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Radiation Dermatitis and Body Mass Index in Patients Receiving External Beam Irradiation: A Case of a Harare Cancer Treatment Centre

Felistus Mawisire
Therapeutic Radiographer

Abstract

The skin is exposed to radiation in the delivery of external beam radiotherapy (EBRT) and 95% of patients on the treatment for various malignancies seem to experience radiation induced skin reactions (radiation dermatitis). The severity of radiation dermatitis appears to be relative to body size in breast cancer patients, but there is no such information on many other sites in cancer patients. It was found imperative to delineate the BMI category of patients susceptible to skin reactions in an effort to appraise future patient centred care for patients on EBRT. This study used the quantitative methods research, longitudinal in nature, in analysing the correlation of radiation dermatitis to body mass index over each individual participant's treatment duration up to at most five weeks. There were 34 enrolled participants in this study. The research used 2Gy fractionation, but the planning maximum skin dose was not recorded. The structured interview were the data collection tools. Assessments for skin reactions were done after every 5 sessions, therefore, 10Gy of treatment, and this was graded according to the WHO criteria for radiation dermatitis. This was further divided into four BMI groups, namely below weight, normal weight, over weight and obese. The data was analysed using the IBM SPSS Version 21 and presented in various forms. Various skin reactions were observed in participants. After receiving 10Gy of EBRT more participants in the lower BMI groups had no skin reactions for the below weight (60%) and normal weight (66.7%). At least grade 1 skin reactions were seen in higher BMI groups; for over weight (62.5%) and obese (75%). After 50Gy of EBRT, all BMI groups suffered grade 2 reactions (42.95% to 100% of each group participant), but the grade 3 reactions were only seen in the overweight group (27.3% of its participants). The Pearson correlation of the skin reactions to the body mass index was found to be positively related for each 10Gy of treatment received and was given as r = 0.305 (sig 2-

tailed 0.114) for 20Gy and r = 0.182 (sig 2-tailed 0.429) and r = 0.138 (sig 2 tailed 0.550) for 40Gy and 50Gy received, respectively. The Fisher test gave an odds ratio of 1.8 for BMI underweight to BMI overweight, at 40Gy and 50Gy, that is, grade 2 reactions increasing with radiation dose. The higher BMI ranges were reported to suffer the higher degree of radiation dermatitis as compared to their lower BMI range counterparts for all anatomical treatment areas. Recommendations have been made to improve EBRT patients' habits and practices to those that reduce skin reactions. In addition, recommendations were given to providers of cancer treatment to implement more skin sparing techniques over and above the need for further research with more participants and also analysing the maximum skin dose received.

Keywords: External beam radiotherapy, Radiation dermatitis, Body mass index.

Background

Radiotherapy is the treatment method most favoured in cancer patients and about 66% of cancer patients receive radiotherapy at some point in their disease management (Berkey, 2010). External beam radiotherapy (EBRT) is given for a variety of cancers such as of the cervix, the breast, lung cancer, head and neck, skin, prostate, genito-urinary and ano-rectal cancers, which are on the increase (Sitas, 2006). In the administration of the radiation treatment, the skin is exposed and gets radiation induced skin reactions, seen in up to 95% of the patients (Ryan et al., 2013; Naylor & Mallet, 2001).

Radiation dermatitis is brought about by the interaction of the radiation with the skin tissue in external beam radiation therapy (EBRT). In the treatment of deep seated organs, the observations made are that the skin may sometimes receive a very significant radiation dose, usually if the field placement is not skin sparing (McQuestion, 2011). The severity of skin reactions have been reported to be relative to body size in breast cancer patients, but there is no such information on many other sites in cancer patients (Wells & MacBride, 2004).

Most studies have focused on obese patients without paralleling the effect on lower body mass index (BMI) participant groupings. There is paucity of data on the relationship between patient body mass index and severity of radiation dermatitis in patients receiving external beam irradiation.

The radiotherapy service utilisation in the Southern African region is expanding (Sitas et al., 2006). Clinical trials and cancer research studies have been done mostly in developed countries, but most of those done in the African region or local contexts are mostly epidemiological (Chokunonga et al., 2014). Incidences of cancer in Zimbabwe are on the increase due to varying factors such as diet and eating habits, and lifestyles which are radically transforming (Chokunonga et al., 2014). Co-morbidities such as HIV, HPV and hepatitis B related infections are also raising cancer incidence in Africa (Chokunonga et al., 2014). Lack of adequate resources have hindered the efforts to control cancer not only in Zimbabwe but in sub-Saharan Africa (Sitas et al., 2006). In Zimbabwe, cancer treatment is offered in government institutions and a new private cancer treatment centre entered the national health delivery service and participates in contributing to alleviating the cancer burden by providing comprehensive cancer treatment and care to affected oncology patients (Kunambura, 2016). Most of the affected cancer patients receive radiotherapy in varying combinations and using two-dimensional (2D) and three-dimensional (3D) radiotherapy treatment field definitions, and they develop skin colouration, pigmentation or even ulcerations on the body area that is affected (Simpson & Godwin, 2011). The above-mentioned developments imply that the treatment of patients for cancer in Zimbabwe has increased and more are receiving EBRT. The volume of people likely to experience radiation induced skin reactions is proportionally on the increase.

Objectives

1) To determine the incidence of skin reactions in patients with varying body mass indices in those receiving external beam irradiation.

2) To establish the body mass index of patients receiving external beam irradiation.
3) To establish the skin reactions experienced by patients receiving external beam irradiation.
4) To establish the relation between body mass index and severity of skin reactions among patients receiving external beam irradiation.

Research Methods

Data was collected from cancer patients receiving external beam radiation at a cancer treatment centre in Harare. The research site was a new cancer treatment centre, which was slowly increasing patient numbers. Albert-Miller (2009) suggested that, in situations where the entire population was very small, the type of research would include every subject, but this was not feasible as some subjects were discriminated against by virtue of neither having either enough treatment fractions nor not having 2Gy fractionation. In addition, some subjects did not receive radiation exposure up to the desired minimal external beam radiation dose as desired by the research criteria. The non-probability sampling, which is non-random, but subjective, pre-determined, and purposive, giving the researchers the privy to capture a range of required relevant aspects, but for each subject in the population to be incorporated into the study, was used (Saunders et al., 2012). Participants receiving EBRT at the cancer treatment centre, who were receiving Mega Voltage X-Ray treatments, at least doses of 36Gy or their treatments were of at least 3 weeks duration were included in the study, but those whose treatment target was the skin (e.g., keloids, skin cancers) were excluded from the study.

Primary data used in this research were in the form of a questionnaire and an analysis of patient treatment records were utilised to correlate the sessions received and the treatment modalities used to the skin reactions. From the analysis descriptive and inferential statistics were derived and presented as Pearson correlations, statistical reports, tables, pie charts, frequency polygon for data collection in this research. The data collected was analysed by the help of the IBM SPSS version 21 package. The t-

test and alternative form were used to assess the reactions and line graphs, and the presentation of the frequency distributions were in terms of ratios and percentages.

The study was structured in such a way that it did not force nor interfere with the participants' welfare. Terre Blanche et al. (2006) upheld that it is important for the research to be permitted by an authority. Permission to research was sought from and granted by all relevant authorities, that is, the research site (Appendix 3), the academic institution (Appendix 2), and the Medical Research Council of Zimbabwe (MRCZ) (Appendix 1). Patients' informed consent was obtained and confidentiality was tightly maintained, and no personal identifying information is in the study. This study was therefore compliant with all ethical considerations and varied conditions as purposed by participating and governing institutions.

Results

The age range of the participants was from just below 20 years up to the 79 years, 82.3% of the participants being 40years old or above, with equal numbers of males to females in the sample. Most of the participants (mode) were in the overweight group at 47.1%. More than half of the participants (58.9%) were found to be above normal BMI range, whilst only 26.5% were in the normal BMI range. The life style and pre-existing skin condition of participants was recorded as in Figure 1 below:

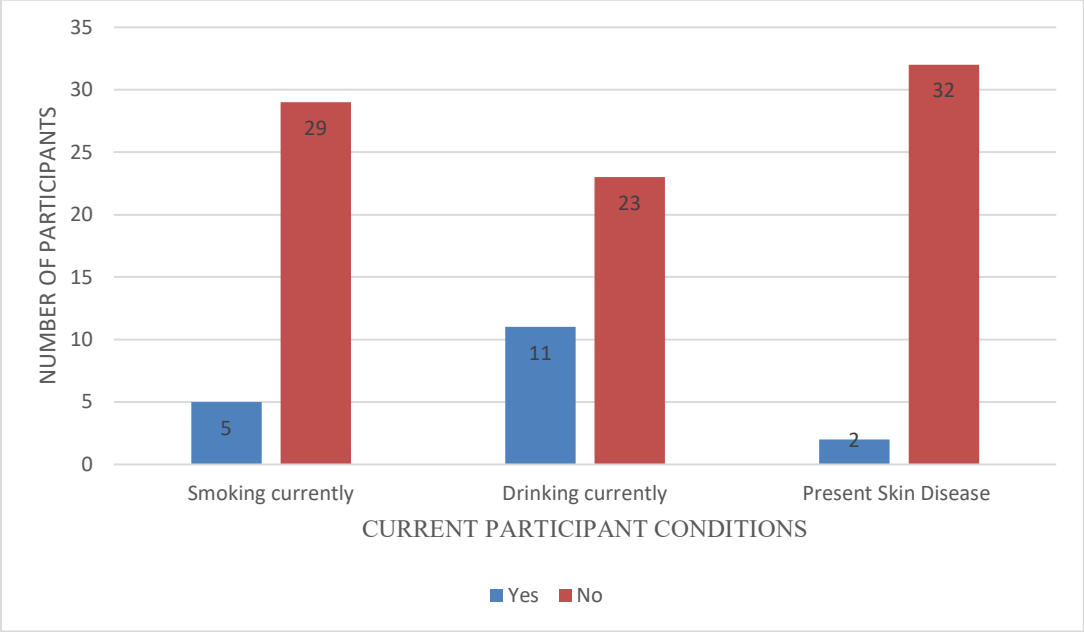

Figure 1: Current participants' condition

The majority of the participants were not smoking (85.3%), nor drinking (67.6%), and did not have any co-existing skin conditions (94.1%) at the time of the EBRT.

The most anatomical regions treated were the pelvis (29.4%), the chest (26.5%) and the head and neck (23.5%). Some of the participants (73%) were not on any concurrent treatment while 64.7% were on 6MV treatments and 76.5% were on 3D treatments. The treatment durations ranged from 3 weeks to 5 weeks. Some of the participants (64.7%) had 5 weeks of EBRT.

Over 85% of all participants were applying the required skin care. The skin reactions were tabulated in Figure 2 below.

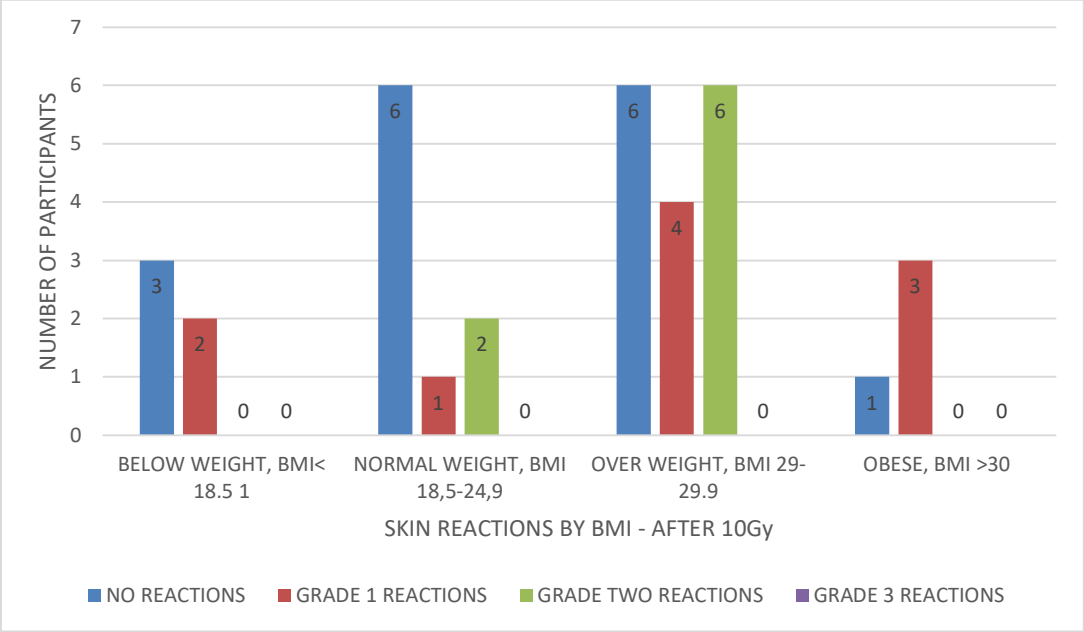

Figure 2: Classification of 10Gy Skin Reactions by BMI Groups

The ratio of participants in each group who had no skin reactions compared to those in the same group who had skin reactions was mostly in the lower BMI groups.

Participants with no reactions were found in all BMI groups. Of all the participants in the above normal BMI groups, 26.7% had grade 1 reactions whilst 50% and 100% of overweight and obese BMI ranges respectively had grade 2 reactions.

Of the participants after 30 Gy of treatment, all BMI groups suffered grade 2 reactions (61.5% to 100% of each group participant), but the grade 3 reactions were only seen in the overweight group (7.7%).

Of the participants after 40 Gy of treatment, all BMI groups suffered grade 2 radiation dermatitis, and 23.1% of overweight participants experienced grade 3 dermatitis, whilst one participant (4.5%) had no skin reactions.

After receiving 50Gy, the distribution of skin reactions was further classified by BMI Groups and the results were as shown in Figure 3 following:

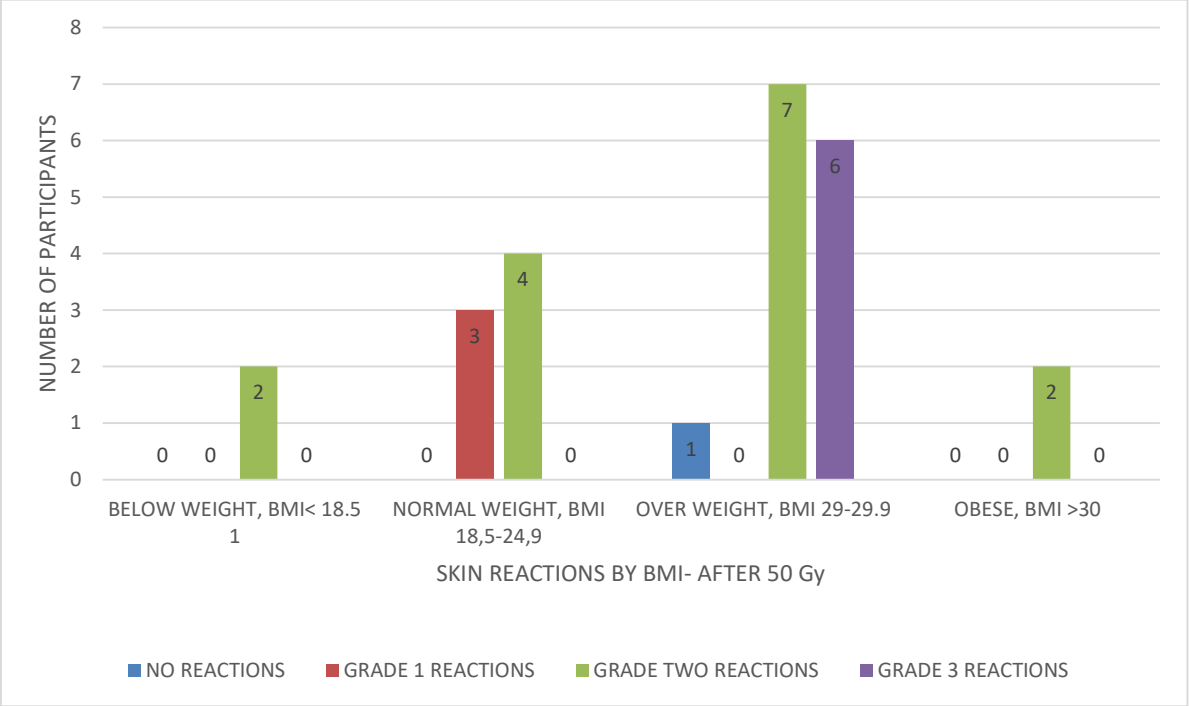

Figure 4: Participants' classification of skin reactions by BMI groups

All BMI groups suffered grade 2 reactions (42.95% normal weight, 63.6% overweight and 100% of each of underweight and obese group participant). The grade 3 reactions were only seen in the overweight group (27.3% of its participants).

The Pearson correlation of the skin reactions to the body mass index was found to be positively related for each 10Gy of received treatment and was given as r= 0.305 (sig 2-tailed 0.114) for 20Gy received and 0.182 (sig 2-tailed 0.429) and 0.138 (sig 2 tailed 0.550) for 40Gy and 50Gy received, respectively. The Fisher test gave an odds ratio of 1.8 for BMI underweight to BMI overweight at 40Gy and 50Gy, that is, grade 2 reactions increasing with radiation dose.

The results indicated that participants were both male and female, and most of them not only adhered to recommended skin care practice, but were also not smoking, not drinking and did not have any skin conditions. On treatment delivery, it covered all

anatomical treatment areas and was mostly 6 MV and 3D, with no concurrent anti-cancer treatment and was over 3 to 5 weeks with a weekly dose of 10 Gy. Whilst the skin care was almost uniform, the weekly reported skin reactions onset was in week 1 and progressed with increasing BMI over the weeks for each participant's treatment duration.

Discussions

There was an equal number of male and female participants , with majority over 40 years of age, and the mode being the 50-59 years age group. This is the opposite of the current Zimbabwe National Cancer Registry figures which reported that the distribution of cancers by ages have been lowered by prevalence of HIV- related malignancy (Chokunonga et al., 2014). The participants were therefore mostly not affected by the epidemic type of malignancies. The majority of the participants were not smoking (85.3%), nor drinking (67.6%) and did not have any co-existing skin conditions (94.1%) at the time of the EBRT. The fact that 73% of participants were not on any concurrent treatment means that the onset and severity of skin reactions experienced by the participants were mostly not from aforesaid treatments but EBRT.

Most participants were being treated the pelvis, chest, head and neck areas, respectively. This agrees with Zimbabwe National Cancer Registry statistics on cancer prevalence in males and females. (Chokunonga et. al., 2014). The treatment durations varied from 3 weeks to 5 weeks. It could have helped to follow up the participants for a longer period even up to 3 months to note the clearing of the skin effects and the possibility of late effects (Bolton, 2014). The majority (64.7%) were on 6MV, and 76.5% were on 3D treatments. Ten MV has better skin sparing abilities and; hence, if dominate, the reactions could have been less (Podgorsak, 2005).

The distribution of the participants by BMI ranges showed the majority to be overweight (47.1%) followed by normal weight. The findings are consistent with results in an American study comparing black and white cancer patients where the

majority of black participants were in the higher BMI ranges (Ryan et al., 2007). The skin care recommended was the protocol practised at the cancer treatment centre and helped standardise the skin care among all the participants (Radiographers, 2015). Most participants (85.3%) were gently washing with mild soap and 88.2% were not applying any lotion consistent with practice that help minimise reactions and infections as recommended by Salvo et al. (2010).

There is an upward trend in the radiation dermatitis seen as the dose received progressed, but in agreement with reports from a study by Bolton et al. (2014).

The BMI and skin reactions are positively related for each week of treatment and were given as r= 0.305 (sig 2-tailed 0.114) for week two and 0.182 (sig 2-tailed 0.429) and 0.138 (sig 2 tailed 0.550) for week four and five, respectively. The Fisher test gave an odds ratio of 1.8 for BMI underweight to BMI overweight, at 40Gy and 50Gy, that is, grade 2 reactions increasing with radiation dose.

There is therefore a change in severity of skin reactions with change of BMI.

The study could have been more reliable if a lot of aspects were standardised such as selecting patients being treated in the same anatomical region, being treated on the same skin sparing EBRT machine energy used and the same field placement and the planning maximum skin dose being recorded for each participant. Assessing a large number of participants was desired but not feasible at the time of the study, but future similar studies with more participants would make the research more reliable.

Recommendations

The patients in the higher BMI groups have to exercise a lot of caution. Of note is smoking, drinking and evidence based skin care whilst on EBRT to reduce the likelihood of radiation dermatitis. A further research, where or when massive patient numbers can be enrolled and each anatomical treatment area on participants can have significant numbers to allow adequate numbers for all BMI groups for conclusive

results. Longitudinal studies ought to be conducted over a long duration to not just capture acute effects, but also record the planning maximum skin dose and also incorporate long term effects.

Objective radiation dermatitis measuring instruments, such as spectrophotometer and colorimeters, which give numeric measures of skin reaction ought to be used. Further studies with specialised treatment techniques such as IMRT would also need to be done. Such techniques will soon be available at cancer treatment centre as the aforesaid, and would lower radiation dermatitis, according to De Langhe et. al. (2014), Ryan et. al. (2013) and Naylor (2001).

Radiation dermatitis is a treatment modality defining term in Zimbabwe, so mitigating the effects would ensure participants finish their EBRT course without mishaps and probable interruptions. This would therefore improve disease prognosis and patient treatment outcomes.

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APPENDIX 1: Medical Research Ethics Clearance: Medical Research Council Of Zimbabwe (MRCZ)

Telephone: 791792/791193
Telefax: (263) - 4 - 790715
E-mail: mrcz@mrcz.org.zw
Website: http://www.mrcz.org.zw

Medical Research Council of Zimbabwe
Josiah Tongogara / Mazoe Street
P. O. Box CY 573
Causeway
Harare

APPROVAL LETTER

REF: MRCZ/B/1129 16 September, 2016

Felistus Mawisire
6797 Zimre Park
Ruwa
Zimbabwe

RE: RADIATION DERMATITIS AND BODY MASS INDEX IN PATIENTS RECEIVING PELVIC IRRADIATION: A CASE FOR A HARARE CANCER TREATMENT CENTRE

Thank you for the above titled proposal that you submitted to the Medical Research Council of Zimbabwe (MRCZ) for review. Please be advised that the Medical Research Council of Zimbabwe has **reviewed** and **approved** your application to conduct the above titled study. This is based on the following documents that were submitted to the MRCZ for review:

a) Study proposal
b) Questionnaires
c) ICFs

APPROVAL NUMBER : MRCZ/B/11219
This number should be used on all correspondence, consent forms and documents as appropriate.

- **APPROVAL DATE : 16 September, 2016**
- **TYPE OF MEETING : Expedited**
- **EXPIRATION DATE : 15 September, 2017**
  After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ Offices should be submitted one month before the expiration date for continuing review.
- **SERIOUS ADVERSE EVENT REPORTING**: All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 3 working days using standard forms obtainable from the MRCZ Offices.
- **MODIFICATIONS**: Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Offices.
- **QUESTIONS**: Please contact the MRCZ on Telephone No. (04) 791792, 791193 or by e-mail on mrcz@mrcz.org.zw.

Other

- Please be reminded to send in copies of your research results for our records as well as for Health Research Database.
- You're also encouraged to submit electronic copies of your publications in peer-reviewed journals that may emanate from this study.

Yours Faithfully

.....

MRCZ SECRETARIAT
FOR CHAIRPERSON
MEDICAL RESEARCH COUNCIL OF ZIMBABWE

MEDICAL RESEARCH COUNCIL OF ZIMBABWE
2016 -09- 16
APPROVED
P.O. BOX CY 573 CAUSEWAY, HARARE

PROMOTING THE ETHICAL CONDUCT OF HEALTH RESEARCH

APPENDIX 2: Permission from Research Site- Oncocare Zimbabwe

Oncocare
Technology. Innovation. Healthcare.

Mrs Felistus Mawisire

6797 Chinhoyi Road

Zimre Park

RUWA

30.06.16

Dear Felistus,

Re: Permission to carry out research at Oncocare Zimbabwe, for NUST MSc Radiography student Felistus Mawisire: Radiotherapy Radiographer.

Topic: *Radiation dermatitis and body mass index in patients receiving pelvic irradiation, a case for a Harare cancer treatment centre.*

Thank you for considering us for you to carry out your research at this centre. As Oncocare we stand for only a responsive, holistic and multidisciplinary approach and but also world class standards in our endeavour to deliver quality service to our clients. It is our hope that your research will aid us and other cancer treatment providers to improve in cancer patient management.

Permission is therefore granted to carry out the stated research. It is our requirement that you adhere to the most ethical processes in the course of your study, for the benefit of the patient and the good name of Oncocare.

On completion of the research, please forward the management the conclusions of the study.

Yours sincerely

Mr.B T Deda
Chief Executive Officer
Oncocare Zimbabwe
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APPENDIX 3: Academic Institution Clearance – National University Of Science and Technology (NUST)

Applied Physics Department

P. O. Box AC 939, Ascot
Bulawayo
Zimbabwe
Telephone: 263 - 9 - 289557/289308
Telefax: 263 - 9 - 286803

NATIONAL UNIVERSITY OF SCIENCE & TECHNOLOGY

5 September 2016

The Secretary
Medical Research Council of Zimbabwe
P. O. Box CY573
Causeway
Harare

Re: Ethics Approval Application-Felistus Mawisire MSc in Radiography Student.

Dear Sir/Madam

This is to confirm that the project proposal by **Ms Felistus Mawisire** entitled: **"Radiation Dermatitis and Body Mass Index in Patients Receiving Pelvic Irradiation: A Case of a Harare Cancer Treatment Centre"** has been reviewed by her academic supervisors here at the National University of Science and Technology. I further confirm that the student has been authorised to submit the proposal to MRCZ for further ethical review.

Thank you in advance for your favourable consideration in this matter.

Yours Faithfully,

Mrs Sindiso Nleya
Academic Supervisor
Department of Applied Physics

APPENDIX 4: Society College of Radiographers- Skin Care Instructions for Patients

(Summarised)

Society College of Radiographers: **PATIENT- SKIN CARE INSTRUCTIONS SHEET**

Skin reactions are known to occur due to the interaction of radiation with tissue. The purpose of these instructions is to help patients undergoing external beam radiotherapy and by implementing them, it will assist in alleviating symptoms and providing them comfort.

1. To reduce friction to the treatment area, the patient is advised to:

- wear loose fitting natural fibre clothing next to the skin, e.g. a cotton T-shirt
- wash the skin gently with mild fragrance free soap and water
- gently pat dry
- BUT not recommended to apply aqueous cream
- wash hair gently with usual shampoo if the scalp is in the treatment field,
- BUT do not dry with a hairdryer
- avoid rubbing, heat and cooling pads/ice
- avoid shaving if possible, wax and all hair removing creams/products
- avoid tight bandages and adhesive tape

2. To reduce irritation to the treatment area patient is advised to:

- use a moisturiser that is sodium lauryl sulphate free
- avoid topical antibiotics unless there is a proven infection
- use deodorant, but away from treated area, as this may irritate the skin
- avoid powder on treated area, as it may cause excessive dryness
- avoid sun exposure and shield the area from direct sunlight
- and use a high SPF sunscreen or sun-block.

3. If your skin is broken, the medical staff will assist you by:

- using appropriate dressings/products to reduce further trauma and infection.
- DO NOT use Gentian Violet
- ALWAYS attend the routine on-treatment checks with the doctor.

APPENDIX 5: WHO BMI weight classifications

The WHO international classification of adult underweight, overweight and obesity according to BMI

Classifications	BMI (kg/m2) principal cut-off points	BMI (kg/m2) additional cut-off points
Underweight	<18.50	<18.50
Severe thinness	<16.00	<16.00
Moderate thinness	16.00-16.99	16.00-16.99
Mild thinness	17.00-18.49	17.00-18.49
Normal range	18.50-24.99	18.50-22.99 23.00-24.99
Overweight	≥25.00	≥25.00
Pre-obese	25.00-29.99	25.00-27.49 27.50-29.99
Obese	≥30.00	≥30.00
Obese class I	30.00-34.99	30.00-32.49 32.50-34.99
Obese class II	35.00-39.99	35.00-37.49 37.50-39.99
Obese class III	≥40.00	≥40.00

The Position of Afrocentric Paradigm in the Contemporary Globalised Professionalised Counselling Services in Zimbabwe

Prince Dzingirayi
Department of Psychology - University of KwaZulu-Natal

Abstract

Counselling in Africa has been there since time immemorial. In the Afrocentric paradigm, counselling had been done by custodians and administrators of culture such as grandparents, significant elders such as chiefs, sahwiras (close friends of the family), and aunties, among others. These individuals had vast experiences, skills and they were regarded as experts. Their role was to make upright citizens who abide with cultural ethos of society. The Eurocentric worldview has over the years determined the universal professionalisation of counselling and has labelled the Afrocentric approach as uncivilised. This has caused a serious erosion of Ubuntu philosophy which is centred on the collective ethos of "I am therefore we are". The objective of this paper is to establish the influence of Afrocentric counselling in the universal professionalised counselling services in Zimbabwe. The study used the Afrocentric paradigm (AP) and conversation research design as the beacon of the research. The participants used in this research were professional counsellors and traditional significant others such as the traditional leaders and community elders. The purposive and convenience sampling was used in the study. Data was analysed using socio-thematic analysis. The study found that the use of professional techniques without considering the values and belief system always worsen the behaviour. The traditional beliefs system matters most as behavioural misfortunes and is always determined by spirituality. It was also noted that currently Afrocentric counsellors are being shunned and negated due to an over-emphasis of Christianity. This was analysed as an indirectly and promotion of colonial ideology. The study found that most Zimbabweans no longer trust their indigenous knowledge and they always cherish foreign ideas. The paper recommended that there is need to invest in Afrocentric counselling and infuse it into professional counselling through collaboration of ideas. There is a need to devise a deliberate training programme which has its bedrock on Afrocentric culture. The paper predicts that lack

of respecting African worldview will cause civil unrest in the African continent due to lack of cultural identity.

Key terms: Counselling, Afrocentric, professionalised counselling, hegemony

Introduction

The globe is currently facing unique and complex mental healthcare challenges. These challenges are precipitated by economic, political, cultural and technological initiatives. The world is trying to come out with strategies that can help to address these mental health challenges and counselling has not been spared. In support of the above, Maree (2013) posit that the economic situation at any given time influences developments in the field of mental health. Counselling is a noble mental health practice which promotes change and prevention of mental stressors, and gives psychological assistance to individuals who had faced the dark mental nodes. In Zimbabwe, poverty is now a prevalent endemic with almost 80% of the population living below the poverty line (WHO, 2021). The country has faced countless hazards within a short space of time such as the negative economic waves, droughts, Cyclone Idai and unprecedented COVID-19 pandemic. These challenges have triggered the acute rise of mental health challenges which warrant counselling. According to Sonya, Byrd and Crockett (2012) the world has increasingly become connected economically, politically, technologically, and culturally. The global connection gave birth to globalisation and professional practices of counselling. Globalisation has brought more harm than good to human cultural identities. This, for example, has made counselling a universal behavioural correctional approach to mental health issues.

The concept of professionalised counselling is a contested system in Africa countries that need serious decolonisation interventions. Professional counselling is currently lopsided towards the Euro-American system and is being criticised for lack of indigeneity, innovation, and relevance to local needs and challenges of indigenous African people. Every society has a philosophy that acts as the soul in its development (Kpobi, 2018). The Eurocentric worldview purports that African countries are known for being poor and uncivilised. Museka and Madondo (2012) submit that the marginalisation of indigenous knowledge systems is a by-product of Western expansionist theories through colonialism, religion, and racial and cultural prejudice premised on technological and scientific developments. The counselling theories are therefore a reflection of Western culture and are the yardstick of measuring professional counselling in Zimbabwe. Counselling in African societies is quite

informal but is very effective. Counselling is now transforming from a Western-based practice to a global phenomenon. The globalisation of counselling has placed the field on the cusp of growth and innovation. Globalisation is thus referred as "Westernisation" of the world (Josephine, 2017). This literally means it is the deliberate promotion of Western capitalism in underdeveloped nations so that the world is becoming homogeneous. Heppner (1997) points that counseling play an important role in shaping the mental well-being of individuals hence became an international mental health remedial strategy. The conceptualisation of mental health is the direct transmission of Western values into Afrocentric culture.

Counselling in Africa has been there since time immemorial. This means professional counselling is not a relatively new concept in Africa. However, it is the westernised counselling approach that has successfully pushed Afrocentric counselling into the background. African counselling is a concept of building an upright community citizenship (*ubuntu*) of an individual guided by culture. In support of the above, Desmond Tutu asserts that *ubuntu* is the foundation and edifice of African philosophy (Ramose, 1999), which determines peace, harmony and development of African people. This was also highlighted by Magesa (1997) who posits that the *ubuntu* philosophy serves as a social foundation for Africans due to the principle of communitarianism as engraved in Afrocentric identity (Mkhize & Nobels, 2020) that emphasises on collectivism. Many scholars have made critical reflection on the weakness of the Euro-western theories used to determine and produce professional personhood in different areas such as counselling. The failure of professionals is centred on the lack of collectivism that cements the African philosophy. Counselling is a universal behavioural remedial strategy that is hinged on cultural identity (Nelson-Jones, 2013). Embracing the *ubuntu* worldview unlocks the capacity of an African culture in which individuals express compassion, reciprocity, dignity, humanity and mutuality in the interests of building and maintaining communities with justice and communalities (Poovan, Du Toit & Engelbrecht, 2006). This can be justified by the amount of counselling cases that used to be addressed during the full swing of undiluted African culture as compared to the contemporary counselling cases precipitated by complex behaviours. Behaviour in line with *ubuntu* is identified as an individual's state of being, governed by ability to reason and think within the community context (Maphisa, 1994; Swarts & Davies, 1997: 290-296). Ubuntu stipulates that a person's mental health is therefore determined by social, cultural and spiritual system. Afrocentricity encompasses indigenous history, traditions, culture, mythology, and the value systems of communities, according to Khoza (as cited in

Mangaliso, 2001). The behaviour of Africans is motivated by what they believe, which is based on what they experience. Ignoring the Afrocentric counselling approaches and skills is therefore a grave mistake within the field of mental health.

Counselling is an intimate exchange of mental health experiences and a process of helping an individual to explore difficulties experienced in life using his/her strength to settle the weaknesses so as to make informed decisions that would lead towards a more satisfying life. Through this relationship, counsellors hope to help clients grow, heal, fulfil their potential, learn to cope or make other positive changes. For many cultures, the idea of discussing these topics outside the family is counterintuitive since these intimate exchanges are traditionally addressed in the relationships within the family and the private sphere of their lives (Josphine, 2017). In the African context, the purpose of counselling was done to shape cultured upright citizens of society (Rupande & Tapfumaneyi, 2013). Traditionally, counselling used to be done by traditional elders who were custodians of culture such as the close friends (*sahwiras*), chiefs, aunties and grandparents. These were used to be regarded as experts guided by cultural wisdom and experiences. Most research indicates that, before colonisation, there were very few counselling cases as compared to the current situation where we are now experiencing complex behaviours that warrant complex counselling skills. This study is therefore questioning why individuals are continuing to misbehave in the presence of modern professionalised counselling. In addition, the study attempted to locate the position of African belief systems in the contemporary counselling services.

The contemporary professionalised counselling processes have raised more questions than answers. Some of the notable questions are: To what extent does "the modern professionalised counselling services" represent the African worldviews in Zimbabwe? Whose theories are being used in the professionalised counselling? Why individuals are continuing to display deviant behaviours despite the available professionalised counselling? Is the African counselling still relevant in the era of contemporary professionalised counselling services? According to Mtemeri et al. (2021), contemporary professionalised counselling involves the use of technology skills in counselling as a new norm needed in the 21st century. The use of technology in counselling is new and is growing rapidly. This kind of counselling has so many names such as e-counselling, virtual counselling, cyber counselling, online counselling and Internet counselling (Beidoglu et al., 2015). The internet-based counselling occurs when the counsellors connect with clients through technological devices such as mobile phones and computers via phone calls, short message service

(SMS), WhatsApp, skype, Zoom, video calling, among others. Despite the development of technology in counselling, there is a serious dawdling in acknowledging the Afrocentric patterns within the contemporary counselling field. The main arguments are centred on treating the Eurocentric counselling approaches as universal and dismiss the the Afrocentric counselling approaches as primitive, uncivilised and unjustified. The globalised professionalised counselling services are continuing to expose the African continent to the West in terms of knowledge systems and development. This has enticed the researcher to carry out this study so as to bridge the gap that has ignored the African worldview in the contemporary counselling field.

Objective of the study

The major objective of the study was to establish the influence of Afrocentric counselling in the universal professionalised counselling services in Zimbabwe. The study placed much emphasis on the relevance of Afrocentric worldview in professional counselling.

Theoretical framework

The Afrocentric paradigm was used as bedrock in trying to fish the real position of Afrocentric counselling in the so called professionalised counselling. The chief proponent of Afrocentric philosophy is Molefi Kete Asante (Josephine, 2017). The theory was developed as a reaction to the dominance of the Euro-American worldview and the marginalisation of African philosophy. Afrocentric means placing African ideas at the centre of analysing African culture and behaviours (Nwoye, 2017; Mbiti, 2010; Mkhize & Nobels, 2020). The Afrocentricity theory demands that Africans appropriate their realities, their history and ultimately their destiny from an Afrocentric perspective. The African-centred paradigm values the use of indigenous healing approaches which are grounded in their belief systems. The Afrocentric paradigm emphasises interconnectedness and spirituality when helping clients in the counselling sessions so as to produce positive therapeutic results to their mental health problems (Josephine, 2017). An Afrocentric worldview assumes that human identity is collective and that spirituality is paramount in African life. It also entails that good health comes from the interrelationship between human beings (the living) and the living-dead (ancestors) hence the concept of spirituality. Spirituality is the immune system that serves the Afrocentric mental health. In another study, Kometsi (2016) indicates that Eurocentric hegemony has created disharmony and disunity in order to demonstrate the superiority of Western governance systems, authority, and

knowledge that narrowed down what it means to be African. This was championed through the imposition of the western form of education that has successfully eroded the salient Afrocentric tenets that define the African spirit as enshrined in its traditional education system. The Euro-western world view has intentionally robbed the collective African *ubuntu* hence delaying and determining the socio-cultural development of the continent. The collective moral rectitude that forms the fulcrum of indigenous education in Africa is not explicitly pursued within the modern counselling system. This lacuna has caused all sorts of mental health challenges leaving the citizens of Africa at the receiving end. Western education, which has foisted a capitalistic and individualistic mentality upon Africans with its system of education, has made education a luxury for the few, forcing a good number of the population not to access such type of education. This has resulted in diverse perspectives among the clients in the counselling field.

How a client views the world is important insofar as it contrasts with the counselor's view (Zaker & Boostanipoor, 2016). Western-based assumptions about normative and healthy behaviours lead to biased interpretations in which other cultures are evaluated negatively. According to Asante (as cited in Nwoye, 2015), the Afrocentric epistemological position asserts that African civilisation is the point of departure for knowledge production that informed many fields such as mental health, philosophy, and technology. Humans need each other to be human, an idea that is embodied in Desmond Tutu's phrase, "a person is a person only through other persons" (Tutu, 2010). In other words, "I am because we are". Connection, interdependence, and relationships are the fundamental features of reality (Nyengele, 2014). The role of significant others who are well vested with the African belief system therefore matters most, and these includes the *sahwiras*, aunties, grandparents, community elders, among others. Mabvurira (2016) indicates that the success or the misfortunes of an individual in the community affect other members of the community. African counselling emphasises the concept of intimate exchange, that is, sharing "secrets" behind closed doors, helping with problems of life's most private topics of love, sex, loss and death. This compliments with Rupande and Tapfumaneyi (2013) who explained that, in many African societies, including Zimbabwe, a stranger is not supposed to know the secrets of the family. Telling a stranger the secrets of the family is condemned in the strongest sense as this is regarded as "*kufukura hapwa*" (divulging family secrets). This cultural aspect corresponds well with ethics of privacy and confidentiality in professional counselling.

The characteristics of professional counsellors

Counselling services help individuals to realise ones' potential in the community. Counselling in Zimbabwe is in sorry state despite having supportive policies. The implementation of counselling policies is still in its infancy. According to Nelson-Jones (2013), the following are some of the characteristics of professional counsellors

- Self-awareness and understanding
- Being culturally sensitive
- Good psychological health
- Being sensitive
- Having an open mindedness
- Showing objectivity and competence
- Trustworthiness
- Interpersonal attractiveness

Theories of professionalised counselling services

Professionalised counselling can best be practised and defined by a certain theory. Counselling theories provide concepts that allow counsellors to think systematically about human development. Theories are therefore the language of counselling sessions. According to Bond (2010), there are so many counselling theoretical approaches that exist and most of them were developed from the experiences of practitioners. Nelson-Jones (2013) posits that theories reflect historical contexts, personal and intellectual life of practitioners. This then creates a lacuna as most of the called counselling theories represent the western culture and only a cosmetic representation of African culture. The fundamental conceptions of addressing mental health challenges is anchored on culture as individuals can create meanings and knowledge. Researches have proved that the epistemologies of the Eurocentric and Afrocentric are always juxtaposed. There is no Afrocentric theory listed on the professionalised counselling list. According to Gilliland (1989), no single theory can adequately explain the client's problems but it serves the counsellors' expectations. According to Nelson-Jones (2013), most of the Eurocentric counselling theories were developed by wounded theorists. This means they were developed in the animal laboratory hence they lack humanity and an Afrocentric flavour. For instance, Sigmund Freud (proponent of psychoanalysis) suffered for many years from periodic depression, mood variations and anxiety attacks. Carl Rogers (person-centred therapy) developed this theory as a reaction to his personal life. According to Nelson-

Jones (2013), Carl Rogers grew up as an extremely shy and solitary child and he considers his parents as masters of subtle emotional manipulation. This triggered the development of the person-centred theory since Rogers felt unsafe to share much of his personal feelings at home for fear of being judged negatively. The table below gives a summary of some of the common theories used in professionalised counselling.

Theoretical system	**Founder**	**Personality theoretical base**	**Key concepts**
Psychoanalytic therapy	Sigmund Freud	Psychoanalysis	Deterministic, topographic, genetic, dynamic, insightful, motivational, developmental
Alderman therapy	Alfred Adler	Individual psychology	Holistic, socially oriented, functionalistic, phenomenological, teleological
Person-centred therapy	Carl Rogers	Person-centred	Humanistic, experiential, existential, organismic
Gestalt	Fredric Perls	Gestalt	Confronter, existential, organismic, Humanistic, experiential
Transactional analysis	Eric Berne	Transactional analysis	Cognitive, interpretational, social-interactive
Behavioural counselling	B.F. Skinner,	Behavioural	Behaviouristic, learning, cognitive, experimental
Rational emotive therapy	Albert Ellis	Rational emotive theory	Rational, cognitive, scientific, relativistic, didactic, decisional
Reality therapy	William Glasser	Reality theory	Reality-based, rational, action-oriented, directive, positivistic

Adopted from Gilliland et al. (as cited in Nelson-Jones (2013)

These theories only represent partial truths as whole truth because they create a superior- inferior picture of counselling. Psychologists' research samples were drawn from less than 5% of the world's population (Arnett, 2008), and yet their findings were generally presented as universal.

Methodology

Conversation research design

The conversation research design was the bedrock of this study. This design was used to gather information based on oral storytelling from the custodians of culture and professional counsellors. This method aligns itself with an indigenous worldview that respects oral work as a means of transmitting knowledge and upholds the relational, which is necessary to maintain a collectivist tradition. Conversation method involves dialogic participation that holds a deep purpose of sharing a story as a means to assist others. In exploring the conversational method, this study focused on the position of Afrocentric counselling approaches in the contemporary professionalised counselling services. Thomas (2005) goes on to state that storytelling has a holistic nature that provides a means for sharing remembrances that evoke the spiritual, emotional, physical, and mental. Barrett and Stauffer (2009) argue that a narrative is viewed as story and is seen as a "mode of knowing" that is involved in knowledge construction. However, when used in an indigenous framework, a conversational method invokes several distinctive characteristics: a) it is linked to a particular tribal epistemology (or knowledge) and situated within an indigenous paradigm; b) it is relational; c) it is purposeful (most often involving a decolonising aim); d) it involves particular protocol as determined by the epistemology and/or place; e) it involves an informality and flexibility; f) it is collaborative and dialogic, and g) it is reflexive.

Population and setting

The research participants were the community elders who are custodians of traditional culture in Makoni rural areas of Zimbabwe. The Chendambuya community was used in the study. A convenient and opportunistic sampling technique was used in the study. The opportunistic selection method was used when dealing with social issues, where the expected participants are not easy to access (Brady, 2019). In this case, the traditional custodians of culture are no-longer easy to find due ill-health and death. Semi-structured interview was used to gather data from the participants using social media platforms such as WhatsApp, emails, Facebook and phone calls so as to cover a wider population.

Data Analysis and Ethical Consideration

The study used socio-thematic analysis to interpret the data collected through interviews. The socio-thematic analysis is a way of generating data by integrating the sociality of the participants in themes (Omodan, 2019). The data was coded into

themes and each theme was subjected to conversational interpretation in a way to understand the sociality of the participants since the problem under study is centred on *ubuntu* kind of social space. Ethical issues of protection from harm, confidentiality, seeking permission from the gatekeepers and competences were respected during the study.

Findings and results

The study elicited various responses from the participants. The findings were in two parts, that is, responses from professional counsellors and from traditional experts. The first part is the responses from professional counsellors. Upon being asked if the Afrocentric paradigm is important in the counselling of clients, the professional counsellors in the study strongly criticised the use of Afrocentric approaches to correct the behaviour of the client. They regarded the African way of counselling used in the past as uncivilised and of ineffectual. The following verbal quotes confirm the above:

Negation of African counselling practices

Participant 1

> African culture has no space in the professional counselling because of its evil undocumented practices. The ethics in the counselling session does not tolerate the use of African worldview. Most individual misfortunes are caused by African culture. Therefore, it causes more harm than good.

Participant 5

> Adhering to long ago counselling practices discredit the field of counselling. Professional counselling is guided by theories and in these theories there is no appreciating of using traditional elders such as the *sahwiras* , aunties and traditional leaders as counsellors.

Unprofessional of the Afrocentric counselling

Participant 8

> The African paradigm is unprofessional and is not relevant in the professional field of counselling.

Participant 2

> The African worldview is associated with witchcraft and it has no proper way of doing counselling. It is very difficult to rely on oral ideology. The experts' counsellors in the African way are no longer there.

Sagging of multicultural approaches in counselling

Participant 4

> The multicultural approach is noble in the counselling field. The professional counsellor should be vested with the culture of the client so that he/she can deal with the belief system of the clients

The traditional elders who are the administrators and custodians of the African culture revealed that it is important to revere African belief systems in counselling clients. They indicated that spirituality is the key cause of fortunes and misfortunes. The traditional elders indicated that, long ago, mental health used to be addressed with traditional experts who had wisdom over the cultural values. They also highlighted that some individuals such as *sahwiras, tete* (aunties), chiefs, grandparents used to be the focal people who ensured quality mental health services to community members. Afrocentric counselling is not reactive but is preventative as it focused on shaping the social fabric (*ubuntu*) of its community members. The following narratives were the responses from traditional experts after they were asked asout the role of traditional culture and indigenous counselling practitioners.

Spirituality counselling

Participant 3

> Traditional elders who played the role of counselling were guided by the traditional spirits. Their expertise was used to be led by spirituality in which they could consult to ancestors. Mental health challenges are a collective issue which needs collective effort.

Participant 9

> Long ago there were very few mental health challenges since individuals used to be shaped by the wisdom of aunties and grandparents. Each expert had special area of focus, for instance aunties and grandparents specialize with marital issues, the traditional leader with political and social challenges. Complex mental health issues would be addressed after consulting the spiritual diviners.

Collectivism in counselling

Participant 11

> Used the principle of "the problem for one is the problem for us all"

On being asked why their Afrocentric culture is no longer effective, they indicated that the African belief system is no longer taken seriously by the current generation. This is due to over-revering of foreign beliefs such as Christianity. The African culture is therefore deteriorating significantly. They pointed out that this started in the post-colonial period.

Discussions

The study showed that there is a controversy between professional counsellors and traditional counselling experts. Various themes emerged from the research including *negation of African counselling practices, unprofessional of the Afrocentric counselling, spirituality counselling* and *collectivism in counselling*. Some professional counsellors completely ruled out the involvement of the African worldview while others showed the importance of the multicultural approaches in counselling. Literally, African counselling practices are being shunned by the professionalised counselling as they are negated as inferior. This complements well with the work of Chung (2005) who indicated that a more global perspective of counselling is noble and stated that being multi-culturally competent is an essential starting point for being an effective professional counsellor on a global or international scale. The same study supports that counsellors need to acknowledge the current cultural background of the client so as to yield effective results.

The participants in this study showed that within the counselling sphere there are exclusive superior cultures which determine the professional counselling of other communities. The professional health experts posit that relying on the African paradigm discredit professionalisation of the metal health field. The African belief system is orally practised therefore professional counselling is defined through guiding principle which is followed globally. There are certain issues that a professional counsellor might need to communicate through the *sahwira* (close family friend) so as to address the behaviour of the client. This might go against the counselling ethics of confidentiality. Consequently, professional counsellors in Zimbabwe are driven by individual needs and not by the collective needs, which is the focus in African culture. The study indicated that spirituality causes both success and misfortunes. It is therefore prudent to consult the spiritual diviners who are able

to communicate with the dead and the living. This indicates that the anger of the ancestors can cause mental health issues which then warrant professional counselling. Bad spirits in the African culture can cause sickness and can affect the health of one of the family members. This entails that collective approach is the best approach in resolving mental health issues. The above supposition indicates that it is not wise to separate Afrocentric approach and the professional counselling services for African clients. There is therefore a need to have a relook at integrating the Westernised theories and African approaches in addressing mental health challenges. The research found that the qualities of professional counsellors are not juxtaposed to the personality of African experts who used to offer counselling services. It is therefore important to have a mix of skills between contemporary counsellors and African centred counsellors such as the *sahwiras*. The development of indigenous models, methods, and materials should therefore be promoted without losing sight of the importance of international collaboration (Savickas, 2011b**).**

Conclusions

The African counselling practices are no longer being used in the professionalised counselling. Most professional counsellors cited the multicultural theories as an element of involving all cultures within the field of counselling. Lack of documentation of African counselling practices has caused professional counsellors to shun it due to lack of information. The African belief system is currently regarded as evil and unholy. The study recommends for collaborating the Afrocentric belief system and the universalised counselling approaches. There is a need to have an *e-Afrocentric* or an *e-ubuntu* counselling practices and this helps to relay information of African culture.

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Can the Factorial Structure of the Four Dimensional Stress Questionnaire (4DSQ) Stand up to the Three Dimensional Stress Questionnaire (3DSQ) in an Organization in Turmoil? A Cross-validation of the Three Dimensional Stress Questionnaire (3DSQ) in an Organization that Recently right-sized its workforce.

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Abstract

This is a follow up study to further establish the factorial and construct validity of the three dimensional stress questionnaire (3DSQ). In the initial study, researchers found that the four dimensional stress questionnaire (4DSQ) (Terluin et al, 2004), which measures distress, depression, anxiety and somatisation did not have factorial equivalence in the Zimbabwean working population. Rather, three factors, namely depression, anxiety and somatisation fitted the data better. This study extends this research on the stability of the three factor DSQ in an organisation that had recently undergone workforce right sizing in response to the deterioration in the Zimbabwean economy. Three hundred and fifty six employees targeted for retrenchment participated in this study as part of a retrenchment counselling exercise. There were 82 (23%) females, 144 (40.4%) males and130 (36.5%) others who did not specify their gender . The mean age was 40.26 years (SD=7.53). The data was subjected to confirmatory factor analysis. The three factor solution fitted the data better than the four factor model. These dimensions were depression, anxiety and somatisation with distress items in the original four dimensions loading onto the depression dimension. The results further confirmed the psychological shift in the symptoms felt by Zimbabwean workers from distress to the more severe symptoms in response to the economic depression the country was experiencing. It is recommended that more studies be carried out with different samples of the working population before its adoption as a screening tool for psychological symptoms of stress.

Introduction

According to Terluin (1996), the dimensions of distress, depression, anxiety and somatisation were all encompassing of the symptoms common to psychological complaints. Terluin (1996) defines distress as the strain induced by a stressor and the attendant behaviour to cope with it. Depression is characterised as having depressive thoughts with suicidal ideation and anhedonia. Anxiety included such symptoms as general anxiety, panic attacks, phobias and general avoidant behaviour. Physical symptoms of stress, both mild and severe, characterised somatisation. The four-dimensional questionnaire (4DSQ) was developed to aid physicians in general care to identify mild from severe symptoms of distress like depression, anxiety and somatisation and extended its coverage to include the working population (Terluin et al., 2004).

The study is unique in that, to the authors' knowledge, no similar study has been carried out since Terluin et al. (2004) study to extend the questionnaire to the working population. However, several studies have been done in other countries for the general population to determine the construct validity of the 4DSQ in other countries.

Nguwi and Zvomuya (2018) used the English version of the questionnaire to establish the factorial validity of the 4DSQ among the Zimbabwean working population. Three dimensions were confirmed after confirmatory factor analysis. These dimensions were depression, anxiety and somatisation with distress items in the original four dimensions loading onto the depression dimension. The tentative conclusion was that the Zimbabwe working population had 'migrated' from distress to the more severe symptoms in response to the economic depression the country was experiencing. There was therefore a need for more research to establish the stability of the three dimensional stress questionnaire (3DSQ) factorial structure and its convergent and discriminant validity. This current study proceeded to validate the stability of the

3DSQ through confirmatory factor analysis in a new sample in an organisation that had recently gone through a staff rationalisation exercise.

Background to the study setting

This study took place in a non-governmental organisation (NGO) as part of training needs assessment following a pre- and post-retrenchment exercise that had some employees losing their jobs completely, while others were promoted or demoted, or had salary cuts or transferred to other locations within the country. It was quite a traumatising experience for both survivors and those laid off in an economy deep in recession. Management felt that it was important to heal the psychological trauma haunting the survivors and restore their psychological well-being in order to perform more effectively. The authors were engaged to come up with a stress management intervention to address this felt need. A serendipitous opportunity had arisen to validate the factorial validity of the 3DSQ through confirmatory factor analysis as found in a previous study.

Participants

The study sample consisted of 369 employees. Following discussions with management, a flier was sent out to all employees to explain the purpose of the exercise to allay their fears about retrenchment. The purpose of the exercise was to assist employees to move on with their lives and contribute productively to the organisation. The flier also stated that, for purposes of confidentiality, the authors would handle the whole exercise without interference from management. A set of questionnaires measuring study variables that included the 4DSQ were posted online for staff to complete in their own time (within a week) in their respective locations dotted around the country. Employees also filled in an informed consent form that indicated that they were free to participate and withdraw from the study at any time if they so wished. Three hundred and fifty six employees responded with usable data representing a 96.48 percent participation rate. These consisted of 82 (23%) females,

144 (40.4%) males and 130 (36.5%) others who did not specify their gender. The mean age was 40.26 years (SD=7.53). Education levels ranged from General Certificate of Education (Ordinary Level) to post-graduate degree. Non-managerial employees were 320 (89.9%). Those transferred to other locations within the country were 78 (21.9%). Employees who got a pay cut were 64 (18%), pay increase were 97 (27.2%) and the remainder maintained their salaries.

The instrument

The 4DSQ was used as originally defined and operationalised by Terluin (1996). The distress dimension had 16 items, depression (6 items), anxiety (12 items) and somatisation (16 items), making a total of 50 items. Unlike the original scoring in the Terluin et al. (2004) study, the items were scored on a 5-point response scale with 'no' = 1, 'sometimes' = 2, 'regularly' = 3, 'often' = 4, and 'very often or constantly' = 5. In the Terluin et al. (2004) study, distress, depression, anxiety and somatisation had Cronbach α reliabilities of 0.90, 0.82, 0.79 and 0.80 respectively.

Data analysis

Descriptives

Categorical demographics associated variance with the dimensions of the 4DSQ was calculated by squaring Eta ($\eta 2$) correlation coefficients. Age, experience and tenure variance associated with the 4DSQ were computed by squaring the Pearson correlation coefficient.

Reliability*:* Cronbach's α measure of internal consistency was used to calculate the reliability of the 4DSQ scales.

Factorial structure

As this was a test of competing models between the 4DSQ and 3DSQ in a new sample, the former was subjected to confirmatory factor analysis. Amos software program (Arbuckle, 1997) version 23 was used to carry out the confirmatory factor analysis to

compare the fit of the data to the two models. The following goodness-of–fit indices were used to evaluate the models: Chi square ($\chi 2$) goodness-of-fit statistic, the root mean square error of approximation (RMSEA), the Tucker Lewis Index (TLI), the comparative fit index (CFI, (Joreskog & Soborn, 1986). The significant $\chi 2$ values indicate poor model fit. The Chi square measure is sensitive to sample size. As the sample size increases, so is the probability of rejecting the hypothesised model (Bentler, 1990). The recommended RMSEA value should be below 0.80. It is recommended that TLI and CFI should be above 0.90. The Akaike information criterion (AIC) (Akaike, 1974) provides information on the likelihood of a model to estimate future values based on in-sample fit of the data. A model that has the minimum AIC among all other models is a good model.

Results

Descriptives

The mean scores and standard deviations for the 4DSQ dimensions are shown in Table 1 below.

Table 1: Mean scores and standard deviations (SD) of the 4DSQ Scales of employees (n=356)

Scale	Mean	SD
Somatisation	4.739	4.422
Distress	4.944	4.579
Depression	0.382	0.949
Anxiety	2.817	3.039

The 4DSQ skewness of the four dimensions were as follows: somatisation (1.28), distress (1.50), depression (3.26) and anxiety (1.16). With the exception of depression dimension these levels are within acceptable limits of ±2 (Trochim & Donnelly, 2006;

Field, 2000). However, for a relatively large sample as this one (n = 356), skewness may not be an issue due to the central limit theorem (Field, 2018).

Table 2 shows the scale dimensions reliabilities and inter-correlations. With the exception of depression, all the other dimensions are above the recommended cut off value of 0.70 (Nunnally & Bernstein, 1994). The inter- correlations of the scale dimensions are all significant ranging from 0.43 to 0.72. The highest correlation was between distress and anxiety suggestive of multi-collinearity. Tabachnick and Fidell (2007) suggest that high bivariate correlations are indicative of problems of multi-collinearity.

Table 2: Scale Reliability and Dimensions Inter-correlations of the 4DSQ(n =356), Cronbach's alpha and correlation coefficients (Pearson r).

	α	r			
	Scale	Somatisation	Distress	Depression	Anxiety
Somatisation	0.86	-	.63**	.43**	.53**
Distress	0.87	.63**	-	.64**	.72**
Depression	0.67	.43**	.64**	-	.49**
Anxiety	0.81	.54**	.72**	.49**	-

Correlation is significant at the 0.01 level (2-tailed). **

Factorial structure of the 4DSQ

Sampling adequacy was tested through the KMO test and was 0.89 and Barlett's test of sphericity was significant at 0.001 indicating that we could proceed with factor analysis. In line with Terluin (1996) findings, four factors were specified in the factor extraction. The four factors explained 48% of the variance. Distress, somatisation, depression and anxiety explained 28%, 5.54%, 7.95% and 6.61%, respectively. The items loaded as expected onto their respective dimensions. The factor loading cut off was set at 0.50 to avoid cross loadings. This had the effect of reducing the items from 50 to 27. Distress had seven items remaining from the original 16 and somatisation had six items from the original 16. On depression, the six original items remained,

with an additional item from distress to make seven. Anxiety ended with seven items from 12 items. Four (items 29, 31, 32 and 36) and two (items 47 and 48) of the original distress items loaded onto the depression and anxiety dimensions, respectively. The high correlations between distress and depression (r = 0.64) and distress and anxiety (r = 0.72) indicated a purer three-factor solution.

Confirmatory factor analysis

The 4DSQ was subjected to confirmatory factor analysis and compared with the competing 3-factor model and the results are presented in Figure 1 and 2. Measurement errors were correlated within each dimension to improve model fit (Gerbing & Anderson, 1984).

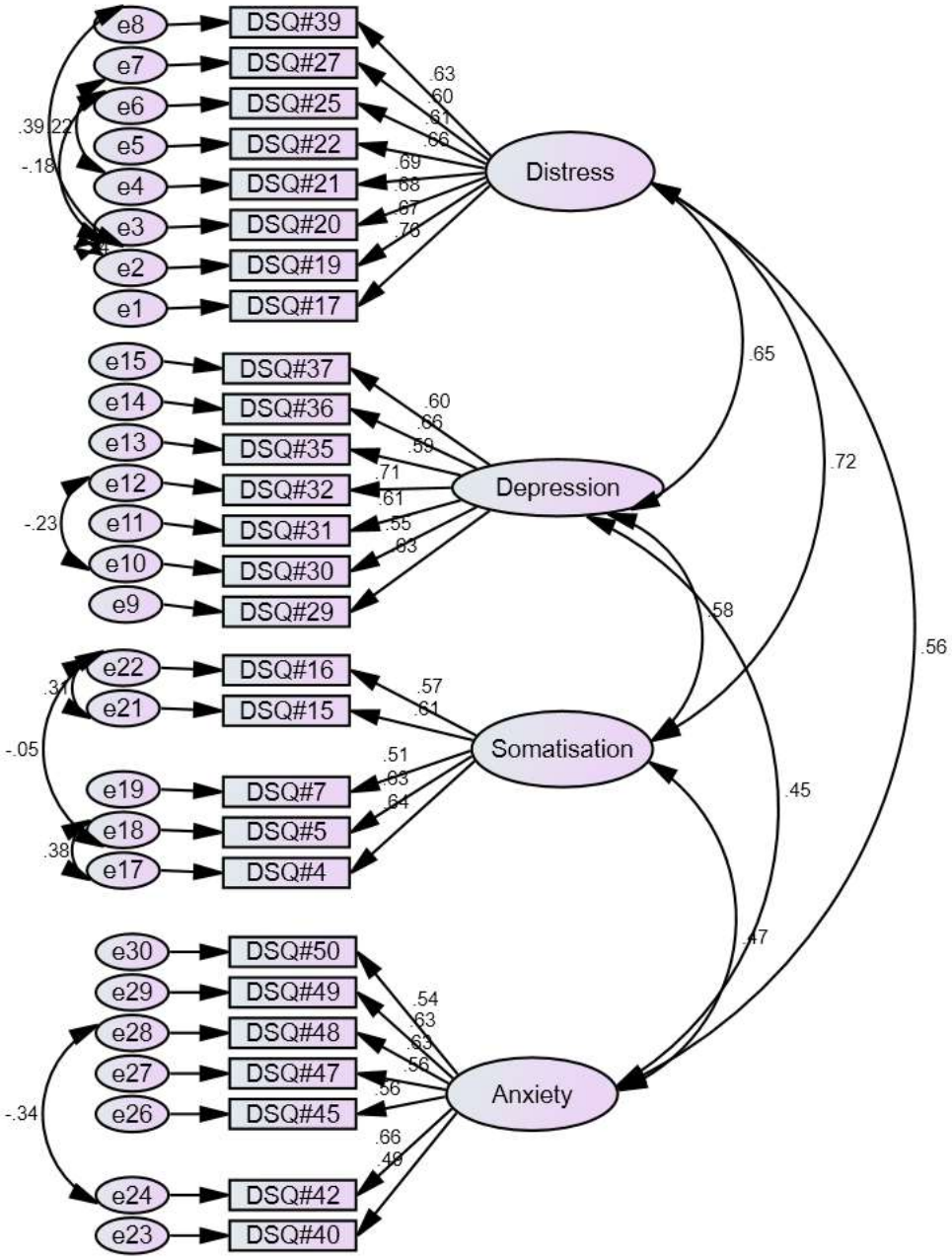

Figure 1 - 4DSQ Confirmatory Factor Analysis

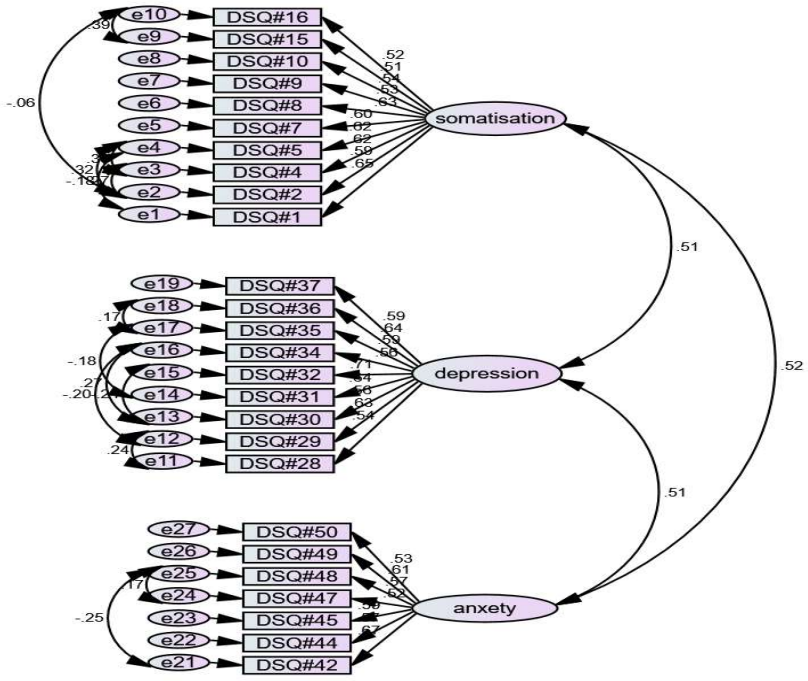

Figure 2 - 3DSQ Confirmatory Factor Analysis

Table 3: Scale Reliability and Dimensions Inter-correlations of the 3DSQ (n =356), Cronbach's alpha and correlation coefficients (Pearson r).

	α			
	Scale	Somatisation	Depressio n	Anxiety
Somatisation	.84	-	.44**	.41**
Depression	.84	.44**	-	.40**
Anxiety	.77	.41**	.40**	-

**. Correlation is significant at the 0.01 level (2-tailed).

Table 4: Confirmatory Factor Analysis of the 4DSQ and the 3DSQ(n =356)

Model	Chi square/df	TLI	CFI	RMSEA	AIC
4 Factor	1.64	0.93	0.94	0.04	645.92
3 Factor	1.65	0.92	0.93	0.04	603.48

The results of a confirmatory factor analysis are shown in Table 4. The results above show that the 3-factor model fits the data better than the 4-factor model, with AIC at 645.92, and 603.48, respectively. The 3-factor model should be preferred based on parsimony as it provides a better fit than the 4-factor model. According to Busemeyer and Diederich (2014), the AIC is "designed to pick the model that produces a probability distribution with the smallest discrepancy from the true distribution" (p.58). A model with the lower AIC is therefore a better model. The inter–correlations among the 3-factor model are shown in Table 3. The lower inter- correlations mean the variables in the 3-factor model are distinct factors unaffected by multi-collinearity.

Discussion

The study was aimed at confirming the three-factor model in the Zimbabwean population following the findings by Nguwi and Zvomuya (2018) which indicated that the three-factor model was more stable in the Zimbabwean population than the four-factor model (Terluin et al., 2004). The fit indices for the 3-factor model were similar to the 4-factor model but superior in terms of the Akaike information criterion (AIC). The three factors confirmed in this study are depression, anxiety and somatisation. At the time, when Nguwi and Zvomuya (2018) presented their findings, Zimbabwe was going through a rough economic period. It would seem the same economic conditions that prevailed during the previous study in 2016 are similar, if not worse now. The conditions are characterised by high unemployment, job losses and low disposable income across all employee categories. For example, the Heritage Foundation (2022) estimates that the Zimbabwean economy, as measured by

Gross Domestic Product (purchasing power parity), declined by eight percent in 2020 and saw a 5-year annual compound growth rate of minus 1.3 percent from 2017 to 2021.

The respondents in this study were not selected through a random sample. They were encouraged to complete the questionnaire as part of a post-restructuring initiative aimed at helping people cope with the post restructuring changes. This may bring in sample bias. More research on diverse samples is therefore needed to validate the 3DSQ before its adoption as a screening tool for psychological symptoms of stress.

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Financing Non-Communicable Diseases Response; Key Lessons From Zimbabwe's National AIDS Levy

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Abstract

In 1990 and 2010, non-communicable diseases (NCDs) barely featured in Zimbabwe's top ten-disease burden profile. However, half of top ten diseases in 2020 were NCDs. The concept of AIDS levy was conceived in 1990 and became law in 1999. National AIDS Council (NAC) was tasked to administer the AIDS levy in 2000. AIDS levy is pegged at 3% for income tax, profits for corporates and trusts. AIDS levy is therefore a homegrown solution reflecting Zimbabwe's commitment to HIV/AIDS health care. It is meant to boost the country's funding, hence attracted foreign funding to strengthen existing local efforts. This study aimed to assess and draw lessons from Zimbabwe national AIDS levy to guide financing for NCDs response. The researcher used the existing framework of SWOT analysis as the guiding principle. The framework of SWOT analysis was applied as an important consideration to assess the strengths and weaknesses of the National AIDS Levy Fund (NAFL). The researcher described existing scientific literature on (NALF). After thorough analysis, recommendations to strengthen NAFL and adapting it to NCDs funding were offered. Based on the AIDS levy experience, policy makers should consider NCDs levy policy, legislation and its accelerated enactment. Considering innovative financing such as sin tax of sugar-sweetened beverages, tobacco and alcohol is key for NCDs response. Health financing policy should be reviewed to reflect prioritisation of NCDs. The Zimbabwe school health policy could be funded from school tuition. Health insurance organisations should consider NCDs financing. Fiscal authorities should explore ways of effective revenue collection in this highly informalised economy.

Key words**: **AIDS Levy, Financing, NCDs, Strategies, Zimbabwe

Introduction

In 1990 and 2010, non-communicable diseases (NCDs) barely featured in Zimbabwe's top ten-disease burden profile. However, half of top ten diseases in 2020 were NCDs. Zimbabwe's health system financing is predominantly donor dependent, as such, the country is grappling with financing NCDs response, owing to unreliable, unstable and unpredictable flow of funds (Nyabani & Ramukumba, 2019). The country is currently grappling with a dual burden of communicable and non-communicable diseases (Nyabani, 2021). It is therefore imperative that prioritisation and funding models targeting NCDs are developed to address the emerging public health challenge posed by NCDs.

Objectives

- To apply the strengths, weaknesses, opportunities and threats (SWOT) analysis to the National AIDS Levy Fund
- To draw lessons for NCDs funding
- To generate policy recommendations based on findings of this study

Methods

The researcher used the existing frameworks of the SWOT analysis as the guiding principle. The framework of the SWOT analysis was applied as an important consideration to assess the strengths and weaknesses of the National AIDS Levy. The researcher described existing scientific literature on National AIDS Levy Fund. After thorough analysis, possible opportunities and threats to the National AIDS Fund were identified. Recommendations of adapting the National AIDS Fund to NCDs funding were offered.

Background, literature and perspective to the study

The first AIDS case was publicly reported in 1985. By 2001, a third of the country's adult population was estimated to be infected, ranking third after Botswana and Swaziland. Reduced life expectancy was predicted down to 29 years in 2003 from 58

years in 1980 owing to HIV/AIDS, with an expected further plummet to 35 years in 2010 (Ministry of Health and Child Care, 2004). For four decades, from 1990 to 2020, HIV/AIDS has been the number one killer in Zimbabwe on priority conditions causing death (Institute for Health Metrics and Evaluation, 2016; 2018; 2020).

The AIDS levy was a sequel to the drought levy, which was enacted in 1992. The drought levy supported food imports during the 1992 drought. Enactment of the drought levy had created good legal precedence, which the proposition of the AIDS levy was laid upon. In general, citizens were familiar with such levies and having had positive experiences out of the drought levy made it easier to convince the populace to consider the AIDS levy. Additionally, political support was high because the AIDS levy was generally viewed as a homegrown solution. However, the processes took long, from 1990 to 1999, for the proposed legislation to be finally enacted. The process needed stakeholder engagement, collaboration between the President's office, Ministry of Health and Child Care, Ministry of Finance, and labour organisations (Bhat et al., 2016).

To put structure in place that would be responsible for administering the AIDS levy and other related roles, the National Aids Council (NAC) was consummated by law in 2000 as a not for profit parastatal. In addition, the NAC Act established the NAC board that was established to give oversight. This body was a multisectoral one, appointed by the president and tasked to develop annual strategic plans. Boards ensure adherence to corporate governance and give strategic direction and oversight of organisations (Munjeyi, Mutasa, Maponga & Muchuchuti, 2017).

There are a number of players involved in collecting the AIDS levy. The board constitutes fourteen members with diverse, but complementary skills set, and representation, including MoHCC permanent secretary, NAC C.E.O, PLWHA, healthcare providers, women, youth, industry and commerce, religious and traditional medical practitioners, trade unions, civil society and the Law Society of

Zimbabwe. The NAC Board is responsible for approving general operational policies and AIDS levy budget consistent with the strategic framework annually (Bhat et al., 2016).

Staff administers the AIDS levy and manages the daily operations of the AIDS levy, namely monitoring and evaluation, coordinating, providing support and monitoring the decentralised, multi-sectoral response guided by the strategic framework and the annual strategic framework established by the NAC Board. However, whereas the staff focus on daily operational activities, boards operate at a strategic level giving guidance regarding policy, strategy and approval of budgets (Mutowo et al., 2015).

The Zimbabwe Revenue Authority (ZIMRA) collects and transfers the AIDS levy directly to the National AIDS Trust Fund on a monthly basis. Unlike other taxes that are managed by the Ministry of Finance, the AIDS levy funds are directly transferred to the National AIDS Trust Fund to be used only for the purpose of the HIV and AIDS response (Bhat et al., 2016).

The revenues and success of the AIDS Levy has depended on the strength of the economy. The AIDS levy grew steadily from its inception in 2000 until 2006 through 2008, when Zimbabwe was faced with significant economic instability and hyperinflation. During the period of economic instability the AIDS levy continued, though its purchasing power was limited and, due to extreme hyperinflation, it was ultimately rendered essentially valueless. Additionally, Zimbabwe's highly informalised economy presents a huge challenge to fiscal authorities regarding revenue collection from the informal sector (Munjeyi, Mutasa, Maponga & Muchuchuti, 2017).

NAC funds procurement of drugs using a 50% allocation, primarily following Zimbabwe's procurement laws under the State Procurement Act to purchase the appropriate drug supply. NAC follows a formal tender process for larger

procurements (procurements greater than US$300,000) and competitive bidding with minimum of three bidders for procurements that are less than US$300,000 (Ministry of Health and Child Care, 2016).

Regarding prevention intervention, the AIDS levy supports condom promotion, prevention of mother-to-child transmission of HIV, safe blood, youth and workplace programs, and further supports for voluntary medical male circumcision programs (Mufudza, 2018). The Zimbabwe school health policy could be taken advantage of to provide health education on the importance of self-care, screening, physical activity and routine check-ups (Zimbabwe School Health Policy, 2018).

There are several financial controls in place to ensure the effectiveness of the AIDS levy. ZIMRA and NAC validate that the amount collected by ZIMRA is the amount that NAC can account for in the National AIDS Trust Fund. Several audits of NAC's financial statements are conducted, including annual audits conducted by Zimbabwe's Office of the Comptroller and Auditor General and internal audits by NAC-employed auditors for all provinces and districts every two years (Marshall 2004). Furthermore, NAC provides quarterly financial reports to the MoHCC, the Ministry of Finance, and Parliament. The NAC Board Finance Committee reviews financial information quarterly. In addition, an audited annual report is publicly distributed and posted on the NAC website. External auditors such as the Local Fund Agent of the Global Fund have reviewed audits and financial reports as part of their capacity assessments (Ministry of Health and Child Care, 2016).

Results

Table 1: SWOT Analysis of the National AIDS Levy

Strengths	**Weaknesses**
• Homegrown solution, thus enjoys ownership and local support, reducing donor dependence, concurrently attracting external support • Tangible benefits of the fund, which could be likened to results realised from the drought levy • Coordination created support structures key in responding to AIDS, at ward, district and provincial level • The AIDS levy was supported by legislation, hence a legal entity • Funds administered by an independent body • Political commitment • Availability of key skills	• Inadequate financial controls • NAC was considered head high with high administration costs • Inadequate resources raised, as revenue collection depends on economic performance • High focus on treatment as opposed to prevention, which is cost effective
Treats	**Opportunities**
• Economic instability • Emerging NCDs competing for fiscal space	• Opportunity to increased communication to enhance accountability and transparency • Submission of quarterly reports to parliament could reinforce better corporate governance • Increase revenue collection through taxing informal sector • Levying mining companies and their employees • Replication of the same within Zimbabwe on emerging conditions such as NCDs • Replication of the initiative elsewhere targeting Communicable diseases such as HIV/AIDS • Expand health insurance coverage based on this model in Zimbabwe and elsewhere in similar conditions

Analysis of the National AIDS Levy Fund Levy (NAFL) shows that the fund enjoys the strength of being a homegrown solution owing to its local development and NCDs funding can derive benefit from this strength should its conceptualisation is done locally as recommended below. Furthermore, the results of the AIDS levy is evident and makes it easy to demonstrate value for taxpayers' money, and the same model can be likened to what the proposed NCDs funding can follow. Analysis of NAFL shows that the AIDS levy has grassroot level structures in place, making HIV/AIDS response local and organic. This is an important aspect of sustainability and a key lesson for the proposed NCDs fund sustainability.

The legality of the AIDS levy emanates from legislation, an important element of its enforcement and, as such, the proposed NCDs levy could benefit from the historical establishment of the AIDS levy if policy makers take advantage of the existing legal frameworks to lay the foundation for the NCDs fund. Furthermore, the independence of the administration of the funder engraves transparency, which is a key component for accountability necessary for cooperation by taxpayers and fund sustainability, NCDs levy could consider these governance structures put in place by the AIDS levy for transparency and governance. Lastly, one of the important strengths of the AIDS levy is that it enjoys political commitment and, as such, it is imperative to advocate for political support for the NCDs fund.

Notably, financial controls for the AIDS levy were inadequate, hence financial controls need to be strengthened to plug leakages and that would enhance financial viability of the fund. The same should be inculcated at the inception of the NCDs fund to address the weakness of funds leakages experienced by the AIDS levy. Additionally, NAC was reported to be head high with high administrative costs. This affects efficiency and reduces the potential impact of the fund. Staff rationalisation is key and, thus the proposed NCD fund should be wary of the aforementioned weakness. Another weakness observed of the fund is its focus on treatment as opposed to prevention. It is important to shift focus towards prevention for effective reduction of

incidence and prevalence in the case of HIV/AIDS and NCDs. Furthermore, the fund feasibility depends on economic performance, hence the need for fiscal authorities to create a performing economy for fund viability of both the AIDS levy and the proposed NCDs fund.

The threats of poor economy and emerging NCDs and pandemics, such as COVID-19, competing for resources significantly affects prioritisation and resource allocation. For effective intervention against both HIV/AIDS and NCDs, it is imperative to create a better performing and enabling economic environment.

There are vast opportunities of public communication to increase fund transparency and accountability, not just for the AIDS levy only, but for the proposed NCDs fund. Additionally, submission of quarterly reports to parliament increases better governance of the fund for both conditions. Furthermore, levying mining companies and revenue collection through taxation of the informal sector would expand the fund for HIV/AIDS and NCDs fund. On the back of rising NCDs, the opportunity to adapt the AIDS levy to NCDs funding is imminent to address this emerging public health threat. Lastly, expansion of health insurance to cover NCDs risk factors and to have a NCDs orientation is a huge opportunity for the health insurance industry.

Discussion

Epidemiological transition

Many sub-Saharan African countries are undergoing an epidemiological transition, Zimbabwe included, are grappling with the duet of both CDs and NCDs (Nyabani, 2021). Marshall (2004) posits that the need to restrategise cannot be emphasised to address the NCDs scourge. It is imminent that financing NCDs response is urgently needed. Legislature to enact NCDs levy is an important starting point, as can be traced to the drought and AIDS levy. However, it is important to reiterate that the threat posed by NCDs needs urgent attention. Legislating the NCDs levy within the Zimbabwean context need not take more than twelve months, hence civil society,

activists and authorities need to explore ways of quickly mobilising key stakeholders together for this cause (Mutowo et al., 2015). The same goes for the NCDs council and its board that would be tasked with the mandate of revenue administration and oversight, respectively. A diversely constituted board, resembling NAC's is a prerequisite. Establishment of ward, district and provincial structures would enable planning, execution, monitoring and evaluation at local micro-level, thus ensure relevance, participation, ownership and inclusivity, which are key elements of sustainability. The systematic flow of funds from Zimbabwe Revenue Authority of Zimbabwe (ZIMRA) directly into the fund holder (NCDs Council) could be adopted. The MoHCC ought to continue to play its oversight role in approving annual budgets and providing general oversight, Ministry of Public Service and Social Welfare may also facilitate administration of basic module education assistance (BEAM) as in the case of AIDS levy (Ministry of Health and Child Care, 2016).

Fiscal authorities need to design strategies to grow the economy, for the proposed fund to be viable. Differing from the NAC model, which allocates 50% of the funds on treatment, it is essential that the NCDs fund allocate 50% to prevention activities, 25% to treatment, care and support and the remaining 25% to administration costs that way most of the preventable diseases are addressed efficiently at far less costs and disease and economic burden curbed early (Ministry of Health and Child Care, 2020). Financial controls through ZIMRA and NAC validating collected revenues is crucial, and quarterly financial reviews by board are equally important as well. Additionally, the involvement of the Auditor General's (AG) office auditing accounts is an important balance and check as well. However, to strengthen good governance, additional measures such as quarterly parliamentary financial presentations ought to be done and an independent private auditor carries an audit once or twice in every five years. Good governance inspires confidence of the public (Munjeyi, Mutasa, Maponga & Muchuchuti, 2017).

To expand the fiscal space for NCDs and to lower consumption of harmful alcohol, sugar sweetened beverages and smoking, sin tax is should be enacted (Mufudza, 2018). Excess consumption of alcohol is associated with liver diseases, cancer, violence and injuries, Smoking is known to cause lung cancer and sugar sweetened beverages are significant contributors to overweight and obesity, which are major risk factors of hypertension, diabetes and cardiovascular diseases, which leads to stroke, disability and related mortality (Mutowo, Gowda, Mangwiro, Lorgelly, Owen & Renzaho, 2015). Sin tax would have a significant dual impact epidemiologically and fiscally. Fiscally, sin tax would raise revenues for prevention, treatment, care and support of citizens who succumb to NCDs.

Results based financing (RBF) within the Zimbabwean context has be shown to have positive results on the health systems performance (Nyabani & Ramukumba, 2019). If the same strategy is applied to health care service providers rendering services to NCDs, better health outcomes would be realised, quality of life would be improved and so is retention, motivation of health work force.

Zimbabwe school health policy should be used to mobilise resources in school settings to promote physical activity, develop wellness and gym facilities and support procurement of equipment such as blood pressure machines, body weight scales, oximeter, height metre for basic biometric and physical measurements and tracking individuals progress towards set targets, School health coordinators come in handy, given that schools are health promoting settings (Zimbabwe School Health Policy, 2018). For example, within the school environment, up to 5% of tuition fees could be allocated to school health fund for the aforementioned activities. This would address risk factors at a tender age, namely child hood obesity, neglect of self-care, inadvertently inculcate wellness consciousness early during the formative years of life.

Health insurance companies' financial viability is also threatened by the emergence of NCDs, hence it is important that they earmark funds for NCDs and strengthen their managed care. This would eventually develop companies that directly deal with NCDs for their clientele and beyond, as have been exemplified by Discovery Health and Vitality, in the case of neighbouring South Africa.

Conclusions and Recommendations

Based on the AIDS levy experience, policy makers and authorities should consider a NCDs levy policy and legislation and accelerate its enactment, same with the responsible administrative body. Given the already burdened citizen, an earmarked NCDs income and corporate tax of 2%, in addition to innovative financing such as sin tax of sugar-sweetened beverages, tobacco and alcohol would go a long way in mobilising resources for NCDs response. Health financing policy should be reviewed to reflect prioritisation of NCDs. The RBF policy implementation, particularly in NCDs interventions, could increase efficiency. The Zimbabwe school health policy could be funded by a 3% earmarked allocation from tuition at school level given that schools are considered as health promoting settings. Health insurance organisations should consider NCDs funds and organisations as exemplified by Discovery Health and Vitality in South Africa. Establishing effective mechanisms of collecting revenue from the informal sector in Zimbabwe's highly informalised economy is key.

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Applying the Diffusion Of Innovation and Health Belief Models to Understand Dynamics of COVID-19 Vaccine Uptake in Zimbabwe (February 2021-October 2021)

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Abstract

In February, 2021, a herd immunity target of ten million was set to be achieved by end of December, 2021, yet the country is still to reach half the target in nine months, with hardly two months remaining to get to December. Understanding COVID-19 vaccine uptake dynamics will appropriately inform planning, policy and strategies to reach herd immunity in Zimbabwe. This study sought to apply the diffusion of innovation and health belief models to describe dynamics of COVID-19 vaccine uptake in Zimbabwe. Data were collected from the daily situational reports that were published by the Zimbabwean Ministry of Health and Child Care from 28th February to 31st October, 2021. Vaccine hesitancy on the back of a hastily developed vaccine is a cause of concern. Complacency due to a reduction reported COVID-19 cases seemed to affect vaccine uptake. Indications suggest campaigns increase vaccine uptake. High COVID-19 incidence and mortality seemed to momentarily increase vaccine uptake. Some people seemed to believe the first does was adequate to confer protection against COVID-19, whereas others took longer than expected to get the second dose whilst self-monitoring to observe the so potential side effects of the vaccine. It appears government position on mandatory vaccination of civil servants as well as the incentive to access social gatherings and public places for the fully vaccinated citizens contributed to increased vaccine uptake.

Uptake of COVID-19 vaccine trends for the period 28th February to 31st October showed an increase that plateaued, thus, with consistent health education campaigns and health policy that sought to achieve herd immunity. Both models were useful in describing trends of vaccine uptake in Zimbabwe.

Key words: COVID-19 vaccine; Dynamics, Health Promotion Models; Uptake; Zimbabwe

Introduction and background

In February, 2021, a herd immunity target of ten million was set to be achieved by end of December, 2021, yet the country was still to reach half the target in nine months, with hardly two months remaining to get to December. Zimbabwe, just like other countries grappled with vaccine hesitancy owing to various reasons, including conspiracy theories. Several scholars elsewhere have utilised different models to explains vaccine hesitancy and predict intention to take COVID-19 vaccine. In their study, Limbu et al. (2022) found that perceived benefits and barriers were the HBM constructs mostly associated with vaccine hesitancy. The study also reports that factors such as employment, occupation and geographical location were associated with vaccine hesitancy. Health behaviour is complex and difficult to understand, as such, it is imperative to utilise empirical models to help Public health policy makers to understand, predict and project the likelihood and factors that may influence hesitancy or uptake of COVID-19 vaccine within Zimbabwe's context (Murewanhema et al, 2020). Understanding COVID-19 vaccine uptake dynamics would appropriately inform planning, policy and strategies to reach herd immunity in Zimbabwe.

Methods

Data were collected from the daily situational reports (SitReps) that were published by the Zimbabwean Ministry of Health and Child Care from 28th February to 31st October, 2021. Data extracted included the number of first and second dose administered. Data from these SitReps were transcribed into Excel for statistical analysis.

Aims

The study applied the diffusion of innovation and health belief models to describe dynamics of COVID-19 vaccine uptake in Zimbabwe.

Objectives

- To apply the health belief model to describe uptake of COVID-19 vaccine in Zimbabwe
- To apply the diffusion of innovation model to analyse COVID-19 vaccine trends in Zimbabwe
- To offer recommendations aimed at spurring vaccine uptake

Empirical literature

Globally, there has been vaccine hesitancy in the world. Literature shows that Asian countries such as China and European countries such as Italy experienced vaccine hesitancy (World Health Organisation, 2020). Mo et al. (2021) sought to understand the intention to take COVID-19 vaccine in China and concluded that use of diffusion of innovations (DOI) theory was key in explaining the intention to receive COVID-19 vaccination. Shmuel (2020) applied the health belief model (HBM) and the theory of planned behaviour (TPB) in Israel to explain the intention to take COVID-19 vaccine and concluded that both models were useful in predicting the uptake of the vaccine and providing indication to policy makers to craft appropriate interventions. The works of Zampetakis et al. (2020) in Greece of applying the HMB to determine factors that influence uptake of COVID-19 vaccine indicated the importance of the model in predicting uptake of COVID-19 vaccine. Studies on how the HBM and DOI models explain COVID-19 vaccine uptake in sub-Saharan Africa (SSA), particularly Zimbabwe, are scanty, hence the need to conduct this study in a context specific a developing country.

Theoretical framework

Health promotion models

According to Green and Krueter (2005), the health belief model (HBM) was developed to explain and to predict health related behaviours. The model focuses on individual

beliefs and attitudes towards prevention of a medical problem, for example, COVID-19.

1) Health belief model (HBM)

Glanz et al. (2005) posits that the HBM explains individual health related behaviours and postulates six constructs:

Perceived susceptibility: Perceived susceptibility refers to beliefs about the likelihood of getting a disease or condition.

Perceived severity: Feelings about the seriousness of contracting an illness or of leaving it untreated.

Perceived benefits: Even if a person perceives personal susceptibility to a serious health condition (perceived threat), whether this perception leads to behaviour change would be influenced by the person's beliefs regarding perceived *benefits* of the various available actions for reducing the disease threat.

Perceived barriers: The potential negative aspects of a particular health action

Cues to action: Triggering mechanisms is appealing.

Self-efficacy: The conviction that one can successfully execute the behavior required to produce the outcomes"

2) Diffusion of innovation theory

Diffusion of innovation theory explains how a new innovation is adopted within communities (Glanz et al., 2005). Three important factors in the diffusion process are characteristics of innovation, characteristics of adopters and features of the setting or environmental context.

Green and Kreuter (2005) submits the following characteristics of innovations that affect adoption:

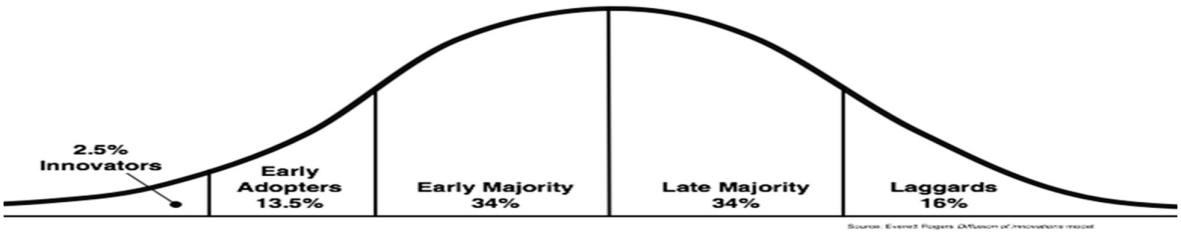
Relative advantage: Is the innovation better than what was there before? An innovation will only be adopted if it is seen as better than the idea, product, or program it supersedes.

Compatibility: Does the innovation fit with the intended audience? Innovations that are compatible with the intended users' values, norms, beliefs, and perceived needs are more readily adopted.

Complexity: Is the innovation easy to use? Innovations perceived as easy to use are more likely to be adopted, whereas more complex innovations are less successfully adopted.

Triability: Can the innovation be tried before making a decision to adopt? Innovations with which intended users can experiment on a limited basis are adopted and assimilated more easily.

Observability: Are the results on the innovation visible and easy to measure? If the benefits of an innovation are easily identified and visible to others, it will be adopted more easily.



According to Glanz et al. (2008), the following characteristics of individuals affect adoption of innovation:

*Innovators***:** Take the lead and are pacesetters

Early adopters: They are quick to learn and follow, and are exposed to latest news and technology

*Early majority***:** They research to find out about innovations and take their time to decide.

*Late majority***:** They are skeptical, and need approval of significant others

*Laggards***:** They are wait and see people and are the last to make a decision.

Environmental settings

There are some contextual factors that affect adoption such as the decision-making processes of potential adopters that are influenced by many other factors in the context, environment, or system in which the process is taking place, several of which have been supported by some empirical evidence. These intra-individual factors include psychological antecedents (for example, learning style, tolerance of ambiguity), meaning, and concerns in the pre-adoption stage, early use, and once use is established.

Results

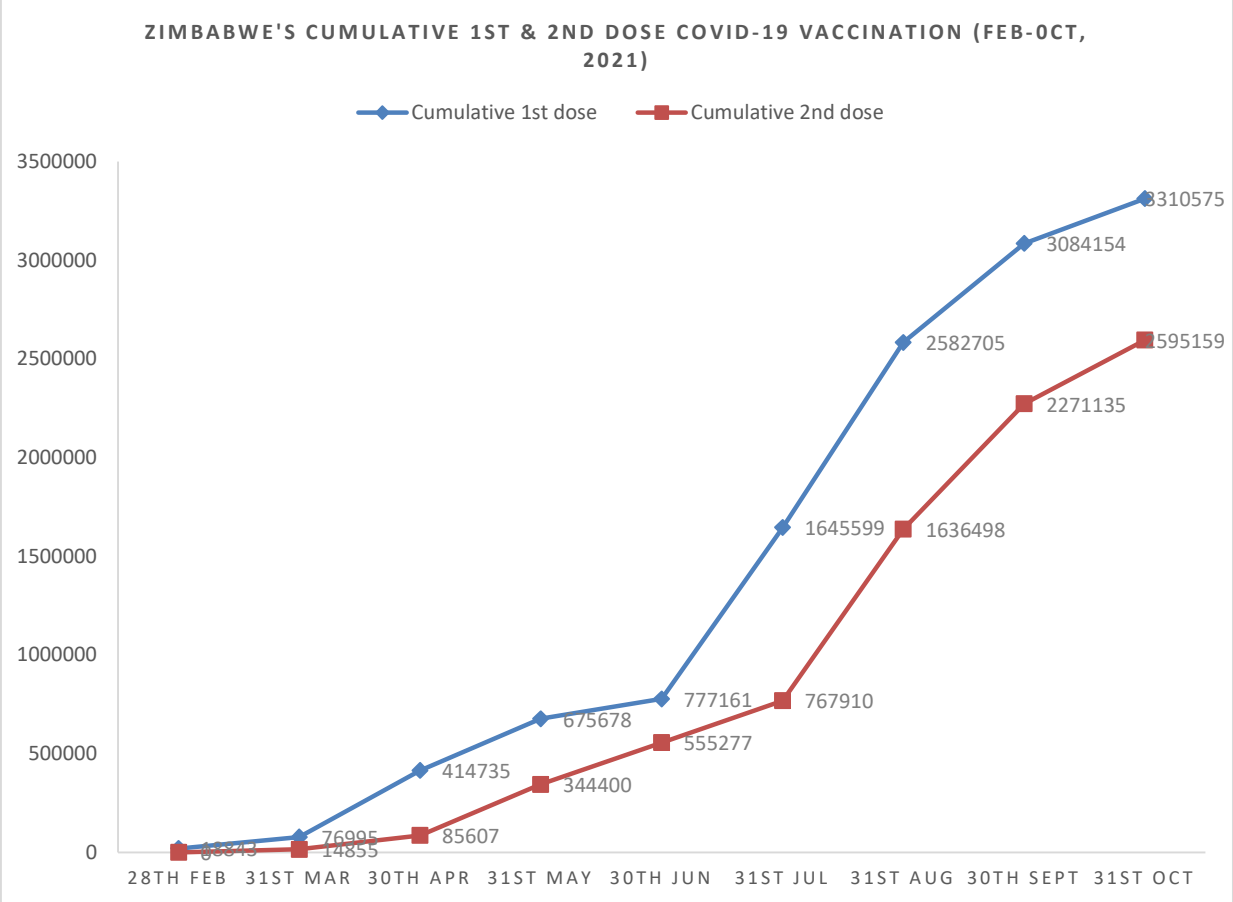


Figure 1: Tracking National 1st & 2nd dose of COVID-19 vaccination (February to October, 2021).

Source: Data from Zimbabwe Ministry of Health & Child Care Situational Reports (SitReps).

Based on the above attached graph, and considering the size of the herd immunity target of ten million, which can be considered as a huge undertaking, time frame and complexity of behaviour change and other factors such as hesitancy and availability of the COVID-19 vaccine and also given that the diffusion of innovation model does not stipulate a fixed time frame for the complete cycle of an innovation to lapse (Green & Kreuter, 2005), save for the phases involved. The researcher reasonably considered the period in question (February 2021 to October, 2021) as the first half of the diffusion of innovation process. The whole cycle should last eighteen (18) months.

The period March to October 2021, constitutes a nine months' time period, which represents the first half of the diffusion of innovation bell curve. The time of nine months period under observation was segmented into the first three phases, namely innovators, early adopters and early majority (Glanz et al., 2008). The results show that vaccine uptake started slowly, resembling the innovators of diffusion of innovation (Glanz et al., 2008), during the first three month, a cumulative of 414 735 and 85607, representing a maximum of 4.1% uptake of the targeted ten million. Theoretically, this phase represents a 2.5% proportion. Suggesting a good start, this is explained by several campaigns, which provided a cue to action, that were conducted during the onset of vaccination (Murewanhema et al., 2019). It is interesting to note that from February to March there was a narrow difference between the 1st and 2nd doses. However, the second dose started lagging behind from March through April, 2021 (MoHCC, 2021). This suggests that people who got the 1st dose were not returning for the 2nd dose, a sign of complacency, which could be barrier related, like unavailability of second dose at some health facilities (MoHCC, 2021). It could also indicate that this could be benefits related, that is, not seeing any benefit derived from the first dose. Alternatively, it could reflect low risk perception and low severity perception issues emanating from the belief that the 1st dose is good enough to confer adequate immunity. Furthermore, the recipient could be spending some time under

self-observation, monitoring possible side effects of the vaccine. A In their research Mundagowa et al. (2021) confirm this assertion. Their study reports that the majority (76.0%) of their respondents were uncertain about the effectiveness of the vaccine and (55.0%) were concerned about its safety.

The period spanning May to June had a semblance of the second phase of the diffusion of innovation (Glanz et al., 2008). This phase was characterised by a rapid increase to 1 645 599 and 767 910 for the first and second dose, respectively. The proportion of people vaccinated was 1 230 884, representing a maximum of 12.3% of the target heard immunity set target of ten million (10 000 000). This is generally a good number achieved within six months and that could be explained by other factors such as increased access and recommendations by world health bodies. Such an observation is in congruence with the works of McAbee et al. (2021) whose study reported that the intention to get vaccinated was influenced by factors such as widespread availability of COVID-19 vaccine free of charge and recommendations by the World Health Organisation (WHO). In theory, early adopters represent 13.5%. The two doses remained wide apart in May, but tapered to close off in June. This suggests scaling up efforts to encourage people to return for the second dose. The gap reduction between the uptake of 1st and 2nd dose in June, mid-winter, could be explained by increased risk perception, resulting in people deciding to go for their second dose, owing to high transmissibility of the corona virus (MoHCC, 2021) given that it spreads via droplet. Several studies have indicated low risk perception as the underlying reason for vaccine hesitancy (Chigevenga, 2021).

The remaining part of the graph for the months August to October, 2021, could resemble the last phase of the first half of the diffusion of innovation model, that is, the early majority. This period is characterised by a sharp rise in vaccine uptake, which could be linked to government announcement of linking the incentive of accessing

social gatherings and public places for the fully vaccinated (MoHCC, 2021). This somewhat tappers on at the end of the observation, suggesting an impending inflexion. By the end of October, Zimbabwe had administered 3 310 575 and 2595159 for first and second doses, respectively. Thereafter both graphs begin to taper off. Tapering off both the 1st and 2nd dose uptake could be a result of low numbers of COVID-19 cases during the summer time, thus fuelling complaceny (Dzinamarira, Nachipo, Phiri & Masuka, 2021). From August to October, there is a gap between the 1st and 2nd COVID-19 vaccination doses. This indicates an increasing number of people who got their first dose mostly during the winter were not getting their second vaccination. This is despite general availability of the vaccine within Zimbabwe (MoHCC, 2021). This also raised a concern given that the programme had been rolled out for at least 9 months, but was still far from reaching half the target. It also suggests resurgent or continued vaccine fears, hesitancy and coplacency (Mundagowa et al., 2021).

Discussion

It is imperative to appreciate that behaviour change theories provide structures that planners may use to systematically design health care, and to explain how and why a program is expected to be effective. There is therefore no one theory that is adequate to fully address all variables that contribute to a person's behaviour, and not all theories are applicable to all situations. Rather, elements of diverse, yet complementary theories may be combined to create a programme tailored for a specific issue and target population.

Although the vaccination programme in Zimbabwe took off on a good note, findings indicate more needs to be done. The fact that Zimbabwe is currently recording low number of COVID-19 incidence and mortality reduces the risk perception of the public and, inadvertently, the need to get vaccination. It is therefore crucial to optimise vaccination during high peak COVID-19 waves, such as the festive season. Whereas

the issue of benefit arises, public health professionals should accentuate the need for added protection from the current existing ones of masking up in public places, maintaining physical distancing and frequent hand washing. The question is left to legal and public health authorities to debate the legality of mandatory vaccination within the context of Zimbabwe's constitution and public good.

As shown below, there is much work that needs to be done and it is not feasible for the achievement of the set target by end of December, 2021. Implementation of recommendations provided below is crucial in achieving the set target and nine additional months could be required to achieve the ten million target.

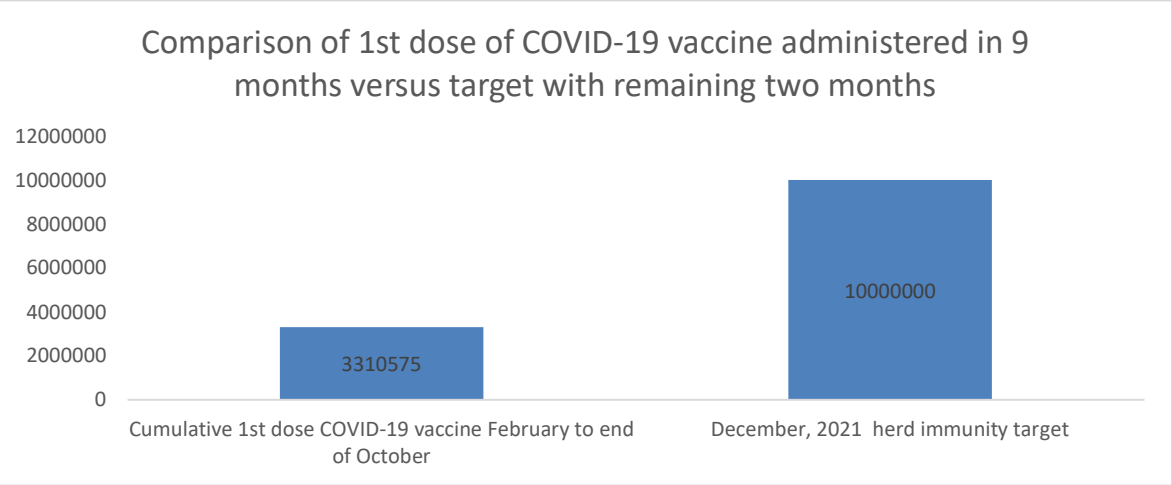


Figure 2: comparison of National first dose as at 31st of October versus end of December target

Conclusion

Continued mass health campaigns and vaccine manufacturing processes, particularly during pandemics, are vital in allaying citizen's fears. Citizenry should be continuously educated of the benefits of full vaccination in and out of hotspots. Health authorities should take advantage of the window of opportunity during high peaks of waves to optimise COVID-19 vaccination during peaks of the pandemic's waves when the general populace seem to be keen to get vaccinated. Vaccine education about the

booster shot is vital to achieve full vaccination. Benefits of fully vaccination should be expounded to increase second dose uptake. Additionally, government should reinforce incentives attached to fully vaccinated persons, such as access to public places and social gatherings. Further, mapping of areas with people with only one dose could be done using geospatial technology and mobile outreach teams following campaigns and bulk SMSs to alert targeted communities. Under current conditions, this study posits that it may take Zimbabwe up to eighteen months to reach a target of ten million if the proffered recommendations are fully adopted. Lastly, a combination of both the diffusion of innovation and health belief models have been useful in analysing influential factors influencing COVID-19 vaccine uptake. It is possible that this experience could be applied to the analysis of other scenarios.

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Guide for authors

The *Zimbabwe Journal of Health Sciences* (*ZJHS*) will consider for publication articles relating to all forms of human psychological services as well as human health and social services issues.

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