HCW on the lack of incinerating capacity to process HCW and lack of sufficient funds to own appropriate HCW storage facilities. This was said to have led to them storing HCW illegally in rented warehouses. The waste companies were portrayed as not having treatment facilities of their own and having to rely on the government facilities which are few and sometimes non-functional. This was

said to have led to backlogs with HCW treatment processes, ‘forcing’ the contractors to stock pile HCW.

“Waste companies were being forced to stockpile dangerous medical waste because the country’s legal incinerators could not cope...” (29th November, 2009).

Some news stories also had frames about some waste management companies being evicted for failing to pay their landlords the rents for the warehouses that they use to store waste. The evicted companies were framed as stockpiling the HCW in their own trucks that are meant for transporting purposes. There were also claims about how the trucks are handled. In the Northern Cape, there was a report about an instance where the vehicles used for storing waste was used to transport liquor to an end of year function.

“The trucks for the contractors are hardly ever washed. And when they are washed, it takes place at the provincial hospital without using any disinfectant to clean and sanitize the vehicles. At one stage the contractors used one of the trucks to collect liquor at a liquor store in Kimberly to have it transported for the end of year function.” (The Mail and Guardian, 9th June, 2011)

Most stories blamed the problem of stockpiling on stiff competition among HCWM companies.

“The bigger problem with waste management by the contractors is that the smaller emerging companies many of whom have won tenders by the Department of Health are squeezed by the well established players who have dominated the industry....so the smaller companies feel the heat...some of them have invested millions to set up specialist disposal plants but stiff competition makes them use short cuts and do illegal things.” (The Sunday Times, 2nd December, 2007)

Financial impropriety: A few newspapers also reported financial impropriety by the Department of Health (DOH). The DOH is responsible for awarding tenders and paying the contractors who are manage HCW across the country. Although no cause was identified as responsible for this problem, it is further reported that the D O H fails to pay the waste contractors who in turn find it difficult to keep their operations running. For example, news stories reported that there have been instances when the waste management companies have stopped collecting waste from all hospitals in protest. Such acts have been said to cause backlogs with waste management processes in most health care facilities. Some waste companies were portrayed as being on the verge of closing down due to the fact

that the DOH did not pay them for several months.

“We have not been paid since November and have been told we will only get the money in mid-April. The department promised payment of the debt.” (The Sunday Star, 17th April, 2010)

Lack of personal protective equipment (PPE) for workers:

One news story reported that some workers that are hired by some waste management companies are not provided with any PPE such as masks and gloves for use when handling waste. As a result, such workers felt that they were at risk of infections because they were pricked by needles while working. One worker claimed that he had become accustomed to the stench produced by the rotting waste:

“We have to use our bare hands to pick up everything that we find here and handle dangerous waste from hospitals...since I started here I have never been given anything [protective equipment] to wear. Initially it was difficult for me to withstand the stench but I am now used to it.” (The Star, 25th May, 2005)

Lack of segregation of health care waste: Some news stories reported that most hospitals in South Africa do not segregate healthcare waste into infectious and non-infectious categories. Most newspapers reported that such cases come to the attention of the public through anonymous ‘tip offs’ that are made to the media by ‘insiders’ (those working for the waste companies). The problem of lack of segregation was framed by one news story (the Daily News, 3rd of February, 2012) as more prevalent in KwaZulu-Natal province where 12 out of the 14 hospitals were said to be guilty of this practice. Most news stories framed this challenge as caused by incompetent waste management companies who give hospitals unmarked containers for storing HCW.

Hospitals are complaining about unmarked (waste) containers that were delivered to them by waste management companies” (Mail and Guardian, 9th June, 2011)

These news stories also report that due to lack of proper segregation of waste in hospitals, there have been cases where dead babies have been found by scavengers among general waste while another case of a leg floating in an abandoned and flooded boiler room was reported at one hospital. Another news story framed this issue as a big problem affecting all hospitals in the Eastern Cape Province. It is reported that the hospital administrations were trying to save money by rationalising services. The news stories reported that there were many instances

when the hospitals were never cleaned, wards and toilets were filthy and HCW was uncollected and seen lying around causing stench:

“The Livingstone Hospital has become a ‘ghost hospital’ which is ‘half closed’ because services there have been streamlined significantly.” (The Weekend Post, 17th September, 2005)

It is further reported that some nurses became fed up with unhygienic working conditions, and therefore went on a protest:

“Today the cleaners did not pitch for work, the floors and the wards are dirty. It is depressing. Our young doctors are refusing to work in the conditions and are leaving the country.” (The Weekend Post, 17th September, 2005)

Use of inappropriate transport: A few news stories reported that the lack of use of appropriate transport by waste management companies was a problem. Most of the waste management companies were said to have used open vans to transport HCW. The news stories framed the problem of use of inappropriate transport by waste companies as caused by a lack of finances to purchase the appropriate vehicles. It was reported that HCW was found on the highways.

“The companies that are awarded tenders do not have the right vehicles. The vehicles are not clearly identified as carrying hazardous waste, a legal requirement!” (The Mail and Guardian, 9th June, 2011)

“...Hazardous waste which fell from a moving truck along Port Elizabeth’s freeways shock motorists by causing obstruction...” (The Herald, 2nd February, 2004)

Reuse of containers for storing and transporting of anatomical waste: One news story reported that some contractors reused buckets containing anatomical waste which are supposed to be incinerated. They framed this issue as caused by incompetence of the waste management companies who do not have the appropriate equipment for managing HCW.

Options proposed or provided to address the problems relating to improper HCWM

The news stories identified three solutions to the problems of health care waste management all of which were directed at the government. These are the need for government to 1) develop regulations and/or review the existing ones, 2) open more

disposal sites and 3) monitor health care waste management. These themes are discussed together with the options that the government is providing to address the problems and these are: development of a health care waste management bill in the Eastern Cape, establishment of disposal sites and a waste management team in KwaZulu-Natal, education awareness programmes, raids, inspections and audits.

The government should develop regulations or review the existing regulations: Most news stories proposed solutions to deal with the issue of improper management of HCW across the country. To address the problem of illegal dumping in the Western Cape, one news story (The Cape Time, 26th November, 2007) claimed that a bill on HCWM (draft) in the Western Cape was initiated by the provincial government in 2005 in response to an incident of needle pricking caused by illegal dumping of HCW.

“The ‘years in making’ Western Cape Health Care Waste Management Act that will make dumping of medical waste a criminal offence will be signed by the Government. This legislation was initiated when more than 40 children had to go for an HIV test in 2005 for injecting themselves with discarded needles in Delft and Mitchells Plain...” (The Cape Time, 26 November, 2007)

After the bill on HCWM (draft) in the Western Cape was released for comments by the public in 2005, it was promulgated into law in 2007 and now it is called the Western Cape health Care Waste Management Act of 2007.

“This act will change the way in which the HCW is managed in the province...for the first time... there will be a uniform provincial standards for managing HCW...” (The Cape Time, 26th November, 2007)

Some news stories also reported that the KwaZulu-Natal provincial government opened a disposal sites in 2007 to address the issue of insufficient disposal and treatment facilities.

“The EnvironServ Company will now install a state-of-the-art facility using a thermal process...the decision to establish was made, because if such facilities were not established, HCW would continue to be transported to other provinces increasing the risk of exposure to communities...” (The Sunday Tribune, 22nd July, 2007)

Some news stories revealed that, to address the issue of illegal dumping of HCW, some partnerships between the governmental departments and environmental activist groups

were formed. Awareness campaigns are held to educate community health workers about HCWM and the implications for its improper disposal. A few newspapers also indicated that conferences and meetings were held to put together a HCWM strategy to regulate HCW in South Africa.

To address the problem of lack of segregation in KwaZulu-Natal province, one newspaper (the Daily News, 3rd February, 2012) indicated that the Department of Health created a waste manager post of which a waste manager in every district of the province is employed to oversee HCWM. A medical waste management strategy was also developed to regulate all HCW in the province. More importantly, there are committees responsible for overseeing all HCWM issues in the province. For example, the committee monitors the transportation of HCW from all clinics and is responsible for ensuring that there is transparency with the tender process for the HCW service contractors. All tenders are published in the provincial and national newspapers in order to promote compliance.

The government should monitor health care waste management: Some news stories suggested that the government should monitor all the HCW that is produced in the country.

“The government must create a specialised agency to oversee medical waste management which will be responsible for regulating medical waste disposal chain; it would enforce laws, create clear guidelines and keep records of medical care waste management activities.” (The Business Day, 14th October, 2009)

In order to ensure that waste management companies comply with the standard waste management procedures, most news stories report that random raids at the warehouses of the waste management companies are conducted by the Green Scorpions (the environmental management inspectors). Those that are found operating without permits are given 24 hours to shut down their operations and are fined. Companies that fail to pay the fines and persistent offenders are imprisoned for five to ten years, and those who stockpile are ordered to remove and dispose of the HCW within 24 hours. Companies that are found guilty of illegal dumping are given 24 hours to clean up. In situations where the offenders are not found, clean up sessions are organised by the government through the health unit in the municipality. The government officials also fence and monitor such areas after cleaning up. Some waste companies have had their contracts terminated by the Department of Health due to non-compliance.

“Wasteman, a waste management company that was allegedly

responsible for being the South Africa’s biggest medical waste dumper, was raided by the South African watch dog the ‘Green Scorpions’ in the last two weeks and has been ordered to shut down; the chief executive director has been arrested and charged for being a persistent offender.” (The Saturday Star, 17th April, 2010)

Inspections and audits by the Department of Health are carried out in hospitals to ensure that they comply with proper procedures of HCWM from point of generation to the point of disposal.

“Provincial Health Department spokesman expresses shock about problems at Livingstone hospital. ‘We promise inspections and audits will be carried out in all hospitals to ensure that this problem does not persist,’ said the provincial Health Department spokesperson.” (The Weekend Post, 17th September, 2005)

Discussion

This study explored how the media frame issues relating to problems and options about HCWM by 20 newspapers in South Africa. The implementation of policies in South Africa occurs at the provincial level. Thus, it justifies why there were more news stories in provincial newspapers than in national newspapers. Considering that a few national newspapers were also reporting on issues relating to HCWM, this could be an indication that HCWM is generating concern among policy-makers, stakeholders and actors at the national level. Alternatively, it can also be assumed that the national newspapers might be interested in covering HCWM issues in order to influence policy-makers to generate relevant policies for proper HCWM (Entman, 2010; Daku, Gibbs, & Heymann, 2012). It is striking that among all provinces, majority of the news stories were from the Eastern Cape Province and were reported by the major Eastern Cape newspapers: The Daily Dispatch and The Herald. At the time of research, the Eastern Cape was one of the five provinces that did not have a provincial policy on HCWM and a treatment plant for treating HCW before its disposal. Therefore, it is possible that it had more HCWM concerns due to a lack of a provincial policy on HCW and treatment plants for managing HCW.

Between 2004 and 2008, there were more stories about illegal dumping of HCW in various provinces by service providers and a decline in the news stories in 2006 which could have been caused by the development of provincial HCWM regulations around the country. While some news stories discussed the publishing of the Western Cape Waste Management Policy in 2007, none of them

discussed the national health care waste draft policy which was published for public comments in 2008. Although no policy was published in the year 2009, it is possible that the number of news stories peaked in this particular year because there was an annual report on healthcare waste which indicated that 800 tons of healthcare waste was illegally dumped around the country. Such publicity caused public protests around the country. Therefore, to address the problem of illegal dumping, The Environment Management Inspectors known as 'The Green Scorpions' together with Police Officers and Environmental Health Inspectors were tasked to conduct random raids and fine the waste management companies that were found guilty. Additionally, a conference was also held in May to try and address the problem. After the conference, there were news stories about awareness campaigns for the public concerning the effects of improper management of HCW. During this period, most of the news stories discussed the problems of HCWM, linking it to the lack of a national policy and/or a failure to implement existing policies. Such reporting is consistent with the gatekeeping literature which suggests that newspapers choose what issues to report based on the newsworthiness of the issue (Soroka, 2002). It is possible that the various policy developments which took place from 2004 to 2008 helped to sensitise the media to healthcare waste management issues in the country to the extent that media organizations considered it newsworthy. At the same time stakeholders might have been sensitized by these draft policies. These two factors may have contributed to an increase in the number of reports relating to healthcare waste management in 2009. It is intriguing to note that news stories began to decline from 2010 to 2014 yet in the year 2011, treatment and disposal facilities for healthcare waste were opened in KwaZulu-Natal specifically in Pietermaritzburg. In Cape Town, new non combustion technology machines for treating HCW were introduced in 2012. One could argue that the decline in the news stories could have been the fact that reporting on positive response to the problem of HCWM was not part of the agenda by the print media.

The most dominant representation in the news stories was on illegal dumping by HCWM companies/contractors. The WHO global health care waste manual (WHO, 2014; Prüss, Giroult, & Rushbrook, 1999) and the South African National Standards on HCW (SANS, 2004) prohibits illegal dumping of HCW due to its environmental and public health effects. While many studies have found that illegal dumping is widespread in South Africa and other low-and-middle-income countries (Raphela, 2014; Abor, 2007; Gabela & Knight, 2010) there is no literature on the perpetrators of illegal dumping. We are therefore unable to assess the accuracy of this frame. Therefore, this issue warrants empirical research that seeks to gain a deep understanding of illegal dumping of healthcare waste.

The media portrayed the waste management contractors as out of control because of their illegal practices. The contractors were portrayed in most of the news stories as engaging in illegal dumping and illegal storage and stockpiling of HCW, using inappropriate vehicles to transport health care waste and re-using containers used for anatomical waste which is supposed to be incinerated. Their activities were also represented as causing health hazards for the environment, residents of communities close to the sites where the illegal dumping of HCW occurs, and their own workers who are not provided with protective devices when handling health care waste. The print media's representation of contractors is that of villains whose activities have gone unchecked by government structures that are largely portrayed as 'looking the other way' while the contractors perpetrate their dastardly acts. Yet, the overarching dominant frame of the cause of the problems of health care waste management in South Africa was the government's lack of proper oversight and control of the waste management sector. The contractors were presented as operating in a very difficult environment caused by governments' inability to create the necessary enabling environment for proper health care waste management and for contractors to do their jobs properly these findings clearly depicts the ability of media to have power in agenda setting (Nambiar, 2002; Boaz, 2005).

Given the manner in which the cause of the problems of health care waste management was framed, the options for dealing with the problem were focused mainly at the level of government [namely the Department of Health and Department of Environmental Affairs]. News stories constructed the contractors' actions as being left to go unchecked and therefore proposed the development of appropriate regulations that will set up an agency to monitor contractors and enforce laws and regulations on the entire health care waste management chain. While the framing of solutions may sound logical and sensible, some news stories, at the same time, ironically portrayed contractors as victims of a system that was not conducive for them to carry out fair and proper waste disposal practices. They were portrayed as 'victims' of circumstances created by governments' lack of funding of the health care waste management sector. This, it was said, led to inadequate financial and human capacity for developing disposal sites and effectively managing the industry as a whole respectively. Government departments were accused of financial impropriety and waste contractors were said to be owed money by government which hampered their ability to comply with regulations. As a consequence, the options proposed were those designed to increase capacity for the incineration of health care waste across the country which most news stories said were only able to process only about 75% of the large volume of health care waste that is generated in the country and sometimes not functional.

There were also proposals for government to purchase modern non combustion technology for the treatment of health care waste.

In addition government was blamed for corrupt tender processes which led to the appointment of incompetent contractors. Government was also vilified for financial impropriety which led to delays in the payment of contractors which in turn further exacerbated their woes. There are studies that have found corruption as a major challenge that has dodged procurement processes in the public sector in South Africa (Ambe & Badenhorst-Weiss, 2012; Osei-Afoakwa, 2012). The authors of these studies argue that corruption in the government sector in South Africa is as a result of decentralization of public procurement. Although news stories constructed the issue of corruption as widespread in the health care waste management sector, we found no empirical research evidence on corruption in the health care waste management sector. Research that seeks to explore this issue would be a welcome contribution to knowledge on health care waste management.

By identifying the illegal and unprofessional practices of waste contractors but blaming government for their reprehensible activities and proposing options that focus mainly on the government, the print media creates a situation that indirectly absolves waste companies. While some news stories mentioned the need to monitor contractors closely, this was not the dominant frame. Further, rarely did the print media emphasise the legal and contractual as well as moral responsibility of the contractors as corporate entities to comply with existing laws and regulations. Instead, there was a strong emphasis on the need for government to do more for contractors and the industry. The SANS 10248 (2004) prohibits illegal dumping of healthcare waste and recommends that specific HCW must be disposed of in a specified manner. For example, anatomical waste must be dumped at an appropriate 'Class A' dumpsite where it must be burnt in a controlled manner. While the dominant representations of problems vilify both the contractors and government, the dominant representations of options have the potential to justify the malpractices of the contractors albeit indirectly thereby tacitly encouraging them to break the law.

Stockpiling by waste management companies is in contravention of the law in terms of the National Environmental Management Waste Act 59 of 2008 (National Environmental Management: Waste Act, 2008). The dominant media frame could lead to a fixation with narrow solutions that focuses on government's failures and responsibilities while neglecting the legal and

contractual obligations, and moral responsibilities of waste companies to deliver services within the confines of their contracts and the laws of the country which prohibit their illegal activities. The dominant media representations of government as the cause of the problem in the industry perhaps largely reflect the views of the opposition party the Democratic Alliance which dominated the coverage of the problems contained in the news stories. As Nelson and Oxley (Nelson, Oxley, & Clawson, 1997) argue, a frame could marginalize other frames of understanding. The frames used by the news stories in our sample could undermine the development of comprehensive solutions that holds the main perpetrators of the illegal activities to account for their actions.

Another dominant representation in the media is that of lack of a national healthcare waste management policy which has led to a fragmentation or 'provincialisation' of policies. A review of policy and literature shows that there is no national policy governing HCWM in South Africa (Nemathaga, Maringa, & Chimuka, 2008). The current national guiding document on healthcare waste management has been in draft form since 2008. Yet, studies by Van Schalkwyk (2013; Erasmus et al., 2012) argue that a lack of a national policy and the fragmentation of policies (i.e. development of policies by various provinces) on HCW management makes it difficult to have uniform implementation in the country and to quantify and monitor HCW.

The print media framing of the problem of fragmentation in policy on HCWM is consistent with empirical evidence on this issue. This media representation could potentially help influence and policy makers to take appropriate action (Akintola, Lavis & Hoskins, 2015; Kingdon, 1995). But as noted earlier, the problem of healthcare waste management cannot be focused on the government's policies alone but must include other levels of society that contribute to the problem. We now turn to the other levels contributing to the problem of waste management in the country as described by the news media.

The other dominant frame in the print media is the lack of segregation of HCW by healthcare facilities. The media frames this frame as an institutional (health care facilities) problem. The WHO global policy (WHO, 2014; Prüss, Giroult, & Rushbrook, 1999) the South African standards 'the SANS 10248 (2004), the South African Constitution (1996) and all South African provincial policies (Gauteng Provincial integrated strategy, 2004; Western Cape Provincial Health Care Waste Management, 2004), puts the responsibility on all waste generators of HCW to segregate waste. Healthcare institutions are given the responsibility to oversee all healthcare waste management

activities in order to ensure that HCW is properly managed. Evidence from low-and-middle-income countries and specifically South Africa, Nemathaga, Maringa, & Chimuka, 2008; Abor, 2007; Akter, 2000; Gabela & Knight, 2010). suggest that healthcare facilities do not segregate HCW because waste generators and handlers do not have skills to do so due to lack of training. However, the media rarely discussed the specific factors or individuals to be held accountable for this problem at the health facility (institutional) level. Some of the news stories blamed the waste companies for not supplying the hospitals with the appropriate facilities for segregating waste.

However, they did not identify who should be held accountable for non-segregation at the institutional level. It was not clear from the reports whether the problems of lack of segregation was caused by medical professionals, cleaning staff, the hospital management or contractors responsible for waste management. Factors like the level of knowledge and skills about segregation of health workers or waste handlers or the availability of the appropriate facilities needed for segregation at the facility level were rarely discussed. This makes it difficult to judge how consistent the news media frames are with the literature and could send confusing signals to policy-makers who are influenced by news media frames . (Daku, Gibbs, & Heymann, 2012). A few of the news stories blamed non-segregation of waste on the contractors for not supplying appropriate facilities. By blaming the problem of non-segregation on the waste companies, the media tends to deflect the responsibility for segregation to the companies. This is inconsistent with the provisions of the Constitution (1996) of the country and all other policies (WHO, 2014; Prüss, Giroult, & Rushbrook, 1999, Occupational Health and Safety Act 85 of 1993; National Health Act No. 61 of 2003) and standards on HCWM (SANS, 10248, 2004). This might absolve the hospitals and health professionals and lead to solutions that are not comprehensive enough for the dealing with the problem.

Completely absent from the media frames is a discussion of issues relating to HCW that emanates from homes in community-based care. The primary health care re-engineering model in South Africa which aims at providing basic home treatment, community assessment and campaigns on a national scale (Schneider & Nxumalo, 2017) will inevitably lead to an increase in the amount of nursing and care activities such as bathing patients, changing soiled nappies, cleaning and dressing their wounds, washing soiled clothes and beddings in the homes. These activities could potentially lead to an increase in the amount of HCW generated. While a previous analysis of the South African print media coverage of primary health indicate that the print media has covered the primary

and community health care was not covered by any news story. This raises questions as to whether HCW at the primary health care and community health care level is seen as an issue of concern by stakeholders and whether the print media considers this issue newsworthy (Soroka, 2002). The gate-keeping literature suggests that news that does not meet the criteria set for newsworthiness by media organizations are either not covered in the first place or discarded during gate-keeping process thereby helping to influence policy agendas by determining the news that is elevated and therefore that will get the attention of the policy-makers and stakeholders (Hamshaw, Barnett, & Lucas, 2017). The lack of coverage of health care waste management in community-based care portrays health care waste management as an issue that is solely at the level of health facilities.

Conclusion

The media framing of healthcare waste management problems as caused mainly by government, results into failure of the print media to propose options that includes waste contractors who are the main perpetrators of illegal dumping and stockpiling could lead to half solutions that masks the real problem and focuses on palliatives instead of focusing on all levels of society mainly the government policy makers and implementers; government agencies; waste contractors; health facilities; individual health care workers; health care professionals; waste workers and cleaners in the health facilities that contribute to this problem. While there is a lot of media reporting on health care waste management from hospitals in South Africa, nothing is mentioned about HCW that emanates from community-based care (CBC). This raises questions as to whether HCW from CBC is seen as important. Seeing that media is a podium for communicating policy issues, it could be used as a podium for sensitizing people about health care waste that comes from homes. For example, through awareness programmes collaborated by community-based organisations (CBOs) managers, community health workers, the waste handlers and community members and the municipality in the communities, people in the community will know the importance of HCW that originates from homes therefore, such awareness programmes could get the attention in media which in turn, media could be a podium used to get the attention of policy makers regarding policy initiatives for governing HCW from CBC.

Strengths and limitations

This study used rigorous and transparent methods throughout the entire process. The use of the South African media database allowed us to have a broad search strategy. The key terms that we used to search for the newspaper articles were reviewed thoroughly. The limitations of this study are: (a) most researchers that have conducted media analysis on health issues have used LexisNexis to identify newspapers for news stories. In this study, LexisNexis was not used because it was not accessible by the University of KwaZulu-Natal at the time of the research. The South African media database was the only reliable database at the time of research; (b) this study is only limited to the print media; other types of media like the television, radio and social media were not used due to limited resources at the time of research yet they could also play a role in reporting issues related to HCWM; (c) this study only focused on news stories that were covered in English and excluded those in the local languages which may be important sources of information therefore, further studies could be conducted to include all the media sources and various sources.

Authors Contribution

Lydia Hangulu, (LH) Conceptualised and wrote the manuscript, Cassidy Mae Shaw (CMS), Arnold Hamapa (AH), and Oswell Khondowe (OK), Collected data under the supervision of Olagoke Akintola, (OA). All authors reviewed the manuscript before submission.

Competing Interest

All authors declare that they have no competing interest

Acknowledgements

Dr Lydia Hangulu would like to thank the National Research Foundation (NRF) of South Africa and the Department of Science and Technology (DST), for the Green Economy Postdoctoral Fellowship provided when writing this manuscript. However, opinions expressed and conclusions arrived at in this study, are those of the authors and not necessarily to be attributed to NRF.

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Biometrics and Healthcare Services in Zambia: Implications for Lusaka and Kalomo Districts

Arnold M. Hamapa^{1,2*}, Euphrasia Mukuka², Charles Michelo², Oswell Khondowe^{1,2}, Lydia Hangulu^{1,2}, Joseph M. Zulu²

1 Lusaka Apex Medical University, Department of Public Health, P.O Box 31909, Lusaka, Zambia

2 The University of Zambia, Department of Public Health, P.O Box 50110, Lusaka, Zambia

*Corresponding author: mudukula3@gmail.com Tel: +260979452488/+260953127187

Abstract

With the growing need to integrate technological advancements in all spheres of human endeavours, we discursively interrogate the adoption and adaptation of Biometrics in the Zambian healthcare sector. As our locus, we look to the implications and perspectives of the use of Biometrics at selected healthcare centres in Kalomo and Lusaka districts using a qualitative approach. It is revealed, that in the absence of Biometrics, several implications abound including greater costs for the health provider and the end-user, security concerns as information is lost as well as patient misidentification challenges. When used, paper reveals two interrelated perspective which show that Biometrics have the heuristic potential to store records and make information readily available for both the healthcare provider and the end-user while at the same time occasioning a fast way of service delivery to the general public.

Keywords: Implications, Perspectives, Biometrics, Healthcare, Zambia,

Introduction

The need for improvement in the provision of healthcare services has been emphasized the world over. This has especially been the case in the light of the adoption of the sustainable development goals (SDGs) which have placed additional emphasis on improving overall human development by 2030. For the World Health Organisation (henceforth WHO 2018), improving health outcomes is at the forefront of this global commitment, with Goal 3 calling on all stakeholders to “Ensure healthy lives and promote well-being for all at all ages. To realize the attainment of this goal, the healthcare industry has seen the introduction and integration of various technological advancements one of which is the Biometric tool. Biometrics have the potential to verify and identify an individual based on their physical, chemical, or behavioral attributes (Jain et al., 2007 cited in Mwapasa et. al 2020) making the provision of healthcare services efficient and effective.

Further still, Mordini and Ottolini (2007) provides that the use of biometrics to identify patients within the healthcare system comes with several potential advantages, such as reducing medical errors, reducing the risk of fraud, and improving the capacity to react to medical emergencies. While the adoption and subsequent adaptation of Biometrics tools in the provision of healthcare services are not alien to the healthcare industry, they are relatively new to the healthcare system in Zambia. Thanks to the Scanning Ears for Child Health (SEARCH) pilot project which run from January 2019 to June 2020, Biometrics were introduced to the Zambian healthcare landscape. Implemented and conducted by Boston University (BU) with a focus on finding an accurate way to identify and link patients to their medical records using ear biometrics as an identifier, the pilot project was privileging in several ways. With this background that the present study sought to unearth the implications and perspectives over the use of Biometric tools in selected healthcare institutions in Zambia.

To adequately attend to the implications and perspectives of Biometric tools for both healthcare providers and end-users on the Zambian healthcare landscape which have their own peculiarity and dynamics, the study employed Rogers’ Diffusion of Innovation Theory (Rogers, 2010) as a theoretical base. While the theory proposes five attributes of an innovation which include relative advantage, compatibility, complexity, trialability, and observability (Zulu et al., 2015), the present undertaking relied only on relative advantage which is the degree to which an innovation is perceived as being better than the idea it supersedes. Rogers’ theory suggests that innovations that have a clear, unambiguous advantage over the previous approach will

be more easily adopted and implemented (Scott et al., 2008a). Current research evidence indicates that if a potential user sees no relative advantage in using the innovation it will not be adopted (Greenhalgh et al., 2004). In what follows, the materials and methods employed in the study are provided.

Materials and Methods

The study employed a qualitative case study design. The data was collected using Focused Group Discussions and key informant interviews. The main target groups for this study were women attending antenatal or maternal-related services. Participation in the Project SEARCH and Under-5 clinics were used to conveniently select women who took part in the focus group discussions (henceforth FGD’s). A total of Seven (7) FGDs from Lusaka district and three (3) FGDs from Kalomo district were held at each of the selected health facilities with these women. In this way, A minimum of sixty (60) women were selected for ten (10) FGDs which were conducted according to clinic zonal areas, and seven (7) key informant interviews with healthcare were conducted. This study was limited to a total number of sixty-seven (67) respondents sampled as aforementioned.

The study was conducted at three health institutions in two districts of Zambia namely Chawama, Railways, and Naluja health facilities. Chawama primary health facility is located within Chawama Compound, a community in Zambia’s capital city, Lusaka. Railways Clinic is located in Lusaka in CBD area near Intercity Bus Terminus, and deals with both local and transit clients. Naluja rural health facility is located in Kalomo district in Southern province of Zambia. The health facilities were selected because of the prospective cohort for Project SEARCH cohort study. Chawama clinic was a host to the Zambian Infant Cohort Study and Naluja Clinic was a pilot study site of SEARCH project.

Whereas, Railways Health facility was recommended by DHD Lusaka office which is one of the three healthcare facilities where a fingerprint biometric tool has been implemented.

To analyse qualitative data from key informants and FGDs, each interview form and audio file were given a unique registration number for the different study participants and groups. Audio recordings and notes from the interviews were carefully transcribed into Microsoft Word and then exported to Nvivo version 12 for coding of themes and analysis. Thematic analysis was used. This is a method for identifying, analysing, and reporting patterns (themes) further interprets various aspects of the research topic within data, and assist in the analysis.

Finally, an application theoretical framework on collaboration was utilized in analysing results. While doing all this, the researcher understood that human research ethics are based on three fundamental principles that are considered as underpinning the principles or guidelines governing research ethics. These principles are namely; respect for persons, beneficence, and justice. Thus, before, during, and after the data collection process and the subsequent analysis, ethical matters were sufficiently attended to.

Results

In this section, the results of the study are presented. The implications arising from the use of Biometrics and the lack of the same are presented first followed by the various perspectives from the stakeholders who are the healthcare givers and the end-users. Both the implications and perspectives relate to the relative advantage of the Innovations and Diffusions theory which is the theoretical framework adopted in the study. The idea of using biometrics for patient identification was generally accepted by most respondents because of its perceived comprehensive benefits on improving cost, record management, data quality, record availability, and patient experience over care coordinated using the current system. Thus, below are the implications presented as identification, cost, and security implications and perspectives presented as faster and availability.

Identification Implications

The study found that there are identification implications associated with the lack of Biometrics in health facilities. One implication posed by a lack of identifiers in health facilities is the failure to identify dead bodies during disposal because they are unclaimed. Drawing on this finding, it becomes clear that the lack of Biometrics has severe implications as the remains of people's loved go unclaimed.

It's a challenge because if somebody comes like maybe a child has just been picked brought to the hospital, with no identification it is very difficult this were we have ended up taking some to the hospital mortuary without any identification and they are an clamed bodies at the end of the day, because there is no identification, because there is no one to claim them, at times you may find that if these are a bit grown it would be difficult to trace since they may have been staying alone in another town ... (IDI001)

Cost Implications

The study found that there are cost implications if a health facility operates without Biometrics. With the current system, when a record goes missing, a replacement record must be purchased at a fee. This replacement fee proves to be a heavy financial burden for most respondents. This was noted as a disadvantage of the current system across both rural and urban settings especially in the Kalomo district as shown below;

I think people can accept the biometric system because of the problems that people go through, some people are poor in the villages, so it is difficult to find money to buy a book when they lose it or when they lose the under-five card and then they chase them back at the health facility and then the patient continues being sick, The biometric system will be good because we will be coming empty handed, they scan your ear and retrieve your file and then you get your treatment.... (FGD Kalomo Group 10, R004)

Security Implications

The study also found that Biometrics have security implications. This is because Biometrics contrast with other identifiers (such as discharge papers, slip numbers and the Under Five Card) which are easily misplaced, lost, forgotten, and damaged. Because they are intrinsic, Biometrics carry the distinct advantage of improving record keeping, quality, and record management in the health sector. In the FGDs conducted, mothers acknowledged that currently, when a record goes missing, a child's medical record is irretrievably lost, making it difficult to receive the correct care.

If the under-five card gets lost, it makes one look foolish, and it becomes difficult... all records remained in the lost card, when you come in that way they tell you to buy a book and start afresh. It becomes difficult because sometimes the child would have already finished the vaccinations but as parent you can't know and the nurse will also not know if the child is done with the vaccination or not, so if the card gets lost and you don't know how many vaccinations your child has received, it becomes difficult to have your child treated ... (FGD Kalomo Group 2, R001)

When the Under Five Card is forgotten at home, misplaced, and/or damaged, providers often turn to the central registry to look up a patient's record. Respondents mentioned that facility registers are kept, where data is entered and stored centrally. For facilities that use SmartCare, the child's record is entered in the SmartCare system, and information is easily located than paper

record systems. For facilities using paper registries, the child's information is recorded as a line in the registry. Having checked in the under-five registers at Chawama Clinic, between 24, 25 to 59 months, the weight of the child is indicated, along with the child's ID number, all the antigens, BCG, PENTA, and PCV, and first and second dose of MMR vaccinations. Healthcare providers raised the main concern with the current system that registries often store incomplete data and are not easily searchable, which makes identifying the patient a time-consuming effort.

Actually it is very bad, where you just assume this baby has received everything, meanwhile this baby has not been covered with all the vaccinations, so it is not good just thinking that this baby has received everything (KII007)

Additionally, when under-five cards or hospital files are damaged to the point of illegibility, lack of identifiers pose a challenge. The condition of under-five as described in FGDs and KII after a few weeks of issuance were outlined as dog-eared (folded corners), crinkled, cracked, ripped or torn, faded, water-damaged and stained which makes it difficult to maintain over the years.

Very often, on a scale of 1-10 I would say maybe up to six (6). Many are times as a health care system we have had to replace those cards either because they have gotten damaged or they have gone missing completely or maybe the child has relocated and where they previously lived the card has remained ... (KII004)

In these cases, as described in the narrative above, retrieval of information is not possible since registers do not keep detailed information apart from name, diagnosis and drugs given to a patient. This leads to delays in treatment and repeating of procedures, which is costly and time consuming. Replacement or temporal records often contain gaps or false information, while damaged paper records can lead to unknown or false information. With the use of a biometric system, patient information can be stored in central server, backed up, and safeguarded from damage.

You want to make sure that you indicate, you give and write somewhere so that you can transfer the information, the following time she does not come, and you miss to transfer that information, she comes maybe after three months or 4 months and they find a different person who was not there. ... This child will be given double vaccine, even if there is no harm just because the mother didn't carry the card with them (KII007)

Provider and End User Perspective of Fastness

The findings reveal that from the perspective of healthcare providers and the end-users, Biometrics identification tools are faster to work with. In this regard, the absence of Biometrics was seen as bringing challenges in healthcare delivery. Both users and providers associated long queues with the current system of tracking children's information from the registers when a card is lost or forgotten. Long queues and wait times are a direct result of the common occurrence of understaffing at clinics. Use of a paper system, where patient information is kept on hard copy, making patients tracking a difficult task, places an additional burden on understaffed clinics. Many indicated that the new system would make record management noticeably more efficient.

Like during the cold season, we have a lot of patients at the clinic, plenty of patients at the clinic, so technology being faster, biometric identification will help us to clear the lines faster, we will clear the patients faster. Their time of stay at the clinic would be reduced ... (KII002, Nurse in Charge, Naluja)

Right now if had to take you to our registry we have plenty of books, when this person comes, even if they have numbers, it takes time for you to pick that number. So at least for the health providers (Andriesen et al.) we are not going to be struggling, we won't think about where we are putting these books because they are so many and files. And again, to the community there will not be any problem because these people won't be carrying anything (KII007, Nurse in charge)

Provider and End User Perspective on Information Availability

The participants were in favour of biometrics because their relative advantage over the current system in data management especially as it relates and extends to the availability of information stored for those accessing healthcare services. In the absence of Biometrics, the current system predisposes users to a lot of inadequacies. For instance, government facilities occasionally experience stock-outs and many facilities throughout Zambia have been out of stock for close to a year now (since 2019). During stock-outs, discharge papers or birth records are used as an intermediary. With limited availability of records, coordination of care is disadvantaged and leads to gaps in tracing malnutrition and vaccination records. Many providers noted this as a disadvantage to the current system, and avoidable if a centralized, electronic

electronic biometric system were implemented.

For some time now there have been no under five cards and mothers are given books or just birth records, we actually had to look at the books and what kind of information is in put in those books which is very embarrassing (KII004)

this new thing is just okay compared to the under 5 cards because these new things that have come they show all the information for the children they are stored in the system at this time the cards are unavailable they use the discharge papers, so this new technology is best (FGD004R)

Discussion

Previous studies suggest that for an innovation to be accepted by potential users it must have a clear advantage over current systems (Hurley et al., 2002). Thus, the relative advantage of a biometric system in both Lusaka and Kalomo districts was seen in terms of its comprehensive benefits compared to other analog identifiers used in health facilities. The findings indicate that the biometric system is regarded as appropriate for its intended purposes as almost all respondents spoke enthusiastically about how proficient biometrics will eliminate gaps from the current process. For instance, respondents noted that using Biometrics has implications on identification given that with its use, there will be few or no cases of failure to identify dead bodies during disposal. This has been happening with the current analog system hence the proposal for the adoption and adaptation of the Biometrics identification tools.

On the cost implications, the findings of the study show that biometrics were largely accepted by respondents due to perceived comprehensive benefits in record management, efficiency, and data quality. From the end-user perspective, respondents noted that in instances when they have lost under five cards, they are forced to buy which comes at a great cost especially to parents in rural areas. Not only do replacements come with a monetary cost to the patient, but it is also unfortunate to note that the new card is likely to be filled in with inaccurate data or left with gaps in the record. Additionally, responses collected from the rural setting revealed that the monetary cost associated with losing an Under Five Card was expressed as a major barrier to seeking care. These were all noted as negative aspects to the current system and were seen areas where a biometric system would be an improvement. For healthcare providers, the cost implications in terms of storage

and also providing alternative means in an event that under-five cards are out of stock are significantly reduced. This is because once the Biometrics system is installed, its use is continuous and the benefits are long term unlike the paperwork as a form of record-keeping.

Biometrics carries a striking advantage of being more secure. Respondents noted that biometrics contrast with other identifiers (such as discharge papers, slip numbers, and the Under Five Card) which are easily misplaced, lost, forgotten, and damaged. This is a security implication given that Biometrics carry the distinct advantage of improving data quality and data management in the health sector. It was noted in both rural and urban settings that the Under Five Card is easily forgotten at home, misplaced, and/or damaged. In these cases, providers will often turn to the central registry to look up a patient's record. Both mothers and providers alike noted that registries often store incomplete data and are not easily searchable, making identifying the patient a time-consuming effort, which often leads to long queues and wait times.

From the perspective of both end-users and healthcare providers, Biometrics, when adopted and adapted in the healthcare industry, will lead to quick and quality delivery of services. This was dubbed as the fastness associated with Biometrics. Both end-users and healthcare providers associated long queues with the current system of tracking children's information from the registers when a card is lost or forgotten. Long queues and waiting times are a direct result of the common occurrence of understaffing in health facilities more especially in rural areas of Zambia. According to Tjoa et al., the Republic of Zambia is among the countries currently facing an acute HRH shortage. When Biometrics are used, there will be better healthcare delivery even with the understaffing of most healthcare facilities.

On the availability of information from the perspective of both end-users and healthcare providers, Biometrics occasions the availability of information even if those accessing services come in large numbers. This was evident in Kalomo and Lusaka as the doctor-patient ratio is significantly high. According to the Government of the Republic of Zambia Ministry of Health (MOH), the country is operating with fewer than half the health workforce necessary to deliver basic health services, with even higher vacancy rates in rural areas. This shortage of health workers is threatening adequate and equitable health care delivery, (Tjoa et al., 2010). With limited availability of records, coordination of care is disadvantaged and leads to gaps in tracing malnutrition and vaccination records. Respondents, particularly healthcare providers noted that all this would be the thing of the

thing of the past when Biometrics are fully operational in healthcare institutions across Zambia.

Summary and Conclusions

The evidence presented in this paper leads to two interrelated conclusions. Firstly, it has been recognized that the Zambian healthcare landscape is ripe for the introduction and subsequent integration of Biometric tools for efficient and effective service delivery. Thanks to the SEARCH pilot project, healthcare institutions stand to benefit from the adaptation and adoption of Biometrics in Zambian. Thus, data as gathered from healthcare providers and the end-users show that not only is the healthcare landscape ripe for integration from the perspective of innovations in healthcare, but the providers and end-users desire to have Biometrics adopted and adapted as soon as possible. Secondly, the evidence in support of the first conclusion that not only is the system ripe but the stakeholders are also eagerly waiting to enjoy the benefits of Biometrics. This shows that all stakeholders in the healthcare industry are tired of the old system. This is because the old system and indeed the current system for most healthcare institutions in the dispersed localities of Zambia has a way it impedes the efficient and effective delivery of services much to the dislike of stakeholders.

From both the positive and negative standpoints, the study has shown that there are implications in the adoption of Biometrics. Firstly, the findings show that there are cost implications that make Biometrics to be accepted. For instance, respondents noted that are comprehensive benefits in record management, efficiency, and data quality. Respondents noted that in instances when they have lost under five cards, they have been forced to buy which comes at a great cost especially to parents in rural areas. Thus, when Biometrics are in place, this would be a thing of the past and by extension, the opposite is true as the absence of Biometrics entails the continuation of the sad realities emanating from the current and old system. Secondly, Biometrics carries a striking advantage of being more secure as they are contrasted with other identifiers (such as discharge papers, slip numbers, and the Under Five Card) which are easily misplaced, lost, forgotten, and damaged. This security implication gives Biometrics a distinct advantage of improving data quality and data management in the health sector while at the same time making it easy for patient identification.

From the perspective of both the healthcare providers and the end-users, the study has revealed two important standpoints and

perspectives concerning the use of Biometrics in healthcare as evidenced by the respondent's views. The first perspective is that when adopted and adapted in the healthcare industry, Biometrics will lead to quick and quality delivery of services given that there will be and there is fastness associated with Biometric tools. Both end-users and healthcare providers associated long queues with the current system of tracking children's information from the registers when a card is lost or forgotten which is it is being proposed that Biometrics be introduced beyond the districts of Kalomo and Lusaka so that this reality is phased out. The second perspective is that Biometrics enables the availability of information. Using the current system, there is a limitation concerning the availability of records such that coordination of care is disadvantaged and leads to gaps in tracing malnutrition and vaccination records. Respondents, particularly healthcare providers noted that all this would be the thing of the past when Biometrics are fully operational in healthcare institutions across Zambia.

Author Contributions

All the five authors contributed towards the study design. AMH and EM carried out the data collection. All authors analysed the data. AMH drafted the manuscript and all the authors contributed towards revision and final approval of the manuscript.

Acknowledgements

This study was financed through the gracious grant of Boston University. It is part of Master of Public Health in Health Promotion and Education programme (MPHHPE) under the supervision of Dr. Joseph Mumba Zulu as primary supervisor and Prof. Charles Michelo as co supervisor. The authors are highly indebted to all who contributed to the success of this study.

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Immunization Coverage And Its Determinants Among Under-Five Children Aged 12 To 59 Months In Mtendere Township Of Lusaka Urban District

Nevy M. M. Mwanza¹, Oswell Khondowe¹, Arnold M. Hamapa¹, Lilian Chigali¹, Lydia Hangulu¹

¹Faculty of Health Sciences at the Lusaka Apex Medical University

*Corresponding author: oswellkhondowe@gmail.com; +260 963667610

Abstract

The main objective of the study was to investigate attainment of full immunization coverage among under -five children in Mtendere township of Lusaka urban district.

This Cross-sectional study recruited households that had children who were under 5 years old. Data was collected from parents or guardians of the children using a questionnaire. Information was also retrieved from Immunization cards.

A total of 339 participants were recruited. Eighty-eight percent of the participants presented immunization cards for their children. There was statistically no significant association between immunization of children and marital status of the participants ($p=0.994$); gender and child immunization ($p=0.0004$); immunization of children and education level ($p=0.636$) and between immunization of children and participant's monthly income ($p=0.263$). There was a statistically significant relationship between immunization of children and religious affiliation ($p=0.05$).

Immunization of children in Mtendere is higher than before. There is need for interventions to improve the proportion of complete immunization for children in the area. The Ministry of Health through relevant authorities should endeavor to sensitize parents about the importance of completing the immunization schedule, especially with regard to Measles.

Keywords: Immunization, under-five, Mtendere township

Introduction

Immunization is an effective public health intervention to reduce morbidity and mortality among infants. It is an important means of controlling diseases, and has been considered the most cost-effective health intervention (Centers for Disease Control [CDC], 2016; Pan American Health Organization [PAHO], 2018; World Health Organization [WHO] 2010; WHO/United Nations Children's Fund [UNICEF], 2011). Immunization has brought sound health to many children in the world, reduced the agony experienced by parents during child rearing and reduced the mortality rate among children (Borus P.K.(2014, 2015,). The use of immunization services however requires acceptability from the target community. This means that for immunization services to be used there must be a clear understanding of the benefits of vaccination among community members, a readiness for providing vaccination by the health services, and interventions to overcome access barriers to immunization services.

Increasing immunization coverage for childhood diseases has become an important developmental issue (Delivery of Improved Services for Health [DISH], 2012; WHO, 2018) and an area that requires more research. Based on WHO/UNICEF (2011) report, global immunization coverage continues to increase dramatically. Global data shows that infants less than one year of age immunized with DPT, (the three doses of the combined vaccine against diphtheria, pertussis and tetanus) increased from 20% in 1980 to 79% in 2006. The percentage of children immunized with three doses of polio vaccine in 2006 rose from 22% in 1980 to 80%. Global coverage for measles increased from 16% in 1980 to 80% in 2006. However, these increases are still falling short of the 2010 target of 90% set by WHO/UNICEF Global Immunization Vision and Strategy. It is argued that further increases in coverage of DPT, Polio and Measles would save millions of infant lives

Morbidity and mortality caused by diseases that are preventable by vaccine are still very high in many developing countries across the world (MOH, 2011). Fifteen percent of deaths in children who are less than five years of age are attributed to these diseases (WHO, 2012). According to WHO, although numerous interventions have been made to increase immunization coverage, full immunization coverage in Zambia remains relatively low at 68% (Chofwe & Kwangu, 2018). Although no data is available on deaths caused by vaccine preventable diseases, the figures pertaining to the average under-five mortality rate in Zambia have shown an impressive decline by 61 percent from 191 deaths per 1,000 live births to 75

deaths per 1,000 live births between 1992 and 2014 (Chofwe & Kwangu, 2018).

The report from Lusaka District Health Systems (LDHS 2018) further states that Mtendere clinic of Lusaka urban District has a catchment population of about 123, 503 of which 20, 552 are under-five children representing a 17% of the total population. The author, during her practice at Mtendere clinic observed children who were not fully immunized. In addition, there are quite a number of preventable diseases like diarrhea and pneumonia among under-five children at Mtendere clinic which signifies that some children are not fully immunized. Factors associated with failure to realize full immunization in mtendere are still unknown. Therefore, this study sought to describe immunization coverage and investigate the factors associated with failure to complete childhood immunization in Mtendere Township. Having been implementing different UNICEF and WHO strategies to boost immunization coverage, some parts of the country are still recording the coverage of less than 68% (Chofwe & Kwangu, 2018).

It is also not clear the extent to which most of the mothers respond to immunization. Hence this study also investigated the knowledge levels of parents on the importance of accessing full immunization for their children in Mtendere township of Lusaka urban District. There is also insufficient literature on factors (either cultural or socioeconomic) that affect mothers from ensuring full immunization coverage of their under-five children. The main objective of the study was to investigate attainment of full immunization coverage among under -five children in Mtendere township of Lusaka urban district.

Methodology

The study adopted a cross-section design to understand the immunization coverage for vaccine preventable diseases among children who were under-five years. The target population that was considered for the study were households that had children who were under 5 years old in Mtendere Township. Children whose parents refused to be included in the study and those with missing critical information were excluded. A one stage sampling procedure technique was used to sample children that were eligible for inclusion. There are ten clusters in Mtendere Township. Based on probability proportional to the size of the population, households were selected randomly and subsequently until a reasonable number was achieved. If the selected household has no eligible child, the next household was selected. In case where there was one eligible child in a household, the child was included. At the household level, the mother was

selected as the respondent. The father or caregiver was used only if the mother was unavailable and this was the case in some households. The survey systems software (survey systems.com/sscalc.htm) was used to calculate the sample size. The following assumptions were used to determine the sample size. Mtendere has a population of 20,552 under-five children (District Health

Survey System 2019). Considering a confidence level of 95% and confidence interval of 5, the sample size of 351 under-five children was determined, which is 1.8% of the total population of households with under-five children in the area. Therefore 1.8% of children were selected from each cluster as shown below

Table 1. Number of households per zone |cluster

ZONES	No. of Households	Approximate No. of children in each cluster	1.8% of children under-five Per Cluster
Zone 1	2653	2122	38
Zone 2	3120	2496	45
Zone 3	3025	2420	44
Zone 4	1030	824	15
Zone 5	1033	826	15
Zone 6	1206	964	17
Zone 7	2522	2017	36
Zone 8	2810	2248	40
Zone 9	1482	1185	21
Zone 10	5572	4457	80
TOTAL	24453	19 559	351

Data was collected from primary sources who were the parents with under five children in Mtendere Township. The researcher designed the data collection tool which comprised of a questionnaire. Structured interviews were scheduled with parents and care givers. The Plan for data collection included: permission to proceed, data collection and data handling procedure. The study used both Primary and Secondary sources to obtain needed data among selected households in Mtendere Township. Method of data collection was through administration of a questionnaire that contained both closed ended and open ended questions which was conducted in English and Nyanja. The collected information was checked for completeness of the questionnaires. The questionnaires were given a code and stored in files. The data was also entered into excel and a backup copy stored on an external hard drive. Data were computed into Microsoft Excel by the researcher. The researcher double checked data entered in excel for consistencies using source documents. The data were then imported into the Statistical Package for Social Science (version 16.0). General descriptive and inferential analyses were used to analyze the data. Means, frequencies, 95% confidence intervals and standard versions

were used to compute descriptive statistics for continuous and categorical data. Statistical comparisons of nominal, ordinal and continuous variables were done by using SPSS . The chi-square test was used for categorical data. The level of significance was set at 0.05. Any p-value of less than 0.05 was reported as statistically significant. Chi-square Test was used to measure the relationship between independent and dependent variables. Statistical significance was set at 0.05.

Prior to data collection, ethical clearance was obtained from the Lusaka Apex Medical University Research Ethics Committee (LAMUREC REFNO. 102-20). Permission was requested and granted by the Lusaka District Health Offices to conduct the study. Informed consent was obtained from all the participants. Participants were informed of what the study was about and asked to participate and that they could withdraw at any time without any repercussions. The respondents were not exposed to any physical and emotional danger or harm. Confidentiality and anonymity was maintained. Respondents were interviewed one at a time in a room to ensure privacy. After each interview

session, the investigator kept all questionnaires under lock and key and no persons other than the researcher was allowed to access the collected data.

Results

Background Characteristics of participants

Age of Participants

The age distribution of respondents is presented in Table 2 below;

Table 2: Age of Participants (n=339)

AGE GROUP	FREQUENCY	PERCENTAGE (%)
15-19	25	7.4
20-24	83	24.5
25-29	94	27.7
30-34	69	20.4
35-39	42	12.4
40 >	26	7.7
Total	339	100.0

Table: 3 Age and Gender characteristics of under-five children

AGE (YRS)	FREQUENCY		TOTAL
	MALE	FEMALE	
0 – 1	48	31	79
1 – 2	52	41	93
2 – 3	62	29	91
3 – 4	23	52	75
4 – 5	20	11	31
TOTAL	205	164	369

The majority of the mothers/caregivers were aged between 25 and 29 according to Table 2. The highest frequency for children was recorded for the age category of 1 to 2 years. It was observed that there were parents or caregivers with over 1 child falling within the desired age category. The majority of the participants were female, accounting for 95% of the total number of participants.

From the 339 participants that were captured for this study, only 14.2% of the participants had obtained university education, 20.1% of the participants had obtained college level education,

a higher percentage (32.4%), was observed for those that had completed basic education and seemed to have been the majority of all the participants. 23% was composed of those that had completed secondary education. There was also recorded a 10.3% of the participants that had not acquired any formal education. Most of the participants (31%) were unemployed. participants working full time was composed of 22.1% of the total participants and 16.8% were part-time workers. Eight percent of the participants were still in school, 11.5% were self-employed and 10.6% had retired from formal employment.

Immunization Coverage

Out of the 339 participants that were reached, 298 (87.9%) of the participants presented immunization cards of their children during the study, while 41 (12.1%) of the participants did not present immunization cards of their children. Out of the 339 participants, 69.9% had taken their children for measles vaccination and the remaining 30.1 % did not. It was observed that 89% of the participants had taken their children for diphtheria, pertussis (whooping cough), and tetanus (DPT). The research further revealed that out of the 89% parents who had taken their children

for the DPT vaccine, all of them had completed the immunization schedule. Results obtained from the survey show that out of the 339 participants, 91% had taken their children for Polio vaccination. The study further revealed that out of 91% parents who took their children for Polio immunization, 60% completed the immunization schedule.

Participants' Perceptions about Factors Affecting Immunization Coverage

Perceptions of individuals on immunization coverage vary.

Table 4: Participant's Perceptions

Participants' perceptions	Yes (%)
The attitude of mothers is important in enhancing utilization of immunization services.	94%
Community awareness is important in promoting immunization services.	100%
Availability of health facilities enhances immunization services.	78%
Availability of immunization equipment enhances use of immunization services.	79%
Mother's knowledge on immunization activities enhances the use of immunization services.	60%
Place of delivery enhances the utilization of immunization services.	98%
Short distance to immunization centers encourages mothers to take children to health centers.	92%
Decentralization of health services is essential in enhancing utilization of immunization services.	58%
Migration of families (change of residence of families) affects utilization of immunization services.	34%
The use of mass media is a strong tool for promotion of immunization utilization of immunization services.	80%
The level of education of the mother is important in enhancing utilization of immunization services.	61%
The age of the mother is important in enhancing utilization of immunization services.	47%
Community health workers play a role in enhancing delivery of services.	94%
Marital status of mothers is important in enhancing utilization of immunization services.	69%
Goodwill of the local leaders to mobilize and support immunization enhances delivery of immunization services..	72%
Anti-vaccine rumors (propaganda against vaccine) affect use of immunization services.	49%
Bad weather conditions affect the utilization of immunization services	80%
The use of mobile vaccination teams enhances utilization of immunization services.	97%

Table 5: Marital Status

MARITAL STATUS	IMMUNIZED		NOT IMMUNIZED		TOTAL
	Observed	Expected	Observed	Expected	
MARRIED	139	138.5	12	12.5	151
COHABITING	113	111.9	9	10.1	122
SINGLE	42	42.2	4	3.8	46
DIVORCED	10	10.1	1	0.9	11
WIDOWED	7	8.3	2	0.7	9
TOTAL	311		28		339

Marital status was stratified into five categories with married participants contributing the highest percentage (44.5%), followed by those cohabiting (35.9%). Thirteen percent of the participants were single, 3.2% were either separated or divorced and 2.7% widowed. The observed frequencies of the participants that had taken their children to be immunized was higher than

the observed frequencies of the participants that had not taken their children for immunization in all the five categories. There was statistically no significant association between immunization of children and marital status of the participants ($p= 0.994$). The relationship between gender and child immunization was statistically significant ($p=0.0004$)

Table 6: Participants Level of Education

LEVEL OF EDUCATION	IMMUNIZED		NOT IMMUNIZED		TOTAL
	Observed	Expected	Observed	Expected	
University	48	44	0	4	48
College	65	62.4	3	5.6	68
Basic Education	101	100.9	9	9.1	110
Secondary Education	73	71.6	5	6.4	78
Uneducated	24	32.1	11	2.9	35
TOTAL	311		28		339

From the 311 participants that had taken their children for immunization, 32.5% had attained at least basic education while 35% had attained primary education. There was no significant

relationship between immunization of children and education level ($p=0.636$)

Table 7: Participants Employment Status

EMPLOYMENT STATUS	IMMUNIZED		NOT IMMUNIZED		TOTAL
	Observed	Expected	Observed	Expected	
Full-Time Employment	68	68.8	7	6.2	75
Part-Time Employment	57	52.3	0	4.7	57
Unemployed	94	96.3	11	8.7	105
In-School	22	24.8	5	2.2	27
Self-employed	36	35.8	3	3.2	39
Retired	34	33	2	3	36
TOTAL	311		28		339

Statistically, the employment status of the caregiver had no significant influence on attainment of full immunization coverage ($p = 0.974$). There was no statistically significant relationship between immunization of children and participant's monthly income ($p = 0.263$). A total of 311 participants took their children for immunization of which 30.1% were Catholics, 22.8% were SDA, 21.2% were Pentecostal, 17.7% belonged to UCZ, and 4.2% represented those that were not affiliated to any religion. There was a statistically significant relationship between immunization of children and religious affiliation ($p = 0.05$). A total of 311 participants had taken their children for immunization out of which 28.6% were in the age group 25-29 years, 25.4% were between 20-24, 21.5% were between 30-34 years, 11.6% were between 35 and 39 years, 7.4% were teens between 15 - 19 years and 5.4% were above 40. Age of mothers had no significant influence on immunization of a child ($p = 0.758$).

Discussion

The current study was designed to identify predictors influencing full child immunization among 12-59 months old in Mtendere. The percentage of children that were fully immunized according to the research findings from the selected sample was found to be 91.7%. Comparing the immunization coverage of children between ages 12-59 months in Lusaka with that of NDHS 2018, the percent of children fully vaccinated is higher by 19%. It is also higher than the national immunization coverage survey that has reported 75% of children aged 12-59 months that were fully immunized as at 2018. Results of the study indicate that immunization coverage in Mtendere has tremendously improved as evidenced by the percentages of parents and caregivers who took their children for immunization

from the sample that was picked, giving coverage of 91.7%. The significant predictors of full immunization in this study were maternal education, employment status, religion, level of monthly income, distance to health facility, sex of the caregiver, antenatal care use and mother's age.

Maternal Education

There was a strong positive association between maternal education and full immunization. Education helps to improve health seeking behavior of an individual. This finding is consistent with other literatures that found that maternal education was a significant predictor of completeness of immunization because highly educated mothers will be more aware of the importance of immunization. The role of maternal education is an important cause of immunization uptake. In contrast, in a study conducted in Libya by Mabrouka and Bofarraj (2011), there was no significant relationship between immunization status and mothers' educational level. A study in Zimbabwe by Mukunga (2015) revealed that Children of mothers with sec implies a high literacy rate among respondents. onday education and higher were 2 times more likely to be fully vaccinated than children with uneducated others. It is also important to note that out of 339 respondents, 14.2% had obtained university education, 20.1% had obtained college level education, 32.4% had completed basic education. Twenty-three percent had completed secondary education and only 10.3% had no formal education. This implies a high literacy rate among respondents.

Distances from Health Facilities

According to a study conducted on the reasons for non-vaccination and the effects of socio-demographic factors on

vaccinations, it was revealed that distance from the health facility is significantly related to the level of immunization coverage (Sebahat & Nadi 2014). Similarly, in Kenya, a study by Ndiritu et al. (2016) on immunization coverage showed that immunization coverage declined with increasing distance from the vaccination clinics in the area.

Mothers' occupation is another factor that influences vaccination uptake. Occupation can influence mothers' likelihood to seek immunization for their child. On the contrary, this study showed that mothers' occupation had no significantly associated with higher or lower likelihood of full immunization. Result also showed that there is evidence that ages of mother predicts child immunization. This could be because elder mothers know the effect and the importance of immunization on children than young women. This finding is the same with the study conducted in Sudan by Ibnouf et al. (2014).

Availability of health facilities is also an important predictor of full immunization coverage. Research conducted by Singh and Yadav (2010), on childhood immunization in urban slums of India, found out that slum dwellers did not access these services. It was argued that weak community organization and low collective confidence in public institutions were responsible for this scenario. On the other hand, although this study indicated that availability of health infrastructure was one of the reasons why immunization coverage in Mtendere was high, findings of a study on health infrastructure and immunization coverage in rural India, revealed that the availability of health infrastructure did not necessarily lead to wider immunization coverage (Datar, Mukherji & Sood 2015). These differences can be attributed to the fact that the current study was conducted in an urban setting with availability of many private clinics, health centres and hospitals. For example, a study on immunization in rural Malawi indicated that low compliance to vaccination recommendations was associated with living in villages where there were no vaccination teams (Vaahtera et al., 2010). The findings were further in agreement with those of Ibnouf et al. (2014) in Sudan which revealed that children in urban areas were more likely to be immunized than those in rural settings.

Findings of this study also revealed that most parents normally complete the Polio and DPT immunization schedules but fail to complete the Measles schedule, where immunization is carried out at 9 months after delivery. On the other hand, a study by Cheyne (2016), on immunization in urban areas in China revealed that failure to complete immunization in urban areas was associated with mother's unawareness about repeat visits to achieve complete immunization rather than vaccine awareness. This

led to failure by mothers to make repeated visits to achieve complete immunization.

Gender

Results from the survey also indicate that the majority of the respondents were female, accounting for 95% of the total number of respondents. This has an impact on the level of immunization in the area because it is normally the mothers who are involved in children's nursing, upbringing and immunization. Very few men or fathers take interest in knowing when the child is due for immunization. The data gathered from the survey did not differ from the facts. It was discovered children that are left in the care of male guardians were less likely to be taken for immunization than those that were left in the care of female guardians. Another study done GAVI (2019) revealed that division of labour in the household may detract from fathers' involvement with childcare duties, including vaccination. On the hand, a study from International Journal for Diseases (2012) states that the woman lacking decision-making autonomy was associated with a lower likelihood of fully immunizing the child. Although available literature shows that the average routine immunization coverage in Luaska district for children aged 12 to 59 months was 73% with the national coverage 75% (ZDHS, 2018), these coverage rates were still below the targeted score of 80% as per UNEPI Standards. It should be noted however, that immunization coverage in Mtendere township is currently higher than what is targeted by UNEPI with over 80% of the children immunized.

Perceptions about factors affecting immunization coverage of respondents varied. Almost all respondents believed that the attitude of mothers was important in enhancing utilization of immunization services in Mtendere due to the fact that in an African setting women play a fundamental role in health up bring of children. 49% of the respondents indicated that anti-vaccine rumors do not affected the use of immunization services this is because a lot of advocacy has been done by all the stake holders and it is hoped that in the years to come more Zambians will have a positive attitude towards immunization. Almost all of the respondents believed that the use of mobile vaccination teams enhanced utilization of immunization services in Mtendere, it is important to note that mobile vaccination teams have been more popular in rural areas than urban areas. The fact that Mtendere is urban, implies that immunization centers are more accessible due to short distances.

Marital Status and Monthly Income

Analysis of association carried out indicated that there was no relationship between marital status, and employment status and full immunization coverage. However, marital status and employment status had no significant relationship with parents taking their children for immunization. In essence married parents are in position to complete immunization schedules for immunization of their children than those who were still cohabiting due to the strong collective ownership, care and upbringing of the growing child.

On the other hand, parents with more income should be able to complete the immunization schedules due to the fact that are in position to raise the required costs. It is also important to note that parents incur some costs every time they take children for immunization which some of the poor mothers cannot afford. Which can highly affects completion of immunization during pregnancy are likely to get full immunization. This could be true because antenatal clinic also facilitates sensitization of women on immunization programme (Mutua et al., 2011). This is consistent with the finding in the research conducted by Adetokumbo et al. (2013) that showed that about 65% of the women got their awareness of immunization at the antenatal clinics. A study done by Kaptoo and Moses (2015) in Kenya revealed that a child born to a family that earns less per month is 3 (three) times more likely not to be fully immunized compared to one born to a family who earns more. Other investigators from Zimbabwe by Mukungwa (2015) have also found that wealth status was also associated with full vaccination. Children of mothers who were rich were 2 times more likely to receive full vaccination than children whose mothers were poor.

Place of Birth

Place of delivery was significant in this study, the same was found in the study conducted in Niger Delta area of Nigeria by Oyo-Ita et al. (2012). A child that is born in a health facility would have more access to immunization than a child born at a non-health facility. At birth, a child is given Polio 0 and this makes the parent to be aware of immunization. Similar findings have been reported in previous studies (Luman et al., 2011; Oladokun et al., 2016). Also, this study shows that a child whose mother attended antenatal clinic regularly

Religious Affiliation

Religion was also found to be significant. This is consistent with the result of the research conducted in Nigeria by Babalola

(2010). Misconception by Muslims affects the immunization uptake. Mtendere Township consist of different religious, population size and levels of development. The study indicated that there were significant relationships between the various religions and completing the immunization schedule.

Conclusion and Recommendations

The result of this study has clearly indicated that mothers in Mtendere have improved on taking their children for immunization. This suggests that immunization uptake in Zambia has generally improved compared to previous reports. According to the Zambia Demographic Health Survey (2018), in Zambia, 75% of children age 12-23 months and 72% of children age 24-59 months have received all basic vaccinations. Seventy percent of children age 12-23 months and 63% of those age 24-59 months received all basic vaccines by age 12 months. The survey further adds that forty-six percent of children age 12-23 months and 33% of children age 24-59 months have received all age-appropriate vaccinations. Similarly, 43% of children age 12-23 months and 28% of children age 24-59 months were vaccinated by their appropriate age. However, because MR2 was introduced in June 2017 and fieldwork began in July 2018, it is unsurprising that many children age 24-59 months did not receive the vaccination, thus lowering the overall percentage of children in this age group receiving all age appropriate vaccinations (ZDHS, 2018). The challenge however is that most care givers who were falling in the other religious category, male care givers, and those that had an income of less than K1000 seemed not to still take their children for immunization and this affects the percentage of children fully immunized in Mtendere.

Universal immunization of children against common vaccine-preventable diseases is crucial to reducing infant and child morbidity and mortality. Zambia has conducted routine childhood immunizations since the inception of the Expanded Programme on Immunization in 1975 and has been actively implementing the Universal Childhood Immunization Programme since 1984. In scaling up immunization efforts, the country has developed the Strengthened Expanded Programme on Immunization Vaccination Manual coupled with integrated management of childhood illnesses (IMCI) (MOH 2017). The IMCI strategy ensures that when children come in contact with a health worker, their immunization status is checked and they are given any necessary vaccines. In Zambia, routine childhood vaccines include BCG (tuberculosis), DPT-HepB-Hib or pentavalent (diphtheria, tetanus, pertussis, hepatitis B, and

Haemophilus influenzae type b), oral polio vaccine or OPV (poliomyelitis), PCV (pneumococcal), rotavirus or RV, and measles and rubella or MR.

Historically, an important measure of vaccination coverage has been the proportion of children receiving all “basic” vaccinations. Children are considered to have received all basic vaccinations if they have received the BCG vaccine, three doses each of the DPT and polio vaccines, and a single dose of the measles vaccine. In Zambia, the BCG vaccine is usually given at birth or at first clinic contact, while the DPT vaccine is given in combination with HepB and Hib (DPT-HepB-Hib) at approximately age 6, 10, and 14 weeks. A first measles vaccination (which was given in combination with rubella beginning in June 2017) should be given at or soon after age 9 months.

The 2018 ZDHS results show improvements in basic vaccination coverage. The percentage of children age 12-59 months who received all basic vaccination increased from 68% in both 2007 and 2013-14 to 75% in 2018. The percentage of children age 12-59 months with no vaccinations decreased from 6% in 2007 to 2% in 2013-14 and 1% in 2018. By province, basic vaccination coverage is highest in Copperbelt (83%) and lowest in Luapula (67%). Basic vaccination coverage increases with increasing mother’s education. Sixty-six percent of children born to mothers with no education received all basic vaccinations, as compared with 88% of those born to mothers with a higher education.

In a nutshell, the study sought to examine the determinants of immunization coverage among children aged 12-59 months in Mtendere. Using the Chi-Square test, the study found that care givers religious affiliation, education and literacy, income, age of the mother, sex, place of delivery significantly influenced child immunization. Sex of the care giver had an interesting influence on child immunization; male care givers were found not to have taken their children for immunization. On factors like Marital status and employment status, it was interesting to note that care givers that had taken their children for routine immunization and those that had not was not a result of being married or single and being employed or unemployed.

Concerned authorities should ensure that care givers especially those that could not identify themselves with any religion and the unemployed less income earners immunize their children since low coverage will always draw back the efforts of fighting vaccine preventable diseases. This calls for intervention towards helping these categories of care givers in Mtendere and the nation at large to know the advantage of taking their children to clinics for immunization.

Recommendations

The Ministry of Health through relevant authorities should endeavor to sensitize parents about the importance of completing the immunization schedule, especially with regard to Measles. The Ministry should further come up with education programmes that target poor people so that they are able to make informed decisions regarding immunization of their children. The Ministry should also conduct measles immunization campaign. Such a campaign should include: specific communication focused on measles immunization by 9 months and special measles drive before seasons known for measles outbreak. A reminder system should be devised such as text messages reminding the mothers to come back at the right time to avoid delays in uptake of the measles booster vaccine as it could expose the children to measles infection. Vaccine stock-out should be avoided at all levels in the supply chain so that caretakers are not turned away on appointment days. This is not only an inconvenience to the consumer but also erodes public confidence in the quality of the service provided. The health care providers should always check the child’s immunisation status at every contact and offer appropriate advice regarding the vaccines. Mothers and caretakers need more information about the value of having their children immunized. There is need to strengthen Information Education and Communication at all levels (national, provincial, district, facility and community) in order to help them make informed decisions about their children’s health. Since the community volunteers provide health education to mothers/caretakers, they should be well informed about changes in the immunization programme through regular

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Patient Perceptions of Physiotherapy for Knee and Hip Osteoarthritis: a Qualitative Study

Sylvia M. Chanda;¹ Hellen Mwembeshi;¹ Arnold Hamapa¹, Lydia Hangala¹, *Oswell Khondowe¹

1. Faculty of Health Sciences at the Lusaka Apex Medical University

*Corresponding author: Dr. Oswell Khondowe, oswellkhondowe@gmail.com; +260 963667610

Abstract

Physiotherapy is a mainstay treatment of osteoarthritis plays a central role in the management of patients with functional limitations. Though physiotherapy is recommended as the main treatment, there is conflicting evidence in literature on perception of patients with osteoarthritis on the benefits of physiotherapy. The main objective was to explore the perceptions of patients with knee and hip osteoarthritis on benefits of physiotherapy. Purposive sampling was used in the study. Ten patients already diagnosed with hip or knee osteoarthritis were sampled. In-depth one to one interviews were conducted and interviews were recorded and transcribed, then themes were generated and analyzed. Four main themes emerged. These were perception of physiotherapy by patients, reduction of pain, improvement of physical function, and need of more information. The study showed that the majority of patients with osteoarthritis of the hip and knee view physiotherapy as beneficial. Most said that physiotherapy treatment has resulted in reduction of pain and improvement of physical function.

Keywords: Perceptions, physiotherapy, knee, hip, osteoarthritis

Introduction

Osteoarthritis (OA) is defined as a degenerative joint disease involving the cartilage and many of its surrounding tissues (Cooper et al., 2013). In addition to damage and loss of articular cartilage, there is remodeling of sub articular bone, osteophyte formation, ligamentous laxity, weakening of periarticular muscles and, in some cases synovial inflammation. Disease progression is usually slow but can ultimately lead to joint failure with pain and disability (Hinnman, 2012). Although OA can occur in all the joints due to aging, it is more commonly seen in weight-bearing joints like the knee and hip. Symptoms of OA include joint pain, stiffness, and limitation of movement (Symmons et al, 2006).

Physiotherapy is a mainstay treatment of OA (Hinnman, 2012; Page et al 2011), it plays a central role in the management of patients with functional limitations. Aims of physiotherapy treatment include pain and spasm relief, reducing stiffness, muscle strengthening, increasing range of motion, increasing flexibility, gait training, balance improvement, and improving functional activities (Potts 2015), which in turn encourages healing of the cartilage as it is stimulated by weight bearing in the joints. Though physiotherapy is the major treatment of OA, patients have varying views about physiotherapy. Some patients with knee osteoarthritis are not aware of the benefits of physiotherapy (Thorstenson, 2014). For example in a study done in New Zealand on patient perception of benefits of physiotherapy, many were unaware of the different interventions that physiotherapy could provide. Furthermore the majority of these patients stated that, they would consider seeing a physiotherapist if they had known the benefits (Reid et al, 2015).

Other patients feel that there is no available treatment, like In India it is a common perception that joint replacement surgery is the only treatment of OA (Patil et al., 2012). Showing that they are unaware of other treatment options including physiotherapy which is the main treatment of knee and hip osteoarthritis (Hinnman, 2012). On the other hand other patients perceive physiotherapy as beneficial in the treatment of OA as shown in the study done in Egypt (Hanan & Sahar, 2011). Poor perception of physiotherapy benefits may affect adherence to treatment. This is because patients may not be committed to an exercise programme and thereby miss appointments which in turn will affect the treatment. This was shown in the study done in India on perceptions of physiotherapist on factors that influence adherence, which

showed that poor awareness of physiotherapy benefits was a barrier to patient's attendance by most participants (Marwaba et al, 2010).

In Zambia there is scarcity of published information on perception of osteoarthritis patients on benefits of physiotherapy. Nonetheless, patients with OA are seen at various institutions in the country. At University Teaching Hospital in Lusaka for example, outpatient physiotherapy department attend to osteoarthritis patients from various localities. In 2013 from January to December, the number of recorded patients with osteoarthritis of knee and hip were 186, and in 2014 there were 196, showing that on average 15 patients are seen each month. The patients with OA make up most of the new patients attended to.

In South Africa the management of osteoarthritis include exercises which should be encouraged in all patients, irrespective of age (Ickinger & Tickly, 2010). There is now convincing evidence that exercise reduces pain, improves functional capacity, and reduces long-term disability, providing adherence is maintained. Transcutaneous electrical nerve stimulation (TENS) is also recommended in most guidelines as safe adjunctive modalities for pain relief. And in Australia, physiotherapy treatment of hip and knee osteoarthritis encompass advice, information and education, exercise programs, joint mobilization, muscle re-education, massage, assistance with use of aids and electrotherapy modalities (Hinnman, 2012).

Benefits of Physiotherapy

Physiotherapy is a non-pharmacological conservative treatment approach, that is recommended in clinical guidelines as the mainstay for the management of knee and hip osteoarthritis. This shows that Physiotherapy should be considered prior to pharmacological interventions for patients with osteoarthritis (Chapple, 2012). Aims of physiotherapy treatment include pain and spasm relief, reducing stiffness, muscle strengthening, increasing range of motion, increasing flexibility, gait training, balance improvement, and improving functional activities (Potts, 2015). Treatment of osteoarthritis may encompass advice, information, education, exercise program, joint mobilization, muscle re-education, massage, assistance with use of aids and electrotherapy modalities (Neogi, 2013).

There is evidence to show that exercise can decrease knee pain and improve function (Guadreaux, 2010; Page et al., 2011). From

this it can be seen that exercises can help reduce pain in osteoarthritis. It may also help improve mobility, strength, and function. Another treatment modality used in treating osteoarthritis is Transcutaneous Electrical Nerve Stimulation (TENS) which has shown significant benefit in pain relief. Both high frequency and strong burst mode TENS have shown benefit (Shamiliyan et al., 2012). Specialized therapy is needed in combination with conventional resistance exercise to overcome decreased neural drive to the muscle. In this regard Sensory Transcutaneous Electrical Nerve Stimulation (TENS) applied to the knee has been reported to excite inhibited motor neuron pools and immediately increase maximal quadriceps voluntary strength. Therapeutic exercise, especially with specialized hand-on exercise training and an element of strengthening, is an effective treatment for hip OA which helps to reduce pain and increase function. There is evidence from a high quality randomized controlled trial that manual therapy may be more effective than exercise in hip OA (Bennel et al., 2010). Ultrasound therapy is yet another treatment modality used to manage osteoarthritis. Application of high frequency sound waves to tissues enhance soft tissue healing, cartilage repair, which goes a long way in improving physical function and reducing pain, this view was also stated (Sanchez et al., 2010). Several studies have shown the benefits of physiotherapy to include pain relief, improvement in function, and reduction in stiffness and increase in strength.

Perception Of Physiotherapy Benefits by Patients

In the last few decades there has been a gradual change in models of healthcare and the way to understand the physician-patient relationship. From a medical model based on the disease and symptoms, there has been a gradual progression towards what has been called patient- focused care whose main features would be respect for the patient's choices and values (Santana et al., 2012). This goes to show the importance of knowing patients perceptions. It is further stated that, the health care professionals should adopt strategies for enhancing patient's self-efficacy, and tailor exercise interventions to the different needs and perceptions of the patients with osteoarthritis (Hanan & Sahar, 2011). Patients with osteoarthritis have varying views on benefits of physiotherapy. According to Thorstenson (2014), most osteoarthritis patients are not aware of benefits of physiotherapy. And in a study done in New Zealand on patient perception of benefits of physiotherapy majority of these patients revealed that they would consider seeing a physiotherapist if they had known the benefits (Reid et al, 2015). In India, according to Patil, Dixit and Shetty (2012) it is a common perception that there is no available treatment other than joint replacement surgery, showing that they are unaware of other treatment modalities

including physiotherapy which is the mainstay treatment of osteoarthritis (Hinnman, 2012). Another study that was done in India on perceptions of physiotherapist on factors that influence adherence reviewed that poor awareness of physiotherapy benefits was identified as a barrier to patient's attendance by most participants. Many patients are not aware of the aim of physiotherapy to bring about independence for patients and their families (Marwaba et al., 2010).

On the other hand, other patients perceive physiotherapy as beneficial in the treatment of OA. This was shown in a comparative study between OA and Osteoporosis patients in Egypt by (Hanan & Sahar, 2011). The study findings pointed to a higher commitment to exercise in both groups with significant differences between them, where osteoporotic patients had significantly higher scores of commitment and self-efficacy, osteoarthritis patients had higher perception of exercise benefits. Another study done in London UK, on patient treatment preferences of OA, of the participants who expressed a preference, the most popular option was physiotherapy. The most frequent reason for choosing physiotherapy was that it was previously beneficial (Mitchel & Hurley, 2008).

Methods

The design of the study was explorative design using qualitative research methods. Purposive sampling was used in the study. The study setting was University Teaching Hospital, physiotherapy outpatient department, which approximately attends to 15 patients with knee and hip OA in a month. Ten (10) patients already diagnosed were sampled. The purpose of study was explained and consenting patients who met inclusion criteria were interviewed using one to one in-depth interview. The interviews were semi structured.

A topic guide adopted from a study done by Hendry et al. (2006) which consisted of several key questions was used. The questions were modified to answer the study objectives. The information generated was recorded using a tape recorder. To establish whether the interview questions were understood correctly, a pilot study was conducted at Levy Mwanawasa Hospital on six patients who consented. The results showed that the interview questions were understood correctly. Thematic analysis was used in the study (Jailan & Ibrahim 2012). Analysis of data firstly involved recording the interviews using tape recorder, then transcribing the recorded interviews, making sure that the character of respondents comments were maintained, then familiarization with the information was done, after that codes were generated manually using highlighters, then

development of themes from the codes and finally analyzing the themes (Fereday & Muir-Cochrane).

Approval to carry out the study was sought from Tropical Diseases Research Centre Ethics Committee. And permission was also sought from UTH to conduct the study at the institution and LMGH to conduct a pilot study. Consent was sought from the patients, who were not be forced to participate and were free to withdraw any time. The patients were informed on the use of tape recorder in the interviews. Confidentiality of all information collected was ensured as the interviews did not require names but number codes were used instead.

Results

Ten eligible patients were identified. They all agreed to participate and were interviewed. Of the ten (10) who were interviewed, nine were women and one man. Their age range was 52– 75 years, and the duration of attending physiotherapy was a month on average.

Emerging themes

Four main themes emerged. These were, perception of physiotherapy by patients, reduction of pain, improvement of physical function and need of more information.

Perception of Physiotherapy by Patients.

Most patients interviewed stated that they viewed physiotherapy as helpful. Eighty percent of the patients 80% (n=8) thought physiotherapy is important in the management of arthritis. The following were some of the responses.

“I think it really helps a lot. After a few sessions you feel the difference, you come very bad but by the time you leave you are much better....” (5)

“What I think is that it helps the person get better than before, it is an important treatment...” (3)

Reduction of Pain

The majority of respondents representing 80% (n=8) said that physiotherapy helped in the reduction of pain. They stated that the treatment received made the pain to be less than before. Below are some of the responses.

“When I came I was in pain but now am okay (1)”.

“The pain is better than before (2)”.

“Physiotherapy treatment has helped to reduce the pain (8)”.

The minority of the respondents representing 20% (n=2) said that there was no improvement in pain. Some responses were as follows.

“I am waiting to get better for I am still in pain (6)”.

There has not been change in pain (10)”.

Improvement of Physical Function

The majority of respondents representing 90% (n=9) said that there has been improvement in physical function. Some of the responses were as follows.

“Because the knee has no pain I walk well and can stand for a long time (8)”.

“At least now I can walk, sweep the house and cook (5)”.

“There has been great improvement in walking and doing house work (3).

Need for More Information.

Under this theme the researcher wanted to know if patients are aware of how the treatments given to them works. The majority of the respondents representing 70% (n=7) said that they did not know how the treatment given to them works. Below are some of the responses.

“I do not know exactly (3)”.

“It is difficult to explain how it works (4)”.

“I do not know how the treatment works (10)”.

The minority of the respondents representing 30% (n=3) expressed an idea of how physiotherapy treatment works.

“Helps to release the muscles (5)”.

“Reduce stiffness (8)”.

Discussion

Most of the patients interviewed, which represents 80% (n=8), stated that they viewed physiotherapy as beneficial in the treatment of arthritis, and that the treatment was helpful. This is in line with the study that was done in Egypt Hanan and Sahar (2011), which showed that patients with osteoarthritis perceive physiotherapy as beneficial. Other studies share same view (Pisters et al 2010). Another study done in London UK, on patient treatment preferences of OA, the most popular option was physiotherapy and the frequent reason for choosing physiotherapy was that it was previously beneficial (Mitchel & Hurley 2008). On the other hand, a few of the patients representing 20% mentioned that they were not aware of the benefits of physiotherapy. Literature shows that some patients are not aware of the benefits of physiotherapy. According to a study done in New Zealand on patients views of benefits of physiotherapy, some of the patients revealed that they would consider seeing a physiotherapist if they had known the benefits (Reid et al., 2015), indicating that they were not aware of the benefits of physiotherapy. Another study that was done in India conflicts with the result of the study, in which it was stated a common perception is that there is no available treatment other than joint replacement surgery showing that patients are unaware of other treatment modalities including physiotherapy which is the mainstay treatment of osteoarthritis (Patil et al., 2012). From the study the results showed that most patients are aware of the benefits of physiotherapy while a few are not.

Majority of respondents which represented 80% (n=8) showed that physiotherapy helped to reduce the pain. Literature shows that physiotherapy treatment aims include pain and spasm relief (Potts, 2015). One of the treatment modality used in treating osteoarthritis is Transcutaneous Electrical Nerve Stimulation (TENS) which has shown significant benefit in pain relief. Both high frequency and strong burst mode TENS have shown benefit (Shamiliyan et al., 2012). There is evidence to show that exercise can decrease knee pain and improve function (Page et al., 2011), and therefore the management of osteoarthritis include exercises which should be encouraged in all patients, irrespective of age (Ickinger & Tikly 2011). It is further stated that there is now convincing evidence that exercise reduces pain, improves functional capacity, and reduces long-term disability, provided adherence is maintained. This view is also shared by Guadreaut (2010). From this it can be seen that physiotherapy can help reduce pain in osteoarthritis. It may also help improve mobility, strength, and function. But a study that was done by Bennel (2014) have a different view from the results of this research. The study showed that physical therapy does not appear

to relieve pain or increase function in hip and knee osteoarthritis.

The majority of the respondents representing 90% (n=9), stated that physiotherapy helped them to improve physical function like walking, kneeling and performing house chores. Literature shows that therapeutic exercise, especially with specialized hand-on exercise training and an element of strengthening, is an effective treatment for hip OA which helps to reduce pain and increase function. There is evidence from a high quality randomized controlled trial that physiotherapy may be effective in improving physical function (Bennel et al., 2010). Literature also show that ultrasound physiotherapy treatment, used to manage osteoarthritis enhance soft tissue healing, cartilage repair, which goes a long way in improving physical function and reducing pain (Sanchezi et al., 2010). On the other hand a study that was done by Hills & Kitchen (2016) that looked at satisfaction of patients on physiotherapy revealed that patients had lower satisfaction on clinical outcomes of physiotherapy. This study do not agree with the findings of the study.

The majority of the respondents representing 70% (n=7) said that they did not know how the treatment given to them works. One of the participants said "I do not know exactly how the treatment works". While the other said "It is difficult to explain how it works". The minority of the respondents representing 30% (n=3) expressed an idea of how physiotherapy treatment works. One said "Helps to release the muscles, and another said "Reduce stiffness". According to a study done in New Zealand on patient perception of benefits of physiotherapy majority of these patients did not know the benefits of physiotherapy (Reid et al 2015).

Conclusion

The study showed that the majority of patients with osteoarthritis of the hip and knee view physiotherapy as beneficial. Most said that physiotherapy treatment has resulted in reduction of pain and improvement of physical function. As the treatment has helped to reduce the pain, they are able to walk for a longer distance and find it easier to perform house chores. The study also showed that most patients need information of how physiotherapy treatment works. Many had no idea of how physiotherapy works in treatment of arthritis. There is therefore need to educate patients on how physiotherapy works.

Recommendation

More information should be made available to patients on how

physiotherapy works to bring about benefits.

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Case Series Of Local Experience In Differentiated Thyroid Cancer Management In The Department Of Nuclear Medicine And Research In Zambia

Aubrey Musonda ^{1,2}, Chibamba Mumba ³, Alex Makupe ^{1,2}, Oswald Khondowe ⁴, Lydia Hangulu ⁴, Arnold Hamapa ⁴

1. University Teaching Hospital
2. Ministry of Health
3. University of Zambia
4. Faculty of Health Science, Lusaka Apex Medical University, P.O. Box 31909, Lusaka, Zambia.

*Corresponding author: amusonda@yahoo.com

4. Department of Paraclinical Science, School of Veterinary Medicine, University of Zambia, P.O. Box 32379, Lusaka, Zambia

5. The Central Veterinary Research Institute, Ministry of Fisheries and Livestock, P.O. Box 33980, Lusaka, Zambia

Abstract

Thyroid cancer accounts for about 2% of all malignancies in the world. The incidence has tripled in the USA from 1975 to 2009 and worldwide due to incidental detection of small volume papillary carcinomas on imaging studies. The increase in incidence could be related to increased use of imaging modalities and fine needle aspiration with changes in histologic criteria. This maybe similar to the Zambian scenario which has led to early diagnosis and prompt treatment in patients with differentiated thyroid cancer.

The aim of this study was to evaluate differentiated thyroid cancer management of the first two cases in nuclear medicine department.

This was a case series design. It looked at the first two patients who diagnosed and managed at the Department of Nuclear Medicine and research, the university Teaching Hospital, Lusaka, Zambia. The cases were selected using convenience sampling and included the first two cases.

The participants included two females aged 66 (Case 1) and 48 (Case 2) referred from local clinic and medical admission ward respectively. Case 1 presented with invasive and incompletely excised papillary thyroid carcinoma, classic variant type with no metastases. Case 2 presented with papillary thyroid cancer diffuse variant and no metastases. The treatment plan for both cases included thyroidectomy and I131 ablation with excellent response.

The use of radioactive iodine therapy in management of DTC is well established as it may reduce risk of recurrence, improves patients quality of life and overall survival rate.

Key words: Differentiated thyroid cancer, multiple endocrine neoplasia, multinodular goitre, Thyroid stimulating hormone and radioactive Iodine therapy.

Introduction

Thyroid cancer accounts for about 2% of all malignancies in the world (Cancer Research UK 2013). The incidence tripled in the USA between 1975 and 2009 and worldwide due to incidental detection of small volume papillary carcinomas on imaging studies (Davies & Welch, 2013). The increase in incidence could be related to increased use of imaging modalities and fine needle aspiration with changes in histologic criteria (Hodgson, et al, 2004). This may be similar to the Zambian scenario which has led to early diagnosis and prompt treatment in patients with differentiated thyroid cancer (DTC). According to Cinar and Tas, (2015) cancer in the elderly, 60% of all cases with cancer, and 70% of cancer-related deaths occur in patients aged 65 years and over. The most common subtypes of thyroid cancer are papillary, follicular, medullary and anaplastic. Thyroid follicular cells give rise to two forms of DTC: papillary which accounts for approximately 85% and follicular thyroid cancer which accounts for about 12% (American Thyroid Association, 2015). DTC is defined as carcinoma derived from the follicular epithelium and retain basic biological characteristics of healthy thyroid tissue, which include the capacity to express the sodium iodide symporter (NIS) (Schmidbauer, Menhart, Hellwig & Grosse, 2017). Anaplastic and poorly differentiated thyroid cancers are rarer and aggressive. The American Thyroid Association Medullary Cancer Guidelines (2008), indicate that the medullary thyroid cancer arises from the C-cells and accounts for about 4% of thyroid cancers, and is less often associated with multiple endocrine neoplasia type 2 (MEN2) (Kloos et al., 2008). The survival rate depends on the histological subtype at presentation, patients age and tumour differentiation (Haugen et al., 2015).

Over a number of years, there has been significant advances in diagnosis and therapy of DTC. However, controversies still exist (Haugen et al., 2015). Feasibility and cost implications of the diagnostic and therapeutic options present practical challenges in many low-income countries including Zambia. Traditionally, the treatment of thyroid cancer usually requires surgical removal of the thyroid gland often with compartmental dissection of abnormal lymph nodes followed by radioactive Iodine therapy (RAI) to destroy any remnant benign or malignant thyroid tissue. Following thyroidectomy and ablation therapy, the management protocol includes administering appropriate suppressive thyroid stimulating therapy (TSH) therapy which could improve the outcome especially in high-risk patients (Luster et al, 2008, Haugen et al, 2015). It has been reported that over suppression has no additional value to the management of the patient but causes adverse effects which may include subclinical

thyrotoxicosis, atrial fibrillation, exacerbation of angina and osteoporosis (Sugitani & Fujimoto, 2010). Chemotherapy and radiation therapy treatment options are not used in routine treatment of DTC, but in a few exceptional cases (Cooper et al, 2006).

It is anticipated that results of this study may inform the improvement of clinical practice and patient care management. Zambia currently has no national protocol in the management of DTC. This study may inform the development and adoption of local protocols. Research results may also add to the body of knowledge on clinical practice and patient care management of patients with DTC.

Objective

This study was conducted to evaluate differentiated thyroid cancer (DTC) management in a nuclear medicine department

Design

This study used the case series design.

Population and Sample

The first two participants who were diagnosed and managed were enrolled in the study.

Setting

The study was conducted at the Nuclear Medicine and Research Department at the University Teaching Hospital.

Sampling Technique

The cases were selected using convenience sampling and included the first two cases.

Data Collection

The data was collected via record review. These records included information generated from the health facilities which referred them for further management.

Clinical Cases

There were two cases under the review period, both females aged 66 and 48 years old.

Case 1

A 66 year old female was referred from a local clinic for euthyroid goitre with associated occasional difficulty in swallowing. There were no other presenting symptoms. There was no history of thyroid disease in the family or neck irradiation. She was known to have hypertension which was well controlled by medications. Otolaryngology assessment was none revealing.

Investigation and Findings

The ultrasound of the neck demonstrated a diffusely enlarged thyroid gland, heterogeneous in texture, suggestive of multinodular goitre (MNG). About 2 months from first presentation, the patient underwent right lobectomy in January 2018 for MNG. Intra-op the right lobe was described as enlarged with multinodular lesions. The CT scan of the head and neck done in January 2018, post right thyroidectomy showed some collection with foci of air in the right thyroid fossa and left lobe of thyroid was enlarged in size with multiple ill-defined hypodense areas with foci of calcification in it (Fig 1). There was no evidence of metastases. In February 2018, left lobectomy was done for the purpose of total thyroidectomy. Histologically, the tumour was papillary thyroid carcinoma, classic variant type described as invasive and incompletely excised.

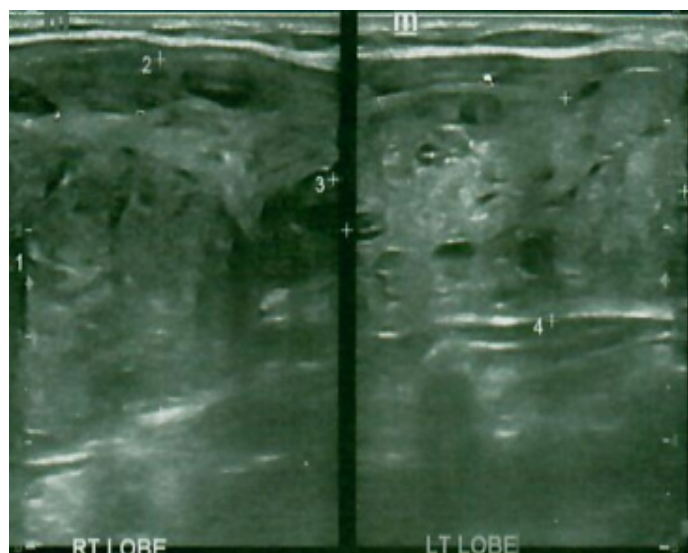


Figure 1 Diffusely enlarged thyroid gland

Lympho-vascular and perineural invasion was not identified. The tumour was positive for margins. Then the patient was referred for radio-active iodine therapy (RAIT). Investigations done prior to ablation included the following: (i) thyroid-stimulating hormone (TSH) was measured at more than 60uIU/ml which was conducive for therapy (ii) the pre-ablation whole body scan (WBS) with I131 showed remnant tissue in the thyroid bed with no loco-regional or distant metastases (Fig 2). About 6 weeks post completion thyroidectomy, the patient was ablated with 2960 MBq of I 131 capsule, according to the stage and risk stratification.

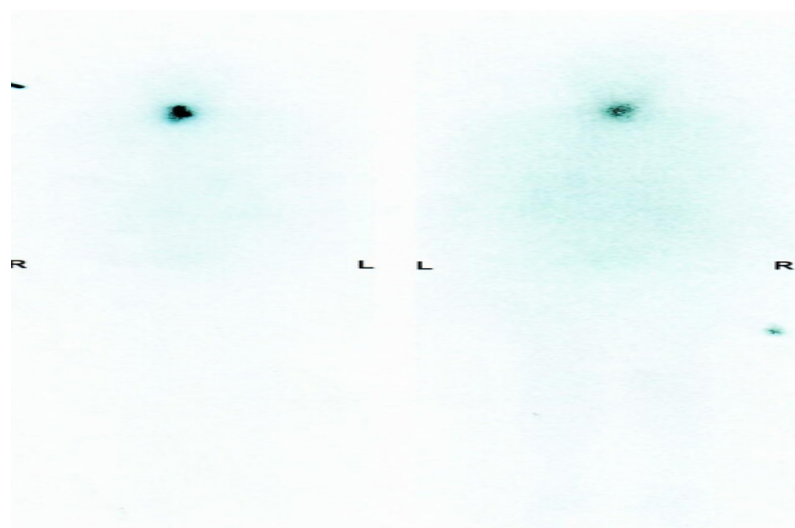


Figure 2 Pretherapy I131 scan showing residual thyroid tissue with no distant metastases

During follow up, the patient's unstimulated TSH, serum TG was 0.8mg/ml and anti TG- antibodies was within normal. The follow-up ultrasound of the neck showed no thyroid gland which was in keeping with the previous therapy. The WBS with I-131 demonstrated no remnant tissue in the thyroid bed or the rest of the body. Clinically the patient presented with no persistent, recurrent or new symptoms related to DTC.

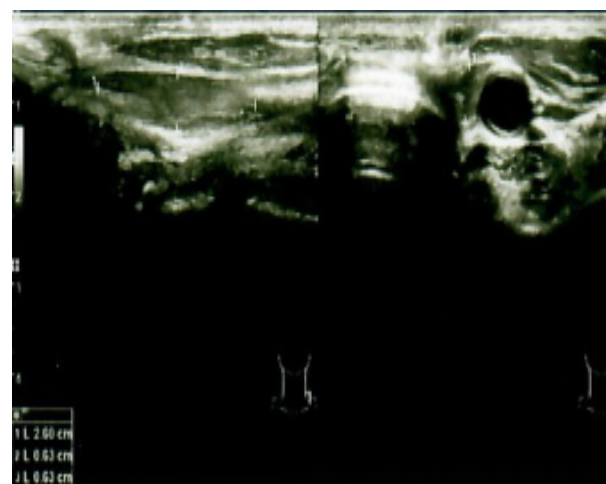


Figure 3. Thyroid Ultrasound post I131 therapy

Using the criteria in the EANM/ATA this was classified as an excellent response. At the time of publication, the patient was on a 2-5 years follow-up plan and suppression thyroid therapy.

Case 2

The patient was a 48-year-old female diagnosed with papillary thyroid cancer diffuse variant. She was referred from the medical admission ward with incidental findings of small painless lumps in the lower part of the right-side of the neck. The baseline thyroid function blood tests were within the normal ranges. Ultrasound of the neck was done which confirmed the presence of multiple nodules in the thyroid (Fig 4). MRI of the brain and neck was requested which revealed lesions in both thyroid lobes of varying sizes. The brain was normal. She had no other presentation or comorbidity.

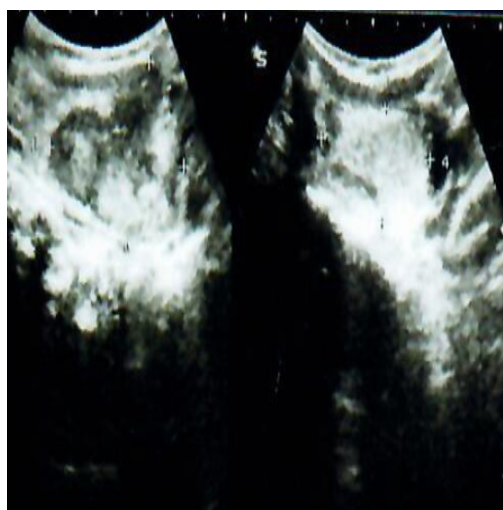


Figure 4. Staging Ultrasound-Multiple solid hypoechoic nodules

The patient had a right hemi-thyroidectomy in January 2017 for what was thought to be MNG, histopathology results showed papillary thyroid carcinoma, diffuse variant. Total thyroidectomy was done 3 months later. Following the aforementioned diagnosis, the patient was referred to Nuclear Medicine Department for ablation where further multiple investigations were conducted for staging, prognosis and risk stratification. A pre-ablation I131 whole body scan (I131-WBS) showed remnant tissue in the thyroid bed with no loco-region or distant metastases (Fig 5). ultrasound scan of the neck, computer tomography (CT) scan of neck and chest, Full blood count (FBC) results were normal and TSH was sufficiently raised at 63.21uIU/ml.

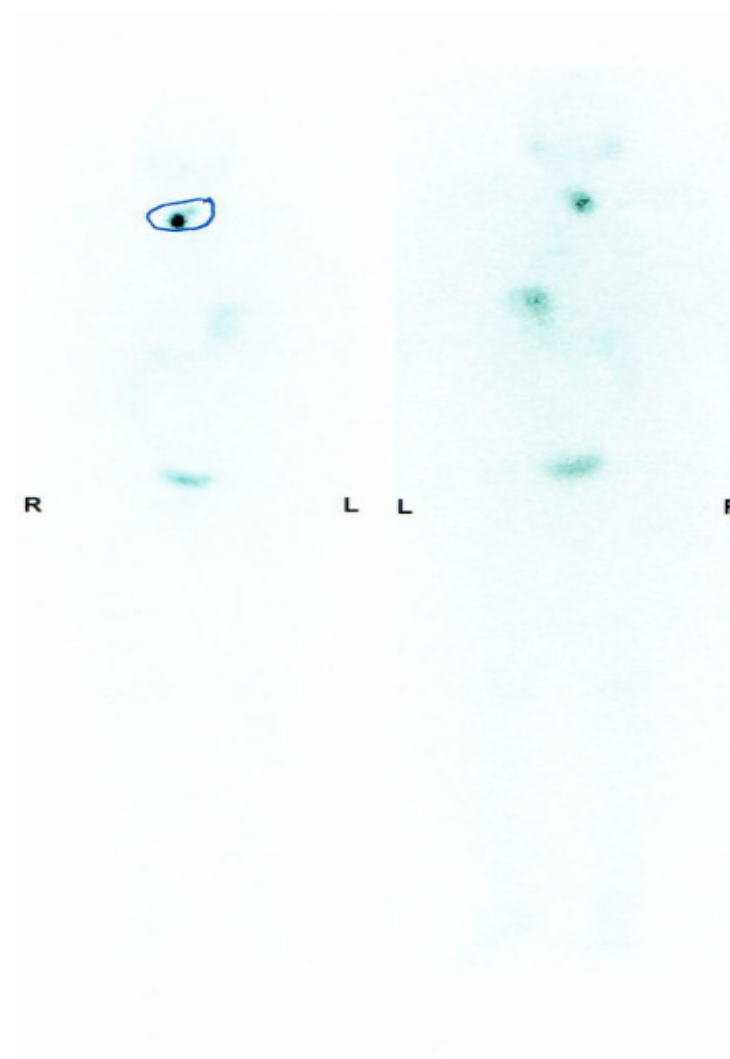


Figure 5. Pretherapy I131 scan showing residual thyroid tissue with no distant metastases

Using the history, examination and diagnostic and staging work up, the patient was categorized into the intermediate risk group and she was ablated with 2150MBq of I131. The post ablation WBS scan was done on day 2 and it showed uptake in residual tissue in thyroid bed and normal biodistribution in the rest of the scan. About a year post ablation, follow up assessment was done. Unstimulated TSH serum TG and anti TG- antibodies were done which were at 0.12ng/ml and within normal respectively. Additionally, on the follow up U/S of the neck no thyroid gland was seen in keeping with the previous therapy. The WBS with I-131 demonstrated no remnant tissue in the thyroid bed or the rest of the body (Fig 6). Using the criteria in the EANM/ATA this was classified as excellent response. At the time of publication, the patient was on a 2-5 years follow- up plan and suppression thyroid therapy (Haugen et al., 2015).

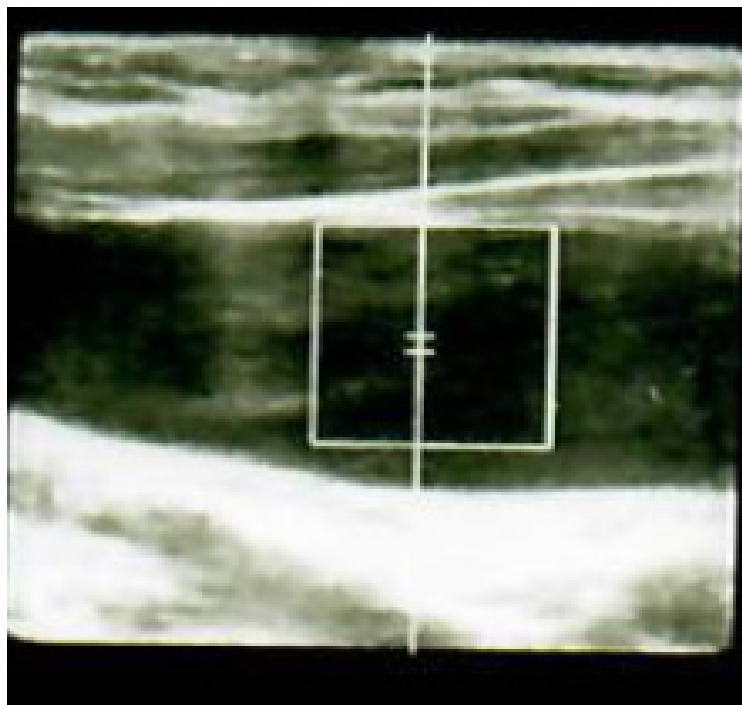


Figure 6. Post-I131 therapy-no thyroid gland

Discussion

Differentiated thyroid cancer patients can present with a varying degree of symptoms depending on the extent of the disease. Wartofsky L et al noted a wide range of presenting symptoms which included cough, dysphagia, odynophagia, haemoptysis, vocal cord paralysis and bone pain mostly in advanced disease (Nguyen et al, 2015). The patient may present with nodal metastases especially papillary thyroid cancer while lung and bone metastases are a rarer form of presentation (Nixon et al, 2012). Our patient who presented with occasional difficult to swallow was most likely due to compression symptoms as opposed to metastases since no local disease involvement was found. The other patient presented with a thyroid incidentaloma with no other presenting symptoms. A thyroid incidentaloma is an expected asymptomatic thyroid tumour discovered during the investigation of an unrelated condition (Russ, Leboulleux, Leenhardt, Hegedüs & 2014). The risk of malignancy in thyroid incidentaloma is similar to that of all thyroid nodules at 5 -13% in the absence of clinical risk factors (Russ, Bonnema, Erdogan, Durante, Ngu, Leenhardt, 2017; Yoon, Lee, Kim, Moon & Kwak, 2016).

A number of investigations are carried out to diagnose or confirm the diagnosis, stage, risk stratify and grade differentiated thyroid cancer diseases. This helps in planning for the most effective and appropriate individualised therapy for the patient. The investigations include Ultrasound scan of the neck (U/S), thyroid function test (TFT) for T3, T4, TSH, full blood count (FBC), ultrasound guided fine needle aspiration for cytology (FNAC)

or biopsy, Whole body scan with I 131 (I131 WBS), Chest x-ray, CT of neck and chest, Single photon emission computer tomography (SPECT) or SPECT/CT and Positron emission tomography (PET) or PET/CT (Luster et al 2008).

All our patients had pre-therapy U/S of neck and U/S guided FNAC. The main aim was to exclude thyroid cancer among nodules which occurs in 7- 15% depending on factors such as age, sex, neck radiation exposure history and family history. The U/S was performed to evaluate thyroid mass whether solid or cystic. U/S also assisted in diagnosing enlarged cervical lymph nodes (Nguyen et al, 2015). According to Haugen et al (2015), the thyroid nodules are a common problem with prevalence of palpable thyroid nodules approximated at (1-5 %) depending on gender in iodine sufficient parts of the world. This figure goes higher when a high-resolution U/S is used to 19- 68% of random selected individuals (Haugen, et al., 2015).

FNAC is an accurate and cost-effective method for evaluating thyroid nodules. When the procedure is performed under the guidance of U/S as compared to palpation, non- diagnostic and false – negative rates are reduced (Chung & Kim, 2019). The I131 WBS were done to stage the patients for loco-regional or distant metastases. These were pre-ablation and post-ablation scans to assess for iodine avidity and further assess the uptake and metastases respectively. CT of the neck and chest were performed in order to assess for metastases such as cervical lymph nodes as well as evaluate the anatomical extent of the tumour into the substernal region. Chest radiography is usually done if there are suspicious of lung metastases and in our set up this is routinely done before thyroidectomy. MRI is not routinely done in thyroid cancer evaluations but can be very instrumental in incidentaloma pick up (Sugianto et al., 2018). PET is more useful in recurrent or metastatic disease with negative I131 WBS but elevated serum thyroglobulin (TG) but not in routine usage (Leboulleux et al., 2007).

All our patients had their thyroid function tests done as part of the initial evaluation, in line with ATA 2015 (6). If serum TSH is subnormal, a radionuclide thyroid scan is done to ascertain the hot, warm, or cold nodules. A hot nodule has a low likelihood of harbouring malignancy and cytology may not be necessary. However, a high serum TSH level (even high normal) is associated with increased risk of malignancy in a thyroid nodule (Golbert et al., 2017). In the studies done by Biondi B et al, they reported that thyroid cell proliferation is TSH dependent to an extent that highly differentiated thyroid malignancies maintain that property. The principle of suppressive TSH therapy is based on this too (Golbert et al., 2017).

Management of DTC is based on the stage, risk stratification and prognostic factors which include Age > 55 years (AJCC8) or >45 years (AJCC7), tumour size, advanced stage, gender, extra thyroidal invasion and distant metastasis. Generally, DTC are not very aggressive tumours, with the best outcomes in low and intermediate risks.

Surgery has been recognized as the first line of therapy in DTC (Jayarangaiah et al., 2019). However, there are some exemption where surgery may not be indicated immediately such as, patients with very low risk tumour, patient at high surgical risk because of comorbid conditions, patients expected to have a short life span or those with medical or surgical conditions that need to be stabilised first (Haugen, et al., 2015). Most commonly used options for surgery include lobectomy, subtotal thyroidectomy depending on the stage, stratification, prognostication factors and the use of radioactive iodine therapy (RAIT). Many of our patients initially used to undergo lobectomy or subtotal thyroidectomy. This was because there was no RAIT being provided and many surgeons felt the need to avoid hypothyroidism by sparing some thyroid tissue. One problem with this approach is the high risk of recurrence associated with DTC especially in the intermediate and high-risk groups. However, with the current availability of RAIT, total or near total thyroidectomy is being performed more. Surgery is known to optimize disease free survival, overall survival, and quality of life in patients (Haugen, et al., 2015; Luster et al., 2008). Additionally, TT or near total thyroidectomy facilitates the use of radioactive iodine for ablation, adjuvant treatment and to utilise serum thyroglobulin in the follow up of patients. RAIT is given for ablation of remnant thyroid tissue, microscopic tumour foci and treatment of metastases thus reducing the chances of recurrence. The ablation of remnant thyroid tissues allows for the adequate follow up and early detection of recurrence with Tg and WBS (Bal & Ajit Kumar Padhy, 2015). The EANM recommends ablation of all differentiated thyroid cancer patients with tumour size above 1cm with RAIT (Cinar & Tas, 2015). Our patients were in the low to intermediate-risk disease and were given therapy in line with this EANM and ATA guidelines. In our patients, thyroid hormones supplements were not prescribed for 4 – 6 weeks post thyroidectomy in order to facilitate for the elevation of TSH to more than 30uIU/ml which stimulate RAI uptake and Tg release (Haugen et al., 2015). After TSH elevation, RAIT was administered in form of capsules (Haugen et al., 2015). In an event that TSH elevation is inadequate, and this is mostly due to extensive functioning thyroid cancer tissues left insitu post-thyroidectomy, recombinant human TSH (rhTSH) is used (Haugen et al., 2015). However, this option is not very practical in our resource constraint environment due to the cost

and limited availability of rhTSH, although it would be preferred by many patients. Post-ablation the patients were put on thyroid hormonal therapy. This serves to correct post-thyroidectomy and ablation hypothyroidism and also to suppress the growth of cancer cells by reducing TSH level.

Follow up assessments of our patients was done with the aid of clinical response, Tg with anti TG-antibodies, TSH, ultrasound scans and I131 WBS 6- 12 months post therapy. Tg as a tumour marker is supposed to be undetectable post TT and ablation. The first patient had Tg of 0.8ng/ml and the second it was 1.0ng/ml with normal anti TG anti-bodies on TSH stimulation. The neck ultra sounds and I131 WBS were negative for both case studies indicating excellent therapeutic responses. The ATA 2015 describes the status of the patient during follow up as excellent response, biochemical incomplete response, structural incomplete response or Indeterminate response depending on the clinical laboratory and imaging results (Haugen et al., 2015).

Conclusion

The use of radioactive iodine therapy in the management of DTC is well established and has been proven preceded by total or near total thyroidectomy. This reduces the risk of recurrence, improves the patients' quality of life and the overall survival rate. The success of this therapy depends on a multidisciplinary team approach and a well-structured follow up system. Case series have limitations such as none generalisation of findings. As such, there is need to conduct prospective studies based on larger sample sizes and interpretation with caution.

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