# THE FIRST NATIONAL NON-COMMUNICABLE DISEASES CONFERENCE

***MULTISECTORAL ENGAGEMENT IN PREVENTION, CARE AND MANAGEMENT OF NON-COMMUNICABLE DISEASES IN TANZANIA***

## PROCEEDINGS

## DODOMA

## 11–13 November, 2019

# THE FIRST NATIONAL NON-COMMUNICABLE DISEASES CONFERENCE

## UNIVERSITY OF DODOMA

## 11 – 13 NOVEMBER, 2019

National Institute for Medical Research,

3 Barack Obama Drive,
P.O. Box 9653,
11101 Dar es Salaam, Tanzania

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## CONFERENCE ORGANIZATION

First and foremost, we would like to extend immense appreciation to the Minister for Health, Community Development, Gender, Elderly and Children, Hon. Ummy Ally Mwalimu and the Deputy Minister Hon. Dr. Faustine Ndugulile for taking time out of their extremely busy schedule to grace the First National Non-Communicable Diseases conference in Tanzania.

Achieving the intended objectives of the conference was made possible by collaborative efforts from different organizations, institutions and individuals whose roles in the Conference are gratefully appreciated. Special thanks go to the University of Dodoma for accepting to host the conference and provide all necessary support to ensure friendly environment during the presentations.

**Organizing Committee**

| | |
|---|---|
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## EDITORIAL

Globally there is evidence of the growing burden of Non-Communicable diseases (NCDs) especially in developing countries including Tanzania. The NCD burden constitutes one of the major challenges to socioeconomic development as it causes a big burden to both the economy and to health care systems. WHO projects that NCD deaths will increase by 15% globally rising from 36 to 44 Million deaths during the period from 2010 to 2020.

In Tanzania, according to the District Health Information Software 2 (DHIS2) report of 2016 – 2018, NCDs cases were recorded to range from 3,386,067 in 2016 to 4,190,467 in 2018, indicating an increment of 24% in the number of NCDs cases reported during the 3 years. Cardiovascular Diseases, Diabetes, Injuries, Chronic Respiratory Diseases and Mental Health Conditions account for nearly two thirds of all NCD cases.

Smoking, excessive alcohol intake, unhealthy diet and low physical activity have remained to be major risk factors for NCDs (Mayige, 2019; Tanzania step survey report, 2012), and these have been cemented with increased modernization and urbanization, the situation prevails in both rural and urban communities. Socio-demographic and economic transition has a big role in the current trend of NCDs in Tanzania. It is important to note that NCDs are preventable if the health sector collaborates with other sectors to make informed decisions in allocating resources to evidence-based interventions and form policies based on existing evidence. However, there is need to focus more on primary prevention at population-level targeting interventions to reduce exposure to tobacco, reduce alcohol intake, reduce salt intake, promote healthy diets and physical activity. Prevention and control of NCs require multi-stakeholder action informed by research and other epidemiological evidence. Health research though it is fundamental in informing the health sector, its utilization has been limited due to several reasons on both the supply and demand sides. Supply side factors include research conducted being less demand driven, weak packaging and acceptability of research findings which is attributed to the language used and degree of involvement of users of research findings along the research process stages and delayed conveyance of findings with policy implications.

Basing on the fact above, the Ministry Health, Community Development, Gender, Elderly and Children (MoHCDGEC) organized the conference with key stakeholders that included programs officials, health practitioners, policy makers, academics, professional associations and councils, industry stakeholders, scientists, students and researchers. The conference with the main theme of "***Multisectoral engagement in prevention, care, and management of non-communicable diseases in Tanzania***" aimed at disseminating scientific and programmatic evidence of various in-country interventions in the face of the growing NCD burden and to use this information to strengthen national preventive, management and control measures.

The Conference had the following sub themes:
***Risk factors and control of NCDs:*** The rise of NCDs has been driven primarily by four major risk factors: tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets.

These in-turn lead to other key metabolic/physiological changes such as raised blood pressure, overweight/obesity, raised blood glucose, and higher cholesterol levels.

***Health Systems:*** This is about all organizations, people and actions whose primary intent is to promote, improve, restore or maintain health of individuals and their communities. According to the World Health Organization Framework for Action, it has identified six building blocks, sometimes referred to as functions of health systems namely: - service delivery, information and evidence, medical products and technologies, health workforce, health financing and leadership and governance, and these are the areas where presentations focused on.

***Care and treatment of NCDs:*** This is based on services that limit the incidence of NCDs by controlling causes and risk factors. Many avenues of these activities focus on strengthening the capacity of health workers on NCDs in diagnosis and management, strengthening of the health system by ensuring availability of medicine and equipment and a well-functioning referral system and rehabilitation services focusing on strengthening community-based rehabilitation as well as palliative care services and home-based care programmes.

***The NCDs burden in Tanzania:*** In Tanzania like many developing countries the burden of NCDs has been increasing steadily. The burden of NCDs is predicted to continue steadily increase if measures are not taken to combat the already identified modifiable behavioural and metabolic risk factors. Almost a quarter of all NCDs cases in Tanzania were reported to have Cardiovascular Diseases. Cardiovascular Diseases, Diabetes, Injuries, Chronic Respiratory Diseases and Mental Health Conditions accounts for nearly two third of all NCD cases.

***NCD Co-morbidity:*** The primary focus of the global NCD response has been on the four major diseases –namely cardiovascular disease (CVD), cancer, diabetes, and chronic respiratory diseases. There is, however, a range of diseases and conditions –including mental and neurological disorders, autoimmune disorders such as psoriasis, bone and joint conditions such as osteoporosis and arthritis, and renal, oral, eye and ear diseases that are linked to the four most prominent NCDs. Often, two or more NCDs manifest in the same individual, referred to as ‘NCD co-morbidities’. NCD co-morbidities can occur because diseases share the same risk factors e.g. tobacco use being a risk for cancer, CVD and dementia; or because some diseases predispose individuals to developing others, as in the case of diabetes, which is a risk factor for CVD, stroke, osteoporosis, kidney failure and depression. On the other hand, with effective antiretroviral treatment (ART), people living with HIV are living longer and develop NCDs associated with not only ageing but also with ARV and the HIV infection itself. Diabetes is a known risk factor for active TB and reactivation of latent TB. NCD co-morbidities impose years of disability and compounded financial burden on those affected, their families, health systems, and national economies.

In addition, keynote speeches and plenary presentations were made by prominent scientists with vast experiences in NCDs. Round table discussion with secondary students on NCD risk factors was also done. Three patients (two with diabetes mellitus and one with sickle cell) provided testimony of their conditions.

The conference produced several recommendations that support planning and implementation of multi-sectoral programmes which may accelerate uptake of best practices towards prevention, management and control of NCDs.

## CONFERENCE OBJECTIVES AND EXPECTED OUTCOMES

**Objectives of the conference were:**

- To disseminate scientific and programmatic evidence of various in-country approaches in the face of the growing NCD burden and to use this information to strengthen national preventive, management and control measures.
- To provide an NCD stakeholders forum that brings together policymakers, development partners, academicians, researchers and beneficiaries to network and share experiences.

**Expected outcomes:**

- Recommendations that support planning and implementation of multi-sectoral programmes and researches that will accelerate uptake of best practices towards prevention, management and control of NCDs.
- A better understanding of stakeholders' roles and responsibilities in NCD prevention and control in developing a coordinated national action.
- Increased dialogue, networking and new collaborations initiated between NCD stakeholders.

## WELCOME REMARKS BY THE NIMR DIRECTOR GENERAL

Dear Guest of Honour;

The Ministry of Health, Community Development, Gender, Elderly and Children wishes to welcome you and all participants to Dodoma and to the first National NCD conference.

Dear Guest of Honour;
As we gather here today, we should remember that NCDs continue to take lives prematurely and overwhelm the health systems. NCDs are responsible for almost 70 per cent of deaths globally.
While we are witnessing burden of non-communicable diseases rising in our county, we should also recall the costs of non-communicable diseases that are huge not only to the people affected, but also to national budget, health systems and the economy in general.

Dear Guest of Honour;
Road traffic injuries especially Boda boda remain a leading cause of death and disability among the population. They rob the manpower and young people' s ability to earn a living and fuel a cycle of poverty that continues to impoverish families and communities.

Alcohol and drug use also deserve greater attention. More than 3 million people die every year from the harmful use of alcohol, and almost half a million because of drug abuse. These deaths are tragic, and they are avoidable.
At the same time, overweight and obesity are skyrocketing, including in children. With just more than 12 years left to achieve our targets and deliver on the promises of the SDGs, we must raise our ambition.

The World Health Organization warns us that air pollution causes a quarter of adult deaths from both heart disease and stroke, while it is responsible for some 30 per cent of deaths due to lung cancer. The result is an alarming loss of 7 million lives prematurely each year to polluted air.

We must also increase our focus on mental health, which has been a neglected element for far too long. Mental health disorders for instance have profound effects on societies, with ramifications that extend far beyond health. Most people with mental illness in our country continue to suffer in silence due to stigma and discrimination. One in five of adolescents experience a mental health disorder in any given year. Many will remain untreated until well into adulthood if at all.

Dear Guest of Honour;
While we are now having the NCD Control Program at the Ministry of Health, Community Development, Gender, Elderly and Children, we should not forget that controlling the NCDs will require bold political commitment, increased investment, innovation, and policies and plans that ensure swift and effective implementation. Multi-sectoral collaboration and partnership across stakeholders will also be critical.

Let us enhance the collaboration between public and private sectors to promote healthy behaviours, increase access to services and unlock additional domestic resources while preventing the NCDs and strengthening broader systems. It is within such a framework where the stronger health systems will be capable of delivering universal health coverage.

Dear Guest of Honour;
To all conference participants, we should ensure that NCDs are embedded in our agenda, including strengthening health systems and moving towards universal health coverage. We need to reimagine healthier, more sustainable food systems that strike a balance between growing hunger and increasing levels of obesity. NCDs are widespread. They have many dimensions, numerous causes, and countless undesirable consequences. But there are proven ways to prevent and manage them.

Dear Guest of Honour
Let me now welcome you to officially open the Conference and I personally wish you all a very productive conference.

Thank you.

## OPENING SPEECH

**By the Honourable Deputy Minister of Health, Community Development, Gender, Elderly and Children; Dr. Faustine Ndugulile (MP)**

The Conference was opened by the Deputy Minister of Health, Community Development, Gender, Elderly and Children who informed the participants that this was the 1st National NCD conference where all the stakeholders working on NCDs have met to discuss their work, present new research findings, interact with policy makers and discuss key issues related to NCD prevention, promotion, cure and rehabilitation so as to reduce the burden of NCDs in Tanzania.

Among the key issues that the Deputy Minister highlighted in his speech were that NCDs cause 34% of all deaths in sub-Saharan Africa. Heart disease alone, causes 12% of deaths in East Africa—more than either HIV/AIDS or from maternal and neonatal causes. By 2030, if not before, the World Health Organization (WHO) predicts NCDs will be the **leading cause of death** across sub-Saharan Africa. Approximately 63% of NCD deaths occur in persons under 70 years of age. Many persons with NCDs die or are hampered by disability in their most productive years, far younger than their counterparts in Europe or the United States.

For households, the costs of care can be devastating: In Tanzania, for example, 92% of low-income patients with cardiovascular disease experienced **catastrophic health expenses**. NCDs are projected to cause more than **$US 7 trillion** in economic losses by 2025 if left unchecked, this is the equivalent of a loss of 4% of GDP per year during the timeframe.

He pointed out that Tanzania in particular, although communicable diseases are still the leading causes of morbidity and mortality, non-communicable diseases contribute significantly to the disease burden especially among adult populations. He noted that diseases that were once considered rare such as diabetes and cardiovascular diseases are now considered a normal phenomenon. The increase in the burden of non-communicable diseases is being fuelled by the socio-demographic transition that is rapidly been occurring in developing countries.

The tragedy of NCDs is that many are caused by forces within our control – exposure to second-hand smoke, cheap foods high in sugar, salt and trans fats, built-up areas that don't cater for physical activity. The Deputy Minister proposed various measures to protect children by limiting consumption of cheap foods and sugar-sweetened beverages and also reinforcing laws such as that of not sending children to buy alcohol and cigarettes if they are under the age of 18; ban the importation of trans-fats as immediate measures and also reinforce laws restricting children not to consume alcohol and some cigarettes until they are 18 years or more.

Rapid urbanization of rural areas and rapid migration from rural to urban areas has contributed to the increased burden of non-communicable diseases, as a result the population is more exposed to sedentary lifestyles and unhealthy diets. The key behavioural risk and major lifestyle factors are implicated in the aetiology of non-communicable diseases.

The Minister urged NCD stakeholders to ensure that all people have access to the full range of health services, from those that protect and promote health, to those that provide treatment, rehabilitation and palliative care. And the following should be done:

- Strengthen multisectoral coordination for society-wide prevention, including with non-health sectors, civil society organisations, and development partners.
- Increase awareness of NCD risk factors through mass media campaigns, school and community-based screening and education, and implementation of nutrition and physical activity guidelines to reduce modifiable risk factors.
- Implement a robust monitoring and evaluation system to measure the effectiveness of health promotion and risk-factor reduction policies and guidelines.

### OPENING PLENARY SESSION

#### Keynote address 1: NCD Burden and National Response

Dr. Omary Ubuguyu.
**Institutional affiliation:** NCD Section - MoHCDGEC

**Introduction**

In Tanzania like many developing countries the burden of NCDs has been increasing steadily (Mayige M, 2012). WHO country profile 2017 showed that NCDs account for 34% (n=142,000) (i.e. *13% Cardiovascular disease, 7% cancers, 2% chronic respiratory disease, 2% diabetes and 10% all other NCDs*) of all deaths and 18% of premature deaths in Tanzania. In 2008, it was estimated that NCD caused a total of 75.7 and 58.8 deaths per 1000 population, of which 42.8% and 28.5 were below the age of 60years among males and females respectively. Age standardized death rates per 100,000 were 874 and 614.3 in males and females respectively (AMMP, 1997).

Cardiovascular diseases (CVD) alone accounts for more than 13% of all deaths much higher than any single disease. Also, DHIS 2 report 2016 -2018 shows significant increase in number of ''NCD cases'' that are recorded, the cases range from 3,386,067 in 2016 to 4,190,467 in 2018. Of these, about 60% reported to have cardiovascular diseases, diabetes, injuries, chronic respiratory disease and mental health conditions and quarter of all reported to have CVS. DHIS 2 report 2016-2019 also showed annual increase of cases with hypertension by 10%, and in regions which have high number of population with Low social economic status (Katavi, Rukwa, Songwe) had prevalence less than 1% while those with higher social economic status (DSM, Kilimanjaro, Arusha, Morogoro, Tanga had prevalence above 7% and Dar es salaam exceedingly high 21%.

**Figure 1: Burden of NCD**

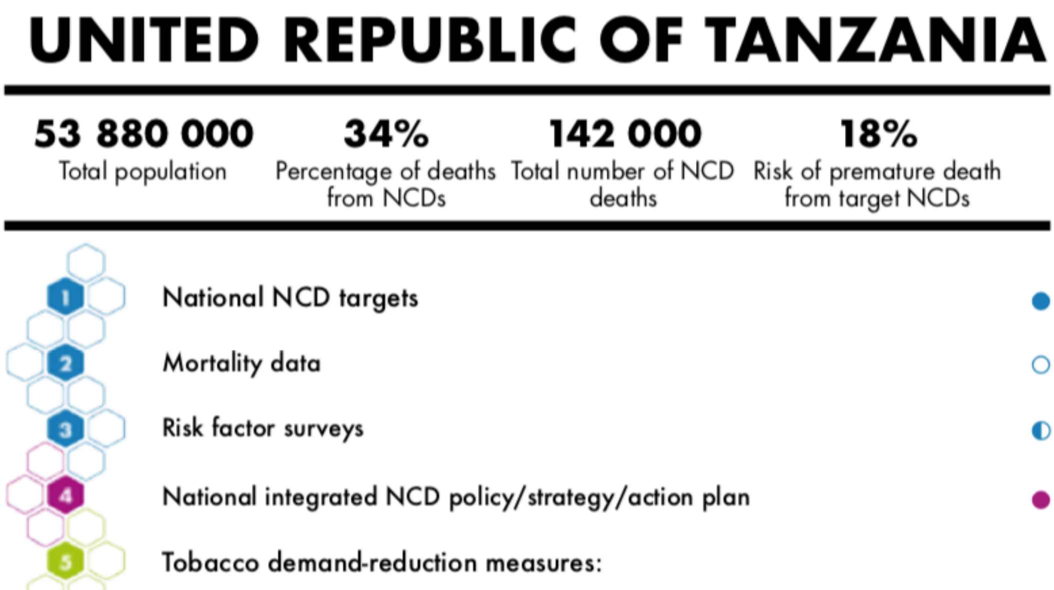
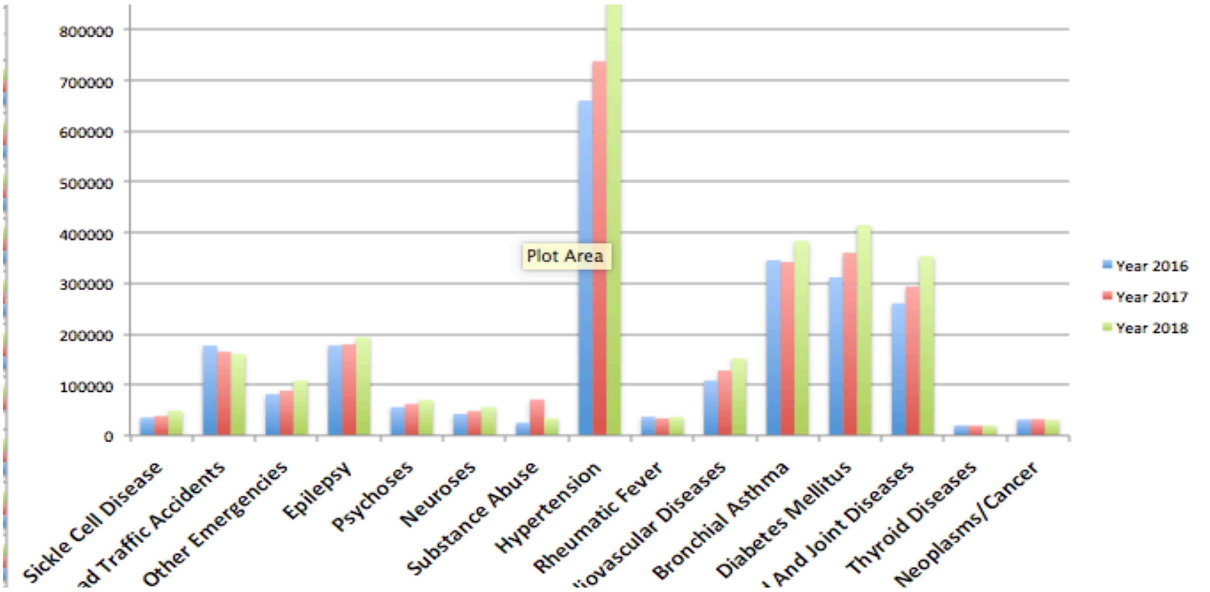
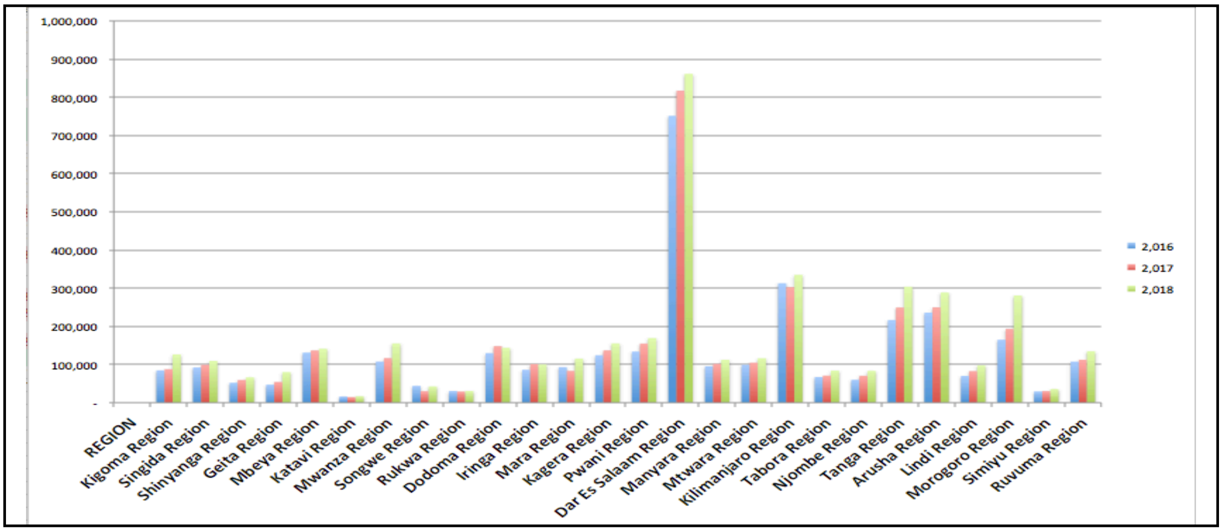


**Figure 2: Distribution by Disease conditions**




Source: DHIS 2 Report 2016 – 2019

**Figure 3: Distribution by Region**




Source: DHIS 2 Report 2016 – 2018

## Social determinants of NCD framework

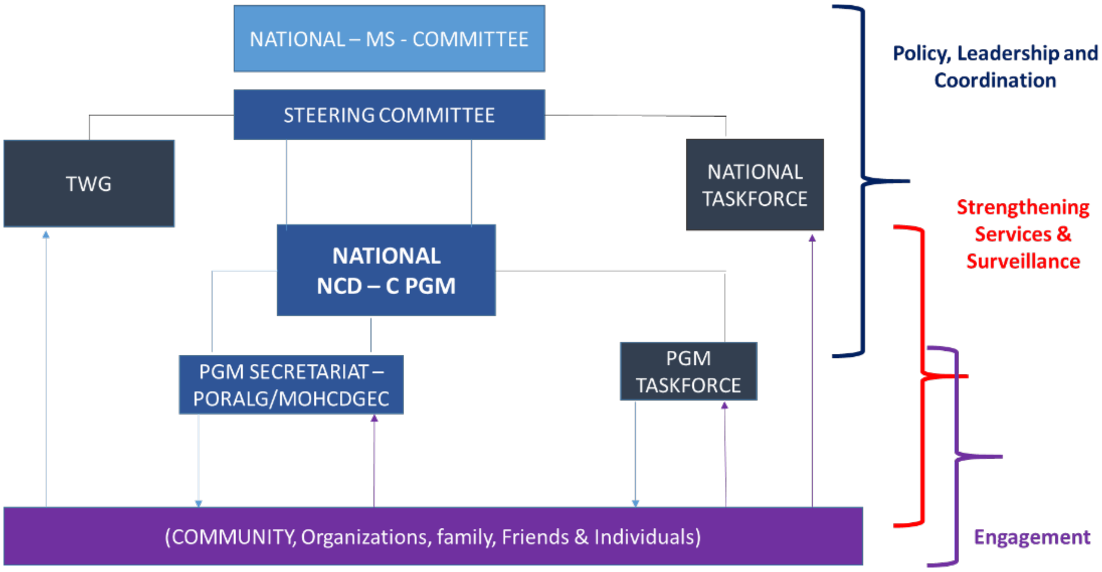
Evidence has shown that, social determinants of NCD framework lies within individual social change, lifestyle adapted through urbanization, and globalization has led to changes in eating habits, physical inactivity and the like. Children spend more time looking at Television instead of outdoor plays, transport use of motorbike instead of bicycle, eat processed foods, and fatty instead of cooked and boiled foods, and consuming fruit juices enriched with sugars, instead of fruits. The complex interplay where interpersonal behaviours and other factors, that are affected by institutional or organizational culture results to an impact in society. To some individual's genetics have effects to the development of some NCDs however nothing much can be done to genetics, but majority of other risk factors can be intervened to prevent and control NCDs.

In every domain of social determinants of NCDs there is a key issue to be addressed, although there is obvious inequality in terms of resources for health and access to services, such that distribution of health and wellbeing brings to health inequality. In order to address all the structural and intermediate determinants of the social determinants of NCD framework, the need for multi-sectoral response in creating enabling environment for development and implementation of public policies and legislations that affect all the five levels of ecological model.

**National Response to NCD**

The MOHCDGEC has created enabling environment for leadership and coordination of the NCD response through inclusion of NCD agenda in the Health Policy, PPP Policy and Legislations, Health in All Policies Initiatives, Multi-sectoral Committees, Health Sector Strategic Plans, National NCD Strategic Plan 2016 – 2020 and the established National NCD Control Program, which is aligned with the 2016-2020 Global Action Plan for the Prevention and Control of NCDs. The four (4) objectives of the National NCD Strategic Plan 2016 – 2020 are; **Objective 1:** To advocate for NCD Prevention and Control as a National Priority by 2020, **Objective 2:** To strengthen leadership, Governance, Multi-sectoral collaboration and accountability to prevention and control of NCD by 2020, **Objective 3:** To Strengthen and align health system to address NCD through Promotive, Preventive, Curative and rehabilitative services by 2020, **Objective 4:** To Strengthen the national capacity for NCD Surveillance, Monitoring and Evaluation and Research for evidence based planning by 2020.

**Figure 4: National NCD Control Program**




**Discussion and matters raised:**

- The top ten NCD's listed according to their prevalence: cardiovascular diseases, Diabetes mellitus, Chronic obstructive pulmonary diseases, Cancer, Mental health conditions, Diseases of the eye, diseases of the ears, dental conditions, injuries and kidney diseases. Cardiovascular conditions accounts for 25% of all NCDs.
- The Tanzanian cities have > 7% prevalence of NCDs, Dar es salaam city is leading by 21%
- This increase in NCD is attributed by changes in culture, norms and societal behaviours e.g. Decreased breastfeeding, decreased physical activity, decreased intake of fruits and vegetables, decreased social cohesion and increased consumption of sugars and salt. It was noted that the educated and more economically advanced society is at an increased risk of NCDs
- The government is launching a NCDs control program. Other Ministries like the Ministry for Finance and Planning, Ministry for Education, Ministry for Information, Sports and Youth and Ministry for Agriculture are also involved in this program. It's important for all stakeholders to share themes, slogan and stick to a common agenda.

## Keynote address 2: The emerging burden of Non-communicable diseases (NCDs) in Tanzania: are we ready for the challenge?

Prof Kaushik Ramaiya,
**Institutional affiliation:** Shree Hindu Mandal Hospital, Tanzania Diabetes Association (TDA), Tanzania NCD Alliance (TANCDA), Dar es Salaam, Tanzania

### Introduction

**NCD perspectives: Globally NCD**

Globally these are considered as diseases of priority. NCDs of global priority include diabetes, cancer, cardiovascular and chronic respiratory disease, which contributes to 60% of global deaths (WHO). They are expanded to low- and middle-income countries, and affects all ages starting younger, not just rich and elderly. These diseases are mostly preventable and if given effective treatments can be cured. However, they contribute to catastrophic costs to government and individuals. Successes in some cancers and cardiovascular. Obesity and diabetes rising everywhere to 320 million and will reach 500 million by 2030.

**Figure 1: Genesis of NCDs**

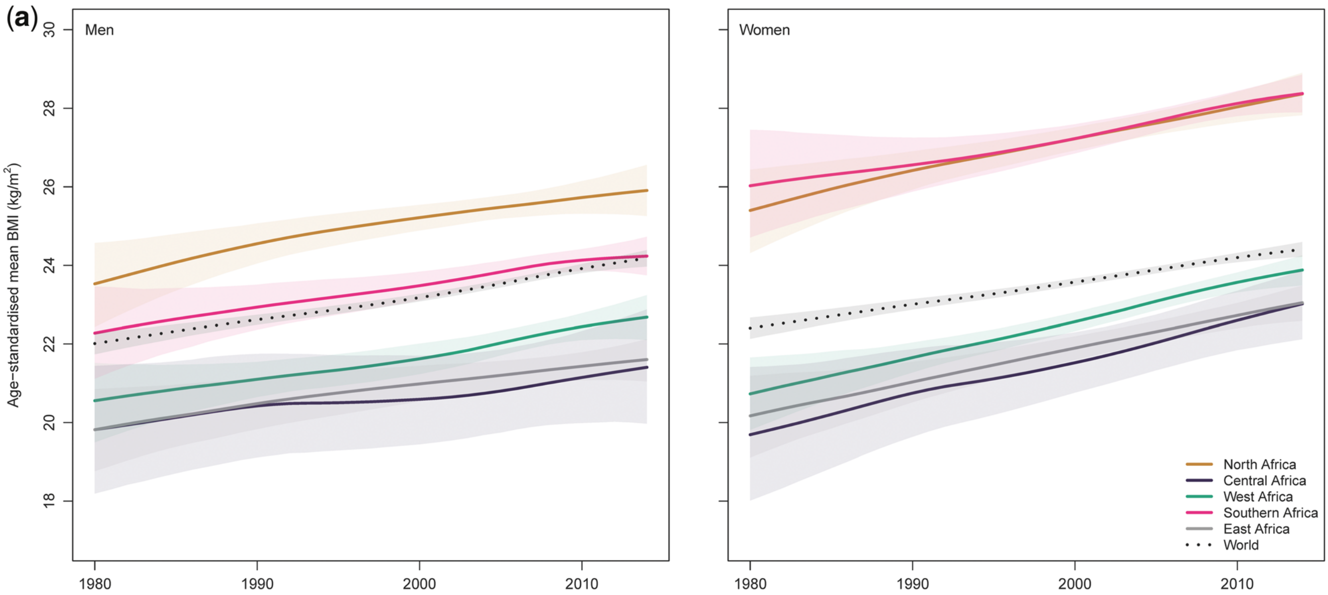
| **UNDERLYING SOCIOECONOMIC, CULTURAL, POLITICAL AND ENVIRONMENTAL DETERMINANATS** | **COMMON MODIFIABLE RISK FACTORS** | **INTERMEDIATE RISK FACTORS** | **MAIN CHRONIC DISEASES** |
|---|---|---|---|
| | Unhealthy diet | Raised blood pressure | Heart disease |
| | Physical inactivity | Raised blood glucose | Stroke |
| Globalization | Tobacco use | Abnormal blood lipids | Cancer |
| Urbanization | **NON- MODIFIABLE RISK FACTORS** | Overweight/obesity | Chronic respiratory diseases |
| Population ageing | Age | | Diabetes |
| Early Life Characteristics | Heredity | | |

The genesis of NCDs is underlying socioeconomic, cultural, political and environmental determinants such as globalization, urbanization, population ageing and early life characteristics. **Common Modifiable Risk Factors** include unhealthy diet, physical inactivity, tobacco use, non- modifiable risk factors, age and heredity. **Intermediate risk factors** are raised blood pressure, raised blood glucose, abnormal blood lipids, and overweight and obesity. Main Chronic Diseases, heart disease, stroke, cancer, chronic respiratory diseases and diabetes. The combined burden of the Major NCDs is a major cause of premature mortality in Low- and Middle-Income Countries, 86% of deaths between the ages of 30 -70 occur in developing countries.

Smoking (behavioural) and high systolic blood pressure (metabolic) are global leading risk factors causing early death and disability, by sex in 2017. However **what matters most in health for prevention are** its lifestyle and the healthfulness or otherwise of our environment and some authorities put the contribution of environment as high as 40%. Genes and medical care are not (although good version of both does help). What is considered as environment is: the physical environment including the built environment and transport systems, the food environment, the economic environment and the social environment.

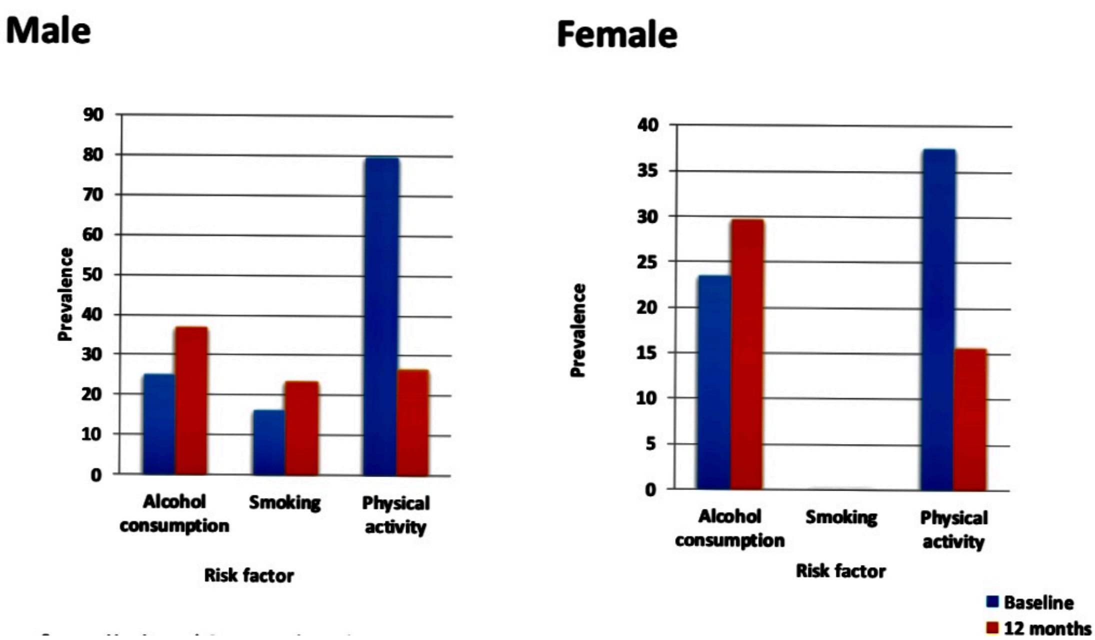
**NCD perspectives: Sub Saharan Africa Region**
The burden of NCDs will increase in the AFRO region and by 2025 will become a major contributor to mortality (40% in 2010 to 55% in 2025). Morbidity from NCDs are very substantial but often under-reported. There is poor reporting of non-fatal but debilitating NCDs such as Mental illness, ear and eye diseases due to variations in the threshold for defining cases. NCDs increase cost of illness due to medical bills and catastrophic expenditure. Non-medical costs like transport and cost of care, and loss of productivity affect socio-economic indicators. There is a potential for $84 billion loss in economic output from 2006-15, in the 23 countries as result of Coronary Heart Disease (CHD), Cardiovascular Disease (CVD) and Diabetes Mellitus (DM) conditions. Cardiovascular diseases have shown to be a major causes of non-communicable diseases burden (percentage of total DALYs) in the African Region (2012) which is 3.8.

**Figure 2: Trends in BMI in the African Region 1980-2010s**




Source: International Journal of Epidemiology, Volume 46, Issue 5, October 2017, Pages 1421–1432, https://doi.org/10.1093/ije/dyx078.

**Figure 3: Urbanisation- changes in selected risk factors**




Source: Unwin et al, 2010. Rural to Urban migration and changes in cardiovascular risk factors

**NCD perspectives: Tanzania**

The diseases like hypertension, diabetes, Coronary Heart Disease (CHD), stroke, chronic heart disease, asthma, cervical cancer, prostate cancer, and gestational diabetes. WHO steps survey (2012) reported that Hypertension was a leading in mortality (25.9%) among all NCDs followed by diabetes at 9.1%. CHD was caused by Hypercholesteremia 26% and hypertriglyceridemia at 26%. A Study for rural and urban Tanzania, reported yearly stroke incidence were 108.6 per 100,000 in Hai and 315.9 per 100,000 in Dar es Salaam Walker et al, 2010. There is an increasing incidence of Chronic Obstructive Pulmonary Disease (COPD) 17% in rural Tanzania (Magitta et all, 2018), and 3% Northwest Tanzania (Kavishe et all, 2015). Asthma in secondary school children in rural and urban areas of the coast of Tanzania affects 12.1-23.1% (Shimwela et al., 2014). There is increasing high risk HPV 20.1% among HIV +ve and HIV-ve women in general population of Tanzania (Dartell et al., 2012) and cervical cancers has contributed to 23.2% and prostate cancer has contributed to 10.4% of all Cancers globally (Globecan 2018). In Tanzania prostate cancer was found among 21.71% of patients who underwent prostatectomy. Studies shows an increasing prevalence of gestational diabetes mellitus 13% (Msolo et al 2019) for urban pregnant women since 1989 to 2018 compared to rural pregnant women 1.0% (Mwanri et al 2013). Therefore, it is important to focus on GDM as it increases the risk of delivery complications and risk for future Type 2 diabetes for the mother and the child. Evidence shows that early diagnosis and appropriate management reduces the risk of GDM. Community based screening reports from 2014 to 2019 have shown increased prevalence of T2DM, hypertension and obesity in Tanzania.

Studies have shown there is an increasing risk NCDs among young generation of school age. The risk is higher in Urban Low Density (ULD) than in Urban High Density (UHD) and Rural school settings e.g.: Hypertension (systolic and diastolic) is 11.3% in ULD, 1.2% in UHD and 1% in Rural population; obesity is 16.9% in ULD and 1.0% in UHD and 0% rural. Population screening conducted from 2014 – 2019 to identify obesity and overweight as risk factors to Hypertension and diabetes among the target groups of various lifestyles showed that of all 20,407 persons obesity and overweight was among the 12.7% known and 22.0% New cases of hypertension, and 5.5% of known and 2.8% of new cases of Diabetes.

**Challenges of Care**

Challenges in NCD are Health System Related, accessibility of care for general population is low, as there are long distances to the clinics and opening hours for clinics are limited. Lack of qualified healthcare providers causes the quality of care to be less than optimal. The challenges to availability of essential medicines is a result of frequent shortages and lack of proper equipment for monitoring and follow-up. Majority of patients cannot afford due to High cost of treatment and medicines and additional financial burden due to high costs of transportation to the clinic.

Co-morbidities and multi-morbidities in patients with these highly prevalent NCDs have shown to affect many patients. In a diabetic economic impact study, a significant number of patients with diabetes were diagnosed or self-reported to have mental illness either depression or other mental condition, cardiovascular diseases such as heart attack, heart failure, or stroke high blood pressure. Proportion of patients with multi-morbidity prevalence is 22.6% (Oni et al 2015), also Diabetes Mellitus increases the risk of TB by a factor of 3.

Economic impact: A cross – sectional study of the microeconomic Impact of Cardiovascular Disease in hospitalization in four Low- and Middle-income countries Tanzania included, a high Proportion of survey respondents experienced catastrophic health spending and distress financing following CVD-related hospitalization (Huffman MD et al 2011).

**Human resources challenge:** Trends of Human resources for health per population ratios for selected cadres, baseline 2008 to 2014, shows that ratio of medical doctors was 0.38 per 10,000 population compared to 2.5 per 10,000 population as WHO recommendation, and nurses is 5.42 per 10,000 population compared to 20.3 per 10,000 population. Evolution of medical training shows increase in number of medical schools and enrolment, however capacity to handle and sustain quality of medical services for patients and training in these schools is very low as there is serious shortage quality mentors, lectures.

Health systems support is very important to ensure equitable services are offered, since the specialised care is limited to few zones. Community action is enhanced through multi-sectoral partnership which links Tanzania NCD Alliance, MoHCDGEC, PORALG and Enablers and they work closely in the NCD agenda. Prevention of NCDs should be strengthened through community actions screening for risk factors and encouraging behavioural changes that exacerbate risks. The project outcome for school health program under APHTA/MOE/MoH/PORALG/WDF showed that 81.2% (N=134) of the primary schools had copies of the school health policy and NCD Curriculum, 91.1% had school Health Committees and 82.2% had health clubs. Knowledge on Diabetes or NCDs: 48% (n=1306) of school children and 39.2% (n=950) of community members had knowledge on NCDs/Diabetes prevention. More than 76% of school pupils have been able to adopt at least 5 healthy lifestyle behaviours. Therefore, the school health program be scaled up and streamlined for suitable results. Consumption of fruits/vegetables, being physically active, non/ex-drinker, use of vegetable cooking oil, having normal BMI. 37.5% of the community members have been able to adopt five of the above healthy lifestyle factors.

**Way forward**

The principles of effective NCD service include leveraging, progressive decentralization, optimizing integration of services, optimizing clustering of related services. The priorities should be; complete government wide action on risk factors, sustained primary health care with prioritised packages plus palliative and long-term caregivers, Surveillance and monitoring, Learning from and integration with HIV/AIDS, TB, and malaria programmes. Governments, private sector, civil society, and international organisations must all work together.

The National NCD Program to be effective it needs; Established National Multi-sectoral NCD Steering Committee, Tertiary and Secondary Care Health Facilities: training, tools, protocols in place and integrated care has been initiated, NCD management capacity for early diagnosis at Primary care (health centres and dispensaries ) to be enhanced (tools and training), Community Health workers , Facility Health Volunteers and Peer educators that will be the key drivers of prevention and advocacy at Primary Care level. Primary prevention program at School level in partnership with MoHCDGEC, MoEST, PORALG and APHFTA. Workplace interventions: Public Sector, Private Sector: formal and informal. Community mobilisation and involving people with NCDs – in partnership with TANCDA. Establishing sustainable training, re-training, continuous professional development and mhealth/e-health programs for Health Care Professionals. Strengthen the GOTHOMIS system to capture relevant NCD indicators and finally, Strengthen supervision, M&E systems.

The key messages on NCD facts that need to be envisaged by the public are as follows; prevention is possible through lifestyles. Both type 2 diabetes and hypertension are reversible especially if detected early (screening), without further medication, through; Healthy diet, increased physical activity, stress reduction and adequate sleep. In both the USA and UK, practitioners are now reimbursed for preventive care-education and counselling. This could be adapted at health facilities, workplaces, schools and community.

## Diabetes, Cardiorenal Anaemia Syndrome – NCD Multi-morbidities

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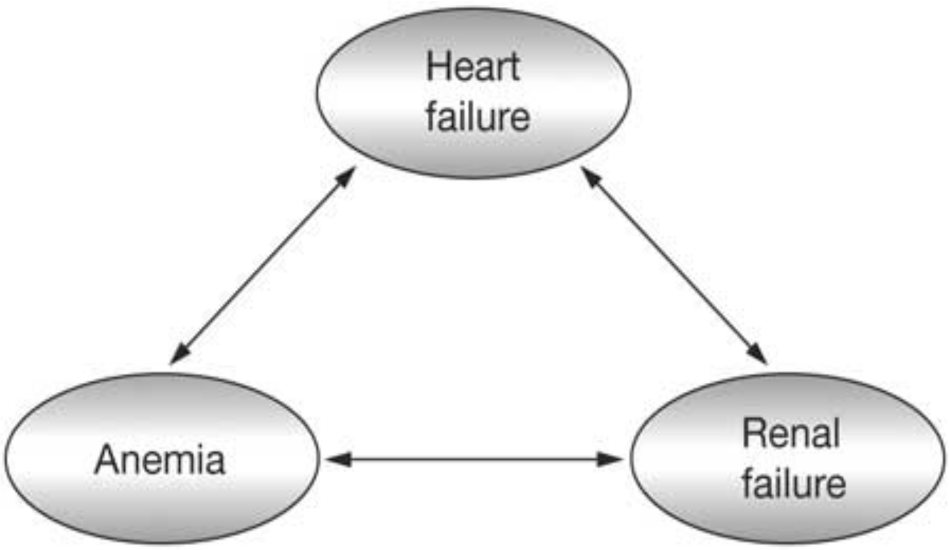
### Introduction

There is reciprocal relationship among the diseases of Diabetes, Chronic kidney disease, Cardio-vascular diseases and anaemia, which if no close monitoring of one condition is done may lead to exacerbate condition or the occurrence of another. Congestive Heart failure (CHF), Chronic Kidney Disease (CKD), and anaemia are common conditions in our admission and community. The interaction between CHF, CKD and anaemia form a vicious cycle, termed as the Cardio-renal anaemia syndrome the term referred to as 'CRAS' (Silverberg 2003). The interactions between these three conditions causes deterioration of the cardiac and renal function and increases anaemia. Each of the three can cause or be caused by the others. Hence frequent COEXISTENCE as well as the CLOSE pathogenetic relationship between them.

### Congestive Heart Failure (CHF) Causing Anaemia

The effect of CHF in causing anaemia remains a major challenge for medical community. The current prevalence in Tanzania is not known and prognosis is poor despite advances in diagnosis and treatment. The great majority of these patients are anaemic, with Haemoglobin less than 12g/dl, Anaemia is more prevalent and severe with the severity of the Congestive Heart Failure. Factors contributing to anaemia due to CHF are due to: Haemodilution, Proinflammatory cytokines, Malnutrition due to right-sided Heart Failure, Iron deficiency, decreased bone marrow perfusion and Drug therapy (Angiotensin Converting Enzyme (ACE) inhibitors, aspirin). Decreased Erythropoietin (EPO) production and resistance to the effects EPO on the bone marrow.



**Congestive Cardiac Failure (CHF) causing Chronic Kidney Disease (CKD)**

The role of Congestive heart Failure to cause Congestive Kidney Disease is by Hypoperfusion which is considered as the leading direct mechanism involved in Congestive Kidney Insufficiency related to Heart Failure, whereas cytokines and growth factors contribute to chronic kidney insufficiency progression. The role of Congestive kidney disease to cause anaemia and congestive heart failure is through progressive renal deterioration that leads to decrease in circulating levels of erythropoietin, With a subsequent decrease in bone marrow erythrocyte production and haemoglobin (Hb), Anaemia in patients with end stage renal disease (ESRD) is associated with a variety of adverse cardiac consequences, including the development of left ventricular dilation, hypertrophy and Chronic Heart Failure. There is a relative resistance to the EPO action and Uraemia-related risk factors in CKD patients.

**The Role of Anaemia in Causing CKD and CHF**

Then, anaemia causing CKD and CHF is by causing tissue hypoxia due to anaemia that leads to peripheral vasodilatation and decreased vascular resistance, which in turn reduces blood pressure. Increased sympathetic activity also causes renal vasoconstriction, resulting in renal blood flow and glomerular filtration rate (GFR) reduction, leading consequently to renal ischemia. The reduced renal blood flow activates the Renin Angiotensin Aldosterone System) (RAAS) and antidiuretic hormone, Causing further renal vasoconstriction, as well as salt and water retention. The renal insufficiency also cause anaemia through reduced erythropoietin production and reduced bone marrow activity. We know Acute and CHF leads to decreased Cardiac Output and this decrease renal perfusion and thus activate (RAAS).

**Figure 1: The Pathophysiology of CRAS**

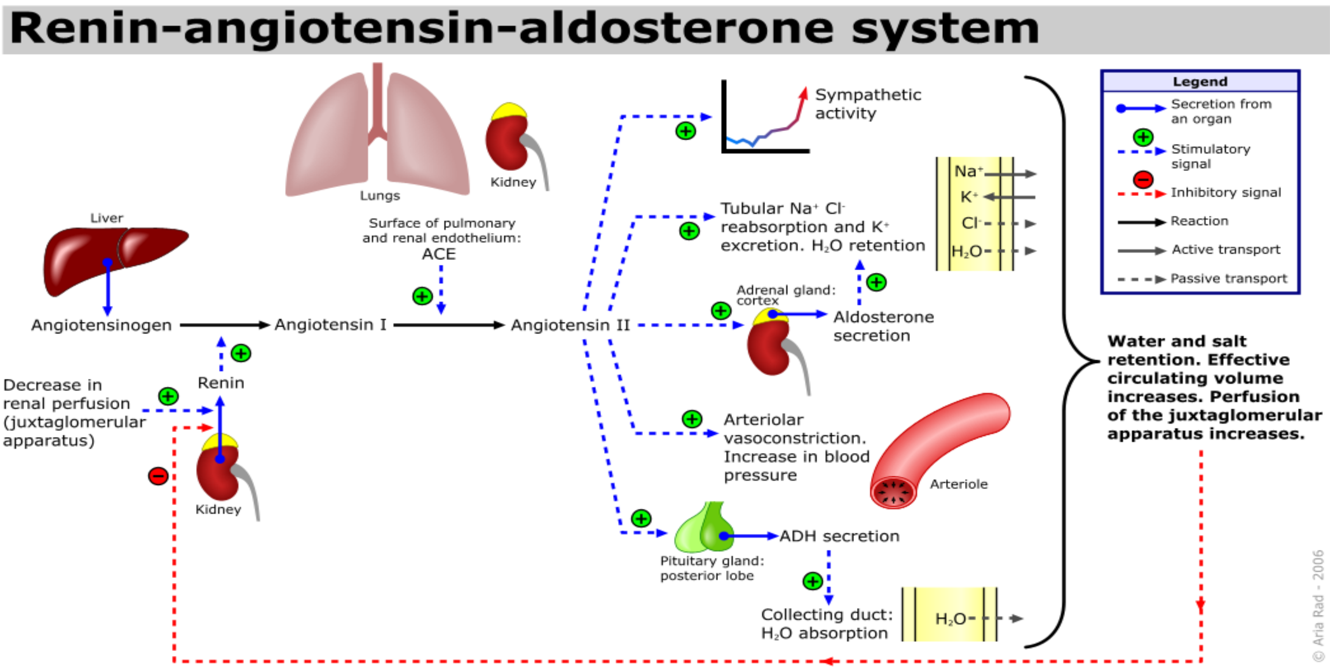
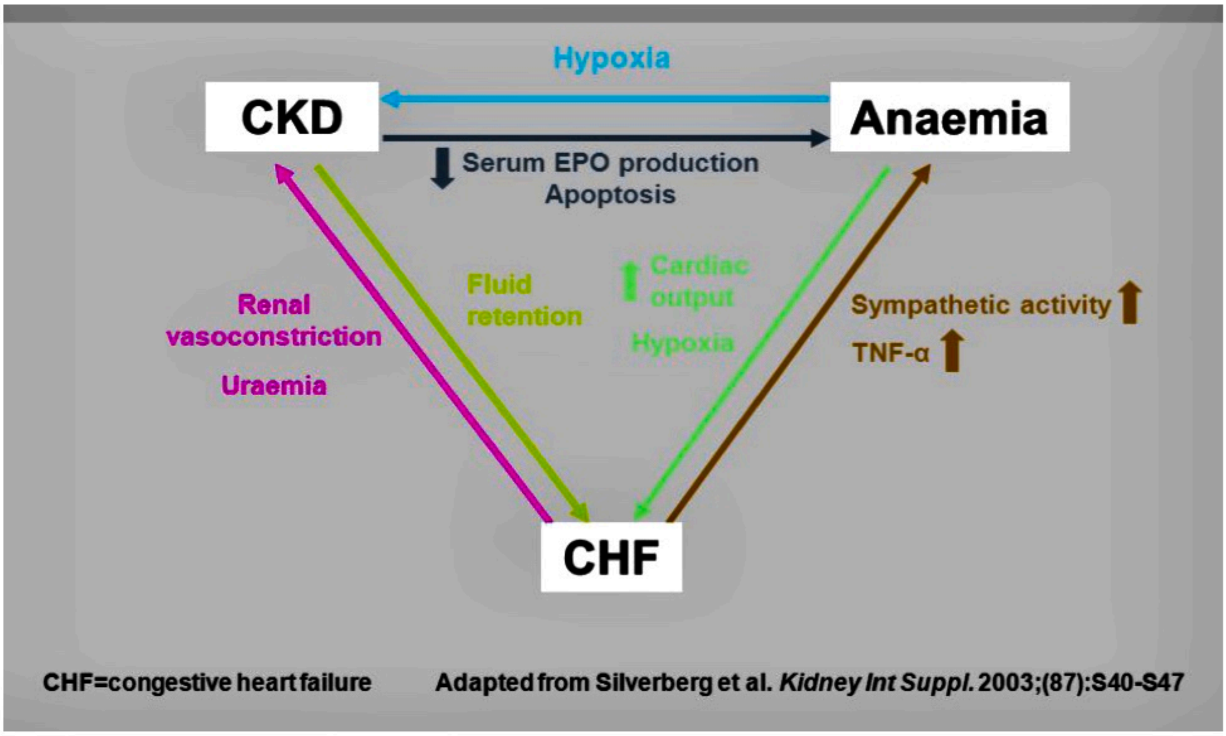


**Figure 2: The Cardio-Renal Anaemia Syndrome – A vicious circle**




**The multi-morbidity of CRAS**

Congestive heart failure (CHF) and chronic kidney disease (CKD) often progress to end stage even with optimum medical therapy. One factor that is common to both conditions is anaemia, which is present in about a third of CHF patients. CHF can cause or worsen both anaemia and CKD, and CKD can cause or worsen both anaemia and CHF. Thus, a vicious circle exists between these three conditions, with each causing or worsening the other. Anaemia in CHF is associated with increased mortality and hospitalization, reduced cardiac function and evidence of more severe CHF and CKD than in non-anaemic patients.

**Conclusion**

These observations reflect that the pathophysiology of kidney dysfunction in the context of heart disease is much more complex than simple reduction of cardiac output. The challenge is to recognize the syndrome, reverse it when possible, and deal with its consequences. An incomplete understanding of the pathophysiology and the limited treatment options enhance the difficulty of defining satisfactory approaches in the management of individual patients.

**Discussion and matters raised:**

- The communicable diseases are still the leading cause of deaths but there has been an increase in Non-communicable diseases
- There is no significant change in the epidemiology of these two groups of diseases i.e. a significant shift from communicable to non-communicable diseases or vice versa.
- There are several ways to solve this emerging double burden of diseases like: Reviewing the extent of the NCDs. Decreasing the risks leading to NCDs, String political commitment. A strong surveillance system. Nutritional food labels should be strictly adhered to, involving religious and institutions in promoting healthy lifestyle, learning from the experienced developed world that has been successful in controlling the NCDs, intersect oral coordination: Other Ministries to work together with the MOHCDGEC. The ministry of Finance and planning to; increase taxes in tobacco n its products, to increase funds in health activities, Integrate health promotion in development plans. Ministry of Agriculture to increase accessibility and affordability of healthy foods and the Ministry of Education, Science and technology to increase access to healthy foods and drinks in schools. Ministry for Information, Sports and Youth to Top increase activities, ban smoking, promote awareness in order to enable people to make informed choices
- It was recommended that the prevention and control of NCDs to be one of the top priorities in health planning.
- The professional conferences should come with priority action plans; encourage partnerships and opportunities among experts.

## Burden of sickle cell and its impact on individual and household level and to the health care systems

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**Genetic basis of SCD**

SCD encompasses HbSS (SCA), HbS-beta Thal, HbS-C etc. the $\beta^s$ mutation in the 6$^{th}$ Codon of B-globin gene Glutamic acid (GAG) to Valine (GTG), this is the same mutation found in all $\beta^s$ genes around the world.

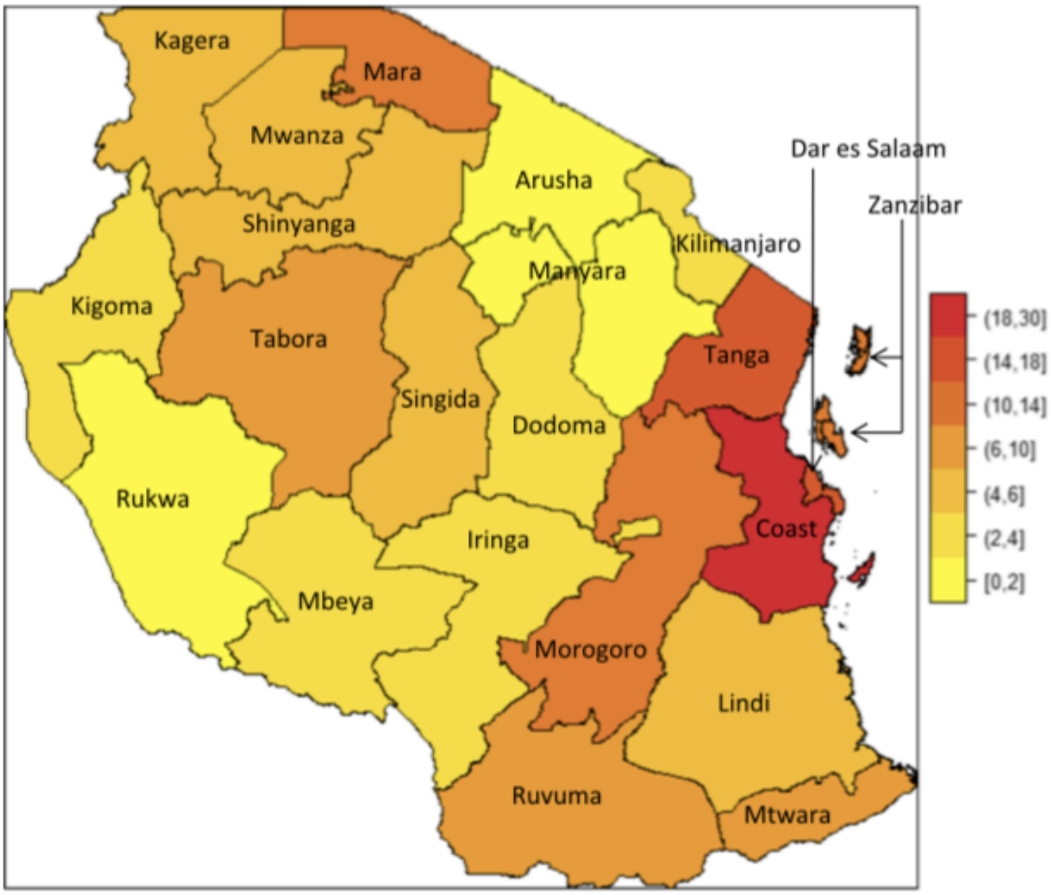
**Global and National burden of SCD**

Over 300,000 births annually, Will rise to 400,000 by 2050, 75% in Sub-Saharan Africa (*Serjeant, G.R., 2017)*, Tanzania is 4th in SSA, 5th globally (only behind Nigeria, DRC, India, Angola). In 2006, (*Piel FB et al, 2013)* WHO classified SCD as a major public health problem (*WHO 59$^{th}$ WHA, 2006).*

**SCD in Tanzania**

12 to 20 % Sickle cell trait (HbAS), high prevalence in the North, Eastern part of Tanzania, 11,000 annual live births with SCD and there is estimated population of around 200,000 people with the disease country wide. (Makani J et al, 2018). There is high birth prevalence of Sickle cell disease in the North-western part of Tanzania. Such that 19.7% of neonates had sickle cell trait or sickle-$B^+$ thalassaemia (FAS) and 1.4% had sickle cell anaemia or sickle $B^0$ thalassaemia (Emmanuela E et all,2017). The Muhimbili Sickle Cell (MSC) Program was established 2004 in collaboration with MNH. Over 4,000 individuals with SCD seen (85% below 18yrs of age). The main focus is on Healthcare, Research, Training and Advocacy.

**Figure 1: Sickle Cell Disease in Tanzania**




Source: Makani J et al, BMC Haemat., 2018

**Clinical epidemiology of sickle cell disease**

Malaria in SCD in Tanzania Evidence of protection from malaria in HbAS - geographic distribution, reduced episodes and severity. Malaria endemic zone is found to have highly prevalent for Sickle cell disease in Tanzania (*Allison 1954, Hill 1991, Aidoo 2002, Williams 2005*). Mechanisms – reduced parasite invasion and growth, increased parasite clearance. *Pasvol 1978, Orjih 1999, Luzatto 1970, Friedman 1979*. Research question – Shouldn't HbSS individuals be even more resistant to malaria? Hospital based study (clinic and inpatients); 2004-2009 1808 SCD patients at clinic; 497 SCD patients admitted. 679 non-SCD patient clinic; 2017 non-SCD admitted. Bacteraemia in SCD in Tanzania for hospital-based study of 648 SCD patients, 890 admissions the results showed 4.8% prevalence of bacteraemia. Patients with bacteraemia were associated with low haemoglobin levels. Hospital based study conducted in the year 2004 to 2009 to follow up 1,725 patients 86 deaths occurred in the period.

**Figure 2: Bacteraemia in Sickle Cell Disease in Tanzania**

| Bacterial isolate | Isolates (*n*) | Percent (100× *n*/43) | Bacteraemia (100× *n*/890) |
|---|---|---|---|
| *Staphylococcus aureus* | 12 | 27·9 | 1·3 |
| Non-Typhi *Salmonella* | 9 | 20·9 | 1·0 |
| *Streptococcus pneumonia* | 3 | 7·0 | 0·3 |
| *Streptococcus* species | 3 | 7·0 | 0·3 |
| *Escherichia coli* | 3 | 7·0 | 0·3 |
| *Klebsiella* species | 3 | 7·0 | 0·3 |
| *Pseudomonas* species | 3 | 7·0 | 0·3 |
| *Salmonella* Typhi | 2 | 4·7 | 0·2 |
| *Proteus* species | 2 | 4·7 | 0·2 |
| *Acinetobacter* species | 1 | 2·3 | 0·1 |
| *Aeromonas salmonicida* | 1 | 2·3 | 0·1 |
| *Morganella morganii* | 1 | 2·3 | 0·1 |
| Total number of isolates | 43 | 100 | 4·8 |

Source: Makani et al, Br J Haematol, 2015

**Mortality in SCD**

Thus, the overall mortality per year was 1.9% which is approximately 3,800 cases out of 200,000. This higher compared to case fatality in US 0.6% (Quinn, 2004) and UK 0.15% (Telfer, 2007). The under-five mortality is 7.3% per year, which is approximately 4 times higher than overall SCD mortality and again for US the rate is 0.81(Quinn, 2004). The main predictors of SCD mortality in Tanzania are Infections (RTI, septicaemia), anaemia (massive haemolysis/aplasia), acute chest syndrome, splenic sequestration, stroke, renal failure, pulmonary embolism, heart failure. Recent estimates by Modell et al, suggests that haemoglobin disorders contribute to the equivalent of 3.4% of mortality in children aged under 5 years worldwide or 6.4% in Africa. The current estimates of infant mortality in Tanzania range between 70 to 80 per 1,000 live births. Childhood Survival in SCD Can be Improved with Effective Interventions such as; Newborn screening, Comprehensive care (infection prophylaxis – penicillin and vaccines, hydroxyurea, folic acid, early diagnosis and treatment of complications, exchange transfusion).

**Figure 3: Predictors of SCD Mortality in Tanzania**

| Clinical features | Survived (n = 1,430; 94.3%) | | Died (n = 86; 5.7%) | | Odds Ratio (95% CI) | p |
|---|---|---|---|---|---|---|
| | n | n (%) or mean (SD) | n | n (%) or mean (SD) | | |
| Age at enrollment (years) | 1,430 | 9.5 (7.8) | 86 | 10.2 (8.6) | 1.01 (0.98–1.04) | 0.408 |
| White blood cell count (x$10^9$/L) | 1,307 | 15.9 (6.9) | 78 | 15.7 (7.3) | 0.99 (0.96–1.03) | 0.849 |
| Hemoglobin (g/dL) | 1,306 | 7.6 (1.3) | 79 | 6.9 (1.6) | 0.73 (0.62–0.86) | $<0.001$ |
| Mean Corpuscular volume (fL) | 1,298 | 79.2 (9.5) | 77 | 79.5 (10.9) | 1.00 (0.98–1.03) | 0.752 |
| Reticulocyte (% of RBC) | 832 | 12.6 (7.1) | 33 | 13.1 (8.6) | 1.01 (0.96–1.06) | 0.670 |
| Hemoglobin F (%) | 1,297 | 6.3 (4.7) | 63 | 6.6 (4.9) | 1.02 (0.96–1.07) | 0.575 |
| Total Bilirubin (µmol/L) | 1,263 | 69.7 (56.7) | 79 | 87.5 (81.4) | 1.00 (1.00–1.01) | 0.010 |
| Direct Bilirubin (µmol/L) | 1,157 | 20.9 (34.2) | 72 | 33.1 (57.6) | 1.00 (1.00–1.01) | 0.019 |
| Indirect Bilirubin (µmol/L) | 1,140 | 51.5 (53.6) | 71 | 57.1 (60.4) | 1.01 (0.99–1.01) | 0.396 |
| Lactate dehydrogenase (IU/L) | 559 | 965.4 (483.7) | 27 | 1,103.7 (339.3) | 1.00 (0.99–1.00) | 0.143 |
| Aspartate transaminase (IU/L) | 1,307 | 50.1 (28.4) | 81 | 49.3 (24.1) | 0.99 (0.99–1.01) | 0.802 |
| Alkaline phosphatase (IU/L) | 1,310 | 265.6 (124.2) | 81 | 276.7 (152.8) | 1.00 (0.99–1.00) | 0.442 |

Source: Makani J et al, PLOS One, 2011

Established causes of mortality in SCD (Manci EA 2003; Serjeant GR 2018; Cannas G 2019): Infections (RTI, septicaemia), anemia (massive haemolysis/aplasia), acute chest syndrome, splenic sequestration, stroke, renal failure, pulmonary embolism, heart failure

**Ongoing projects**

There are four projects on going; Newborn Screening (NBS), SPARCO (SICKLE PAN-AFRICAN RESEARCH CONSORTIUM), H3ABionet, SickleGenAfrica, HASTE (**H**ydroxyurea **A**ffordable for **S**ickle patients in **T**anzania is **E**ssential). Pilot NBS indicates that it is acceptable and feasible in TZ, need to develop and maintain national registry of SCD in Tanzania. The registry and bioinformatics support will facilitate genetic and other research in SCD. Urgent need to uptake in-country compounding of Hydroxyurea.

**The financial burden of SCD.** Scanty studies despite SCD high prevalence among children in sub-Saharan Africa, Non in Tanzania, SCD - enormous stress and financial burden on the parents of children with SCD. Yet most SCD individuals mostly funded through out-of-pocket spending (OOPS). OOPS has no financial risk protection and may lead to financial catastrophe for households and the country economy. Catastrophic health expenditure (CHE) cut-off is 10% of total household income or 40% of non-food income to maintain health. The importance of financial burden in Tanzania are; Help to guide policy makers define appropriate strategies to offset the burden guide health care providers in their choice of cost-effective measures in taking care of individuals with SCD. Help the households to plan for the health care needs. SCD financing in Tanzania is, there is no free treatment for SCD patients. Medical bills through self-financing, A few patients enrolled in the National Health Insurance Scheme (NHIS) –mainly the National Health Insurance Fund (NHIF). Children advised to "Toto Afya Kadi Scheme".

**Psychological Impact of Sickle Cell Disease**
The overall health depends on the quality of life and psychological preparedness of the caregivers. SCD individuals need optimal family support, understanding and care, providing adequate nutrition and health care delivery favourable family environment has been shown to be a good prognostic index. Include the financial burden of the disease, the disruption of family interactions, and the disruption of routine family activities. Plus, subjective psychosocial burdens -e.g. depression, sorrow, anger and/or stigmatisation and the ability of the family to cope with the disease. Assessed with the Sickle Cell Disease Burden Interview (SCDBI).

The SCD impact to individuals, families and community. About 42.2% caregivers stated – SCD children made them neglect other family members. 33.8% had difficulty coping with the care of their children. 5.8% noted that severely disrupted family interactions. Some cope relatively well, others inadequately, resulting in feelings of **depression, sorrow and anger** towards themselves and the affected child.

**Opportunities for improvement of SCD care in Tanzania**
Scale up SCD clinics at district and regional hospitals. Finalize and implement National NBS Program. Establish a National SCD Registry. Adopt in-country compounding of Hydroxyurea. Expand coverage of NHIF among individuals with SCD. Prepare for BMT for returning trainees to hit the ground "As a country, we are at the right time to advance SCD care" running.

**Conclusion**
There is high burden of SCD in Tanzania. Malaria, bacteraemia are important causes of morbidity in SCD. High mortality in SCD in Tanzania, especially below 5 years of age. Severe anaemia is a major predictor of morbidity and mortality. Early intervention (NBS, comprehensive care) work. Most individuals with SCD in TZ have low concentration of HbF in F-cells. SNP's for BCL11A and MYB influencing HbF expression. Identified Increased activated memory T/B lymphocytes in children with SCD.

## Knock, knock... Who's there? It's us. Overweight and Obesity!

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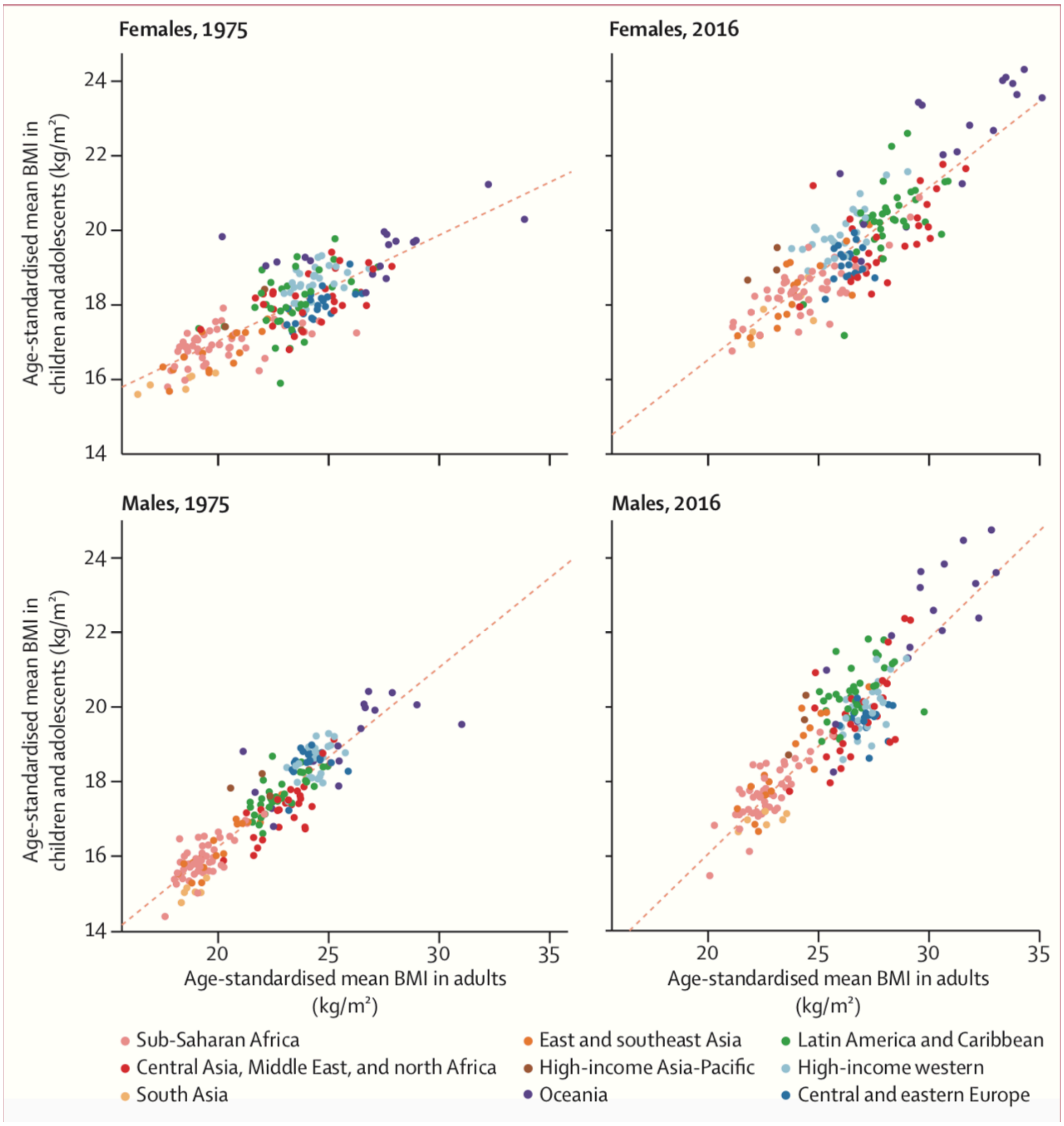
**Introduction**

Global NCD burden. NCDs account for almost 75% of premature deaths globally. In 2017, 80% of premature deaths related to NCDs (age 30-70) occurred in LMICs. In SSA, age disability-adjusted life-years due to NCDs increased by 67% from 1990 to 2017. Diet-related health effects; Diet-related risk factors were attributed to 11 million deaths (22% of all global death in 2017) and 255 million DALYS. Leading Diet-related cause of death CVS (10 Million) , cancers (913 090) and type 2 diabetes (338 714). More than 5 Million diet-related deaths occurred in adults younger than 70 years. Intake nuts, seeds, whole grains, milk and an increase in sugary beverages, processed meats & sodium. Intake > Men; >50-69.

Global Obesity and overweight. Obesity is tripled since 1975. In 2016, 1.9 Billion adults overweight, 650 million obese. 41 million children <5 overweight/obese. Over 340 million adolescents (5-19) overweight. Change in prevalence (0.7% to 5.6% girls and 0.9% to 7.8% boys), Largest change in Southern Africa (WHO, Key facts 2018. Lancet 2017, NCD-RisC). National trends and regional variation. National Trends in overweight and obesity among non-pregnant women 15-49 years as from 1991 – 2018 has been increasing to 31.7% and 7.3% respectively (TDHS 2015/16, TNNS, 2018).

**Figure 1: Global Trend in Obesity**

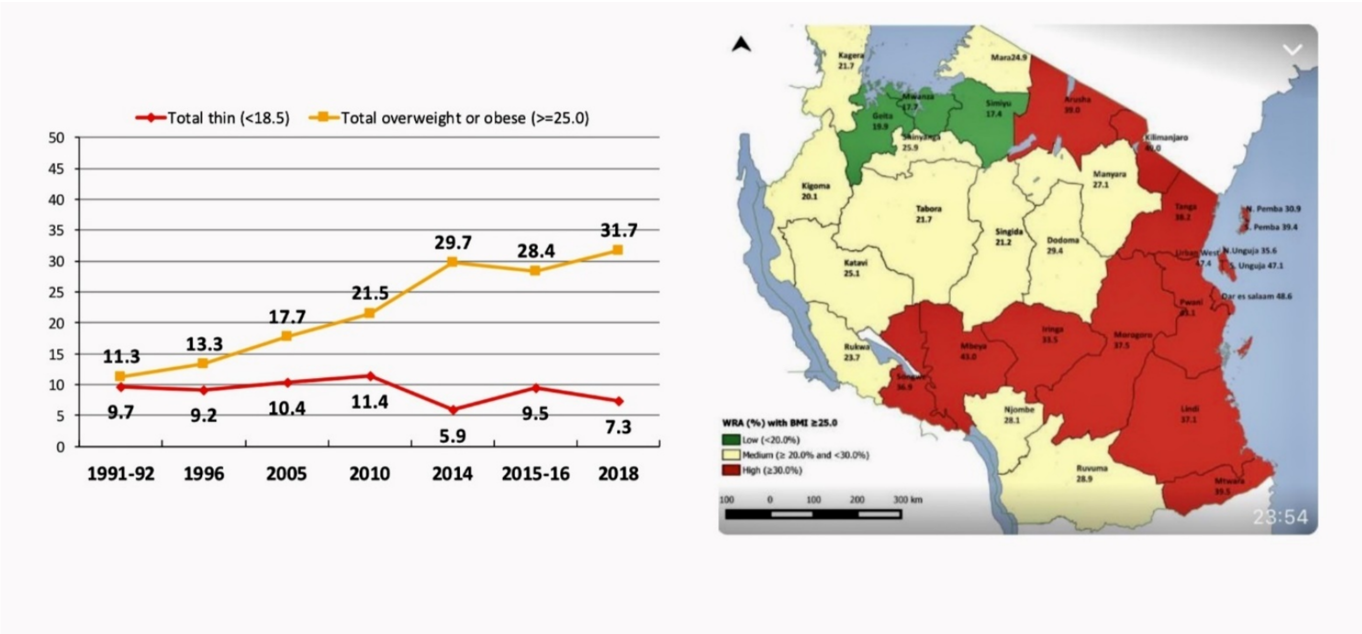



Source: WHO, Key facts 2018. Lancet 2017, NCD-RisC

## Drivers of obesity and overweight

Tanzania DHIS 2012 report shows 33.8% have raised triceglycerides, 26% have raised cholesterol, 25.9% have hypertension and 9.1% have diabetes. The main risk factors which are behavioural have been associated with the causation of these diseases. These are alcohol, unhealthy diet, tobacco use and physical activity. Several factors have contributed to the interplay in occurrence of increasing prevalence of obesity and overweight. These factors are the drivers of change in nutrition status and need to be dealt in national perspectives so as the individuals live a healthy life. The drivers that need national perspectives include the international factors (globalization of markets, development and media programs and advertising) and national or regional factors (transport, urbanization, health, social security, media and culture, education and food and nutrition). The community need to have access to public transport that is convenient for all calibres, public safety for school and work-related activities, health care and sanitation for environment free of infection. Control of manufactured processed foods/imported foods. Local markets should be filled with agriculture food crops, and schools and food vendors need to be able to access. This model if successful will facilitate individuals to consume and have balanced food intake/nutrient density thus enhance energy expenditure ultimate goal is prevention of obesity and overweight for all ages.

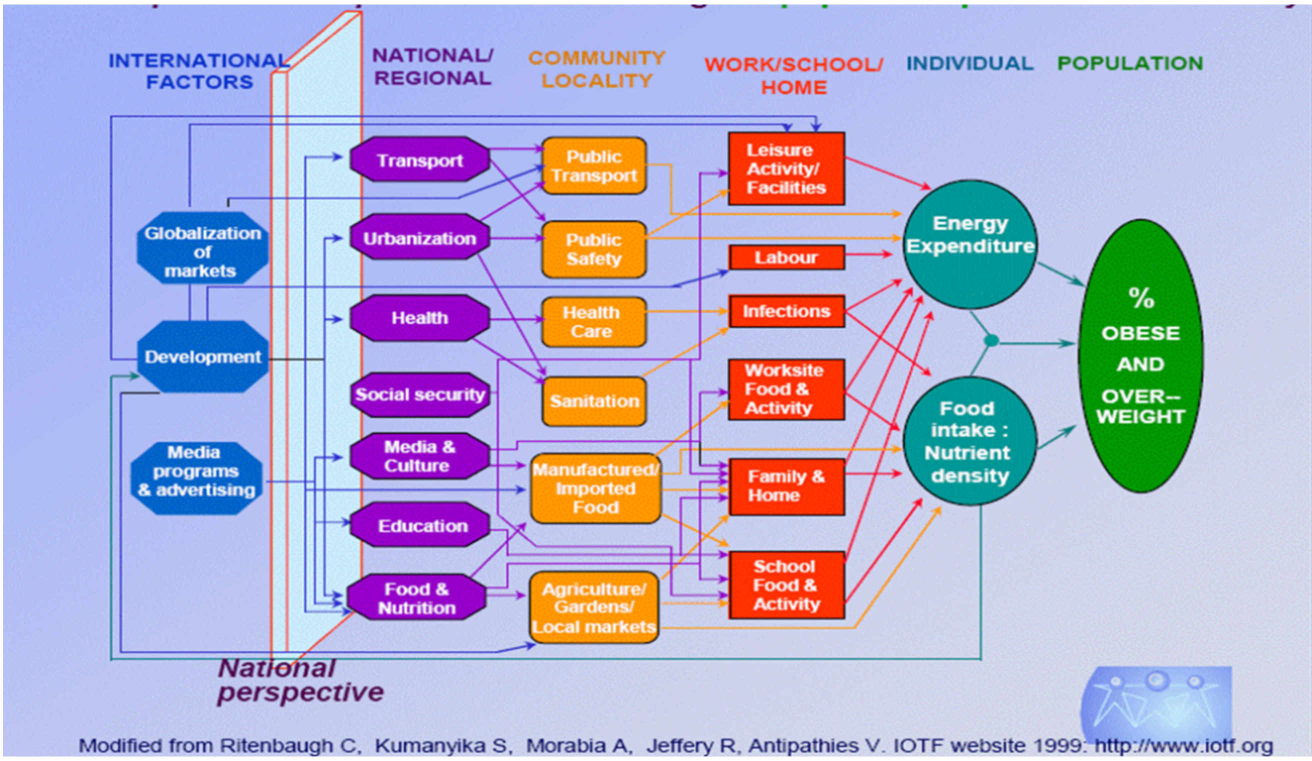
Figure 2: Trends in overweight/obesity among non-pregnant women 15-49 years Tanzania (1991 – 2018)




Source: **TDHS 1991/92, 1996, 2005, 2010, 2015/16*

*** TNNS 2014, TNNS 2018*

**Figure 3: Drivers of change in nutrition status**




## Approaches to prevention and National responses

Approaches to prevention and control should aim to: Adults - maintain a healthy diet and healthy weight. Children - maintain healthy weight trajectory. This require: Multi-sectoral engagement (health, food industry, agriculture). Policy change, Multi-level approach (individual, family, population). Combine risk factors (i.e. Individual food consumption, patterns/eating habits, Food contents, Active lifestyle) and risky environment measures (i.e. Availability of healthy foods, physical activity, infrastructures and promoting environments). Key Result Area (KRA) 4 in the national multisectoral Nutrition Action Plan (NMNAP) geared to strengthen the prevention and management of overweight and obesity, and DRNCDs. Track overweight/obesity National targets 2021 (prevalence children <5 (<5%) and WRA (<30%). Reduce risk factors. Strengthen health system.

## Conclusions

The need for political leaders' engagement in awareness creation. NCDs have recently received attention and a specific day has been set for physical activities in the country (Hon. Mama Samia Suluhu Hassan, VP). Launch of a National program to oversee NCDs – Thursday 14th November 2019. Develop and scale-up interventions to promote healthy lifestyles (health diets, physical activity and medical checks among adult population) and improve the environment. Strengthen surveillance to monitor coverage and performance of interventions to reduce DRNCDs.

**Discussion and matters raised:**

- 9.1% of all Tanzanians have Diabetes Mellitus.
- The non-communicable diseases tend to present with co morbidities e.g. 94% of Diabetes mellitus patients had other chronic conditions i.e. HIV and hypertension (HTN), and 5% were found to have more than one comorbidity.
- Clinicians were argued to be looking for other co morbid conditions even if they are working in a different clinic.
- NCDs pose a very high load in the health care system because it tends to over utilize the health services e.g. Diabetes patients were found to be utilizing the health services four times higher than other patients, their rates of clinic attendance were almost 10 times higher and medications use was 8% higher than other cases.
- Only 30% of those diagnosed with Diabetes continue with treatment after 1 and a half year of diagnosis.
- Treatment for NCD alone costs about two hundred million shillings per month which is 6.6% of the entire MOCDGEC budget.
- Not all the drugs are easily available and of those which are available are not affordable to most of Tanzanians.
- The ratio of doctor patient ratio is still low though there is an increased number of medical training institutes and number of students.
- Challenges faced in health care: over prescriptions and poor patients follow up.
- Among the initiatives taken to combat this problem are preparation of NCDs curriculum.
- This problem needs partnership; several organs and alliances have been initiated and are working together with the MOHCDGEC e.g. TZ NCD Alliance, WDF etc.
- Since the health system is overwhelmed with management of the NCDs there has been several programs initiated to prevent NCDs e.g. The school health program which helps students to adopt healthy lifestyle.
- The government is argued to take wide action on risk factors.
- Improve accessibility to primary health care.
- The NCDs to be integrated with other conditions.
- Multi sectorial involvement
- NCDs are preventable if detected early
- Funds should focus more on prevention initiatives.

## Tanzania Non-communicable Diseases and Injuries Poverty Commission: Findings and Recommendations

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**Institutional affiliation:** NIMR-HQ, Tanzania NCDI Commission

**Background**

Lancet Commission for "Reframing NCDs & Injuries for the Poorest Billion" established in 2015. Tanzania MOHCDGEC established Tanzania NCDI Poverty Commission in 2016 to analyse NCDIs in Tanzania in context of socioeconomic characteristics and provide recommendations for health sector strengthening for NCDIs. NIMR took lead on local analysis with support from Global NCDI Commission and Partners in Health NCD Synergies. Tanzania NCDI commissioners are as follows; Co Chairs: Prof Ayoub Magimba and Dr Mary Mayige. Members: Prof Julie Makani, Dr Sarah Maongezi, Dr Janeth Mghamba and Dr Mariam Kalomo. Commission Coordinator: Mr Gibson Kagaruki. Dr Kaushik Ramaiya Commission Advisor. Global NCDI Poverty Commission Technical Team are Drs Neil Gupta and Alex Kintu, Prof Gene Buckman, Matt Coates, Ministry of Health Community Development, Gender, Elderly and Children, National Institute for Medical Research, Partners in Health, Harvard Medical School.

**Expected deliverables of the commission are:**

This commission was formulated to perform and deliver the following. Assemble data regarding disease burden and intervention coverage in relation to household poverty. Assemble data on costs, financing, and governance. Document innovative policies and service delivery models. Review possible NCDI policies and service delivery strategies with their associated costs and impact on health and poverty. Undertake a priority-setting exercise for expanded health investments. Document the "Voices of NCDI Poverty" through patient and provider narratives. Final output of the commission includes; Report providing analyses and recommendations regarding NCDIs for the poor in Tanzania; Stakeholder engagement and advocacy.

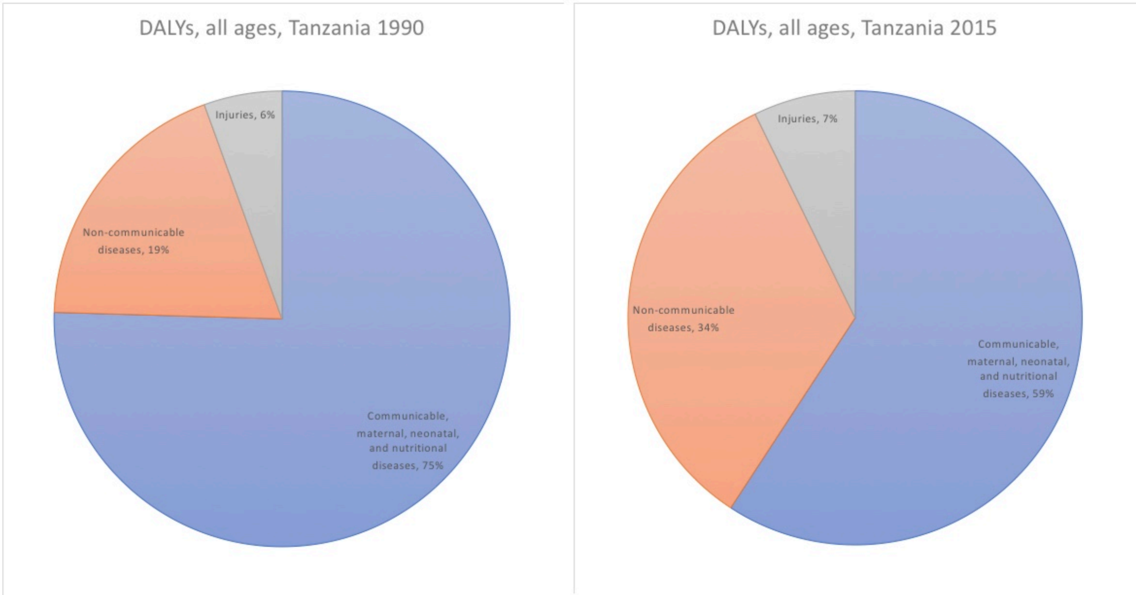
**Multidimensional poverty index –Background World Bank**

Population in 2015: 53 million, current appr 58 million. 68% of population lives in rural settings. Annual population growth is 3%. Poverty can be defined using income or by assets. According to World Bank definitions ($1.90 per day), in 2010, 14.4% of population classified as living in poverty. According to multidimensional poverty index (assets/deprivations), 66% of the population is poor. 28% of Tanzania's urban population (10 million people) were among the world's poorest billion. 77% of its rural population (36 million people) were among the world's poorest billion.

**Burden of NCDs and NCD Risk Factors in Tanzania**

Over 50% of NCDI burden of disease in Tanzania occurred before age 40 (GBD 2017). Less than 40% of NCDI DALYs are due to CVD, chronic respiratory diseases, cancer, and diabetes. 79% of NCDI DALYs are not attributable to behavioural or metabolic risk factors. Less than 20% of NCDI burden is due solely to behavioural & metabolic risk factors.

## Figure 1: Trend in Burden of disease due to NCDs in Tanzania




Source: https://vizhub.healthdata.org/gbd-compare/

## Figure 2: Shared determinants between NCDs and risk factors related to poverty

| NCDs | Condition | Risk factors related to poverty |
|---|---|---|
| Cardiovascular | Hypertension | Idiopathic, treatment gap |
| | Pericardial disease | Tuberculosis |
| | Rheumatic valvular disease | Streptococcal diseases |
| | Cardiomyopathies | HIV, other viruses, pregnancy |
| | Congenital heart disease | Maternal rubella, micronutrient deficiency, idiopathic, treatment gap |
| Respiratory | Chronic pulmonary disease | Indoor air pollution, tuberculosis, schistosomiasis, treatment gap |
| Endocrine | Diabetes mellitus | Undernutrition and early childhood programming |
| | Hyperthyroidism and hypothyroidism | Iodine deficiency |
| Neurological | Epilepsy | Meningitis, malaria |
| | Stroke | Rheumatic mitral stenosis, endocarditis, malaria, HIV |
| Renal | Chronic kidney disease | Streptococcal disease |
| Musculoskeletal | Chronic osteomyelitis | Bacterial infection, tuberculosis |
| | Musculoskeletal injury | Trauma |

Source: Adapted from: Bukhman & Kidder, Partners in Health 2011

**NCDI Poverty Priority Setting**
Established a set of priority NCDIs with a focus on: Burden of Disease, Severity / Life Expectancy, Poverty / Equity. Described a package of NCDI interventions to introduce and intensify in health sector based on: Alignment with national strategic goals and chosen priority conditions. Cost effectiveness, Financial risk protection, Equity, Feasibility. The package and model potential impact was costed and the feasibility of financing this package was assessed.

**Priority interventions**
Selected list of NCDI health-sector interventions based on given criteria. Data provided on unit cost by DCP3. Adjusted cost of each intervention for Tanzania. Multiplied cost by Tanzania burden of disease
Established baseline and target coverage for each intervention. Calculated total cost of introducing/intensifying these interventions. Determined affordability based on Tanzania fiscal space or other financing mechanisms.

**The Cost of Financing the Proposed Interventions**
Using the most recent National Health Account figures for 2016 for a Total Health Expenditure (THE) of USD $1.97 billion (USD $35.5 per capita) and a gross domestic product of USD $53.3 billion; The incremental annual investment for the prioritized NCD interventions is USD $459 million, which would represent 23.3% of current THE (0.86% of GDP) or approximately USD $8.01 per capita annually. The total for prioritized mental health interventions is USD $70.5 million, which would represent 3.6% of THE (0.13% of GDP) or an additional USD $1.23 per capita annually. The total for prioritized surgical interventions is USD $172.7 million, which represents another 8.8% of THE (0.32% of GDP) or USD $3.01 per capita annually. Overall, combining the incremental cost of NCD, mental health, and surgical interventions is USD $702.9 million, representing 35.6% of THE and 1.32% of GDP, or approximately $12.26 per capita annually. The subset of interventions designated in the "high-priority package" by DCP would cost USD $378.9 million annually ($6.61 per capita), which would represent 19.2% of THE (0.71% of GDP).

**Affordability and fiscal Space**
Regulatory mechanisms for fair pricing of pharmaceuticals in the public and private sector, efficient procedures to access funds generated by health facilities through insurance, and timely and adequate disbursement of funds for procurement of commodities and supplies.
Proposals to increase fiscal space; earmarked taxation mechanisms on unhealthy behaviours such as tobacco and alcohol, surcharges on automobile registrations or insurance, levies on airline taxes or international departures, or proportions of value added taxes.
Integration of services in the health system including aligning donor funding towards the national strategic plan for addressing NCDIs in Tanzania.
Universal Health Coverage, also serve as a foundation for high-priority cost-effective interventions to address NCDIs in Tanzania

**Main findings**
NCDIs are an important problem in Tanzania. NCDIs currently comprising 41% of all death and disability in Tanzania and have almost doubled over the past 25 years. NCDIs affect

young populations in Tanzania. Although deaths from NCDIs may occur later in life, over half of the health burden of NCDIs occurs before age 40. NCDIs are diverse in Tanzania. Over 60% of the NCDI DALYs are from conditions other than CVD, cancer, diabetes, and chronic respiratory diseases. Risk factors for NCDIs are complex and may differ by socioeconomics. 79% of NCDI DALYs in Tanzania are not attributed to traditional behavioural or metabolic risk factors need to address also other determinants including health system strengthening. NCDI services are limited. Although included in essential service packages, the availability of services for NCDIs are limited and variable. Access to NCDI services may be worse for poorer populations. There are barriers in access to treatment for common diseases such as hypertension and diabetes faced by people in lower quintiles of wealth and in rural areas. Financing for NCDIs is limited. Only 7.8% of Tanzania's total health expenditure is on NCDs and 0.64% on injuries. Expenditure on NCDs increased from 45 million USD in 2012 to 154 million USD in 2016 (2.73% to 8.74% per capita), expenditure on injuries.

**Recommendations:**

**We must broaden the NCDI agenda in Tanzania**. This commission recommends an expanded set of 48 NCDI conditions for attention and priority to appropriately capture the full burden of NCDIs affecting Tanzanians.

**Evidence-based interventions for NCDIs are needed to achieve UHC**. This commission recommends 53 previously described evidence-based cost-effective health sector interventions to fill the gap for NCDI services to achieve UHC.

**More investment in NCDIs are needed**. Overall, the combined annual incremental cost of this comprehensive set of NCD, mental health, and surgical interventions is estimated to be USD $702.9 million, or approximately $12.26 per capita annually, which represents 35.6% of total current health expenditure or 1.32% of GDP.

**More data is needed on NCDIs in Tanzania**. There is a need to describe the burden of NCDIs disaggregated by socio economic indices to best target interventions. More studies are needed to fill this knowledge gap, and systematic inclusion of socioeconomic indicators in disease registries, health facility reporting, and household surveys could further provide this information.

**Greater stakeholder engagement is required**. Participation is needed from all sectors, particularly from patients and civil society, policymakers, academia, and clinicians. Advocacy and discussion with these stakeholders may result in greater awareness and high-level commitments to combat an expanded group of NCDIs in Tanzania.

**Discussion and matters raised:**

- The Non communicable diseases burden has doubled since 1990. More than 50% of cases occur before 40 years of age. Of all cases of Non communicable diseases, only 2.7% of those on treatment are controlled.
- The services related to Non communicable diseases are not available but are not to standards, urban areas tend to have more services as compared to rural areas and also the services are available mostly in hospitals than in lower level health facilities.
- Non communicable diseases costs are expensive
- The non-communicable diseases are important in Tanzania
- The non-communicable diseases affect young adults
- The non-communicable diseases agenda must be broadened

- There is need to do evidence-based interventions

## Current Status of Musculoskeletal Trauma Care Systems in Tanzania

Dr. Billy Thomson Haonga. MD
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### Introduction

A trauma system is an organized, coordinated effort in a defined geographic area that delivers the full range of care to all injured patients. The system includes, Injury prevention programs, Implementation and optimization of prehospital care, Acute care resources and facilities, Post-hospital care. An estimated 1.2 million deaths and 50 million nonfatal injuries occur each year due to road traffic accidents alone (WHO 2015). Traumatic injuries contributing to more global disability than human immunodeficiency virus (HIV), tuberculosis and malaria combined (Gosselin et al 2009 WHO Bulletin), For each person who dies from trauma, 3-8 more are permanently disabled. An estimated 1.2 million deaths and 50 million nonfatal injuries occur each year due to road traffic accidents alone (WHO 2015). Traumatic injuries contributing to more global disability than human immunodeficiency virus (HIV), tuberculosis and malaria combined (Gosselin et al 2009 WHO Bulletin), For each person who dies from trauma, 3-8 more are permanently disabled

### Road Traffic Crash Prevention

Improve road safety Improved road engineering. Introduction of sidewalks – lack of pedestrian walkways associated with two-fold increased risk of pedestrian fatality. Enforcement of speed limits. Rumble strips installed on the main Accra Kumasi highway in Ghana reduced crashes by about 35% and fatalities by about 55% (Afukaar et al. Inj Control Saf Promot 2003). Vehicle design and maintenance. Human behaviour. Speed control, seat belt use, ethanol consumption.

Police Reports shows that registered vehicles are 512,000 cars and 4 wheeled light vehicles, 86,000 trucks, 49,000 buses, 809,000 motorized 2 and 3 wheeled, 55,000 other vehicles. All these need to have any level of insurance in order to be on road. Annually police reports around 4,000 death of people due to road traffic and the Road Traffic Accidents costs around 2,400 - 2,500 Billion Tanzanian shillings annually. Reports from Sumatra shows that Fatality accident involves: 34% of case are pedestrian. 26% of cases single vehicle accident. 20% of cases Head on collision.

### Burden of trauma in Tanzania

The Burden of Femoral Shaft Fractures in Tanzania. Study sites included six government hospitals across Tanzania. Femoral shaft fracture annual incidence rate was 2.5 – 18.4 per 100,000 people. Incidence rate of trauma is consistent with an increased femoral shaft fracture incidence in Tanzania. (Edmund Eliezer, et al). Trauma burden in Tanzania: a one-day survey of all district and regional public hospitals in all 105 district and regional hospitals across mainland Tanzania, of all 5227 patients were seen in all hospitals, 508 (9.7%) patients presented with trauma-related complaints (Hendry R. Sawe, et, al). Traumatic injury disabilities alone cause twice as much morbidity as caused by HIV, TB and Malaria combined. Police reports that only 512,000 cars are registered but the deaths from Motor traffic crushes causes 4,000 deaths. Accidents reported by the police; 34% are from pedestrians, 26% single vehicle, 20% head on collision. Fracture of femur accounts for most trauma cases. A one-day survey done in Dar es Salaam hospitals identified that 10% of cases seen per day were trauma cases and motor traffic crushes were the major contributor.

**Access to Care: Pre-hospital**
Three tier pre-hospital care system: Basic First Aid. Community members with minimal training. Recognize an emergency, call for help and provide treatment until formally trained health - care personnel arrive to give additional care. Basic Life Support. Extensive formal training in pre-hospital care, scene management, rescue, stabilization and the transport of injured people. Advanced life support. MD or EMT staffed with extensive referral network. Acute care resources and facilities, 4 referral hospitals with human resources Regional Hospitals, Human resource training, 3 Medical schools with Mmed OT, MUHAS alone over 40 residents, Cost of running trauma centre. Teaching/Training of Health Care Professionals. One area in which there has been some effort to educate traditional practitioners is in fracture care. In a large portion of the developing world, fractures continue to be treated by traditional bonesetters. While many fractures heal properly with traditional treatment, bone setters often do not appreciate the dangers of tight splintage and compartment syndrome. Although the rate of complications following treatment by traditional bonesetters remains unknown, catastrophic consequences such as gangrene and Volkmann's ischemic contracture have been the focus of numerous articles. Health Workforce to for trauma and injury care is of serious shortage and mal distribution. 80% of trained orthopaedic surgeons in the world live and practice in the 26 developed nations. 80% Orthopaedic Surgeons in Tanzania practice in Dar. The Cost of Intramedullary Nailing (IMN) for Femoral Shaft Fractures in Dar es Salaam, Tanzania compared to External Fixator (EF) was studied to compare the cost effectiveness. The outcome in term of effectiveness and the cost of treatment between the IMN and EF groups in a 3 month follow up was 0.26 QALYs for IMN and 0.24 QALYs for EF. This suggested that IMN is more cost effective. Predictors of Re-operation for Adult Femoral Shaft Fractures Managed Operatively in a Sub-Saharan Country. The overall rate of re-operation for intramedullary fixation was 5.2% (14 of 268) compared with 25% (1 of 4) for plate fixation ($p = 0.204$). EQ-5D at one-year score was higher for patients who did not have a complication requiring re-operation (0.95) compared with patients who did have a complication requiring reoperation (0.83) ($p = 0.0002$) (Eliezer et al).

**Post hospital care**
Barriers to Prosthetic devices at a Tanzania Hospital; Financial, Organizational, Educational issues (Haonga et al. EAOJ 2019). Will be important to invest in, post-acute phase of rehabilitation and psychological counselling.

**Discussions and matters raised**
- There is limited access to pre-hospital care i.e. not many people are trained in basic first aid, basic life support and advanced cardiac support.
- Ambulances are just packed in Hospitals instead of working in the community e.g., with the fire and rescue team to carry the injured.
- Traditional bone setters are significant in the community, but they don't appreciate complications arising from a tight cast or compartment syndrome.
- There is poor distribution of orthopaedic surgeons in Tanzania, 80% of all surgeons are located in Dar.

- The costs of treatment by intramedullary nail was low as compared to an external fixator due to a shorter hospital stay
- There is poor post hospital care due to barriers to prosthetic devices in Tanzania and poor access to counselling services.
- Improving road safety can prevent traffic crushes e.g. By improving road engineering, introducing sidewalks, increased speed limit, improve vehicle designs and maintenance and encouraging good behaviours like wearing helmets during motorcycle rides.

## Reflections on Development of Mental Health Services in Tanzania

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**Background**
Despite substantial gains since 2000, many resource limited countries face considerable challenges on advancing access and quality of health care, especially non-communicable diseases. The investigators Global Burden of Diseases (GBD) 1990-2016 reported, contributors of deaths in the low and middle income countries has been as follows, 5.0 million people die due to poor quality of care, and 3.6 million people die due to non-utilization of existing care (Lancet 2018). Countries that scored low in Health Care Access and Quality (HAQ) index had poor quality of services on Chronic Respiratory Diseases (CRD) primary care to specialized treatment (Venkatesan et al, 2018). Chronic respiratory diseases (CRDs) are diseases of the airways and other structures of the lung. The Common CRDs include; Chronic Obstructive Pulmonary Disease (COPD), Asthma, Occupational lung diseases, Pulmonary hypertension. Though COPD and Asthma the most common diseases in the communities. Globally, 360 million people suffer from asthma and 175 million people are affected from COPD with mortality of 3 million people while that of asthma is 0.4 million people. 90 and above of these deaths occur in the low- and middle-income countries (GBD, CRD Collaborators, 2015). Global trend of CRD from 1990 to 2015, the Prevalence of Asthma has increased by 12.6%, COPD increased by 44.2% while mortality of Asthma decreased by 26.7% and that of COPD increased by 11.6%. the overall mortality of COPD is 8 times more common than in asthma. The risk factors for these conditions contributed due to smoking, ambient particulate matter, household air pollution, occupational particulates, ozone, occupational asthmagen and second-hand smoke (Source GBD CRD Collaborators 2015). In Tanzania the prevalence of Asthma has increase3d by 12.6%, and COPD has increased by 44.2%.

**New Entry in CRD Post-TB Lung Diseases**
In several decades, treatment largely focused on microbial cure without considering other aspects of Health and Well-being after TB. Large population studies in Latin America showed COPD was strongly correlated history of previous PTB treatment (Sobrino et al, 2017). WHO reports that 54 million people were cured of PTB from 2000-2017. Fifty percent of people succumb to lung illness after cure from TB, and 25% suffer severe post TB lung disease. However, there is neglected phase of life after TB (WHO, 2018).
Post-TB Lung Disease presents with heterogeneity due to variations in host immune response. Clinical presentation of patients who have been treated from TB are Chronic obstructive pulmonary disease (COPD) in adults, bronchiectasis in children, fibrosis, pulmonary hypertension, mixed diseases and aspergillosis (Ravimohan et al, Eur Resp Rev.2018). during the first international post-tuberculosis symposium 2019, in South Africa, researchers came with more questions than answers on epidemiology, mechanisms of post TB lung disease, host directed therapies, treatment and holistic management, recurrent PTB and health system advocacy. Despite of high burden there is limited scientific evidence for guiding treatment. Almost none of the research studies assessed management of post TB Lung disease. (Van kampen SC, et al. BMJ 2018). Therefore it is high time to; develop a standard way of obtaining relevant data on CRD and risk factors; encourage countries to implement health promotion and CRD prevention policies; make recommendations of

simple and affordable strategies for CRD; to gather and disseminate knowledge on all aspects of TB and lung diseases; to alert doctors, decision makers, leaders of opinion and the general public to the dangers presented by TB, other lung diseases, HIV and NCDs as well as community health problems associated with them.

**Global Response to COPD and ASTHMA**

During the year 1993, Global Initiative for Asthma (GINA) was launched in collaboration with the National heart, Lung and blood Institute, (NIH-USA and the WHO). The purpose was to improve diagnoses, management and prevention of asthma by stimulating research, and providing evidence based educational resources for worldwide use. There have been several updates and up to 1995 already there have been more than 10 guidelines. In 1997, the Global Initiative for Chronic Obstructive Lung Disease (GOLD) was launched in collaboration with the NIH-USA and the WHO. This initiative recommended for effective COPD management and prevention strategies for use in all countries. The initiative coordinated development and updates to guidelines and up to 2010 already more than 5 guidelines have been developed. Currently the GINA and GOLD have published the 'pocket guide for Asthma management and prevention' and the 'pocket guide for COPD management and prevention however all these guidelines are yet to be implemented in the Region.

**The challenges in the Health Systems to Address CRD in Tanzania**

The health system experience on CRD in the sub-Saharan African countries Kenya, Uganda, Sudan etc, is encircled in the fact that, the burden of CRD is not known in these countries, CRD, is not a priority at local and national level, CRD clinics are not organised and data for CRD is not generated through HIMS. Therefore, is the International Multidisciplinary programme to address Lung health and TB in Africa (IMPALA) supported these countries in the study to generate evidence to break the vicious circle. In Tanzania the intervention was demonstrated in Chamwino district, Dodoma. Challenges in breaking the vicious cycle in order to integrate CRD in the health system lies on Health system architecture to deal with acute diseases and disease specific vertical programs such as HIV, TB and malaria, while these patients mostly may have other co-morbidities such as malnutrition, DM, Hypertension, COPD and mental disorders (Bygbjerg IC. 2012). The health system from acute and vertical disease program, need transformed into adaptive health system. The ADEPT (Adaptive Diseases control Expert Programme in Tanzania) was established with a purpose to develop a model that will strengthen health systems by shifting traditional vertical programmes to an adaptive diseases control approach using TB/DM as a case study in Tanzania.

The new health system architecture is important in addressing CRD and other diseases since studies have shown 10-90% of patients have mental disorder of some kind such as; generalised anxiety disorder, adjustment disorder or depressive disorder. There is still a lack of evidence for prevalence of mental disorder in COPD related to post-TB.

**Recommended Research Questions**

Implementation research questions for CRD remain on pharmacological and non-pharmacological on effectiveness, affordability and methodology. Clinical research questions; knowledge on precise mechanisms of post TB lung disease is needed and host and TB pathogen factors causing post-Tb lung disease remains unclear. Recommendation is if we treat risk groups that will develop TB and close the spigot TB incidence, the expected impact is to prevent development of CRD.

**Discussion and matters raised:**

- Post Tuberculosis lung disease is a new entry in chronic respiratory diseases
- 50% of patients treated for TB develop post TB disease which is characterized by symptoms from various conditions like COPD, Bronchiectasis, fibrosis, pulmonary hypertension, mixed diseases and aspergillosis
- Several initiatives were established to fight the chronic respiratory diseases e.g. Global Alliance against chronic respiratory diseases, Global Initiative for chronic obstructive lung disease and Lung health and TB in Africa.
- Health systems should include chronic respiratory diseases
- A study is ongoing to establish how the Chronic Respiratory Diseases can be integrated into vertical programs; it is done in conjunction with Diabetes Mellitus.
- Tuberculosis should be treated from the latent stage.

## Reflections on Development of Mental Health Services in Tanzania

Prof. Gad Kilonzo.
**Institutional affiliation:** MUHAS

**Introduction**

I propose to reflect on the changing fortunes of mental health in Tanzania during the greater part of the past one hundred years. Before I do that, I should like to dwell on what obtained before that and to some extent still sustain Social and emotional comforts are crucial component of mental health. They are a happy coincidence of satisfying endeavours in work, study, interpersonal relationship, emotional self-nurturance, culminating in high self-esteem. In time past, we had our share of these ingredients of mental health Inadequate appreciation of this together with the effects of rapid social technical change can only render us the poorer. In traditional Tanzania society, the extended family, often including several extended families within a larger family group, provided social, spiritual and emotional succour. Elders, grandparents, uncles and aunts provide counselling, advice and reconciliation. As early as first half of the last century it was recognized that this disintegration is associated with increase in prevalence of mental disorders (Hughes 1962). Among the Igbo of Nigeria, Hughes found out that twice as many individuals were mentally disturbed among the socially disintegrated compared to those who were socially integrated.

**Traditional healing system**

Psychiatric services were introduced into pre-existing traditional healing system during the nineteenth century. In traditional Tanzania communities, the process of healing is intimately related to traditional religious experience. To be healthy is to be whole in the intricately intertwined spiritual, mental, social and physical realms. The state of being healthy does not only entail harmony among individuals in the community, but also harmonious relationship between community and the physical environment, as well as the spiritual world of the ancestors and God who sustain them. To be healthy is to be holy – to meet the expectations of the living, ancestors and God. Disturbance in any area of this complex relationship can lead to ill health – and mental disturbance to boot. The healer and healing process must address this whole system of extended family, community and belief system. Even the empirical herbalist requires his client to seek harmony within the social and spiritual realms as prerequisite to healing. The whole community is involved in the healing process, which taps into the immense wealth of family social and emotional resources. Slave trade, colonization, urbanization, and rapid transformation into market economy upset the delicate balance and exposed people to more stress and more mental disturbance (Good 1987). Colonialists, doctors and missionaries failed to recognize the value of traditional healing system (Good 1987). Mental health specialists in Tanzania may also fail to appreciate the value of traditional healing when dealing with dislocated urban healers where there is more heterogeneous definition of the universe with a generous sprinkling of pretenders and charlatans among healers (Schwantz 1990).

**Development of psychiatric services in Tanzania**

Introduction of Western psychiatric services in Tanganyika had early beginnings in the 19$^{th}$ century. In 1877 CMS opened 1$^{st}$ hospital at Mamboia for Germans. 1897 a dispensary was established for natives, Arabs and Indians in Dar es Salaam. No Western mental health services existed until 1905 when Lutheran missionaries converted an asylum for freed slaves at Lutindi to a "lunatic asylum" in Korogwe. Establishment of British administration in 1918 saw expansion of health services. 1951 Broadmoor Institution (Isanga) "for the criminally insane" was opened next to Mirembe but under the administration of the prison system. 1962 Irente mental hospital opened by Lutheran missionaries to meet growing need for bed with a capacity for 200. Overall approach up to this time was custodial (Kilama 1974). Custodial care was provided by wardens till 1920 when patients received clinical care under the British Indian Lunacy Act. It was not till 1959 when the British Mental Treatment Act called for decentralization of mental health services, that the modern era started. 1962 evaluation of Tanganyika noted with dismay the overcrowded conditions and absence of facilities for treating mentally ill in peripheral hospitals other than 11 holding beds in Dar es Salaam which constituted "barred cells … not suitable for modern psychiatric treatment (Titmuss 1963). The report further noted that in a country of 10 million people there was only one psychiatrist who covered Dar es Salaam clinics, consulted for Mirembe and forensic patients at Isanga. The report further castigated the practice of holding patients in police cells and prison wards. The report recommended decentralization of mental health services to be available in general hospitals at district levels and training of health personnel for this purpose: 1. Instruction of mental health must be an important item in the training of doctors both before and after qualifications. 2. Health Centres should be the first place of reference for mental cases, to spare the mental hospital the admission of many patients who would be successfully treated near their homes. 3. One mental hospital should be brought up to the standard required to offer postgraduate training. Decentralization of services in Tanzania started in earnest in the mid-60s with opening of psychiatric units at Muhimbili, Moshi, Tabora, Mwanza, Mbeya and Songea. Establishment of agricultural psychiatric rehabilitation villages in Tanzania is an innovative aspect of decentralization (Kilonzo 1992). 1919 there were 1,200 hospital beds in the country with 86 of these for mental patients (Titmus et al 1963). 1927 Mirembe mental hospital was opened with a capacity for 1,000 beds. It overflowed to 1500 – 3000 with patients transported hundreds of miles over poor roads (Titmus 1963; Margetts 1958). This was aimed at serving the Eastern Africa.

**Turning Point in Tanzania**

Coincidence of forward thinking of the WHO, good will of Danish people and Tanzanian policy of comprehensive health delivery system in the periphery, placed the country in the forefront of integrating Mental Health (MH) services at the PHC level. Realization that integration of mental health into Primary Health Care (PHC) delivery system was essential if mental health services was to reach people all the people in need was already crystallizing in the 70s.

**Integration of Mental Health into Primary Health Care (PHC)**

Integration of mental health into PHC offered opportunities for meeting the needs of mental patients in settings of meagre resources. Giel and Harding (1976) pointed out that the expansion of mental health services in developing countries will only take place if: The task is taken up by PHC workers.

Services are directed at the few priority target conditions that are major contributors to morbidity in the community. The impetus for integration of MH services into PHC came from WHO in the mid-70s with the recommendation that: *"the needs of mental health care should not be regarded as separate from, but as an integral part of the general health needs of every community"* (WHO 1975). WHO further recommended that the greater part of the work of MH specialists should be the training and supervision of PHC workers. Despite decentralization of MH care between 1965 and 1980, service could at best cover 20% of the population with serious and urgent need of service (Schulsinger and Jablensky 1991). To address this problem integration of mental health into PHC was implemented in 1980 with the assistance of WHO and DANIDA. This entailed training of clinical assistants, nurses and social workers. Information and skills provided focussed on most prevalent psychiatric conditions. Provision of appropriate echeloning of care from village level, health centre, district, region to consultant hospitals. Using clinical descriptions and case vignettes it was possible to train PHC workers to recognize target conditions and train them to acquire necessary skills in their management. Between 1980 and 1983 such a system was implemented in two pilot regions of Morogoro and Kilimanjaro (Schulsinger and Jablensky 1991). At the end of a three-year implementation period in the pilot regions, an external evaluation report could conclude that: (1) The estimated number of people in need gained access to the services. (2) The program was cost effective. (3) The program was operational and could be extended to all other regions. The efficacy of the program in the two pilot regions could be illustrated by the dramatic drop in the number of patients admitted at both psychiatric units in Moshi and Morogoro. In both cases bed occupancy rates dropped to less than half at the height of the implementation of the program. A major bottleneck in the expansion of integration of MH into PHC was lack of skilled professionals (psychiatrists, psychologists) to carry out training and supervision.

**Tanzanian Mental Health Specialists**

In the 70s there were only 2 psychiatrists in public service in the country with population of upwards of 30 million. In the early 80s 3 WHO consultants joined the effort of integrating mental health into PHC. Clinical officers and nurses held much of the fort during this time (specially trained AMOs and mental health nurses). In the 70s there were only 2 psychiatrists in public service in the country with population of upwards of 30 million. In the early 80s 3 WHO consultants joined the effort of integrating mental health into PHC. Clinical officers and nurses held much of the fort during this time (specially trained AMOs and mental health nurses).

**Benefits of Enhanced Mental Health are Legions**

Enhanced and better integrated central neuronal functioning which translated into more active mind. Enhanced body immunity against infections and all cancers. Better physical health in all spheres. Zest for life and healthier social life. General wellbeing and more productive life leading to more vibrant economy. Benefits of longevity and improved life span.

**Discussion and matters raised:**

- Multi sectorial involvement should include collection of funds for programs such as charging services like it is done for REA while buying electricity through LUKU.
- NHIF should prepare and be involved in NCDs prevention

- The NHIF should get advice from experts on the costs of services and not come up with its own prices
- The IT systems should be involved in multi sectorial approach since there is a need for systems and applications
- The morning joggings be re-introduced in schools.
- Sidewalks should be promoted to encourage walking; this will also help to prevent pedestrian MTA and mental conditions arising from physical trauma.
- The stakeholders themselves should take lead in taking actions for NCDs e.g. Doctors themselves should indulge in dieting and exercise.
- The policies set should be structured in such a way that children are conditioned since young on healthy lifestyle.

### Testimonial 1: Type 1 Diabetes mellitus

James Wilfred Chumi and Hawa Omary Mchopa
**Institutional Affiliation:** Coordinated through TDA/TANCDA

The following youths presented their experiences in living with the Type 1 Diabetes mellitus. They pointed out challenges they experience in accessing health services, and also challenges of accessing these services from the peripheral primary level health facilities such as dispensaries and health centres. They expressed the challenges of waiting time at diabetic dedicated clinics, and also referral from one clinic to another since services are not well integrated, that necessitates to do tests and examination all over.

### Testimonial 2: Type 1 Diabetes Mellitus

Arafa Salim Said
**Institutional affiliation:** Coordinated through Muhimbili Sickle Cell Disease Program MSCP - MUHAS

A youth living with Sickle cell Disease provided a testimonial on areas that affect most patients living with the disease. She explained challenges from diagnosis as many present with anaemia and failure to thrive but diagnosis is delayed due to poor quality of integration of services and diagnosis at primary level facility. For her sake she said was privileged as her parents took necessary measures to seek medical care since early childhood and since then she has been on regular treatment and follow up to a dedicated clinic. But how much are these clinics distributed along the country remains a question to be answered.

## RISK FACTORS AND CONTROL OF NCDs

Epidemiological evidence shows that noncommunicable diseases (NCDs) are among the leading causes of morbidity and mortality globally. For example, NCDs, including heart disease, stroke, cancer, diabetes and chronic lung disease, are collectively responsible for almost 70% of all deaths worldwide. Almost three quarters of all NCD deaths, and 82% of the 16 million people who died prematurely, or before reaching 70 years of age, occur in low- and middle-income countries. The rise of NCDs has been driven by primarily four major risk factors: tobacco use, physical inactivity, the harmful use of alcohol and unhealthy diets. These in-turn lead to other key metabolic/physiological changes such as raised blood pressure, overweight/obesity, raised blood glucose, and higher cholesterol levels.

The rise of NCDs poses devastating health consequences for individuals, families and communities, and threatens to overwhelm health systems. Prevention and control of NCDs require multisectoral approach that involve all key sectors and stakeholders responsible for development of policies and regulations for education, trade, food, alcohol and urban development as the responses from the health sector. All collective strategic efforts and partnerships should be geared toward prevention of premature mortality and reduction of NCD-related morbidity and disability. With health systems under stress, promoting healthy diet, physical activity, reduced alcohol use and tobacco smoking cessation are simple and cost-effective measures to reduce premature death and disability from NCDs. Prevention strategies are not only effective for those who do not have NCDs, but also for mitigating and reducing the burden of various NCDs and the risk of developing co-morbidities alongside existing illness.

## Prevalence and Predictors of Gestational Diabetes Mellitus among Pregnant Women Attending Antenatal Clinic in Dodoma Region Tanzania

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**Background:** Gestational diabetes mellitus (GDM) is rapidly increasing worldwide. Globally, 17.8 million pregnancies are complicated by GDM. In recent years, Tanzania has experienced a dramatic increase in the prevalence of GDM ranging from 0% in 1993 to 19.5% in 2017. Despite of its known effect, GDM screening is not part of the routine antenatal services in Tanzania. This results to scarcity of data on the magnitude and risk factors for GDM.

**Objective:** To determine the prevalence and predictors of GDM among pregnant women in Dodoma region, Tanzania from March to August, 2018.

**Methodology:** A cross-sectional study was carried out in Dodoma region, between March and August of 2018. A total of 582 pregnant women were recruited from four local health facilities. Convenient and simple random sampling were used to select health facilities and study participants. Screening and diagnosis of GDM was performed using the 2013 WHO criteria. Analysis was done by using SPSS (version 23) to determine the prevalence and predictors of GDM.

**Results:** Among 582 participants, 170 (29.2%) women were diagnosed with GDM. GDM was significantly associated with maternal age of more than 35 years (AOR= 2.775), low physical activity level (AOR= 4.684), alcohol use (AOR=4.437), non-healthy diet (AOR=2.262), lack of awareness about GDM (AOR= 3.406) and family history of diabetes (AOR=2.455).

**Conclusion and recommendation:** Prevalence of GDM is relatively high in Dodoma Region. This represents a significant number of high-risk pregnancies that are currently being undetected and sub-optimally managed. These findings emphasize the need for screening and intervention on GDM. Due to the resource constraints, high risk women could be identified and prioritized for screening.

## Unsafe Food as Risk Factor for NCDs: A Case of Dietary Exposure to Multiple-Mycotoxin through Maize in Tanzania

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**Institutional affiliation:** Tanzania Medicines and Medical Devices Authority &Tanzania Bureau of Standards

**Background:** In Tanzania, maize is the main staple food and used as a main ingredient in complementary foods yet is highly contaminated by multiple mycotoxins. Mycotoxins are of concern due to their negative impact on public health. Mycotoxin exposure may induce acute or chronic disease episodes, with various forms of NCDs including cancer and impaired child growth.

**Objective:** To establish extent of Multiple-mycotoxin contamination in maize and subsequent dietary exposure in Tanzanian infants.

**Methodology:** Stored maize samples from 300 households in three agro-ecological zones were pooled into 60 samples. Multiple-mycotoxins were quantified using UHPLC/TOF- MS. Using @Risk software, probabilistic exposure assessment to the mycotoxins in infants aged between 6 to 12 months was conducted by modelling maize intake data (kg/kg body weight/day) with multiple mycotoxins contamination data (µg/kg) in maize.

**Results:** Except for T-2 toxin, aflatoxins, ochratoxin A, deoxynivalenol, fumonisins, HT-2 toxin, and zearalenone were detected. High occurrence and levels of aflatoxin B1 (50%; 3-1,081µg/kg), fumonisin B1 (73%; 16-18,184µg/kg), fumonisins B2 (48%; 178-38,217µg/kg) and deoxynivalenol (63%; 68-2,196µg/kg) was observed. Over 80% and 45% of samples were contaminated with more than one mycotoxin and co-contaminated with aflatoxins and fumonisins respectively. The estimated mean exposures were higher for aflatoxins (6 folds), fumonisins (3 folds) and deoxynivalenol (2 folds) relative to the health-based guidance values of 0.017ng/kg body weight/day, 2µg/kg body weight/day and 1µg/kg body weight/day, respectively. The population at risk of exposures above the limits of health concern ranged from 12% for HT-2 toxin, through 35% for deoxynivalenol to 100% for aflatoxins. The contamination and subsequent exposure varied among the agro-ecological zones.

**Conclusion and recommendation:** This study indicated that children receiving maize based complementary foods in Tanzania are at a high risk of exposure to multiple mycotoxins at levels that exceed the reference toxicological values. The study further indicates that Eastern low land zone is at higher risk of exposure to multiple-mycotoxins, especially aflatoxins and fumonisins and requires immediate attention.

## To What Extent Have Arts-based Approaches Been Used to Promote Health in Sub-Saharan Africa? A Scoping Review

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**Institutional affiliation:** University of Glasgow, UK; Ifakara Health Institute, Tanzania

**Background:** Preventing non-communicable diseases (NCDs) is a public health priority across Sub-Saharan Africa (SSA). Arts-based research is ideally positioned to address and negotiate cultures in relation to health. However, the scope, scale and utility of using arts in health promotion in SSA remains poorly documented.

**Objective:** To explore and synthesize previous successes and failures in arts-based health promotion within SSA to inform future NCD prevention efforts.

**Methodology:** A systematic scoping review of 11 online databases spanning biomedicine, arts and humanities and social sciences using terms designed to identify SSA studies employing an arts-based method within health promotion.

**Results:** We identified 59,794 records, screened 217 full texts and included 119 studies. These were based in 30 SSA countries: 52 in South Africa, 9 in Tanzania, 8 in Uganda, 7 each in Kenya, Malawi and Zimbabwe, 6 in Nigeria, 5 in Botswana and Ghana, 4 each in Ethiopia, Liberia, Swaziland and the Gambia, 3 in Zambia and Namibia, and 2 or fewer in 15 other countries. The majority of studies (85%) focused on HIV/AIDS. However, we found some on Ebola (5%), malaria (3%), and cholera, reproductive health and gender-based violence (each 2%). Only one study addressed an NCD (cardiovascular disease). Theatre-based approaches were most common (44%), followed by music and song (23%), visual arts (9%), storytelling (8%) and film (5%). Challenges relating to content (e.g. reinforcing rather than challenging negative health behaviours), power relations (e.g. failing to put artists and communities at the centre of the process) and inadequate evaluation were reported.

**Conclusion and recommendation:** Arts-based health promotion methods have been widely used in SSA. The majority of studies were conducted in South Africa, with Tanzania well-represented among other countries. The potential of arts-based health promotion to inform NCD prevention remains largely untapped. Future research should focus on: 1) broadening application of arts-based research to NCD prevention; 2) addressing challenges, including in relation to robust evaluation of the impact of arts-based approaches.

## Assessment factors associated with cardiovascular diseases among patients attending cardiac clinic at a referral hospital in Tanzania

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**Background:** Mortality and morbidity due to cardiovascular diseases (CVDs) are escalating worldwide, with disproportionately significant worse outcomes in developing countries due to rapid health and nutrition transition. Despite the growing trends of CVDs cases in hospital settings especially in Tanzania, still no study has been conducted to evaluate CVD risk factors among patients attending cardiac clinics, to see how they respond to current treatment.

**Objective:** To assess lifestyle risk factors associated with CVDs among patients attending cardiac clinics at Kilimanjaro Christian Medical Centre (KCMC) referral hospital-Tanzania.

**Methodology:** A cross-sectional hospital-based study was conducted to determine the prevalence of CVDs risk factors among patients with hypertension (HTN) and coronary heart diseases (CHD) who attended the cardiac clinic at KCMC between April-July 2018. Socio-demographic characteristics, medical condition and risk factors for HTN and CHD were collected using a structured questionnaire. Blood samples collected from each patient were analysed by Cobas Integra/Maglumi analysers, to detect and quantify important biomarkers. Descriptive statistics were used to summarize socio-demographic, lifestyle risk factors and biomarkers for HTN and CHD. Pearson's chi-square tests were used to associate risk factors for HTN and CHD while multinomial logistic regression was used to determine independent predictors for HTN and CHD.

**Results:** Of the 100 participants, 65% had HTN, 23% had CHD and 12% had both disease conditions. The most prevalent risk factors for HTN and CHD were: alcohol intake (67%), high blood pressure (59%), physical inactivity (61%), obesity (39%), alanine aminotransferase (ALT) (43%), low-density lipoprotein (65%), C-reactive protein (CRP) (78%), sodium (41%) and potassium (40%). Moreover, age, plasma glucose, ALT, and CRP were independently and positively associated with HTN and CHD.

**Conclusion and recommendation:** This study affirmed patient's exposure to CVD risk factors, despite being under medical management. These findings call for sensitization programs and additional interventions in the management of CVDs among these patients, to include health education on lifestyle modification and proper dietary habits.

## Reverse Diabetes: A change to the conventional diabetic plate

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**Background:** A change in the conventional diabetic plate to a plant based (vegan) diet will reliably improve the glycaemic control of diabetic patients and also confer benefits of normalizing weight, blood pressure, and reduction in rates of diabetic complication. It is well known that type 2 diabetes can be prevented by maintaining good eating habits, ideal body weight, and an active life. Type 2 diabetes has been traditionally viewed as an irreversible condition. However, research shows that normal glucose levels and beta cell function can be achieved through a low-fat plant based (vegan) diet. Also, research shows that without specific dietary intervention, deterioration of glycaemic control and beta cell function is progressive whether or not pharmaceutical treatment is intensive.

**Objective:** The solution seeks to improve lives by reducing the occurrence of complications in Type 2 diabetes.

**Methodology:** A participatory pilot study among adults who are motivated to regain their health by trying a low calorie, low-fat plant based (vegan) diet. Individuals will be monitored for fasting blood glucose every week and HgbA1C levels at week 1, 4, 8, 12 and 16. Anthropometrics– height and weight, blood pressure and patient history will be taken. This is a protocol for a study which is to start soon.

**Results:** This solution will help not only diabetic patients but also patients with hypertension and other non-communicable diseases as it concomitantly addresses the basic causes of the conditions such as overweight and obesity

**Conclusion and recommendation:** Currently, in Tanzania there is no such a solution implemented. Health care facilities implement the conventional diabetic plate which is ineffective. This is evidenced by the increasing rates of complications in our diabetic patients despite the aggressive use of medication. This solution is promising, and it is cheap and sustainable.

## Magnitude of Overweight, Obesity and Insufficient Physical activities among Secondary School Students in Kinondoni Municipal, Dar es Salaam

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**Introduction:** It is estimated that 38 million deaths occurring worldwide are due to NCDs mainly cardiovascular diseases, diabetes and chronic lung diseases. Eighty percent (80%) of these deaths are from middle- and low-income countries (around one million children) below 20 years of age died in 2002 as a result of NCDs while more than 25% of obese adolescents had signs of diabetes by 15 years of age.

**Objective:** To determine the prevalence of NCD risk factors among secondary school students in Dar es Salaam to obtain data for an advocacy campaign on tackling childhood obesity among adolescents.

**Study design and site:** A cross sectional survey was conducted among secondary school students at Kambangwa and Makumbusho secondary schools in Kinondoni municipality in Dar es Salaam city in June 2016. Schools were randomly selected from the list of public schools obtained from the executive municipal director. A simple random sampling technique was conducted to obtain a calculated sample size of 234 students from form one to form four classes from both schools.

**Data collection:** A pre structured, self-administered questionnaire was used to collect information such as age, year of study, sex, most favoured foods and drinks, and time for physical activities. Height and weight were measured and the Body Mass Index (BMI) calculated and interpreted according to the World Health Organization reference charts for adolescents. Descriptive statistics were calculated using the Statistical Package for Social Sciences (SPSS version 20). Written consents were sought from the parents before students were enrolled in the survey.

**Results:** Of the 234 students enrolled, 71.4% were female and 51.3% were below 15 years of age. While 152 (65%) preferred using their free time for studies, only 12 (5.1%) preferred using their free time for outdoor sports. A total of 204 (87.2%) participants reported to be involved in sports activities, favouring football and netball (30.4% each). A half (50%) participated in sports once per week and 50.4% of them spent more than 30 minutes in each sports session. Rice and ugali were the most preferred foods (36.8% and 31.2% respectively. Fresh fruit juice was the most preferred drink by 59% of participants and only 39 (16.7%) participants preferred water as their favourite drink. 54%of participants had normal body weight while 23 (9.8%) were overweight and 5 (2.1%) were obese.

**Conclusion:** Obesity and overweight are prevalent among secondary school adolescents in Kinondoni municipal with high level of inadequate physical activities and unhealthy food preferences. School health education regarding the consequences of unhealthy diet and sedentary lifestyles should be established, school children be encouraged to participate fully in recreational school physical sports and schools should create supportive environment for them such as sports fields and equipment. We suggest a national surveillance be conducted with regards to obesity.

## Pre, Post-harvest Practices Associated with Reduction of aflatoxin and fumonisins in maize based complementary foods in Tanzania.

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**Background:** Studies have documented the linkage between dietary intakes of mycotoxins with occurrence of NCDs particularly child stunting and various cancer forms. Maize, a major component of the daily diet in Tanzanians, is the most vulnerable to mycotoxin contamination. Pre- and post-harvest practices are primary lines of defence against mycotoxins in various foods.

**Objective:** To reduce mycotoxin contamination in maize through good pre- and post-harvest practices

**Methodology:** A 3x3 and 2x4x3 pre-harvest factorial experiments in Randomized Complete Block Design and a post-harvest intervention in a Cluster Randomized Controlled Trial were implemented in three agro-ecosystems of Tanzania to determine the effectiveness of various practices on reduction of aflatoxin and fumonisin contamination in maize. Quantification of fumonisins and aflatoxins in maize grains was done using HPLC-FLD.

**Results:** Maize grown under combined application of fertilizer, insecticide and fungicides had significantly ($p < 0.05$) lower contamination of fumonisins than maize grown with sole or no application. Early sowing and harvesting were important measures to control fumonisin accumulation. Maize variety, STUKA M1 was less susceptible compared to STAHA, although these were not always significant. No aflatoxins could be detected in all pre-harvest samples. Use of drying, sorting and protecting maize against storage insect pests significantly ($p < 0.05$) reduced aflatoxin and fumonisin contamination. Drying maize on mat/raised platform, sorting and application of synthetic insecticides during storage also reduced contamination of aflatoxins and fumonisins.

**Conclusions and recommendation:** There is a higher possibility to minimize mycotoxin associated NCDs through reduced dietary intake with fumonisin and aflatoxin by using agricultural practices such as balanced use of fertilizer, insecticides, fungicides, early planting and harvesting of some early maturity maize varieties. Also, the use of post-harvest practices, like sorting, drying, and control of insect have great role to reduce the toxins.

## Hyperglycaemia during Pregnancy in Tanzania: Situation Analysis

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**Background:** Prevalence of hyperglycaemia during pregnancy is increasing parallel with the increase in prevalence of Type 2 diabetes. Pregnancy could be a window of opportunity for increased detection and management to prevention of future type 2 diabetes.

**Objective:** To document trend and current situation on gestational diabetes mellitus (GDM) in Tanzania.

**Methodology:** Published papers on the magnitude and risk factors for hyperglycaemia in pregnancy in Tanzania were retrieved from Google scholar and PubMed, reviewed and summarized.

**Results:** Six papers were retrieved. Gestational diabetes did not exist in the country in the nineties. However, recent studies reported prevalence of about 18% in Dar es Salaam, 4% in Morogoro, 16% in Arusha and 20% in Kilimanjaro regions. Identified risk factors were family history of type 2 diabetes, mid upper arm circumference (MUAC) ≥28cm, pre-pregnancy obesity, percentage body fat, previous macrosomia, previous still birth and maternal age. A study in Dar es Salaam reported that universal screening does exist where every pregnant woman is tested for glucose in urine, but it is known that screening through urine is less sensitive and it detects only less than 5% of the women with GDM.

**Conclusion and recommendation:** Prevalence of GDM is increasing in Tanzania, parallel with increase in overweight and obesity among women of reproductive age. There is a need to develop a clear diagnosis and management strategy and nutrition guideline for diabetes during pregnancy to prevent poor outcomes for the mother and the child.

## Selective screening for gestational diabetes in Sub Saharan Africa

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**Background:** Current WHO guidelines recommend universal screening of all pregnant women for gestational diabetes mellitus (GDM). This may be costly for middle- and low-income countries. The use of selective screening reduces the number of unnecessary oral glucose tolerance tests hence maximizing the use of available resources.

**Objective:** To review the existing selective screening methods and their application in Sub Saharan Africa.

**Methodology:** Published papers on the selective screening for GDM in Sub Saharan Africa were retrieved, reviewed and summarized.

**Results:** A total of five studies conducted in Tanzania, South Africa, Ghana, Nigeria and Kenya were identified and reviewed. The methods used to identify risk factors varied across countries depending on the research design, selection of participants, gestational age at screening, age, BMI and diagnosis criteria used. Risk factors could identify 64% of the women with GDM in Tanzania, more than 95% in South Africa, 54% in Ghana and 80% in Nigeria. Another study in Nigeria reported GDM prevalence of 4.9% and 1.6% when selective and universal screening was used respectively.

**Conclusions and recommendations:** Some selective screening methods were promising while others did not perform well. Each country had a different set of risk factors which limit generalization. Further research is needed to validate the existing selective screening methods and develop risk factor checklist, which is simple, clear and easy to use at the clinic and for self-identification to enhance self-care.

## Awareness and Perception on Population-Based Tobacco Control Interventions in Preventing Non-Communicable Diseases: A Case Study of Ilala District, Tanzania

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**Background:** Tobacco consumption is one of the four major modifiable risk factors for NCDs. Minimizing and restricting tobacco consumption is an effective way of preventing NCDs and deaths attributed to tobacco use. Tanzania has taken many initiatives for controlling and regulating tobacco consumption to prevent NCDs in country for decades. However, situation keep on worsening yearly.

**Objective:** To assess the general public awareness and perception on population-based tobacco control interventions in preventing NCDs in Ilala District.

**Methodology:** In a population based cross-sectional survey, questionnaires with close ended questions were administered to 384 respondents. Observation checklist on 300 cigarette packets and 152 public sites were used to check the use of population-based tobacco control interventions. Data were analysed using excel and Statistical Package for Social Sciences (SPSS) version 20.

**Results:** Research findings revealed that awareness on population-based tobacco control intervention is very low as only 30% (95) of respondents were aware that, tobacco is the key risk factor for all the four major NCDs. However, 88.3% (280) noted that smoke ban in public is not effective, while 94.6% (300) noted that, imposing health warning message on tobacco products packages and banning tobacco advertisements, promotions and funding by tobacco industry respectively have not been effective strategies in reducing tobacco use among the public.

**Conclusion and recommendation:** This study concludes that, implementation of population-based tobacco control intervention for preventing NCDs in Ilala Districts is hampered by ineffectiveness of tobacco control policies and lack of enforcement of the Tobacco Product (Regulation) Act of 2003.

The study recommends that, the current Tobacco Product Act of 2003 needs to be revised to comply with WHO Framework Convention on Tobacco Control and become more effective in enforcing the implementation of population-based tobacco control interventions for successful prevention of NCDs.

## Pesticides as a risk factor for non-communicable diseases

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**Background:** Growing evidence indicates that early life exposure to environmental risks such as chemicals and air pollutants might increase Non-Communicable Disease (NCD) risks throughout the life course. About 8.2 million out of 12.6 million (61%) of all annual global deaths linked to the environment are due to NCDs. Pesticides are among the toxic chemicals deliberately introduced in the environment and are known to cause a number of NCDs.

**Objective:** To investigate how pesticides are a risk factor for NCDs for informing the intervention measures.

**Methodology:** Literature review on pesticides and non-communicable diseases and exposure studies done locally are used to come up with information on the pesticide contributions to NCDs. Major studies on prenatal pesticide exposures were chosen to illustrate pesticide link with NCDs. Chlorinated and organophosphorus pesticides were chosen due to their intensive use both in agriculture and public health in Tanzania. In 1991-1994 organochlorine residues in 326 human serum samples collected from coffee and cotton growing areas of Tanzania were analysed and results presented to show chemical body burden.

**Results:** Dichlorodiphenyltrichloroethane (DDT) exposure in utero was shown to be risk of breast cancer in a 54 years prospective study. About 98% of study participants in coffee and cotton growing areas in early 1990s had residues of 5 to 10 different chlorinated pesticides, mostly DDT and metabolites at high levels. In horticulture 2019, number of exposure symptoms and Acetylcholinesterase depression was higher in farmers exposed to organophosphates and carbamates than in controls. Several studies have reported adverse health effects on women exposed to pesticides and their offspring. Women spraying pesticides in small-scale agriculture reported more spontaneous miscarriage compared to those who did not.

**Conclusion and recommendation:** DDT and related pesticides are predictors of breast cancer. Organophosphorus pesticides can cause miscarriages and developmental effects on children. Reducing pollution from pesticides can prevent NCDs. Existing evidence of association between pesticides and NCDs presented here should serve as a warning and cause for action.

## Food based dietary guidelines (FBDGs) development and promotion in Tanzania

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**Background:** Food-based dietary guideline (FBDG) is a tool for nutrition education and behaviour change communication strategy to improve dietary practices and address diet-related public health problems. It has evidence-based recommendations as guides to inform people to consume a healthy optimal diet while simultaneously helping protection against development of lifestyle conditions/non-communicable diseases (NCDs) like diabetes.

The FBDG is accompanied by a Food guide; a visual representation to help consumers implement FBDG; it translates nutrient standards and recommendations into simple practical advice on the types and quantities of foods needed for optimum health.

**Objective:** To promote desirable and culturally acceptable eating behaviours using evidence-based recommendations that will help to prevent NCDs through adoption of healthier lifestyles.

**Methodology:** A multidisciplinary technical task team did desk review on dietary patterns in Tanzania. Types of meals, preparatory methods and consumption frequency among others influence people's nutrition and health status. Different conditions thought to be of public health significance were listed and voted for. FBDGs messages for the general population based on selected priority problems and risk factors were developed.

**Results:** Qualitative guides of Tanzania FBDGs include: 1. Enjoy a wide variety of foods daily with everyone in your household. 2. Limit your intake of foods containing saturated fat, trans-fat, added sugar, added salt, and highly processed foods. 3. Feed infants and children appropriately according to age. 4. When pregnant and breastfeeding, continue eating a variety of foods while increasing intake of animal source foods. 5. Make your food nutritious and safe. 6. Choose to be active every day. The quantitative part of food guide model was established as plate model.

**Conclusion:** Promotion and dissemination of the Tanzania FBDGs will be carried out at National and Community levels through basic health educational services, training activities, and periodic campaigns via multiple communication channels and media.

## Predictors of alcohol use disorders and its association with family functioning among adults residing in Dodoma municipal, Tanzania

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**Background**: Alcohol use disorders (AUDs) cause 3.3 million number of deaths each year globally. It is also one of the leading causes of diseases, violence and accidents. This study aimed determine the prevalence and predictors of AUDs and its association with family functioning among adults residing in Dodoma municipality.

**Methods**: A Cross-sectional study design was employed using a randomly selected sample of 690 adult aged 18 years and above residents of the then Dodoma Municipal. Data was collected using two assessment tools; the AUDIT for alcohol use and the General family functioning of family assessment device (FAD). Face to face interview was done to collect data from participants after considering ethical issues. Multivariate analysis was used to measure for independent associations.

**Results:** There is high prevalence of AUDs (21.4%) among adults residing in Dodoma municipality. Predictors of alcohol use disorders were; those aged 40 years and above (OR;15.04,CI; 1.631-139.289), male gender (OR;1.978,CI;1.028-3.807 ),not attending for church or mosque spiritual services (OR;14.687,CI;5.423-39.779), cigarette smoking (OR;31.434,CI;1.949-162.203) and peer pressure(not having best friends drinking) (OR;0.06;0.021-0.169). Furthermore it was found that alcohol use disorders have significant association with family dysfunction, (OR;0.469,CI;0.280-0.788).

**Conclusion and recommendation**: AUDs is a problem among adults residing in Dodoma municipality and it is significantly associated with family dysfunction. More studies are needed to experiment interventions that could be used to reduce AUDS and its impact on family functioning.

## Effectiveness of Brief Behavioural Intervention on controlling alcohol use, self-efficacy and drinking expectancy among pregnant women in Dodoma region, Tanzania; A Quasi-Experimental study

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**Objectives:** This study examined the effectiveness of brief behavioural intervention in controlling alcohol use among pregnant women. Additional aim was to determine the association between change in self-efficacy, alcohol expectancy and alcohol use in pregnancy.

**Methods:** A quasi-experimental study involving 53 pregnant women identified using alcohol during pregnancy out of 365 screened for alcohol use during Antenatal care attendance in the Dodoma region, Central Tanzania. The 53 pregnant women were subjected to baseline and three months post-test evaluation using the following tools; Alcohol Use Disorder Identification Test-Consumption (AUDIT-C), Alcohol Timeline Follow Back (ATFB), Alcohol Abstinence Self-Efficacy Scale (AASES) and the Drinking Expectancy Questionnaire (DEQ). A single session, Brief Behavioural Intervention (BBI) was given to all participants after baseline assessment. Descriptive analysis was done on drinking pattern, self-expectancy and drinking expectancy at baseline and evaluation. Paired sample t-test was used to determine mean difference of alcohol drinking before and after intervention. Regression analysis was employed on measuring the effectiveness of the intervention and for the association between drinking expectancy, drinking, and self-efficacy.

**Results:** About 15% were identified to use alcohol, brief intervention significantly reduced drinking frequency and quantity t (53) = 10.3, $p < 0.001$), 65% of participants abstained following a brief behavioural intervention. Brief intervention reduced alcohol drinking significantly with increase in self-efficacy (coefficient= -0.057 standard error= 0.020 $p < .00$) and reduced alcohol drinking significantly with decrease in positive drinking expectancy (coefficient=0.034 standard error= 0.014, $p < .00$). The association persisted after adjusting the independent variables which include Educational status, Age, Marital status, Source of income, Partner drinking and Pre-pregnancy Drinking

**Conclusion:** Findings show the effectiveness of brief behavioural interventions in controlling prenatal alcohol use. Addressing individual self-efficacy and drinking expectancy is crucial in reducing alcohol drinking in pregnancy. Routine screening for alcohol use among pregnant women would be of great benefit if adopted as part of antenatal care.

## Advancing “Healthy Street Food Incentives” to boost the safety and nutritional balance of street food in Tanzania by identifying the types of food prepared and consumed: A Case Study of Dar es Salaam, Tanzania

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**Background:** Street food vending and consumption have increased over the years in urban areas of Tanzania, providing food and income for a growing number of low- and middle-income city dwellers, and a crucial source of income for thousands of low-income women. However, literature shows four drawbacks undermines the sector; food safety issues; nutritionally unbalanced menus; unplanned vending spaces; widespread informality. Such issues put consumers’ health at risk, limit the ability of public authorities to monitor and plan development intervention, and hinder the economic growth of street food vendors. Addressing such issues, the MoHCDGEC and FAO led a baseline survey to collect updated information on street food vending and consumption to fine-tune, plan and guide the implementation of development interventions. In particular, the survey aimed at assessing: the variety of ingredients used by street food vendors; the variety of street foods eaten by consumer; the adequacy of storage and preparation practices; the formal status and the economic turnover of SFVs.

**Methods:** The survey was carried out in 14 marketplaces located in four Municipal Councils of Dar es Salaam; Kinondoni, Temeke, Ilala, Ubungo. Data collection was carried out through interviews with 597 street food vendors and 717 consumers by using questionnaires with closed-ended questions. Samples of both groups were selected through a multi-stage cluster sampling technique. Data were collected digitally on mobile devices using KoBoCollect. Statistical analysis of collected data was done with SPSS and Excel by computing measures of central tendency and correlations. Spatial analysis was done with QGIS to find significant spatial patterns.

**Results:** SFVs usually cook a variety of staples, meats, relishes and vegetables, however, the staples are usually served in a larger amount compared other varieties. Survey showed 72% of consumers eat vegetables at least once a day, and most consumers prefer amaranth leaf (57%) and sweet potato leaves (46%) above all. Only 25% of consumers eat fruit from SFVs and Consumers with a higher level of education and an employment tend to eat more fruits than less educated consumers, students, pensioners and unemployed people. 36% of SFVs have some sort of official document that enables them to carry out their business and 69% of habitual street food consumers in Dar es Salaam have never suffered from food poisoning due to street food in the last year, and 28% rarely have.

**Conclusion:** SFVs surveyed do not provide sufficiently varied menus enabling consumers to meet a nutritionally balanced diet. Very few SFVs offer fruit. Moreover, poor food handling by SFVs tend to reduce the nutritional quality of foods, and to make them prone to contamination that make them unsafe for consumers' health.

## HEALTH SYSTEMS

Health systems are responsible for delivering services that improve, maintain or restore the health of individuals and their communities. This includes the care provided by hospitals and other settings, but also less visible tasks such as the prevention and control of NCDs, health promotion, health workforce planning and improving the social, economic or environmental conditions in which people live.

Health systems need to be well organised and strengthened to be able to effectively respond to the rising NCDs burden which significantly impact premature deaths and disability globally. NCDs put increasing strain on the well-being of the population, health systems working to treat patients, and overall economic development. Loss of economic productivity as a result of NCDs is significant: it has been estimated that for every 10% increase in NCD mortality, economic growth is reduced by 0.5%

In almost all countries, development of health systems that are responsive to the challenge of prevention and treatment of NCDs is a priority. NCDs consist of a vast group of conditions, but in terms of premature mortality, emphasis has been on cardiovascular disease, cancer, diabetes, and chronic respiratory diseases.

NCDs are best addressed through comprehensive and sustainable approaches, which integrate population-wide health promotion and preventive measures. Response to NCDs require training of health workers and an effective surveillance and monitoring system. Such a multifaceted response demands a well-functioning health system. However, health systems in LMICs have been largely structured around infectious diseases and maternal and child health.

In response to the rising NCD epidemic, in November 2019, the Government of the United Republic of Tanzania launched a National NCDs Prevention and Control Programme. The programme will contribute to better organise and lead the prevention and control strategies of NCDs and NCDs risk factors.

This section presents comprehensive information from both research and programmatic health system issues focusing on NCDs. The following are key areas in this sub-theme:

- Human resources for health (task sharing and task shifting)
- Health financing for NCD services
- Access to NCD services
- Integration of NCDs, CDs and RCH
- Health information systems and NCD data capturing
- Performance of NCD surveillance
- NCD's Governance
- Essential Drugs and Commodities
- NCD's Logistics and Supply chain
- The role of community health workers in NCD care and linkage to the health facilities

## Barriers and Potential Facilitators for Effective Nutrition Governance in Tanzania Mainland

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**Background:** Good nutrition governance is essential for all countries trying to improve nutrition because it forms the foundation from which sustained and quality nutrition services can be provided at scale.

**Objective:** To identify barriers and facilitators for effective nutrition governance and determine the levels and patterns of nutrition governance in Tanzania Mainland.

**Methodology:** Both qualitative and quantitative methods were used during data collection whereas in quantitative a convenient sample of 184 Council Nutrition officers and 26 Regional Nutrition officers were invited to fill in semi structured web page questionnaires, using survey monkey. As for qualitative part, 12 Nutrition officials from 12 Councils with and without adequate nutrition governance were purposefully selected and interviewed for more complementary information. Descriptive analysis was performed using SPSS Version 20 to identify the barriers and facilitators. Qualitative data were analysed using Nvivo software version 11.

**Results:** Inadequate funding for nutrition services, inadequate supportive supervision, inadequate nutrition assessment and screening and inadequate multisectoral collaboration were key barriers for effective Nutrition governance. Factors that potentially facilitated effective Nutrition governance, as identified by participants, were in service training, supportive supervision and availability of development partners supporting nutrition services. About 60% of the Councils in Tanzania Mainland had adequate nutrition governance and Councils differed in the level of nutrition governance. Ten nutrition governance patterns indicative of the most common nutrition activities in the country were identified namely: Nutrition training, Funding for nutrition, Nutrition information, Supportive supervision, Nutrition planning, Shared nutrition messages, Prioritization of nutrition, Nutrition information feedback, Nutrition budgeting and Access to nutrition data. The first, second, third, fourth, fifth, sixth, seventh, eighth, ninth and tenth nutrition governance patterns explained the cumulative proportion of 17.26%, 28.3%, 38.64%, 46.48%, 53.95%, 60.11% 65.43%, 70.43%, 75.1%, and 79.4% of Nutrition governance variability, respectively.

**Conclusion and recommendations:** Effective Nutrition governance in Tanzania Mainland will likely require attention towards innovative mobilization and distribution of resources, infrastructure to support multi-sectoral platforms and inter-organizational networks. It is important to have accountability in funds disbursement and execution for timely implementation of nutrition activities. Other important issues may include establishment of institution aiming to train more institutions to have more professionals and more researches to combat the challenges.

## A sustainable academic strategic approach of resolving challenges as well as promoting mental healthcare systems in Tanzania

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**Institutional affiliation:** Mental Health Tanzania

**Background:** Promoting mental healthcare has been a worldwide challenge due to instability of mental health systems. In Tanzania, mental healthcare facing uncountable challenges and, unlike physical healthcare, is an unknown model of healthcare to most of the population. The challenges included poor access to mental health services and insufficient distribution, shortage and use of resources such as professionals, funds and facilities (Chikomo, 2011; Mbatia, Shah & Jenkins, 2009). Mental health primary care services are delivered through health centres and dispensaries, which are staffed by general nurses and clinical officers who have received a small amount of basic training about mental disorders, diagnosis, and treatment (Kempinski, 1991; Chikomo, 2011). Mental healthcare in Tanzania is mostly provided by community health workers, general nurses and assistance medical officers (Jenkins, Mbatia, Singleton, et al:2010).

Mental health is still significantly under-funded, with only about 1% of healthcare expenditures by the government directed towards mental health (World Health Organization, 2014). There are poor interventions, supervision, therapeutic approaches, counselling settings, incompetence of professionals in terms of skills, education, training, experience, and expertise (Chikomo, 2011; Mbatia, Shah & Jenkins, 2009). There is high stigma against people with mental disorders (Mbatia, Shah & Jenkins, 2009). In Tanzania, psychology as a discipline does not stand on its own, there are no departments of psychology in Tanzanian universities, nor licensing body/ authority of psychology in Tanzania (Hassan, 2009).

**Methodology:** Analysis of secondary data was done to determine challenges facing mental healthcare in Tanzania.

**Actions based on the results:** Based on the challenges, we decided to register Mental Health Tanzania (MHT) as independent institution for promoting mental health in Tanzania. We have also, launched Mental Health Clinics in Mwanza and we are spreading the clinics to all regions in Tanzania. MHT was established to address mental healthcare challenges; promote mental health industry; provide mental health services as well as involving in mental health activities.

Moreover, in dedicating to resolve the challenges, MHT is vindicating expression of interest for establishing a psychology college in Tanzania. This tertiary education and training institution to be named as The Tanzanian College of Applied Psychology (TACAP) will be awarding certificates, diplomas, degree as well as master's degree and PhD in the long run. By doing so, the college will be producing trained, skilled, knowledgeable as well as experienced counsellors, psychologists, psychiatrists, social workers, therapists and occupational therapists in different faculties of mental health industry such as psychology, counselling, applied social science, couching and psychiatry.

**Conclusion and recommendations:** Establishment of the TACAP will solve most of the mental health System challenges in Tanzania through increasing the number and competency of professionals, influencing better interventions, supervision, therapeutic approaches, counselling, as well as establishing psychology as a standalone discipline.

## The Sickle Pan-African Research Consortium (SPARCO): Delivering Improved Research Capacity in Sickle Cell Disease

Agnes Jonathan Mbwambo, E Balandya, J Kent, M Nkanyemka, J Makani
**Institutional affiliation:** Muhimbili University of Health and Allied Science, Department of Haematology and Blood Transfusion

**Background:** The countries that bear the greatest public health burden of sickle cell disease (SCD) are in Africa. Over the past 10 years, there have been concerted efforts to address the burden of SCD. These efforts have been limited by the absence of a multisite, well described SCD cohort; failure to deploy consistent standards of care; human resource capacity that is limited in number and skills and few programs to guide locally appropriate interventions.

**Objective:** To develop improved research capacity and resources for Sickle Cell Disease Research in Africa.

**Methodology:** The Sickle Pan-African Research Consortium (SPARCO) consisting of a hub (Tanzania) and collaborative consortium sites in Ghana and Nigeria will develop a platform to address these issues. SPARCO will establish a SCD database that will form a SCD registry within the institutional health information management system. Locally appropriate standards of care will be determined based on available resources. Working with existing programs, SPARCO will increase the quantity and quality of skilled healthcare professionals working in SCD. Finally, we will build on existing research activities to plan for clinical and implementation studies.

**Results:** The project has completed its second of four years and achievements are developments of a consortium of researchers in four countries supported by patient representative organizations. Enrolment of SCD patients into a disease registry and database with over 8,000 patients registered. Completion of a review of Standards of SCD Care from around the world and completion of draft Guidelines for Management of SCD. Over 300 individuals trained, and five research priority areas developed.

**Conclusion and recommendation:** SPARCO will strive to reduce the burden of SCD in Africa whilst establishing the capacity for research that will contribute to scientific knowledge to find a cure for SCD. With effective partnerships, significant advances in health and biomedical science can be achieved.

## An integrated health systems approach for improving health care services for Chronic Lung Diseases in Sudan and Tanzania: A multidisciplinary approach

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**Background:** Chronic Lung Diseases (CLDs) are major global health challenge yet neglected in Low- and Mid-Income Countries (LMICs). Integration of CLDs into the health care system through multidisciplinary approach may facilitate better management. This project is adopting an action research cycle to generate evidence on the requirements and process for developing context appropriate integrated lung health services in LMICs from health systems and community perspectives.

**Objective:** To understand and improve upon integration of CLD services within the health systems of Sudan and Tanzania through a multidisciplinary approach

**Methodology:** It is a baseline assessment that involved interviews with stakeholders from different level of the health care system and record reviews from selected ten health facilities in Tanzania.

**Results:** About 80% of presumed TB cases in Tanzania were found to be negative, however no clear path was in place for the management thereafter. The lower level health facilities were found to have nurses and medical attendants while Medical doctors being concentrated at regional hospital. No equipment or CLD guideline for diagnosing CLDs were found in most facilities. Reporting forms captured asthma only with the rest of CLDs being grouped under 'others' hence not reported within the health system. These gaps have attributed to low prioritization of CLDs with corresponding low budget allocation because of lack of evidence, leading to vicious circle of poor management of CLDs.

**Conclusion and recommendation:** Findings show a vicious cycle gap; no data no prioritization. Currently, efforts are underway to develop tools including algorithm, patient flow, training materials and reporting tools and training will later be provided to enable community health workers to refer presumed TB and other CLDs people; and for clinicians to properly diagnose and report CLDs.

## Tanzania Non-Communicable Diseases and Injuries Poverty Commission: Findings and Recommendations

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**Introduction:** The Tanzania NCDI Poverty Commission was established in 2016 in collaboration with the *Lancet* Commission on Reframing Non-Communicable Diseases and Injuries for the Poorest Billion. The aim of the commission was to establish the burden of disease of NCDIs in Tanzania, particularly in relation to socioeconomic risk factors, understand and document the availability and coverage of health sector services for NCDIs in Tanzania, prioritize NCDI conditions, and propose a package of cost-effective interventions to address priority NCDIs in Tanzania including estimating the cost of implementing the interventions.

**Methodology:** We conducted secondary data analysis on the Service Availability and Readiness Assessment 2012, Service Provision Assessment 2013, STEP survey 2012, and 2016 IHME Global Burden of Diseases database and selected NCD priority conditions based on overall burden of disease, severity, disability and equity. Priority interventions were then selected based on cost effectiveness, financial risk protection, equity, feasibility and alignment with national strategic goals using a recommended package of health sector interventions to achieve Universal Health Coverage in low and middle income countries (Disease Control Priority 3 http://dcp-3.org/).

**Results:** NCDIs in Tanzania contribute 41% of all disability-adjusted life-years (DALYs), which have almost doubled over the past 25 years. >50% of NCDI disability occurs before age 40. Over 60% of NCDI DALYs are from conditions other than cardiovascular diseases, cancer, diabetes, and chronic respiratory diseases. The commission proposes 31 NCDI conditions and 54 evidence-based cost-effective health sector interventions to fill the gap for NCDI services to achieve UHC. This set of interventions includes services for NCDIs, palliative care, rehabilitative care and represents medical, surgical, psychosocial, and community-based approaches that would require integration at multiple levels of the health care system.

**Conclusion:** NCDIs are a major health concern in Tanzania with a diverse set of conditions that also affect young and rural populations. The agenda for NCDIs needs to recognize the local burden of disease and include additional conditions that are causing significant burden locally and affect the young, such as epilepsy, sickle cell disease, rheumatic and hypertensive heart diseases, and injuries due to violence. By investing in an expanded set

of cost-effective health sector interventions, Tanzania may more equitably avert significant premature morbidity and mortality due to these conditions.

## Integrating and decentralizing diabetes, HIV and hypertension services in Africa: INTE-AFRICA

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**Background:** Disease epidemiology has changed rapidly in Africa. There is an increasing non-communicable disease (NCD) burden globally, with an estimated one billion people living with hypertension and about 9.4 million related deaths occurring annually. Although HIV/AIDS is the leading cause of death among adults in sub-Saharan Africa (SSA), global trends are mirrored in the region, as evident from the rapidly increasing burden of NCDs such as diabetes mellitus (DM) and hypertension in SSA countries, giving rise to a dual HIV-NCD epidemic. There is therefore a need to introduce integrated and decentralized approach to improve management of the three disease conditions.

**Objective:** To assess the effectiveness and feasibility of large-scale scale up of diabetes and hypertension integration services either on their own or with HIV-services in order to generate the research evidence needed by African health services to scale-up and sustain the screening and management of diabetes and hypertension in different settings.

**Approach:** The INTE-AFRICA project will be implemented in the selected health facilities and its catchment population where the clients originate.

The INTE-AFRICA is an implementation trial that will be carried in a collaborative network involving National Institute for Medical Research, Muhimbili Centre (Tanzania), The AIDS Support Organisation (Uganda), Ministry of Health Uganda and Tanzania, Liverpool School of Tropical Medicine-UK, Medical Research Council UK, University College Dublin (Ireland), IS Global (Spain).

In INTE-AFRICA, we wish to scale up two approaches of integrated chronic care on a much larger scale integration of HIV, diabetes and hypertension services in other clinics. We wish to study both scenarios as the reality is that in the long-term, 10-20-year horizon, health services for diabetes and hypertension will need to be integrated with services for HIV-infection in most settings in order to optimise use of resources. INTE-AFRICA is designed to influence global policy and practice. It represents a major step change from our initial pilot work funded by NIHR, which assesses feasibility and will finish before INTE-AFRICA starts.

***Expected Outcomes to be measured***

INTE-AFRICA will measure efficacy data in patients, health economics data and aggregated data at the health facility level. Therefore, the endpoints will be Linkage into care, the rates

of retention in care, changes in biomedical indicators over time: fasting blood glucose, HbA1c, blood pressure and HIV plasma viral load and Clinic usage.

## Burden of Eye Diseases in Tanzania and Access to Eye Services

Dr Bernadetha R. Shilio, Sarah Maongezi
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**Background:** Eye morbidity are among the disabilities affecting the community member in Tanzania. It is within the mandate of the Ministry to ensure universal eye health as stipulated in the Health Policy and Sustainable Development Goals. Access to Eye Services enable the Nation to measure the implementation of Program interventions.

**Objective:** To determine the magnitude of Eye Disease in Tanzania.

**Methodology:** A retrospective cross - section review of DHIS 2 and National Eye Care Program Data 2016 – 2018. Data was analysed through tables and graphs. Interpretation of Data was conducted, and results discussed. Short, intermediate and Long-Term recommendations were made.

**Results:** Data from all the Regions, Zonal Referral and National Hospital showed various spread of different eye diseases and varying eye services provision at different levels of competences. There is increased number of eye diseases attendances over the 3 years, however the number of Cataract Surgery Rate decreased in 2018. There has been a tremendous increase in the number of DM clients receiving DR Services.

**Conclusion and recommendation:** Despite the increase burden of Eye Disease, Tanzania is a way behind to reaching the National and International Target on Elimination of avoidable blindness by the year 2020 and beyond. Plans are needed to address the challenges in reaching the population in need.

## Using the Health Believe Model to Explain the Patient's Compliance to Anti-hypertensive Treatment in Three District Hospitals - Dar Es Salaam, Tanzania: A Cross Section Study

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**Background:** Hypertension is one of the most important cardiovascular risk factors; but compliance to anti-hypertensive disorder remains to be a public health challenge worldwide. The study aimed at finding the influence of health belief model in treatment compliance among elderly hypertensive patients in three district hospitals in Dar es Salaam, Tanzania.

**Objective:** To assess factors affecting treatment compliance with antihypertensive therapy guided by the use of Health Belief Model variables among hypertensive patients attending hypertension clinics at Amana, Mwananyamala and Temeke-Dar es salaam.

**Methodology:** We conducted an analytical cross- sectional study in three District hospitals in Dar es Salaam Region. We included patients who were on antihypertensive medications. Simple random sampling was used to enrol study participants. Data were collected using structured questionnaires. Data were analysed using SPSS. Frequency distribution and Multivariate analysis was done using Linear Multiple Regression to identify variables which are strongest predictor of treatment compliance among variables of Health Believe Model.

**Results:** A total of 135 participants were enrolled, 56% were compliant to treatment. Multiple linear regression was used to operationalize the Health Belief Model with treatment compliance being dependant variable. The predictor variables were perceived benefit, perceived barriers and cues to action. Multivariate analysis indicated significant model fit for the data ($F = 11.19$ and P value $< 0.001$). The amount of variance in treatment compliance that is explained by the predictors is 30.3% ($R^2 = 0.303$) with perceived barrier being the strongest predictor of treatment compliance ($\beta = -0.477$; $p < 0.001$). A negative beta coefficient indicates a negative association between perceived barriers and treatment compliance. Other predictor variables were not statistically associated with treatment compliance.

**Conclusion and recommendation**: The study showed that almost half of study participants had hypertensive treatment compliance, with the use of health believe model the important strongest variable was perceived barrier to treatment. An innovative strategy on improving patients' perception of barrier to treatment is recommended to increase treatment compliance.

## The effectiveness of a Nurse-lead community-based health education intervention on improving self-care practices and glycaemic control among type-2 diabetes patients: A controlled quasi-experimental study

Dr Stephen M. Kibusi, Panga Zacharia, Dr. Mariam Munyogwa
**Institutional affiliation**: The University of Dodoma

**Background:** Globally, diabetes is the chronic metabolic disease that highly necessitates top priority to intervene. Health literacy could be the cost-effective intervention that assures better disease outcome.

**Objective:** This study aimed at testing the effectiveness of a Nurse-Lead community-based education intervention for improving self-care practice and glycaemic control in people with type 2 diabetes mellitus in Tabora region, Tanzania.

**Methods:** A quasi-experimental study was conducted to 165 randomly recruited participants with type 2 diabetes mellitus from different clinics. The mean participants' age was 54 ±13 years. Of all the participants, female constituted 55.8%. Data were collected in two phases (pre/post-test) through structured diabetes questionnaires and clinical tools. Both descriptive and inferential statistics were conducted.

**Results:** Participants with good knowledge score before intervention were 39.4% compared to 87% after educational intervention. Those with a positive attitude were 23% before and 67% after intervention. With good practice before intervention were 9% compared to 48% after intervention and those with good blood glucose control before were 33% compared to 87% after intervention. The t-test showed significance differences; Knowledge score pre-intervention was (n=165, M=64.00, SD=10.92) and post-intervention was (n=165, M=76.21, SD=8.24), mean difference of (12.21, t (164) =15.60, $p<0.001$). Attitude, pre-intervention was (n=165, M=61.02, SD=9.10) and post-intervention was (n=165, M=71.74, SD=6.47) mean difference of (10.72, t (164) =16.27, $p<0.001$). Practice, pre-intervention was (n=165, M=54.60, SD=9.66) post- intervention was (n= 165, M=68.02, SD=8.00) whereby the mean differences was (13.42, t (164) =18.26, $p<0.001$).

Subsequently, the linear regression showed a significant association in knowledge change with attitude at baseline (B=-0.217, $p<0.05$ CI: -0.385, -0.49). Attitude change was statistically associated with knowledge change (B= 0.191, $p<0.01$, CI: 0.065, 0.318) whereas practice change was statistically associated with knowledge change (B=0.163, $p<0.05$, CI: 0.020, 0.307) and glycaemic level change was significantly associated with practice (B-0.027, p= 0.06, CI: -0.48, 0.007).

**Conclusion:** A nurse-lead educational intervention was an effective tool in the change in knowledge, attitude and practice that lead to participants' improvement in glycaemic control.

## The right to health and access to universal health coverage for older people

Dr Godfrey Mubyazi, Dr Mary Mayige, Gibson Kagaruki, Dr Elizabeth Shayo
**Institutional affiliation:** National Institute for Medical Research, Tanzania

**Background:** In Tanzania, the proportion of disease attributed to non-communicable diseases (NCDs) doubled between 1990 and 2015; and in 2016 NCDs were estimated to account for just over one-third of all deaths. Evidence shows that the impact of NCDs in Tanzania is disproportionately high among people aged 50 and older. Like income, health status and access to healthcare is unevenly distributed across sociodemographic and age group. Older people were found to experience barriers related to availability, accessibility and acceptability of good-quality healthcare services.

**Objective:** This analysis was carried out to assess the extent to which older people can realise their right to health and are included in UHC efforts in Tanzania.

**Methodology:** We used a mixed-methods approach, which included: in-depth interviews and focus group discussions for Qualitative data. Quantitative (secondary) data was gathered from different sources, including the National Bureau of Statistics (NBS), particularly the Service Provision Assessment Survey (SPA), Demographic and Health Survey (DHS), Household Budget Survey (HBS) and Panel data; and from the National Institute for Medical Research (NIMR), particularly the STEPS survey.

**Results:** The report found that, overall; there are low rates of insurance coverage and financial protection among older people in Tanzania. Only around one in eight people aged 50 and over have insurance, and nearly three quarters (73.6 per cent) still incur out-of-pocket expenses for health services despite government policies mandating fee exemptions for this population. Focus group discussions revealed that older people suffering from non-communicable diseases (NCDs) could not afford to put aside financial resources to cover health-related costs.

**Conclusion and recommendation:** The Ministry of Health, social welfare offices, local governments and health providers must ensure that free services are compensated for either through government subventions or some form of health insurance to ensure that risks are pooled among a wider population. This will help to overcome the financial pressures to recover costs or generate income that prevent older people from receiving the health services to which they are entitled.

## CARE AND TREATMENT OF NCDs

Non-Communicable Diseases (NCDs) have been identified as high priority at national, regional and international levels and emphasis is on the need for take action to save millions of lives and enhance development initiatives. All UN member states acknowledge that the global burden and threat of NCDs constitutes one of the major challenges for development in the twenty-first century. Currently NCDs are causing more than 60% of global deaths, of which 80% occur in developing countries. It is projected that NCDs will cause up to 75% of worldwide deaths by 2030. The World Health Organization (WHO) estimates that by 2020, NCDs will account for 80% of the global burden of disease, causing seven out of every 10 deaths in developing countries, approximately half of them premature deaths under the age of 70 years.

The government of Tanzania like many other African countries is facing the double burden of communicable and non-communicable diseases. NCDs have been identified by WHO to need priority health interventions and research for prevention and control. In the fight against NCDs, WHO calls for the following; (i) Intersectoral and multidisciplinary research to understand and influence the macroeconomic and social determinants of NCDs and exposure to NCD risk factors (ii) Translation research and health system research for global application of proven cost-effective strategies and (iii) Research to enable expensive but effective interventions to become accessible and used appropriately in resource-constrained settings.

Tanzania has developed the National NCDs strategy whose goal is to reduce the disease burden from NCD. Key to this strategy are the promotive activities focusing on increasing awareness of NCD and associated risk factors, promoting healthy lifestyles and community involvement and the individual taking responsibility for own health; preventive services focusing on limiting the incidence of NCD by controlling causes and risk factors, care and treatment activities focusing on strengthening the capacity of health workers on NCD in diagnosis and management, strengthening of the health system by ensuring available medicine and equipment and a well-functioning referral system and rehabilitation services focusing on strengthening community based rehabilitation as well as palliative care services, and home-based care programmes

This section presents comprehensive information from both research and programmatic issues on NCDs care and treatment in Tanzania. The following are key areas:

- Diagnostic and curative services
- Counselling services
- Rehabilitation and palliative care
- Challenges in the management of NCDs
- Care of the children, elderly and pregnant mothers
- Care of the physically challenged people

## Comparison of Blood Pressure Lowering Effect between Calcium Channel Blockers and Angiotensin Converting Enzyme Inhibitors in Patients with Moderate to Severe Hypertension

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**Background:** Guidelines for management of hypertension recommend combination therapy for moderate to severe hypertension. Combinations of diuretic with Angiotensin Converting Enzyme Inhibitor (ACEI) or Calcium Channel Blocker (CCB) have been used interchangeably. However, physicians prefer a combination of diuretic with CCB, claiming it works better than the combination of diuretic and ACEI in black hypertensive patients.

**Objective:** This study aimed to compare blood pressure (BP) lowering effect of CCBs and ACEIs in combination with a thiazide diuretic among moderate to severe hypertensive patients attending care in Dar es Salaam regional hospitals.

**Methodology:** An open-label, non-inferiority randomized comparative trial was conducted from November, 2018 to January, 2019. Patients were recruited consecutively and randomized to receive a combination of diuretic with either CCB or ACEI. BP was assessed at baseline and 4 weeks post-treatment. Patients' socio-demographic and clinical characteristics were obtained using a structured questionnaire. Data were analysed using Statistical Package for Social Sciences software, Version23. Independent t-test was used to determine differences in mean BP reduction. Chi-square test was used to check for determinants of BP lowering. P-value $< 0.05$ was considered significant.

**Results:** Of 239 patients assessed, 69% were female and the mean age (±SD) was 60±12 years. BP was controlled in 86.0% of patients in the CCB arm and 84.7% of patients in the ACEI arm ($p = 0.792$). The mean systolic BP reduction observed 4 weeks post-treatment were 43 mmHg and 40 mmHg ($p = 0.093$) in the CCB and ACEI arms respectively. For diastolic BP, mean BP reduction was 22 mmHg for both CCB and ACEI arms ($p = 0.772$).

**Conclusion and recommendation:** CCB and ACEI in combination with thiazide diuretic showed impressive BP reductions and therefore either of the combinations can be used in the initial treatment for hypertensive patients when the priority is to reduce BP.

## Comparative Study on Association of Intermittent Iron and Folic Acid Supplementation on Cognitive Abilities of Adolescent Girls Aged 10-19 Years: Case Study of Meatu and Itilima Districts

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**Background**: Literature suggest that iron deficiency anaemia could affect cognitive abilities, as it affects brain function in attention, working memory and retention. The 2015/2016 Tanzania Demographic and Health Survey reported that about 47% of adolescent girls in Tanzania had anaemia. The prevalence of cognitive abilities among adolescent girls in Tanzania is not well documented but high rates of anaemia indicate a large proportion of adolescent girls could have cognitive impairment. Additionally, very little is known about the association between intermittent iron and folic acid (IFA) supplementation and cognitive abilities in Tanzania.

**Objective:** To compare the prevalence of cognitive abilities among supplemented and non-supplemented adolescent girls aged 10-19 years in Meatu and Itilima Districts.

**Methodology:** A comparative cross-sectional study aiming to compare association of Intermittent IFA supplementation on cognitive abilities prevalence among adolescent girls aged 10-19 years was carried out involving 396 adolescent girls supplemented with IFA in intervention district (Meatu) and 374 non-supplemented adolescents girls in control district (Itilima). In Meatu girls received IFA supplements on weekly basis for 1.5 years prior to the study together nutrition counselling and education. The study assessed cognitive abilities using Digit span and Fluid intelligent test adopted from the Gujarati version of Wechsler Intelligence Scale for Children to test attention, short term memories, thinking and acting.

**Results:** Prevalence of cognitive abilities were significantly higher in the supplemented (80.5%) than the non-supplemented group (19.8%), p-value <0.000. For working memory prevalence were 84.53% and 15.47% respectively, with p-value <0.000.

**Conclusion and recommendation:** The difference in prevalence of cognitive abilities among non-supplemented adolescent girls in our setting is alarming, that Iron deficiency anaemia affects cognition. Since it is difficult to influence dietary behaviour due to social cultural reasons and poverty, IFA supplementation is very crucial in addressing cognitive impairment for productive generation and future development.

## Inhaler Technique and Asthma Control among Asthmatic Patients at Muhimbili National Hospital, Dar es Salaam Tanzania

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**Background:** In Asthma management, sub-optimal inhaler use leads to poor disease control and increased healthcare costs. Sub-optimal inhaler use largely emanates from poor inhaler technique. In Tanzania, the burden of poor inhaler technique, its associated factors and relation to asthma control is largely unknown.

**Objective:** The aim of this study was to evaluate inhaler technique among asthmatic patients in Muhimbili National Hospital (MNH), its associated factors and its relationship with asthma control.

**Methodology:** In this cross-sectional study patients' demographic, clinical and socioeconomic data were recorded. Metered-Dose Inhaler (MDI) use technique was assessed by direct observation against a standardized checklist. Asthma control was assessed using the Asthma Control questionnaire (ACQ). Summary statistics were reported as percentages and associations were analysed using the chi-square test. Logistic regression was used to determine predictors of poor inhaler technique. P value $< 0.05$ was considered statistically significant.

**Results:** A total of 275 patients were enrolled: 161 (58.5%) were female and 64.3% had been trained on inhaler use by doctors. Many patients used improper MDI technique: No full exhalation (97.1%), uncoordinated inhalation and canister actuation (87.6%), and No/short breath hold (85.8%). Factors associated with incorrect technique were training time <5 minutes (78.7%), training only once (74.3%) and concomitant use of other asthma drugs (78.9%). ACQ showed that 80.5% patients were poorly controlled.

**Conclusion and recommendation:** Incorrect inhaler technique among asthmatic patients at MNH were high and associated with poor asthma control. There is undoubtedly lack of expertise and consistency in offering correct inhaler use instruction. National guidelines on management of asthma need to be revised to include specific inhaler education tools and methods.

## Saving Lives through Voluntary Blood Donation: Learning from Medical Students in Ruvuma, Southern Tanzania

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**Background:** Most of developing countries like Tanzania are failing to meet the WHO minimum target of collecting blood donation from 1% it's population. Medical students are high merit potential blood donors due to their medical knowledge, physiological potential by age and a will to volunteer for change. The use of medical students in southern Tanzania for blood donations has not been reported.

**Objective:** To assess knowledge, awareness, attitudes, practices, willingness to donate in future and factors associated with voluntary blood donation among medical students in Ruvuma, Southern Tanzania.

**Methodology:** A cross-sectional survey conducted from March to June 2018. A total of 176 students were randomly selected and filled a self-administered questionnaire on blood donation. The data were analysed by SPSS Version 24.0.

**Results:** The average age was 25.8±3.6 years. Eighty students (45.5%) had ever donated blood out of whom 66 (82.5%) were volunteering. Repeated donors out of those who had ever donated were 46 (57.5%). Most of participants (90.3%) had positive attitude toward blood donation and 77% perceived voluntarily donated blood as the best blood source. Most of participants (75.6%) were willing to donate in the future. Factors significantly associated with ever donating blood were age above 30 (OR=0.18, $p<0.001$), male sex (OR=3.69, p=0.001), past HIV screening (OR=2.59, p=0.029), knowledge of one's own blood group (OR=4.86, $p<0.001$) and knowledge of safe duration of time taken to donate a unit of blood (OR=2.42, p=0.024).

**Conclusion and recommendation:** Medical students presented high awareness, positive attitude, and high intention to volunteer for blood donation. The National Blood Transfusion Services and MOHCDGEC in association with governments of students' organizations to use the medical students for blood donation in Tanzania to achieve the WHO goal of 100% voluntary blood donation by year 2020.

## Herbal use among Hypertensive Patients at the Kilimanjaro Christian Medical Centre, Tanzania. Cross-sectional study

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**Background:** Hypertension control remains a challenge. Concomitant herbal use has been linked with this poor control, but information on herbal medicine use among hypertensive patients in this setting is scarce.

**Objectives:** the current study aimed to determine the prevalence, reasons, and factors associated with herbal use among hypertensive patients attending outpatient clinic at Kilimanjaro Christian Medical Centre.

**Methodology:** We enrolled 300 hypertensive patients aged 18 years and above attending the medical outpatient clinic at the Kilimanjaro Christian Medical Centre between June and August 2018 who gave written consent. A questionnaire was used to collect participants socio-demographic, economic, and reasons for the herbal use. A multivariable logistic regression model was used to determine independent factors associated with herbal use. Factors with a p-value of less than 0.05 were considered significant.

**Results:** The mean (±SD) age was 64.1 (±2.00) years. More than half (52.0%) of the participants were female and the majority (73.7%) were married. Twenty eight percent used herbs, with the majority using garlic (68.8%) followed by mlonge (29.4%). About a third (68.3%) mentioned advice from a friend or a relative as the main reason for herb use. The only factor independently associated with herbal use among hypertensive patients was lack of health insurance (aOR= 2.8, 95% CI=1.2-6.7).

**Conclusion and recommendation:** In this population, herbal use was common among those lacking health insurances. Friends and relatives are influential in the decision to use herbs. The results call for more efforts to address awareness of the consequences of herb use in hypertensive patients.

## Hypertension control among patients attending the Kilimanjaro Christian Medical Centre, Tanzania: a cross-sectional study

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**Background:** Globally, poor hypertension control contributes significantly to the growing burden of Disability Adjusted Life Years. Despite the awareness and availability of interventions, only a small number of patients achieve the desired outcome, and the factors associated with poor control remain unclear.

**Objectives:** The current study aimed to determine the prevalence and factors associated with hypertension control among patients attending the Kilimanjaro Christian Medical Centre.

**Methodology:** We conducted a hospital-based cross-sectional study between June and August 2018. At the medical outpatient clinic, known hypertensive patients aged 18 years and above who gave consent were enrolled. An interview schedule was used to collect the general characteristics of the participants. Followed by blood pressure recording using digital sphygmomanometer. Poor hypertension control was defined as two consecutive (current measurement and a month preceding data collection) high blood pressure measurements (=>140/90) among patients on anti-hypertensive. Logistic regression was performed to determine factors associated with poor control. A p-value <0.05 was considered significant.

**Results:** A total of 300 hypertensive patients were enrolled in this study. More than half (52.0%) of the participants were female and living in rural areas (57.3%). The mean (±SD) age of participants was 64.1 (±2.00) years. More than three quarter (86.7%) of the participants had poor control. Factors associated with poor control were; age (cOR=1.1, 95% CI=1.0-1.1), being unemployed (cOR=3.5, 95% CI=1.3-9.1), and duration on ant-hypertensive (cOR=1.1, 95% CI=1.0-1.1). We found no statistically significant association between the use of herbs and poor control.

**Conclusion:** Eight in every ten patients had poor control. The poor control in this population was associated with unemployment, age, and duration on anti-hypertensive. The results call for more concerted efforts to address hypertension management.

## Program evaluation of Tanzania's first public, city-wide EMS system in the Mwanza Region: The Three-Year Mark.

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**Background:** Research has shown that access to prehospital emergency care and transport in Tanzania is severely limited and largely dependent upon untrained bystanders using private transport. In Mwanza, public health and safety organizations have worked together to implement a community-based emergency medical service (EMS) to improve access to emergency care and transport for the critically ill and injured. This study seeks to evaluate the impact and outcomes of the EMS system over the past thirty months.

**Methods:** We conducted quantitative and qualitative evaluations looking at records collected from emergency incidents dispatched to local responders between July 2015 and December 2018. Additionally, focus groups were conducted to evaluate the program's strengths and weakness for the following stakeholders: community responders, firefighters, emergency dispatchers, and emergency physicians.

**Results:** Quantitative – Beacon's decentralized dispatching system was activated for 509 incidents from July 2015-December 2018 with a mean scene arrival time of 05:03 minutes. Twenty motorcycle taxi drivers were trained in basic life saving techniques that include bleeding control, airway management, and splinting. Forty percent of incidents were labelled as traumatic motor vehicles accidents, with over 180 people needing immediate hospital transportation to local medical facilities. Qualitative – 39 stakeholders participated in the focus groups to identify lessons for future programs in Tanzania, including strengths, weaknesses, and opportunities.

**Conclusion:** Mwanza's first public EMS system has demonstrated the successful implementation of an urban prehospital system in a low-resource setting. Limitations of this program are due to the volunteer status of the responders which may be linked to an under-reporting of responder arrivals and transport times. There has been little public outreach or education due to fears about demand overwhelming this fledgling system. A secondary pilot program has been launched in the city of Iringa using the same framework with evaluations planned at 6 and 12 months.

## Improving the Quality of Surgical Care in Tanzania's Lake Zone Region: A Prospective Multicentre Longitudinal Study

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**Background:** Rates of post-surgical complications in low- and middle-income countries (LMICs) remain alarmingly high. Safe Surgery 2020 is a multicomponent intervention to strengthen five areas: leadership and teamwork, safe surgical and anaesthesia practices, sterilization, data quality and infrastructure to improve surgical quality in Tanzania. We hypothesized that implementation of Safe Surgery 2020 would lead to improved safety, teamwork and communication, and data quality and in turn reduce the incidence of maternal sepsis, post-operative sepsis, and surgical site infections (SSIs).

**Methods:** Safe Surgery 2020 in Tanzania is a longitudinal, quasi-experimental study implemented in 20 health facilities (10 intervention and 10 control) in the Lake Zone of Tanzania. Twenty-five trained medical data collectors gathered data for a 3-month period in 2018 (pre-intervention) and a 3-month period in 2019 (post-intervention). Adherence to 16 safety and teamwork/ communication measures was assessed by direct observation in the operation theatre. We prospectively collected data on maternal sepsis, post-operative sepsis, and SSIs through daily surveillance and completeness of their patient files retrospectively through chart review. We used difference-in-differences to analyse the impact of the Safe Surgery 2020 intervention on surgical quality processes and complications.

**Results:** After 1-year, intervention hospitals showed 35% improvement in adherence to overall safety measures ($p=0.003$) and 48% improvement in teamwork and communication ($p=0.018$). There was a 40% improvement in documentation for sepsis ($p<0.001$) and a 12% improvement in documentation for SSIs ($p=0.014$). Maternal sepsis rates decreased by nearly 2% in the post-intervention period ($p=0.023$).

**Conclusion:** The Safe Surgery 2020 intervention was associated with measurable improvements in safety practice, teamwork and communication, and data quality along with a reduction in the incidence of maternal sepsis.

## Status of Traditional Medicine Registration in Tanzania Mainland

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**Background:** Inadequate attention has been given to the safety of traditional medicine products in Tanzania. The Traditional and Alternative Health Practice Council, a professional body responsible for regulating and monitoring both practice and products related to traditional medicine in Tanzania, introduced in 2017 mechanisms of observing the safety of those products.

**Methods:** In 2017, the council started to register all marketed traditional medicines based on laid down safety criteria. For traditional medicines to be registered it requires to pass through different government agencies for identification of plants, toxins including aflatoxins, heavy metals and microorganism contamination screening under appropriate laboratory techniques before approval by a Medicines Registration Committee and, finally, issue of a traditional medicines certificate of registration by the Council.

**Results:** In 2017 to May 2019, a total number of 23 applications for issue of certificates were filled and scrutinized. All applications were assessed by the registration committee. Thirteen (13) were approved by the committee and hence registered. Ten applications were not approved by the committee and hence not registered. The reasons for failure to register were mainly due to contaminations by either fungi or microbes. Among the prevailing microbiological and mycology contaminants were *Staphylococcus spp* (10%), *Escherichia coli* (15%), Total Plate Count (20%), Aerobic Bacteria (35%) and fungi/moulds (20%). The result shows that many of the manufacturing facilities do not observe cleanliness during harvesting, drying, grinding and other manufacturing procedures, thus causing such enormous contaminations.

**Conclusion:** The existence of microbial contaminations indicates poor understanding of good manufacturing practices. There is a need to educate traditional health practitioners and traditional medicine manufactures to adhere to basic good manufacturing practices as well as the importance of submitting their samples to relevant laboratories for contamination screening before submitting their products for registration. Lastly, there is a need to educate the community on the importance of choosing registered traditional medicines in the market.

## Non-Communicable Diseases (NCDs) 'Mkoba' Services

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**Background:** Recent increase in incidence, morbidity and mortality of non-communicable diseases in the developing world, Tanzania inclusive. According to WHO data; 1 June 2018, about 15 million people die annually from an NCD between the ages of 30 and 69 years; over 85% of these deaths occur in low- and middle-income countries.
An important way to control NCDs is to focus on reducing the risk factors (unhealthy diets, physical inactivity, exposure to tobacco smoke or the harmful use of alcohol) associated with these diseases; and hence, a community-based approach is of vital value.

**Objectives**: NCDs Mkoba services aims at raising NCDs awareness among community and enhance community involvement in NCDs control through community self-prevention, early diagnosis and treatment initiation and hence, reduce NCDs incidence, complications and premature deaths.

**Methodology**: Adopting the success of Reproductive and Child Health outreach services; NCDs services which includes, but not limited to healthy lifestyle advice, simple tests and treatment initiation are expected to be rendered nearby to community homes. Intra Community Organization will work in collaboration with MEGRA Medical Clinic - Ukonga, Dar es Salaam in these outreach services.

**Results:** Mkoba Services is newly registered, and results of this initiative will be reported in the future meetings.

**Conclusion:** If NCDs control were to be considered as a community war; which we believe is, "NCDs Mkoba services" potentially stands to be among the most important community-based weapon in the fight.

## Experience of Percutaneous Balloon Mitral Valvuloplasty for Rheumatic Mitral Stenosis at Jakaya Kikwete Cardiac Institute (JKCI) in Tanzania

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**Background:** Percutaneous balloon mitral valvuloplasty (PBMV) is safe and effective management for rheumatic mitral stenosis (rMS). It is cheap when compared to surgery, used as a bridge to surgery for pregnancy women or for too ill patients to undergo surgery, and offers similar results comparable to surgery. Wilkins score <8 is the most important determinant for PBMV success.

**Objective:** Despite of its advantages, PBMV is not routinely done in Tanzania hence we sought to determine its applicability at JKCI.

**Methodology:** We recorded demographic and clinical variables of 7 consecutive patients with rMS attending JKCI outpatient clinic. The data were analysed and presented as mean ± SD and as counts for continuous and discrete variables respectively.

**Results:** Mean ± SD age was 33 ± 10 years, and all were females except one. The average Wilkins score was 8. Three were in atrial fibrillation (Afib). All patients had preserved ejection fraction and two had severe pulmonary hypertension. Left atrium (LA) was moderately (>55mm) and severely enlarged (>65mm) in five and two patients respectively. All patients had no thrombus on initial screening by Transthoracic echocardiogram (TTE) done by single cardiologist but upon Transoesophageal echocardiogram (TEE), three (who were in Afib) had thrombus in LA but none on anticoagulants. Since thrombus is a contraindication for PBMV, only four underwent the procedure out of which three were successful and one failed due giant LA size despite a good Wilkins score.

**Conclusion and recommendation:** We found that PBMV can be successfully done among patients with rMS upon carefully screening for eligibility. TEE should be done to all patients prior PBMV to rule out LA thrombus which might not be evident at TTE. Patients in Afib and with LA > 55mm should be anticoagulated. LA size should be considered important determinant of PBMV success.

## The Pharmacogenomics of the Response to Hydroxyurea in Individuals with Sickle Cell Disease in Tanzania

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**Background:** Sickle cell disease (SCD) is caused by a point mutation on the beta globin gene resulting in synthesis of abnormal haemoglobin sickle (HbS). Tanzania is the 5$^{th}$ country worldwide with the highest number of individuals born with SCD. Foetal haemoglobin (HbF) is a major modulator of disease severity. Hydroxyurea is the only medicine for SCD available in Africa that can increase levels of HbF. However, the response within individuals is variable because of both genetic and environmental actors. There is no information from Tanzania on the genetic factors that may influence hydroxyurea response (pharmacogenomics) which may allow prediction of response.

**Objective:** To investigate the pharmacogenomics and identification of early predictive markers of hydroxyurea response in SCD patients in Dar-es-Salaam, Tanzania.

**Methodology:** This is a longitudinal descriptive study. 100 SCD patients (age above 5 years) with SCD on hydroxyurea treatment will been rolled from Muhimbili National Hospital in Dar-es-Salaam. Haematology parameters (Automated haematology analyser), haemoglobin quantification (HPLC) and quantification of F-cells and F reticulocytes (Flow cytometry) will be performed and gamma and beta globin gene expression will be done by Real time, quantitative polymerase chain reaction. Data will be analysed by Open source RNA-seq pipeline. Determination of genetic markers of hydroxyurea response will be by Targeted next generation sequencing and analysed by IlluminaHiSeq Analysis Software v2.0, Genome Sequencing Data Analysis Pipelines.

**Results/Progress:** Between March and July 2019, 40 individuals with SCD have been enrolled. The age range is 5.3-60 years and HbF levels range from 1.1-10.6% (Median 3.85). For quantification of HbF per F-cell and F-reticulocytes we are performing flow cytometry for all visits. Ongoing follow-up visits are scheduled at 2, 3, 6 and 12 after the initial enrolment visit with a fixed dosage of 20mg/kg/day. For molecular and genetic markers of hydroxyurea response 12 targeted regions of interest which are associated with either regulation of haematopoiesis, synthesis of HbF and hydroxyurea metabolism have been selected for investigation.

**Conclusion and recommendation:** This study demonstrates feasibility in conducting pharmacogenomics studies in Tanzania. The findings from this study will assist in developing precision medicine approaches that will be used to identify individuals who are likely to show early response to Hydroxyurea treatment for SCD in Tanzania.

## A randomised placebo-controlled double-blind phase II trial to determine the effects of metformin versus placebo on glycaemia in HIV-infected persons with pre-diabetes in Tanzania

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**Background:** Persons who develop diabetes first pass from a phase of normal glucose through to impaired glucose tolerance, known as pre-diabetes. Recent studies have shown that pre-diabetes strongly predicts the risk of developing diabetes; studies in different populations have shown that 10-20% of subjects with prediabetes progress to clinical diabetes each year, and 70% of these individuals can expect to go on to develop overt diabetes during their lifetime.

Metformin is the recommended first-line drug for persons with diabetes and HIV-infection in the UK, Africa and elsewhere. Metformin has also been evaluated in HIV-infection individuals on ART who have lipodystrophy and metabolic syndrome (but who do not have diabetes or pre-diabetes). Based on the evidence, we believe that metformin is safe for use in HIV-infected individuals on ART who have pre-diabetes. Our purpose is to conduct a phase II trial and generate the data needed to design a phase III trial. We plan to continue the phase II trial into a phase III trial, with the same protocols, but expanding the numbers of study participants.

**Methods**: We plan to conduct a phase II randomised double-blind placebo-controlled trial to evaluate the use of metformin in HIV-positive persons on antiretroviral treatment (ART) with pre-diabetes. This study is designed to inform a phase III trial that will evaluate whether metformin can reduce the progression to diabetes and reduce adverse clinical events among this group.

Eligible patients will be HIV-infected adults on ART and confirmed to be pre-diabetic, using the Oral Glucose Tolerance Test (OGTT). We will randomize the participants with no contraindications at a ratio of 1:1 to either the metformin or the control (placebo) group. All patients will continue to take their ART.

The primary outcome measure is glycaemia control at 12 months as ascertained by the OGTT. We will compare mean glycaemia between the metformin and control arm at 12 months in an intention-to-treat (ITT) analysis. Secondary endpoints will include changes in glycaemia from baseline, incidence of adverse events, rates of retention in care and estimated adherence to study drugs.

The study will be based in Tanzania, at Amana and Hindu Mandal Hospitals. Recruitment is estimated to be complete within a 90-day period. Each participant will be followed up for a duration of 12 months after recruitment. The study is funded by a NIHR-UK grant, and will be done in a collaborative network involving UK, Uganda and Tanzania.

## Perceptions of Drink Driving: A Qualitative Assessment of Factors Influencing Drink Driving Behaviour in Moshi, Tanzania

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**Background:** Globally, half of the population consumes alcohol, and about 10.3% have an alcohol use disorder. Alcohol use while driving is a major contributor to road traffic injuries (RTI). We need to understand the culture and perception of drink driving in the setting to understand why people continue to drink drive and allow policymakers to develop more effective ways to address drink driving behaviour.

**Objective**: This study aims to qualitatively determine what injury patients, their families, and community advisory board members in Tanzania say should be done about drink driving

**Methodology**: Participants were adult trauma patients presenting to the KCMC ED within 24 hours of their injury who are admitted to the hospital. A total of ten focus groups were conducted (4 patient, 4 family, and 2 CAB) with a total of 104 participants (37 females and 67 males).

**Results**: The normalization of drinking among drivers has allowed this behaviour to become ingrained in the culture. Participants expressed notions that passengers are responsible for their own safety, rather than drivers being responsible for their passengers. Most participants believe it is a citizen's duty to inform the police of suspected drink driving, however there were differing opinions about how effective informed police officers can be in practice. Focus group discussions including all three population types highlighted major themes of 'drinking is ingrained in boda boda driver culture', 'individuals have personal responsibility to address drink driving', and a 'police enforcement on drink driving is necessary'.

**Conclusion and recommendation:** Drink driving is ingrained in the culture and passengers believe they are responsible for their own safety as well as informing the police of suspected drink driving. Policy interventions could be the most effective at reducing the prevalence of drink driving in Tanzania.

## The Characteristics, Predictors and Outcomes of Adult Injury Patients who present for care in Northern Tanzania

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**Background** Over 5 million people annually die from injuries and millions more sustain non-fatal injuries requiring medical care. 90% of injury deaths occur in low and middle-income countries (LMICs).

**Objective**: This study describes the characteristics, predictors and outcomes of adult acute injury patients presenting to Kilimanjaro Christian Medical Centre (KCMC) Moshi, Tanzania.

**Methodology**: This secondary analysis of an adult acute injury registry (>17 years) analysed self-reported patient socio-demographics, clinical indicators, injury characteristics, procedures, and hospital discharge outcomes. Injury severity was determined by Kampala Trauma Score (0-8 moderate/severe, 9-10 mild).

**Results**: Of all injury patients (n=872), 83% were men and 39% self-employed. Mean age was 38.3 (SD 16.1) years with 8.4 (SD 3.3) years of education. Injuries were road traffic (63%), fall (18%) or assault (14%) related. Comorbidities of those who self-reported included 6% (33/578) HIV, 7% (20/283) diabetes and 12% (43/355) hypertension. Median injury to hospital arrival time was 4.4 (IQR 2.0;9.0) hours and median length of stay was 6.4 (3.0;14.8) days. Mortality was 7% and 53% had motor dependence at discharge. Patients >65 years (OR 4.0, CI 1.1;15.3), who were male (OR 4.1, CI 1.6;12.4) or had a moderate/severe injury (OR 2.5, CI 1.2;5.3) were more likely to die. Patients having neurosurgery (OR 15.3, CI 5.3;46.0) or general surgery (OR 7.1, CI 1.7;26.5) were more likely to die than patients having an orthopaedic surgery. Those who reported never being tested (OR 1.9, CI 1.0;3.7) or having HIV (OR 4.2, CI 1.0; 14.7) were more likely to die than patients reporting not having HIV.

**Conclusion and recommendation**: KCMC injury patients are primarily young men suffering road traffic crashes with delayed hospital presentation and prolonged hospital stays. Being older, male and requiring non-orthopaedic surgeries or having HIV portends a worse prognosis. Prevention and treatment focused interventions to reduce the burden of injury mortality and morbidity at KCMC are needed.

## Exploring Mental Health Profiles of Traumatic Brain Injury Patients in Northern Tanzania

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**Background**: Globally, traumatic brain injury (TBI) accounts for more deaths and disabilities than any other type of injury. Hazardous alcohol use is known to increase risk for injury and commonly coexists with mental health illnesses. Though hazardous alcohol use and TBI exert heavy burdens in Tanzania, their interaction with mental health is largely unknown in this setting.

**Objective**: This study aims to explore the pre-injury mental health profiles and drinking patterns of TBI patients in Northern Tanzania.

**Methodology**: A secondary data analysis included adults (≥ 18 years) with TBI of any severity presenting to the Kilimanjaro Christian Medical Center emergency department within 24 hours of injury. Surveys were administered to patients asking about their mental health prior to injury. Variables included measures of functional independence, aspects of psychiatric health, quality of life, and alcohol use. Hazardous alcohol use was defined as an Alcohol Use Disorder Identification Test score greater than seven. We conducted a latent profile analysis (LPA) on patients' pre-injury mental health.

**Results**: Our sample included 190 participants, out of which 159 (83.7%) were male. The median age of the sample was 29.5 years. The LPA model with the strongest fitness revealed four profiles: "Hazardous Drinkers" (51.7%), "Lower Cognitive Ability Non-Drinkers" (18.1%), "Distressed Moderate Drinkers" (13.9%), and "Healthy Non-Drinkers" (16.2%). Profiles were not associated with severity of injury.

**Conclusion and recommendation**: This study provides insight into the possible mental health profile a TBI patient may fall into, supporting the need for interventions to offer better targeted care as each patient has distinct rehabilitation needs.

## Feasibility of A Pragmatic Randomized Adaptive Clinical Trial of a Culturally Adapted Brief Intervention for Alcohol Use in Moshi, Tanzania

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**Background:** Alcohol use disorder treatment in low resourced settings lacks trained personnel and infrastructure. A brief intervention (BI) to reduce alcohol related harms has been shown to reduce alcohol related injuries for up to two years. We culturally adapted a BI, "Punguza Pombe Kwa Afya Yako (PPKAY)" "Reduce Alcohol for Your Health" for Tanzanian Swahili and Kilimanjaro region.

**Objective**: This study aims to show the feasibility of a trial testing PPKAY, a nurse-driven intervention, to control alcohol related harms

**Methodology**: Our single-blinded, adaptive and multi-stage randomized controlled trial aims to determine the most effective intervention, with or without SMS booster, to reduce alcohol use among injury patients. Our feasibility trial described feasibility, fidelity, and patient and provider acceptability.

**Results:** 75 patients were enrolled, with 80% 6-week and 83% 3-month and 6-month follow-up. Nurses found PPKAY easy to administer with a high rate of intervention fidelity (76%). By the end of follow-up, 74% of attempted SMS messages were registered as sent. Nurses reported that a majority of patients eagerly participated and requested additional education with messaging capabilities. The study protocol was followed without deviation during adaptation nor errors in the envelope randomization processes and all participants were blinded and allocated to the planned intervention arm. While not powered to determine an effect size, preliminary analysis suggests a signal of difference between intervention groups ($P<0.06$).

**Conclusion and recommendation**: Our intervention and trial design are feasible with a high fidelity. Our patients and providers report high levels of acceptability of the intervention. Results suggest undertaking a full trial to evaluate the effectiveness of PPKAY in a low- and middle-income country.

## Time to Treatment Analysis and Impact on Outcomes in Adult Trauma Patients in Northern Tanzania

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**Background**: Traumatic injuries result in more than five million deaths annually, the burden of which disproportionately affects low- and middle-income countries (LMICs). In Tanzania, traumatic injuries are responsible for over 93 deaths per 100,000 persons and over 3,800 DALYs per 100,000 persons each year. Reducing the morbidity and mortality of trauma patients relies on timely management of their complex needs.

**Objective:** Our aim was to investigate the relationship between time to treatment metrics and patient outcomes for adult trauma patients presenting to Kilimanjaro Christian Medical Center (KCMC) Emergency Department (ED). By evaluating this association, improvement interventions can be developed for the management of trauma patients in Tanzania.

**Methodology**: Data analysed in this study came from an adult trauma registry that enrols patients presenting to the KCMC ED within 24 hours of their injury who are admitted to the hospital. Primary outcomes were Glasgow Outcome Score (GOS) at discharge. GOS was compared to time to obtaining diagnostic imaging in the ED. A positive GOS outcome was defined as a score of ≥6 a negative GOS outcome was defined as a score of <6.

**Results:** Of the 787 trauma patients enrolled in the registry, 662 received x-ray imaging, 205 received computerized tomography (CT) imaging, and 353 received point of care ultrasound (POCUS). New variables were created to define whether imaging was indicated in situations where it was not obtained. Chi-squared analysis found a significant difference in all diagnostic imaging categories, x-ray ($p<0.01$), CT ($P<0.01$), and POCUS ($p<0.03$) when comparing positive and negative GOS at time of discharge.

**Conclusion and recommendation**: This study demonstrates the importance of timely, appropriate diagnostic imaging in trauma patients in LMICs. Interventions that focus on obtaining prompt imaging in trauma patients in resource limited settings may improve patient outcomes.

## Perception of risky driving behaviours and associated factors among commercial motorcycle drivers in Dar es Salaam, Tanzania

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Muhimbili University of Health and Allied Sciences

**Background:** Commercial motorcyclists (MCs) are generally recognized to take high risks while driving, but surprisingly little is known about their perception of these risks.

**Objective:** This paper attempts to describe driver's perception of risk driving behaviours and investigates its association with the driving behaviour

**Methodology:** This was a cross sectional survey carried out between December 2018 and 24 March 2019 in Dar es Salaam, Tanzania. A random sample of 400 motorcyclists was drawn from 127 registered parking stages in the city. Drivers aged 18 years and above completed a questionnaire that include measures of risk perception and risk driving behaviour. Logistic regression was used in the analysis. Principal component analysis was used to reduce items and generate variable for summarizing driving behaviour.

**Results:** Among the 400 respondents, the proportion of drivers who had good perception of risky driving behaviours was 52.8%. Majority of drivers considered risky driving with two passengers 351 (88%), passing through a red light 365 (91.5%) and driving without a helmet 371 (93%). Surprisingly close to a third 118 (29.6%) of drivers and 109(27%) reported to often drive with two passengers or without wearing helmet respectively. In the multiple regression, after adjusting for other factors, drivers who reported bad driving behaviours had 4.6 more odds of poor perception of risky driving behaviours than the reference. Other important determinants for poor perception of risky driving were high income and helmet ownership

**Conclusion and recommendation:** Our results underscore the important of leveraging other means to change driver's behaviours other than increasing perception.

## Assessment of Comprehensive Care of Asthma in Schools in Dodoma, Tanzania

Dr. Digna Narciss Riwa
**Institution affiliation:** NCD Coordinator Dar es Salaam

**Background:** Asthma is a reversible Chronic Obstructive Pulmonary Disease, affecting children's between 6 to 12 years. Worldwide, deaths range from 420 to 1000 per day of which80% occurs in low- and middle-income countries. Tanzania had 2491 deaths due to asthma, accounting for 0.67% of all deaths. Basing on DHIS2 on 2018, Dodoma Regional hospital attends higher number of cases from four councils namely Chamwino, Chemba, Kongwa and Mpwapwa. There is however a challenge in diagnosing and poor monitoring of asthma in schools

**Objective:** To assess the comprehensive care of asthma in school children

**Methodology:** Three schools were randomly selected for the study. Screening was conducted in Kaloleni, Ihumwa and Lukundo using Standardized questionnaires and peak flow metres where an average of 3 readings were recorded then correlated with the height. Those below 75% were given placebo inhalers then rest for 15minutes then repeat the test, if still less than 75% were introduced to salbutamol inhalers and rest for 15 minutes and repeated the test again if is above 75% and of symptoms free were declared to be asthmatic.

**Results:** out of 371 school children screened were between 6-17 years, **49**% newly diagnosed between 8-12 years, 65% known asthmatic with range of 13 to 17 years. Based on symptoms 83.9% newly cases had chest tightness, 72.5% experienced wheezes and 64.6% got restless at night-time. 70.4% known cases on treatment still had chest tightness, wheezes 59.8% and 75.7% history of sneeze after 80.8%.

**Conclusion and recommendation:** Many asthmatic cases exit undetected hence comprehensive assessment and care is needed in schools. Sustainable screening and provision of first aid post with kits in schools.

## Laparoscopic Sleeve gastrectomy (LSG): The First case performed in Tanzania

Dr. Edward Ketson Msokwa, Dr. Martin Sindani
**Institution affiliation:** University of Dodoma-College of Health Sciences

**Introduction**: The prevalence of Obesity is progressively increasing in low income countries Tanzania included (1,2). Despite this fact there is less effort toward initiation of surgical management of obesity witnessed by International federation for the surgery of obesity and metabolic disorders (IFSO) 2018 report (3). Laparoscopic sleeve gastrectomy (LSG) is the newer bariatric surgery for the management of morbid obesity. It is the most effective and easier to perform laparoscopic surgery (2,4). We are presenting the first LSG performed in Tanzania.

**Case presentation**: A 37 year's old obese black woman, presented at Benjamin Mkapa Hospital Dodoma Tanzania, with ten years history of progressive weight gain. This was associated with heart burn, odynophagia and non-progressive dysphagia. Oesophageogastrodeudenoscopy (OGD) revealed gastroesophageal reflux disease (GERD) with moderate hiatus hernia. She consented for LSG which was performed in collaboration with American surgeons. Within 3 months of follow-up, she has significant improvement in terms of weight loss and quality of life (QoL). She has lost 15 kg which is equivalent to 14.4% percentage excess BMI loss (%EBMIL). Also, she reported significant improvement of difficult in swallowing and epigastric pain. Currently she is on management of gastric ulcers which developed after the surgery.

**Conclusion**: This is the first successful LSG done in low income country (Tanzania). It is the time for policy makers to evaluate the feasibility of these procedures in our health care system.

## Factors affecting visual outcome post treatment of Diabetic macular oedema at CCBRT Hospital Dar es Salaam

Dr Cyprian G. Ntomoka, Undendere Picard
**Institutional affiliation:** CCBRT

**Background**: Diabetic macular oedema (DME) is a common cause of visual reduction in patients with Diabetes mellitus. Vascular endothelial growth factors (VEGF) is proved to play a major role in the vascular proliferation and consequent hyper permeability in eyes with DME. Various anti- VEGF agents; bevacizumab, ranibizumab and Aflibercept are now used interchangeably in most centres to treat DME. In most of the studies there has been a significant resolution of the oedema and improved visual acuity.

**Objective:** To determine factors affecting visual outcome after the first three doses of Avastin injection given monthly to diabetic patients.

**Methodology:** A retrospective cross section study of patients with DME who had been injected Avastin for the first quarter of 2019. Excluded those with hazy media, those with previous similar injections, those with other commodities and incomplete data. All had been injected monthly for three months with 1.25 mg/0.5 mls of bevacizumab (Avastin). Pre and post injection BCVA was taken, initial and final Macular thickness measured with OCT and data were entered into SPSS 16 for analysis.

**Results:** Out of 98 patients injected, thirty-five eyes of 21 patients were analysed; mean age of the participants was 60.9 years, male 51%. Forty eight percent of eyes vision improved and 31% did not improve. There was significant correlation between visual improvement and reduction in the macular thickness (p value 0.04). Association between visual improvement and duration of diabetes, control of diabetes, hypertensive status, gender or age were not significant.

**Conclusion and recommendation:** Further inquiries on no visual improvement or visual deterioration should be studied using large number of subjects, and multiple study sites to yield more convincing results.

## Surgical Audit report of the visually impaired patients due to cataract from January to July 2019 at CCBRT Hospital Dar es Salaam

Dr Cyprian G. Ntomoka,  Al Attas Ahmed
**Institutional affiliation:** CCBRT

**Background:** Cataract is a clouding of the crystalline lens of the eye; number one worldwide cause of irreversible visual loss. Recently, WHO showed that 2.2 billion in the world are visually disabled of which 75% are of preventable origin like cataract.  In Tanzania nearly 2 million people are affected, and cataract causes at the top. Usually associated with old age and chronic diseases like diabetes and managed only by performing surgery with artificial lens implantation; Often patients recover their vision within few weeks, however a complete evaluation is done 12 weeks post-surgery.

**Objective:**  To evaluate visual outcome of patients after cataract done at CCBRT Hospital

**Methodology:** A retrospective cross section study of patients who had underwent cataract surgery. All patients had their Best Corrected Visual Acuity (BCVA) done on Snellen VA chart before and after surgery; causes of poor vision, complications and any comorbidity were reported. Data were entered into MSCO soft were for analysis.

**Results:**  All operated patients were audited, analysis involved only 1218 patients and excluded those with prior or co-morbidities and those with missing data. Ninety two percent of 806 patients came for follow up between 4-11 weeks post-surgery had normal BCVA (6/6-6/18 Snellen chart, WHO recommends >90%), only 2.5% of them had poor vision (<6/60, WHO recommends <5%). Out of 120 patients who could come after 12 weeks of surgery 92.8% had normal best corrected vision (WHO recommends >90%) and only 0.8% had poor BCVA. Most of our patients however recovered their vision with spectacles (30% VS 10% for WHO)

**Conclusion and recommendation**: Visual Disability due to cataract is surgically treatable and no one should unnecessarily go blind because of this.

## Burden of Eye Diseases in Tanzania and Access to Eye Services

Dr Bernadetha R. Shilio and Sarah Maongezi
**Institutional affiliation:** MoHCDGEC

**Background:** Eye morbidity are among the disabilities affecting the community member in Tanzania. It is within the mandate of the Ministry to ensure universal eye health as stipulated in the Health Policy and Sustainable Development Goals. Access to Eye Services enable the Nation to measure the implementation of Program interventions.
**Objective:** To determine the magnitude of Eye Disease in Tanzania.

**Methodology:** A retrospective cross - section review of DHIS 2 and National Eye Care Program Data 2016 – 2018. Data was analysed through tables and graphs. Interpretation of data was conducted and results discussed. Short, intermediate and Long-Term recommendations were made.

**Results:** Data from all the Regions, Zonal Referral and National Hospital showed various spread of different eye diseases and varying eye services provision at different levels of competences. There is increased number of eye diseases attendances over the 3 years, however the number of Cataract Surgery Rate decreased in 2018. There has been a tremendous increase in the number of DM clients receiving DR Services.

**Conclusion and recommendation:** Despite the increase burden of Eye Disease, Tanzania is a way behind to reaching the National and International Target on Elimination of avoidable blindness by the year 2020 and beyond. Plans are needed to address the challenges in reaching the population in need.

## THE NCD BURDEN IN TANZANIA

Noncommunicable diseases (NCDs) tend to be chronic and are the result of a combination of genetic, physiological, environmental and behaviours factors. The main types of NCDs are cardiovascular diseases such as heart attacks and stroke, cancers, chronic respiratory diseases (such as chronic obstructive pulmonary disease and asthma) and diabetes. NCDs disproportionately affect people in low- and middle-income countries where more than three quarters of global NCD deaths – 32 million – occur.

People of all age groups, regions and countries are affected by NCDs. These conditions are often associated with older age, but evidence shows that 15 million of all deaths attributed to NCDs occur between the ages of 30 and 69 years. Of these "premature" deaths, over 85% are estimated to occur in low- and middle-income countries. Children, adults and the elderly are all vulnerable to the risk factors contributing to NCDs, whether from unhealthy diets, physical inactivity, exposure to tobacco smoke or the harmful use of alcohol.

These diseases are driven by forces that include rapid unplanned urbanization, globalization of unhealthy lifestyles and population ageing. Unhealthy diets and a lack of physical activity may result in raised blood pressure, increased blood glucose, elevated blood lipids and obesity. These are called metabolic risk factors that can lead to cardiovascular disease, the leading NCD in terms of premature deaths.

NCDs risk factors are mainly grouped into modifiable behavioural risk factors and metabolic risk factors.

According to the WHO report (June 2018), modifiable behaviours, such as tobacco use, physical inactivity, unhealthy diet and the harmful use of alcohol, all increase the risk of NCDs. For example, tobacco accounts for over 7.2 million deaths every year (including from the effects of exposure to second-hand smoke) and is projected to increase markedly over the coming years. Furthermore, 4.1 million annual deaths have been attributed to excess salt/sodium intake. Whereas, more than half of the 3.3 million annual deaths attributable to alcohol use are from NCDs, including cancer. Additionally, insufficient physical activity is associated with 1.6 million deaths annually.

On the other hand, metabolic risk factors contribute to four key metabolic changes that increase the risk of NCDs:- raised blood pressure, overweight/obesity, hyperglycaemia (high blood glucose levels) and hyperlipidaemia (high levels of fat in the blood).

In terms of attributable deaths, the leading metabolic risk factor globally is elevated blood pressure (to which 19% of global deaths are attributed), followed by overweight and obesity and raised blood glucose (Source: https://www.who.int/news-room/fact-sheets/detail/noncommunicable-diseases).

In Tanzania, according to the DHIS2 Report (2016 – 2018) NCD cases were recorded to range from 3,386,067 in 2016 to 4,190,467 in 2018, indicating an increment of 24% in number of NCDs cases reported in 3 years. Cardiovascular Diseases, Diabetes, Injuries, Chronic Respiratory Diseases and Mental Health Conditions accounts for nearly two third of all NCDs cases.

This section presents comprehensive information from both research and programmatic issues on NCDs burden. The following are key areas under this sub-theme:

- Cancers
- Diabetes
- Cardiovascular diseases
- Chronic Respiratory diseases
- Mental health conditions
- Injuries
- Sickle-cell and other haemoglobinopathies
- Nutritional disorders

## The Burden of Non-Communicable Diseases among Public Transport Workers in Dar es Salaam

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**Institutional affiliation:** Muhimbili University of Health and Allied Sciences

**Background:** In Tanzania and other countries with similar contexts, public transport workers (PTWs) are at a higher risk of NCDs due to the sedentary nature of their occupation and their working environment in general.

**Objective:** To determine the burden of NCDs and associated factors among Public Transport Workers in Dar es Salaam, Tanzania.

**Methodology:** We conducted a cross-sectional study between May and July 2019 among 132 commuter bus drivers and their conductors in two districts of Ilala and Kigamboni, Dar es Salaam, Tanzania. We interviewed participants using the validated WHO STEPS tool. We measured body weight, height, waist circumference, blood pressure (BP) and random blood sugar levels of each participant and performed descriptive statistics using SPSS software version 22.

**Results:** Participants were universally male with high NCDs risk factors. About one in every four participants smoked tobacco or consumed alcohol. About 44% were hypertensive while only 0.8% had hyperglycaemia. This population had high burden of overweight (31.1%) and obesity (6.1%), rates that are comparable to the national average. Deeper analysis showed that advanced age was associated with alcohol consumption, raised BP and random hyperglycaemia whereas tobacco smoking was more common among younger participants.

**Conclusion and recommendation:** Public Transport Workers in Dar es Salaam are at an increased risk of NCDs. They exhibited high risk of overweight and/or obesity, tobacco smoking, alcohol consumption and high blood pressure. Advancing age is a risk factor for high BP and random hyperglycaemia whereas tobacco smoking is more common among young ones. The observed behavioural factors need to be investigated for the wellbeing of PTWs and the safety of commuters in Tanzania.

## Prevalence of Hypertension Determined by 24-Hours Ambulatory Blood Pressure Monitoring Among MUHAS Employees

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**Background:** In Tanzania, majority of previous studies on hypertension were based on elevation of clinic blood pressure (BP). However, clinic BP may over-estimate the true prevalence of hypertension due to white coat effect, may miss to diagnose individuals with masked hypertension and miss to identify nocturnal non-dippers. There is also increasing evidence that Ambulatory Blood Pressure Monitoring (ABPM) is more accurate than clinic BP in predicting cardiovascular risk.

**Objective**: To determine the prevalence of hypertension using ABPM and to explore the relationship between ABPM profiles with cardiovascular risk factors among MUHAS employees.

**Methods**: A descriptive cross-sectional study was conducted from October 2018 to February 2019. A structured questionnaire was used to gather information on socio-demographic characteristics and cardiovascular risk history. Anthropometric measurements were taken, and blood samples were collected and analysed for glucose, creatinine, cholesterol and uric acid. Two sets of BP were taken; one at the clinic and another using 24hrs AMBPM. Data analysis was done using SPSS Version 20, and a p-value of $<0.05$ was considered statistically significant.

**Results:** This study had 390 participants**.** Their mean (SD) age was 40.5 (8.9) years, and 53.6% were men. Prevalence of hypertension was 23.1%. Prevalence for white coat, masked and nocturnal non dippers were 16.2%, 11.6% and 66.7% respectively. The mean 24-hours BP showed the best correlations with traditional cardiovascular risk factors. In multivariate analysis, independent factors associated with hypertension were male gender (OR=7.96), age ≥40 years (OR=3.94), family history of hypertension (OR=5.6), central obesity (OR=8.98), hypercholesterolemia (OR=3.84) and hyperuricemia (OR=7.9), all $p<0.01$.

**Conclusion:** The prevalence of hypertension among MUHAS employees is 23.1% and is associated with traditional cardiovascular risk factors. Ambulatory BP correlates better with cardiovascular risk factors and is the best measure of one's true BP.

## Cervical Cancer: diagnosis and access to care among women in Mbeya region-Tanzania

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**Background**: According to the World Health Organization, Cervical Cancer (CC) is among highly preventable and treatable forms of malignancy, if diagnosed in its early stages and treated effectively. Nevertheless, CC is one of the leading malignancies in women from sub-Saharan Africa. In Tanzania, CC screening and diagnosis has been scaled up, however, women are diagnosed with CC late and have limited access to cancer treatment and/or palliative care.

**Objective:** To describe CC disease stage during time of diagnosis, access to care and survival time of patients diagnosed with CC in Mbeya region.

**Methods:** In the ongoing 2H study conducted in Mbeya, women are screened for CC using Visual Inspection with Acetic acid (VIA) and cyto-histopathology tests. The study receives participants from all CC screening clinics in Mbeya region. Women diagnosed with CC are referred to META Obstetrics and Gynaecology Hospital in Mbeya for disease staging (FIGO) and further clinical management. Women with advanced disease beyond surgical limits are further referred to the Ocean Road Cancer Institute (ORCI) in Dar es salaam.

**Results:** Since 2013, 2104 women have been screened within the study setting and among these, 265 already have invasive CC (5.7% Adenocarcinomas and the remaining are Squamous Cell Carcinomas). During this analysis, 197/265 (74.3%) were reviewed by a Gynaecologist at META and had reports of CC clinical staging. Majority of women, 84.3% (166/197) were found to have advanced disease at the time of initial diagnosis (beyond FIGO stage 2A). Almost half of the women (97/197) were aged 35-50years, while 88/197 were above 50years and only 12/197 women were aged <35years. Those who had accessed care and received treatment were 52.79% (104/197) - Cryotherapy (4/104; 3.8%), Loop Electrosurgical Excision Procedure (LEEP) (16/104; 15.4%), Hysterectomy (42/104; 40.4%), attended ORCI for chemo-radiotherapy (36/104; 34.6%). Some of the reasons cited for inability to access care included lack of funds, spiritual healing options, and need for non-surgical management of the disease. Median survival time was as low as 6months after the time of initial diagnosis for women diagnosed with FIGO stage 4, and 13months for women diagnosed with FIGO Stage 3B.

**Conclusion and recommendations:** Scale up of CC screening and management in Tanzania is notable, however, cancer cases are still diagnosed late with poor prognosis. Cancer management and access to care is limited due to infrastructural and financial challenges.

## Diabetes prevalence, awareness and control in Dar es Salaam City: A community-based study

Smita V Bhalia, Pedro Pallangyo, Happiness Swai, Naairah Hemed, Jalack Millinga, Lucia Kabeya, Mohamed Janabi

**Institutional affiliation:** Jakaya Kikwete Cardiac Institute

**Background:** Diabetes is a major endocrine disorder of global health importance associated with high morbidity, mortality and cost of care. It is estimated that about 90% of persons with prediabetes and 46.5% with diabetes in sub-Saharan Africa are unaware of their status and as a result not on treatment.

**Objective:** To explore the prevalence, awareness and control rates of prediabetes and diabetes among urban dwellers residing in Kinondoni district, Dar es Salaam.

**Methodology:** We recruited and screened 1374 persons for diabetes mellitus in a population-based cross-sectional study. Diabetes was diagnosed using a random blood glucose (RBG) ≥11.1 mmol/L and/or fasting blood glucose (FBG) ≥7 mmol/L. Prediabetes was defined as a FBG of 5.6-6.9 mmol/L and/or RBG of 7.8-11.0 mmol/L. Potential factors associated with prediabetes and diabetes were assessed by univariate analyses and significant factors were then put in a logistic regression model to control for confounders.

**Results:** The mean age of the participants was 42.9 years, 64.3% were women and 68.9% were overweight or obese. The crude prevalence of prediabetes and diabetes was 15% and 13.6% respectively. 21.9% of persons with diabetes were aware of their diabetes status and 46.3% of these had their blood sugar controlled. Obesity (OR 1.5, 95%CI 1.1-2.0, $p<0.01$), female sex (OR 1.6, 95%CI 1.1-2.1, $p<0.01$) and age ≥55 (OR 1.9, 95%CI 1.4-2.5, $p<0.001$) proved to be the strongest factors associated with new diagnosis of prediabetes and diabetes.

**Conclusion and recommendation:** The prevalence of prediabetes and diabetes is increasing rapidly in urban Tanzania while the awareness and control rates remain low. Parallel to this, obesity, which proved to be the strongest modifiable risk factor for prediabetes and diabetes, is also rising exponentially.

## Knowledge of Cardiovascular Diseases Causes and Risk Factors among Dar es Salaam Residents

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**Background:** Cardiovascular diseases (CVDs) are associated with significant morbidity, mortality and increased cost of care worldwide. Despite their poor prognosis, CVDs are preventable through effective control and management of established risk factors. Knowledge of CVDs causes and risk factors is a prerequisite for making sound decisions and behaviour modification toward one's cardiovascular wellbeing.

**Objective:** To assess the basic knowledge of CVD risk factors among Dar es Salaam residents.

**Methodology:** In a community screening conducted in Dar es Salaam in July 2019, a structured questionnaire on CVD risk factors was administered to 1816 people. Their anthropometric, blood pressure and blood sugar measurements were performed by qualified nurses. Comparisons were made using the student's t-test, chi-square test and multivariate logistic regression to assess for factors associated with poor knowledge of CVDs.

**Results:** The mean age of participants was 42.7 years and 60.8% were men. About 12% of individuals had history of smoking, 46.7% were alcohol drinkers, 85.1% were physically inactive and 70.3% had increased body weight. Elevated blood pressure was observed in 41.6% of individuals and 6.7% had hyperglycaemia. Less than three-quarters of participants knew that CVDs are the leading cause of mortality globally and 55.8% believed that CVDs are curable upon completion of dosage. Multivariate logistic regression analyses revealed age<45 (OR 1.7, 95% CI 1.4-2.1, p-value <0.001), low education (OR 1.4, 95% CI 1.1-1.7, p-value <0.01), lack of health insurance (OR 1.6, 95% CI 1.3-2.0, p-value <0.001), and negative personal history of NCDs (OR 1.4, 95% CI 1.0-1.7, p-value 0.021) to be associated with poor knowledge of NCDs.

**Conclusion and recommendation:** Despite ongoing NCDs campaigns, knowledge about risk factors for CVDs remain variably low particularly in impoverished societies. In view of this, health promotion campaigns need to be tailored predominantly for the disadvantaged individuals in the society.

## Hypertension in Urban Tanzania: Something Must Be Done Now!

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**Background:** Globally, elevated blood pressure is the leading single cause of morbidity and mortality, and a growing epidemic of public health importance in sub Saharan Africa (SSA). Despite the rapidly increasing prevalence of hypertension in SSA; the detection, treatment and control rates are staggeringly low in the region.

**Objective:** To determine the prevalence, treatment and control rates of hypertension among residents of Tanzania's largest city and economic capital, Dar es Salaam.

**Methodology:** 2773 adults were recruited in a cross-sectional, community-based survey in June 2019. Physical activity was assessed using the physical activity vital sign scale (PAVS). Qualified nurses measured and recorded blood pressure and anthropometric measurements. Hypertension was defined according to the 8th Report of the Joint National Committee (JNC 8) or use of blood pressure lowering medications. Chi-square, student's t-tests and multivariate logistic regression analyses were performed to determine factors associated with elevated blood pressure.

**Results:** The mean age of participants was 45.8 years, 61.8% were women, 6.8% were ever smokers, 13.1% were alcohol drinkers, 64.9% had excess body weight, and 87.3% were physically inactive. 1652 (59.6%) of individuals had elevated blood pressure or were using anti-hypertensive medications; 943 (57%) of these were unaware of their hypertensive status. Among those with hypertension awareness, 36% were on regular treatment and 17.5% had their blood pressure controlled. Age ≥40 (OR 5.7, 95% CI 4.2-7.8, $p<0.001$), male sex (OR 1.6, 95% CI 1.1-2.2, $p<0.01$) and BMI ≥25 (OR 3.9, 95% CI 3.1-5.1, $p<0.001$) were strongly associated with 'newly diagnosed hypertensive' status.

**Conclusion and recommendation:** Our findings suggest that excess body weight is a single modifiable risk factor strongly associated with high blood pressure. In view of this; strategic, collaborative and aggressive measures to control the obesity epidemic are fundamental in the fight against hypertension.

## Acute Kidney Injury in Polytrauma Patients in Tanzania

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**Background:** Polytrauma not only causes local injury but also multi-organ dysfunction. Acute Kidney Injury (AKI) is one of the most common causes and contributors to the high morbidity and mortality among these patients. Global prevalence of AKI in trauma patients is as high as 40.3% and the reported incidence varies widely between 0.1% and 8.4%. Prevention is possible once magnitude and risk factors are identified. Early detection and management of AKI leads to better outcomes.

**Objective:** To determine the prevalence, severity and risk factors associated with AKI in polytrauma patients at Muhimbili Orthopaedic Institute, Dar es Salaam, Tanzania

**Methodology:** A cross-sectional study was done from July 2018 to March 2019 among all adults with polytrauma who presented at the emergency department at MOI. The New Injury Severity Score (NISS) screening tool was used to identify polytrauma patients. The KDIGO criteria was used to identify patients with AKI. Descriptive statistics were performed using SPSS software version 22.

**Results:** More than half (56.4%) of the patients were between 26-40 years and 92.3% of them were males. About 2 in every 5 (38.4%) polytrauma patients had AKI in different stages. Older patients and those with systemic inflammatory response syndrome (SIRS) had increased risk for developing AKI.

**Conclusion and recommendation:** There is high prevalence of AKI among polytrauma patients. Elderly patients and those with SIRS were seen to have higher likelihood of developing AKI. A high index of suspicion is necessary to identify patients who are likely to develop AKI especially among elderly patients and those with SIRS.

## Chronic Kidney Disease among Patients Living with HIV/AIDS in Tanzania

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**Background:** There is limited evidence of kidney disease and risk factors among patients with HIV/AIDS in East Africa.

**Objective:** To determine the prevalence and predictors of moderate to severe kidney disease (KD) among HIV/AIDS patients in Dar es Salaam, Tanzania.

**Methodology:** A cross-sectional analysis of the baseline clinical data for 30,822 HIV-infected adult patients who were attended at the MDH-CTCs in Dar es Salam, Tanzania was done. Moderate to severe kidney disease (KD) was defined as estimated glomerular filtration rate (eGFR) < 60mL/min/1.73m$^2$. Log binomial regression models were used to estimate prevalence ratios as predictors of KD.

**Results:** Our study population was relatively young [Median age (IQR) of 35(12) years], predominantly female (57% non-pregnant, 13.1% of all participants were pregnant) and majority (90.6%) were ART naïve. Overall prevalence of moderate to severe kidney disease (KD) was 11%. In multivariate adjusted analysis, compared to the reference groups at the time of enrolment into care, KD was significantly associated with advanced age (i.e. ≥ 50 years) [RR 2.03, 95% CI (1.80-2.30)], enrolment at the hospital-level CTC [RR 1.56(1.26-1.96)], worsening of anaemia, haemoglobin level of <7g/dl [RR 2.43(2.04-2.90)]; high concentration of serum alanine aminotransferase, ALT levels >200U/L [RR 1.66(1.01-2.72)]; poor immunological status, CD4 count < 50cells/mm3 [RR 1.61(1.43-1.59)]; and advanced WHO HIV/AIDS clinical stage, stage IV [2.07(1.72-2.50)].

**Conclusion and recommendation:** Moderate to severe kidney disease (KD) is prevalent among HIV positive patients at the time of enrolment at Care and Treatment Centres in Dar es Salaam, Tanzania. Advanced age, enrolment at hospital, worsening anaemia, rising serum alanine aminotransferase and advanced HIV disease (proxied by low CD4 and higher WHO clinical stage) are independent predictors for developing KD among HIV patients. Patients with HIV/AIDS should be screened for early markers of KD at the outset and followed up closely thereafter.

## Stroke in Young Adults Admitted at a Tertiary Hospital in Tanzania: A Comparison with Older Adults

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**Background:** Stroke in young adults is increasing, associated with devastating outcomes, and is a public health crisis that requires urgent interventions. There is paucity of data on the prevalence, risk factors and 30-day outcomes of stroke in young adults in Tanzania.

**Aim:** To determine the magnitude of first ever stroke, describe stroke sub-types, risk factors and outcomes in people ≤45 years compared to older adults.

**Methods**: This cohort study recruited 369 first ever stroke participants (123 young adults and 246 older adults) admitted at Mloganzila- Muhimbili National Hospital with a World Health Organization clinical criteria for stroke. Demographics, stroke subtype based on brain imaging and risk factors were captured. Stroke severity was assessed using the National Institute of Health Stroke Scale on admission. Outcomes were assessed at 5-point intervals to 30-days using the Modified Rankin Scale. Stroke prevalence and risk factors in the young were compared to older adults. Kaplan-Meier analysis was used to estimate survival.

**Results:** The stroke prevalence was 26.3% overall: 25.4% (95% CI 21.5% - 29.3%) in the young and 26.8% (95% CI 23.9% - 29.6%) in the old. Factors associated with stroke in younger adults compared to the old were: a new diagnosis of hypertension 26.8% vs 9.3% $p<0.001$, HIV infection 11.4% vs 4.9% $p=0.021$, use of illicit drugs 4.1% vs 0.8% $p=0.044$, hormonal contraception in females 48.5% vs 9.4% $p<0.001$, rheumatic mitral stenosis 3.3% vs 0% $p=0.012$, raised low density lipoproteins 27.7% vs 16.4% $p=0.024$, sickle cell disease 9.7% vs 4.2% $p=0.047$ and thrombocytosis 16.9% vs 5.6% $p=0.007$. The 30-day fatality rate was 49.1% in the young vs 67.2% in the older adults.

**Conclusion:** The high burden of stroke in the young is coupled with very high 30-day fatality rates. Young strokes have special risk factors that should be screened and controlled so as to prevent subsequent development of stroke. Therefore, there is an urgent need of integrating preventive strategies to combat stroke in young adults. Furthermore, further analysis on predictors of mortality following stroke and predictors of risk factors are needed.

## The Burden of Anaemia in the First 1,000 Days of Life in Tanzania

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**Background:** The first 1,000 days from conception to the second birthday, is a critical window period for rapid growth and development that increases demand for more nutrients. During this period anaemia is a nutritional problem which is more prominent. Iron deficiency estimated to accounts for nearly 50% of anaemia cases. Low dietary intake particularly bioavailable iron that do not meet the demand increases the risk of the problem. Infants are at higher risk of anaemia than pregnant women because of late introduction of iron rich food while most of them have low iron store at birth due the effect of maternal anaemia, prematurity and low birth weight.

**Objective:** The purpose of this review was to highlight the prevalence of anaemia, trend and distribution during the first 1,000 days and call for more actions.

**Methodology:** The study involved secondary analysis of data from DHS survey of 2005, 2010 and 2015

**Results:** Prevalence of anaemia among pregnant women and children below two years in 2015 survey were, 57% and 75%, respectively. The prevalence of anaemia among pregnant women ranged from 27% in Mbeya region to 81% in Kakawin Pemba. In children below 2 years the range was from 54% in Iringa region to 88% Kaskazini Pemba. At 6 months of age about 8 in 10 children are already anaemic and the problem declines as children grows. Uptake of recommended interventions for addressing the problem particularly among pregnant woman had not improved much despite a good supply for most of required supplements and drugs.

**Conclusion and recommendation:** The national prevalence of anaemia in this critical period had not improved. There is a need to identify and address specific local community challenges contributing to the problem and operational challenges affecting uptake of recommended interventions.

## Dysglycaemias among Patients with Chronic Kidney Disease in a Tertiary Hospital in Tanzania

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**Background**: Chronic Kidney Disease (CKD) contributes to morbidity and mortality globally and especially so in the sub-Saharan Africa. CKD influences the control of blood glucose levels resulting in glycaemic dysregulation (causing either hypoglycaemia or hyperglycaemia) through various proposed mechanisms. In this study we investigate on the patterns, magnitude and factors associated with dysglycaemia among CKD patients attended at the tertiary Muhimbili National Hospital, Dar es Salaam, and Tanzania.

**Materials and Methods:** We carried out a cross-sectional hospital-based study between July 2017 to January 2018 at the Renal Unit of the Muhimbili National Hospital in Dar es Salaam, Tanzania, involving 328 CKD patients. Oral Glucose Tolerance Test (OGTT) was done to these patients and their respective glycaemic levels were recorded. SPSS version 20.0 was used for data analysis.

**Results:** Of the 328 study participants enrolled; 128 (39%) were (known to be) patients with diabetes mellitus, 7 (2.1%) were (newly) diagnosed to have diabetes mellitus and 17 (5.2%) were found to have impaired glucose tolerance by OGTT. Furthermore, of the 128 patients with established diabetes mellitus; 7(5.5%) and 20 (15.6%) were found to have hypoglycaemia and "burnt-out" diabetes mellitus respectively. On multivariate analysis; age of 50 years or more [OR 2.92, 95% C.I. (1.71 - 4.99)], co-existent hypertension [OR 2.96 (1.71 - 4.99)] and a positive family history of diabetes mellitus [OR 7.8 (3.74 – 17.02)] were found to be independent factors associated with presence of dysglycaemia.

**Conclusion:** Established diabetes mellitus, impaired glucose tolerance, hypoglycaemia and "burnt out" diabetes are all prevalent among the CKD patients attended at the Renal Unit of Muhimbili National Hospital, Dar es Salaam, Tanzania. Age of 50 years or more, family history of diabetes and co-existent hypertension are independent predictors of dysglycaemia among these patients.

## The burden of non-communicable diseases and comorbidities in the injury population in Tanzania: An observational study

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**Background:** Globally, traumatic brain injury (TBI) accounts for more deaths and disabilities than any other type of injury. Hazardous alcohol use is known to increase risk for injury and commonly coexists with mental health illnesses. Though hazardous alcohol use and TBI exert heavy burdens in Tanzania, their interaction with mental health is largely unknown in this setting.

**Objective**: This study aims to explore the pre-injury mental health profiles and drinking patterns of TBI patients in Northern Tanzania.

**Methodology:** A secondary data analysis included adults (≥ 18 years) with TBI of any severity presenting to the Kilimanjaro Christian Medical Center emergency department within 24 hours of injury. Surveys were administered to patients asking about their mental health prior to injury. Variables included measures of functional independence, aspects of psychiatric health, quality of life, and alcohol use. Hazardous alcohol use was defined as an Alcohol Use Disorder Identification Test score greater than seven. We conducted a latent profile analysis (LPA) on patients' pre-injury mental health.

**Results**: Our sample included 190 participants, out of which 159 (83.7%) were male. The median age of the sample was 29.5 years. The LPA model with the strongest fitness revealed four profiles: "Hazardous Drinkers" (51.7%), "Lower Cognitive Ability Non-Drinkers" (18.1%),"Distressed Moderate Drinkers" (13.9%), and "Healthy Non-Drinkers" (16.2%). Profiles were not associated with severity of injury.

**Conclusion and recommendation:** This study provides insight into the possible mental health profile a TBI patient may fall into, supporting the need for interventions to offer better targeted care as each patient has distinct rehabilitation needs.

## The prevalence of alcohol and substance use among injury patients in Northern Tanzania

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**Background:** Alcohol and substance use are significant injury risk factors. Up to 45% of injury patients drank alcohol at or around the time of injury. It is important to investigate such factors in local Tanzanian settings.

**Objective:** To determine the prevalence of alcohol and substance use among adult injury patients presenting to Kilimanjaro Christian Medical Centre (KCMC) for treatment of an acute injury.

**Methodology:** This was a secondary analysis of a prospective trauma registry for adult (>17 years) injury patients treated at the KCMC for an acute (<24 hours) injury. Self-reported demographic and substance use data included the Alcohol Use Disorder Test (AUDIT) or alcohol at the time of injury determined by self-report or physical exam including substance use. Injury and injury severity data was collected by the Kampala Trauma Score. Descriptive statistics, and chi-squared and multivariate logistic regressions were used to test associations with injury severity.

**Results:** Mean age of 38.3 (SD 16.1) years and 8.4 (SD 3.3) mean years of education. Injuries were related to road traffic (63%), fall (18%) or assault (14%) ranked as mild severity (56%). 57% self-reported alcohol within the last year, of these 20% had an alcohol use disorder (AUDIT> 8); 24% of patient reported alcohol use prior to their injury. 20% of injury patients reported any drug use, specifically 18% reporting tobacco, 3% marijuana and 1% khat/mirungi use. Alcohol use in the last year was associated with an increased use of tobacco (OR 5.2, CI 2.9;9.9) and other drugs (5.9, CI 1.8;38.6). While alcohol alone was not associated with injury severity, reported use of a drugs was associated with 3 times higher risk of a severe injury (OR 3.1, CI 1.0;8,9).

**Conclusion and recommendation:** Alcohol use is far more common among KCMC injury patients than other drug use, yet, drug use is associated with an increased severity of injury. Further research delineating the association of alcohol and drug use on the severity of injury is warranted.

## Prevalence of Rheumatic Heart Disease among school children in Zanzibar: An echocardiography-based screening

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**Background**: Rheumatic heart disease (RHD) continues to be a common health problem in the developing world, causing morbidity and mortality among both children and adults. Evidence suggests that there has been little if any decline in the occurrence of RHD over the past few decades. Recent reports from the developing world have documented rheumatic fever (RE) incidence rates as high as 206/100 000 and RHD prevalence rates as high as 18.6/1000. The high frequency of RHD in the developing world necessitates aggressive prevention and control measures. The major interventions for prevention and control include: (1) reduction of exposure to group A streptococcus, (2) primary prophylaxis to prevent initial episodes of RF, and (3) secondary prophylaxis to prevent recurrent episodes of RE. A study to assess the prevalence of rheumatic heart disease among school children in Zanzibar using an echocardiography-based screening was carried out. The study further aimed at determining the level of knowledge and practices of health care workers regarding sore throat, Acute Rheumatic Fever (ARF) and Rheumatic Heart Disease (RHD) so as to establishing gaps in clinical practice for diagnosing and managing sore throat, ARF and RHD among health care workers in Zanzibar.

**Objective**: To establish the prevalence of rheumatic heart diseases in Zanzibar among school children aged 6 to 17 years through the use of echocardiography as well as determining the knowledge of the same among health care workers and community members

**Methodology**: This is an observational cross-sectional study designed to estimate the prevalence of Rheumatic Heart Disease (RHD) in school children aged 6 to 17 years in Zanzibar, United Republic of Tanzania, using questionnaire and echocardiography. The study population was drawn from a random sample of children in standard one through six attending primary school, the primary sampling unit being the school. The primary requirement of the sample was to give estimates of RHD incidence Several scenarios were tested and it was eventually decided the survey would aim to produce a national estimate with a 20% Relative Standard Error (RSE) and domain estimates with a 25% RSE with the domains as the two islands of Zanzibar, Pemba and Unguja, in urban/rural locations.

**Results**: The knowledge gap was identified among health care workers in terms of diagnosis management of RHD; of 192 health care workers interviewed, 58.33% did not know the exact causes of ARF and RHD. Additionally, 34.81% do not prescribe antibiotics to children presenting with sore throat. The prevalence of Rheumatic heart disease stood at 0.46 % among school children aged 6 to 17 years old screened. Meanwhile the study also explored other heart Disease (by 0.46%) which included Mild Mitral Valve prolapsed, tricuspid regurgitation, Myomatus MV.

**Conclusion and recommendation**: The prevalence of RHD seems to be low in Zanzibar as compared to many other countries in the region having the same status. The Zanzibar Poverty Assessment has documented a moderated improvement in access to safe drinking water, electricity and sanitation including for some poor and rural populations. Improvements were also observed in terms of housing conditions and ownership of modern assets. However, with revealed high rates of sore throats (29.80%), there is need to take urgent action so as to ensure proper management is provided to children presenting with such conditions and probably exploring the use of antibiotics for management in other infective conditions and thus treating indirectly. Education may improve recognition of streptococcal sore throat among clinicians

## Investigation of the pharmacogenomics of Hydroxyurea response in individuals with sickle cell disease in Tanzania

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**Background:** Sickle cell disease (SCD) is caused by a point mutation on the beta globin gene resulting in synthesis of abnormal haemoglobin sickle (HbS). Tanzania is the 5$^{th}$ country worldwide with the highest number of individuals born with SCD. Foetal haemoglobin (HbF) is a major modulator of disease severity. Hydroxyurea is the only medicine for SCD available in Africa that can increase levels of HbF. However, the response within individuals is variable because of both genetic and environmental actors. There is no information from Tanzania on the genetic factors that may influence hydroxyurea response (pharmacogenomics) which may allow prediction of response.

**Objective:** We are implementing a study to investigate the pharmacogenomics and identification of early predictive markers of hydroxyurea response in SCD patients in Dar-es-Salaam, Tanzania.

**Methodology:** This is an-ongoing longitudinal descriptive study whose target is to recruit 100 SCD patients (age above 5 years) on hydroxyurea treatment from Muhimbili National Hospital in Dar-es-Salaam. Haematology parameters (Automated haematology analyser), haemoglobin quantification (HPLC) and quantification of F-cells and F reticulocytes (Flow cytometry) will be performed and gamma and beta globin gene expression will be done by Real time, quantitative polymerase chain reaction. Data will be analysed by Open source RNA-seq pipeline. Determination of genetic markers of hydroxyurea response will be by Targeted next generation sequencing and analysed by IlluminaHiSeq Analysis Software v2.0, Genome Sequencing Data Analysis Pipelines.

**Results/Progress:** Between March and July 2019, a total 40 individuals with SCD have been enrolled. The age range is 5.3-60 years and HbF levels range between1.1 and 10.6% (Median 3.85). For quantification of HbF per F-cell and F-reticulocytes we are performing flow cytometry for all visits. Ongoing follow-up visits are scheduled at 2, 3, 6 and 12 months after the initial enrolment visit with a fixed dosage of 20mg/kg/day. For molecular and genetic markers of hydroxyurea response 12 targeted regions of interest which are associated to either regulation of haematopoiesis, synthesis of HbF and hydroxyurea metabolism have been selected for investigation.

**Conclusion and recommendation:** This study demonstrates feasibility in conducting pharmacogenomics studies in Tanzania. The findings from this study will assist in developing precision medicine approaches that will be used to identify individuals who are likely to show early response to Hydroxyurea treatment for SCD in Tanzania.

## The prevalence of dementia in rural Tanzania: Community-based prevalence estimates in 2009-2010 and 2018-2019

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**Introduction and objective:** The majority of people with dementia live in low- and middle-income countries (LMICS). Current limited epidemiological data on dementia in sub-Saharan Africa indicate that prevalence may be increasing. We previously reported prevalence of dementia of 7.5% (6.4% age-adjusted) in rural Tanzania in 2009-2010 in individuals aged 70 and over. We aimed to repeat a community-based dementia prevalence estimate in the same setting to assess whether prevalence has in fact increased.

**Methods:** This was a two-phase door-to-door community based cross-sectional survey in the Hai district, rural Kilimanjaro Tanzania. In Phase I, trained rural primary health workers screened all consenting individuals aged 60 and older from 12 rural villages using a newly-developed dementia screening App based on previously-validated paper-and-pencil tools (The IDEA six-item cognitive screen and IDEA-Instrumental Activities of Daily Living (IADLs) assessment).

In Phase II, a stratified sample of those identified in Phase I were clinically assessed using the DSM-V criteria by a research doctor and case histories subsequently reviewed by consensus panel to confirm diagnosis. Data were compared to data previously obtained in 2009-2010 using similar methodology within the same region.

**Results:** Of 3022 people who fulfilled the inclusion criteria, 424 screened positive for probable dementia, and 227 screened positive for possible dementia using the IDEA six-item screen. During clinical assessment in Phase II, 105 cases of dementia were identified according to the DSM-V criteria. The prevalence of dementia was 6.1% in those aged 60 and over (10.2% in those aged 70 and over). Prevalence rates increased significantly with increasing age.

**Conclusions:** The prevalence of dementia in this rural Tanzanian population is similar to that reported in high-income countries and appears to have increased since 2010. Dementia is likely to become a significant health burden in this population as demographic transition continues. Further research on risk factors for dementia in sub-Saharan Africa is needed to inform policy makers and plan local health services.

## Burden of Oral health and national response

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**Background:** The coverage of oral health care services in Tanzania is very limited as only 6.4% of all registered public and private health care facilities. A total of 591 out of 9247registered health facilities from both public and private offered dental care in the country. For the past five years, number of dental patients has been increasing yearly in the dental clinics from 47965 patients in the year 2014 to 636,642 patients in the year 2018. Dental caries is among the "top ten diagnoses" in most of Regional referral Hospitals, District hospitals and health centres where dental services are provided, and dental personnel are available.

**Top ten Dental Diagnoses for the past five years (2014 -2018):** Nationally the leading dental diseases are Dental caries 1,717,494 (71.08%), Periodontal disease 163,728 (6.8%), Dental abscess 74,396 (3.08%), Other dental diagnoses 67,337 (2.79%), Shedding of Deciduous teeth 52,783 (2.18%), Dental fluorosis 41,976 (1.74%), Tooth impaction 37,750 (1.56%), Periodical abscess 26,748 (1.11%), Malocclusions 23,067 (0.95%) and lastly Pericoronitis 21,067 (0.89%) patients respectively. However, proportion of patients with dental caries countrywide showed decline of the prevalence of dental caries for the patient visited health facilities from 84.5% in the year 2014 to 69.4% in the year 2018.

**HMIS top ten diseases report:** In the year 2018 a total of 26 regional referral hospitals offered dental services. When you run HMIS top ten diseases report into DHIS2 in the intervention called " (IPD,OPD, DENTAL and EYE) for the patients of all ages, ***Dental caries*** appeared among the major hospital diagnoses into sixteen (61.5%) regional referral hospitals which offered dental services. Furthermore, Dental caries is among of the top three Non communicable Diseases in those 16 hospitals leaded by Hypertension followed by Diabetes mellitus, eye diseases or Dental caries interchangeably.

**Oral health indicators based on top ten dental diagnoses for the year 2018:** Nationally, Ruvuma region has highest proportion of patients with dental caries (98.4%), Manyara region has high proportion of patients with periodontal diseases (15%), Iringa region has high proportion of patients with dental abscess (8%) while Manyara region has high proportion of patients with Malocclusions (3.2%). Furthermore, Iringa and Mtwara regions had high proportion of patients with impacted teeth (2.8%) respectively, while on dental fluorosis Iringa region reported 1.5% high as compared to other regions. Moreover, Geita region has the high proportion of patients with pericoronitis (4.9%), while Iringa, Manyara, Singida and Tanga regions have high proportions of patients with orofacial injuries (2.8%) each.

**Recommendation:** We urge the government to increase the coverage of oral services from the current 6.4% to the at least 50% of all registered health facilities by 2020. Further, this should go with improved prevention and promotion of oral disease in the community.

## Capacity development in renal dietetics in a resource limited setting

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**Introduction:** Nutrition Is the cornerstone of prevention of progression of chronic kidney disease (CKD). Individualize diet management in CKD involves diet assessment, weight, height, blood pressure and biochemical parameters measurements: potassium, phosphorous, albumin, creatinine, uric acid levels. The information enables appropriate diet prescription and plan as per recommended allowances for specific nutrients and fluid. Hence this implies the need of expertise and experience in renal dietetics and nutrition and clinical aspects l. This is often lacking in resource limited settings. The presentation aims to discuss the process involved in the developing renal dietetics training module and the training conducted.

**Methods:** Three candidates, with prior employment for short periods as dietitian, hospital dietitian and nutritionist in calcium intervention study in pregnancy were selected after a rigid interview process. Of the 3, 2 were graduates in human nutrition and one graduate in family consumer study. The tasks to be performed, skill and knowledge needed were identified through discussions with experts and literature search and a job description was compiled.

The 8-week training module with a total of 7-hour teaching for 2 days a week was compiled. The training, both classroom teaching and practical, included topics in both renal and basic therapeutics dietetics and nutrition. The training also consisted of pre-test, post-test and a nutrition game. The trainees also attended the 4-week training in kidneys diseases and haemodialysis with newly recruited dialysis nurses. At the end of the training, the 3 trainees provided feedback on the training using structured questionnaire.

**Results:** The 8-week training covered topics on dietary management of: diabetes, hypertension, obesity, gout, HIV, CKD with and without dialysis, diet assessment, portion size assessment and analysis using food composition tables and interpretation; , anthropometric measurements, nutrition and dietetics counselling.

**Conclusion**: This training provided as an exploratory pilot study, involving a few candidates has set a scene for future trainings with a focused level for more renal nutritionists in Tanzania. The current experience provides opportunity for further strengthening, expansion and establishment of such training, as significant need exists.

## NCD CO-MORBIDITIES

The primary focus of the global NCD response has been on the four major diseases – namely cardiovascular disease (CVD), cancer, diabetes, and chronic respiratory diseases –and four risk factors – tobacco use, unhealthy diet, physical inactivity, and harmful use of alcohol– identified by the World Health Organization (WHO) and the UN as those responsible for the greatest burden. There is, however, a range of diseases and conditions –including mental and neurological disorders, autoimmune disorders such as psoriasis, bone and joint conditions such as osteoporosis and arthritis, and renal, oral, eye and ear diseases that are linked to the four most prominent NCDs.

Driven by similar risk factors, together with demographic changes including rapid urbanisation and ageing populations, these diseases are closely interconnected. Often, two or more NCDs manifest in the same individual, referred to as 'NCD co-morbidities'. NCD co-morbidities can occur because diseases share the same risk factors, with tobacco use being a risk for cancer, CVD and dementia; or because some diseases predispose individuals to developing others, as in the case of diabetes, which is a risk factor for CVD, stroke, osteoporosis, kidney failure and depression. As a result, these conditions can benefit from a comprehensive and integrated response.

Health systems also increasingly have to manage patients living with infectious diseases such as HIV/AIDS and tuberculosis (TB) alongside NCDs. This issue is particularly acute in low- and middle-Income countries facing a double burden of diseases. With effective antiretroviral treatment, people living with HIV are living longer and develop NCDs associated with ageing. Furthermore, some antiretroviral drugs may also increase risk to people living with HIV of developing certain NCDs, for example through insulin resistance, leading to increased risk of diabetes and CVD; while HIV infection itself increases the risk of CVD, and some cancers. Diabetes is a known risk factor for active TB and reactivation of latent TB.

NCD co-morbidities impose years of disability and compounded financial burden on those affected, their families, health systems, and national economies. While the prevalence of co-morbidities varies, it increases substantially with age in all countries, with higher rates in urban than rural areas, and disproportionately affecting those who are poorest. Social-economic inequalities are exacerbated for people living with co-morbidities, with the most drastic implications for those living in developing countries enduring a double burden of NCDs and chronic infectious diseases. NCD co-morbidities are associated with greater healthcare utilisation and financial burden including, in most cases, higher out-of- pocket expenditures - often more than double or NCD co-morbidities than for a single NCD. Globally, health systems are ill-equipped to respond to the challenges posed by NCD co-morbidities. In the first instance, health systems have evolved to address acute issues, rather than to provide the continuous care required for chronic conditions, including NCDs.

Furthermore, many health systems are configured to treat singular diseases in a soloed, vertical approach, which is inappropriate and ineffective for people living with NCD co-morbidities. Given the complexities involved in clinical management decisions, developing clinical practice guidelines on managing co-morbidities for primary care practitioners is vital.

This section presents comprehensive information from both research and programmatic issues on NCDs care and treatment in Tanzania. The following are key areas:

- NCD-TB
- NCD-HIV (hypertension, diabetes, cancer etc)
- NCD-and RCH
- NCD multi-morbidity

## Prevalence of Microalbuminuria among Patients with Hepatitis B Infection in Tanzania

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**Background:** Extra hepatic manifestations of chronic Hepatitis B viral infection are prevalent in up to 20% of patients with both acute and chronic infection. The prevalence of hepatitis B surface antigen (HBsAg) ranges from 2 to 20% among patients with end stage renal disease (ESRD) on haemodialysis. The most common glomerulopathy associated with Hepatitis B viral infection is Membranous Nephropathy (MN). This study measured microalbuminuria (as a proxy for glomerular damage) among patients with chronic Hepatitis B viral (HBV) infections attended Hepatology Unit of the Muhimbili National Hospital, Dar es Salaam, Tanzania between August and December 2018.

**Objective:** To determine prevalence of albuminuria among patients with hepatitis B infection in Tanzania

**Methodology:** The urine albumin and creatinine testing were done using CYBOW 12MAC albustix strips Albumin creatinine ratio (ACR) was then calculated to determine the level of albuminuria and expressed as mg/mmol. ACR <2mg/mmol for male and <2.8mg/mmol for female were defined as normal albuminuria, ACR≥2.5-29.9mg/mmol for male and ≥3.5-29.9mg/mmol for female were defined as microalbuminuria and ACR≥30mg/mmol for both male and female were defined as macroalbuminuria. Data was analysed using SPSS version 23.0. Factors associated with albuminuria were analysed using binary logistic regression model and a two-tailed p value <0.05 was used to signify statistical significance.

**Results** A total of 400 patients were analysed. Males constituted 70% (280) of the study population. Majority of co-morbidities were hypertension 29 (7.2%), renal disease 16 (4%), diabetes mellitus 16 (4%) and hepatitis B virus/Human–Immunodeficiency co-infection were 7(1.8%). Mean estimated glomerular filtration rate (eGFR) was 121.4+-34.6 ml/1.73m$^2$. Prevalence of albuminuria was 49 (12.25%). None of the investigated factors was significantly associated with albuminuria.

**Conclusion and recommendation**: Microalbuminuria is common among patients with Hepatitis B viral infection in Tanzania. More studies are warranted to determine associated factors.

### Anaemia in Patients on Haemodialysis Therapy in Tanzania

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**Background:** Anaemia is a common complication among patients with end stage renal disease (ESRD) on maintenance haemodialysis therapy (MHD) and is associated with increased morbidity and mortality.

**Objective:** To determine the prevalence of anaemia and associated factors among patients on maintenance haemodialysis in Dar es Salaam, Tanzania.

**Methodology:** A total of 233 patients receiving maintenance haemodialysis therapy (MHD) from three centres in Dar es Salaam, Tanzania between September and October 2017 were recruited into this study. Data was analysed using SPSS version 23 software and summarized into frequency tables. Log binomial regression analysis was used to estimate relative risks and determine factors associated with anaemia.

**Results:** A total of 233 participants (65% male) were recruited into the study. Over three quarters (78%) of the patients were aged 40 years or more with overall mean haemoglobin (Hb) level of 11g/dl. The overall prevalence of anaemia was 69%, stratified by gender 74% of female and 64% of male patients had anaemia (Hb<12g/dl for female and <13g/dl for male gender) respectively, the observed difference between gender was not statistically significant (p=0.26). Stratified by underlying cause of anaemia, 84% were attributed to serum iron deficiency, 0.43% to serum folate deficiency and none to serum vitamin B12 deficiency respectively. In the multivariate analysis; low serum transferrin saturation<30% [AOR 9.29, 95% CI (4.15-20.80), p<0.001] and presence of more than one comorbidity [AOR 1.89 (1.04-3.49), p=0.04] were independently associated with anaemia. Conversely, being educated beyond primary level education [AOR 0.37 (0.19-0.76), p=0.006] and being on haemodialysis for more than 1 year [AOR 0.4(0.21-0.80), p=0.01] were found to be protective against anaemia in these patients.

**Conclusion and recommendation:** High prevalence of anaemia (especially Iron Deficiency Anaemia) was found in patients receiving maintenance haemodialysis for end stage renal disease in Dar es Salaam Tanzania. Presence of more than one comorbidity and low serum transferrin saturation were associated with anaemia whereas post primary school education and receiving haemodialysis therapy for more than one year seemed to confer protection against anaemia in these patients.

## Inflammation is Associated with Increased Prevalence of Dysglycemia among the HIV Population with Undetectable Viremia

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**Background:** Ongoing chronic inflammation among People living with HIV (PLHIV) is correlated with the increased risk of dysglycemia. However, there is limited data on inflammation and dysglycemia within this group in sub-Saharan Africa (SSA). Extrapolating findings from high income countries to SSA is hampered by ethnic and social-economic difference.

**Objective:** To assess the levels of inflammation (C-reactive protein and Interlukin-6) on a cohort of PLHIV and its associations with dysglycemia.

**Methodology:** A cross-sectional study was conducted at the Infectious Disease Clinic in Dar-es-salaam from March to December 2018. Purposive sampling was used to identify participants who had an undetectable viral load and were on 1st line anti-retroviral therapy (ART). The WHO stepwise approach for non-communicable disease (NCD) surveillance tool was used to collect data. Fasting blood glucose and blood glucose after 75 g oral glucose load was measured using COBAS-*integra 400+* platform. Associations were explored using the Chi square test and binary logistic regression was performed to estimate the odds ratios. A p-value less than 0.05 was considered statistically significant.

**Results:** A total of 240 participants were enrolled; 42% were overweight/obese and 89% had a high waist to height ratio. The median ART duration was 8(5-10) years. The prevalence of dysglycaemia was 32%, (Pre-Diabetes-31% and Diabetes- 2%). High CRP was associated with 2.05 increased odds of having dysglycemia OR 2.05(1.15-3.65) (p = 0.01). History of stavudine intake was associated with 1.99 odds of having dysglycemia OR 1.99 (1.04-3.82) (p= 0.03). We did not find a significant association between IL-6 and dysglycemia.

**Conclusion and recommendation:** There was high prevalence of pre-Diabetes compared to Diabetes; this presents an opportunity for intervention. High inflammation among PLHIV was observed to increase the odds of dysglycemia by two times. These findings highlight an urgent need to integrate routine screening of dysglycemia among the HIV population. More rigorous studies are required to establish causality of dysglycemia among PLHIV.

## A Randomised Controlled Trial of Preventive Treatment of Latent Tuberculosis Infection in Patients with Diabetes Mellitus

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**Background:** An estimated one quarter of the world's population have latent tuberculosis infection (LTBI), of whom 5-10% will go on to develop TB disease at some stage. Screening and preventive treatment of LTBI is considered essential for global TB control. With short and effective treatment regimens available, the clear direction for global TB control is to expand preventive treatment to other high-risk groups. One such group is people with Diabetes Mellitus (DM) in TB-endemic countries. People with DM are ~3.7 times more likely to develop TB than those without DM. It is estimated that DM now accounts for >10% of TB globally, and this will increase significantly in the coming decades due to the dramatic rise in type 2 DM in TB endemic settings.

**Objective:** To perform the first randomized controlled trial (RCT) to evaluate the efficacy and impact of preventive treatment of LTBI in people with DM.

**Methodology:** We will randomize 3000 people with DM and LTBI in Tanzania and Uganda to 12 weeks of rifapentine and isoniazid preventive therapy or placebo, with cumulative incidence of TB disease over 24-months follow-up as primary endpoint. In addition, we will: (i) evaluate optimal ways to screen people with DM for LTBI and TB; (ii) address gaps in prevention and therapeutic management of combined TB-DM; and (iii) estimate the population impact and cost-effectiveness of treatment of LTBI in people living with DM.

**Results:** In the next 5 years, this EDCTP-funded project will generate knowledge and practical applications to prevent TB among people with DM and improve management and outcome of combined TB and DM.

**Conclusion and recommendation:** Our project addresses a prevention priority area (TB and comorbidity) and includes partners who have worked together previously and are experienced in performing RCTs in high TB and DM burdens.

## Improving retention in care and ART adherence by addressing depression using the trained peer led *NAMWEZA* strategy, Dar es salaam, Tanzania

Dr. Hellen N. Siril , Prof. Sylvia Kaaya
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**Background:** The prevalence of depression among PLH receiving care is estimated at 22%, compared to 4%-6% in the general population. It is implicated in patient losses to follow-up, and poor adherence to clinic visits and ART in HIV services. Little evaluation has occurred of interventions that address depression among PLH. We report the findings of NAMWEZA a 10 once weekly sessions structured and manualized psychosocial group intervention targeting PLH.

**Objective:** Pre and post (12 months) changes in hope and depression in exposed PLH; Effects of NAMWEZA on clinical outcomes including ART adherence retention in care, and predictors of LTFU in NAMWEZA versus a comparison group.
**Methodology**: Stepped Wedge design for NAMWEZA pilot; quasi-experimental design to compare clinical outcomes in NAMWEZA exposed versus unexposed groups at baseline and 24 months follow-up.

**Results:** At the end of 24 months follow up, NAMWEZA increased hope by an average of 1.98 points (95% confidence interval [CI] 1.26, 2.43; p-value <0.0001), and decreased depression by an average of 0.77 points (95% CI 0.67, 0.86; p<0.0001). NAMWEZA participants with poor adherence to ART decreased by 60% from 46% at baseline to 18 participants at 24 months follow up (Chi-Square test = 10.1, p=0.039), while there were insignificant changes in the comparison group (poor adherence decreased by 5% from 79 to 75 people (Chi-Square test=1.11, p=0.944)). Similarly, cumulative losses to follow up (LTFU) were significantly lower in the intervention (n=20; 5%) compared with the comparison group (n=60; 15%; p=0.002). Factors predicting loss to follow up including, low CD4, low body weight, low HBG and a longer duration of taking ART were only significant in the comparison group. Suggesting more resilience in NAMWEZA participants.

**Conclusion and recommendation**: NAMWEZA intervention reduced depression, improved hope and reduced losses to follow up among PLH in the intervention group, improved adherence to ART. This intervention could be beneficial to integrate in HIV care clinics to reduce depression and its consequences on PLH in care.

## Community mHealth Integrated Care (ComHIC) to manage hypertension/diabetes in Tanzania's overburdened health system

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**Background**: Although Tanzania has a well-developed NCD Strategic Plan, the already overburdened health system is limiting effective control of major NCDs. Various supporting programs have already been tried, including those using mobile phone technology for health (mHealth) in communicable disease and reproductive health programs.

**Objective**: This paper presents an implementation research framework to apply mHealth in NCD programs using community health promoters (CHP). CHPs will apply mHealth to support existing local health systems to help control and manage Hypertension (HT) and Diabetes mellitus (DM) patients.

**Methodology**: Based on scoping review of literatures and existing resources and consultations with stakeholders, research framework was developed. To develop strategies to improve management of hypertension and diabetes patients in Tanzania, the research team is currently working with multi-level stakeholders considering the program's sustainability: (1) national, regional and district governments; (2) local health officers; and (3) community partners.

**Results:** The study first assesses the capacity of the local health system to manage HT and DM patients, after which it will proceed to assess the impact of introducing mHealth with support from CHPs to manage those patients. To assess the impact of integrated CHWs and mHealth intervention, the project will conduct a Randomized Controlled Trial (RCT) with two study arms; intervention and control. Analysis will be performed to elucidate effectiveness of use of mHealth with participation of CHPs towards better management of HT and DM.

**Conclusion and recommendation**: This research will be conducted with participation of national/regional health authorities, health professionals, regional/district health practitioners, communities, HT/DM experts, international implementation science experts. Collaborative plans of the program implementation and evaluation are shared. Findings from the study will strengthen strategies for improvement of management of HT and DM patients in Tanzania.

## ROUND TABLE DISCUSSION: ALCOHOLISM AND TOBACCO USE EFFECTS TO OUR GROWING POPULATION AND ITS ENVIRONMENT

**Moderator:** Tanzania Tobacco Control Forum

A total of 30 advanced-level secondary school students from Dodoma Secondary were invited for a round table discussion on the second day of the conference (12th November 2019). The discussion was opened with a presentation from Tanzania Tobacco Control Forum. Facts about tobacco and its health effects were presented. It was also mentioned that there is high rate of alcohol consumption believed to be attributed by stress, hence counselling was seen important as the alternative to deal with stress. Discussants had the view that there is misconception regarding physical exercises as they are perceived to be punishment rather than an activity for body fitness and risk avoidance practice.

Discussants were concerned with the gains from the tobacco industry vs the health impact costs meaning that participants wanted to know the cost of treating tobacco related diseases vs the benefits the country gains from selling tobacco.

During the discussion, it was also realized that students had a negative outlook towards sanitary pads as they believed that they caused cervical cancer. Clarifications were made of the safety of the pads and urged students to continue using sanitary pads rather than other locally available means which might be riskier to their health. The following were proposed action to control risk factors for Non-Communicable Diseases:

**Pesticides**

- To conduct more research on distribution of risk factors particularly pesticides, and then create awareness on health impact of pesticides to the community.

**Use of unhealthy food**

- Ensure our families avoid the use of too much sugar and too salty foods.
- Improve awareness of the public on diet and physical activity through education.

**Harmful use of alcohol**

- Imposing taxes on alcohol beverages.
- Restricting access alcohol beverages especially to children.
- Restrict areas for selling alcohol i.e. they should not be close to schools or any place which is close to places where children play.
- Banning alcohol promotion and advertisement.
- Assist alcohol vendors to adopt another economic activity with less negative impact to the community health.

**Tobacco consumption**

- Increase taxes on tobacco products.
- Restricting smoking in working area and public places.
- Imposing Health warning messages in cigarette packages together with picture that shows the consequences of tobacco consumption.
- Banning tobacco advertisement, promotion and funding.
- Promote the use of alternative crops.

- More research on the government gains from tobacco vs the cost incurred to treat tobacco related diseases.

**Physical inactivity**

- Instil the culture of doing physical excises right from primary schools.
- National health insurances have to consider on investing on prevention like having gyms and form health clubs for its members to practice preventive behaviours as a risk reduction strategy rather than concentrating on curative care.

**Comments that cut across all risk factors**

- Create community awareness on health effects of consuming alcohol, tobacco, unhealthy food and promote physical activities across all age. The awareness should be accompanied by demonstrations like pictures, photos, video etc. to increase understanding.
- Conduct more research on benefits and consequences of tobacco, and alcohol, this will help the government to be more informed for decision making.
- Provide awareness to the citizens on risk factors of NCDs so that during elections they can choose a leader who will really help to implement the appropriate interventions.

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## CONFERENCE RECOMMENDATIONS

The conference participants had the following recommendations for implementation:

**General recommendations (for the Government)**

1. To increase awareness of NCD risk factors through mass media campaigns, school and community-based screening and education, and implementation of nutrition and physical activity guidelines in order to reduce modifiable risk factors.
2. To foster and strengthen multisectoral collaboration, coordination and partnership in order to have synergistic effects in the control of NCDs and to improve population health outcomes.
3. To pay particular attention to vulnerable groups such as those who may not have access to information about healthy diets and lifestyles or may not be able to look after themselves thus becoming susceptible to NCDs.
4. To enable communities, explore possibilities for solving their nutritional problems and translate perceived potentials into action implementation.
5. To look into ways of regulating the breweries and tobacco industries so that while promoting their products they should also sincerely protect minors.
6. To reinforce laws that limit youth to buy alcohol and cigars if they are under the age of 18 as well as emphasizing the bi-laws that designate smoking and non-smoking areas.
7. To maximize the use of locally available mass media since they have greater reach in the intervention areas and over a satisfactory segment of the local population.
8. To allocate recreational spaces in urban and peri-urban settings, playgrounds and sidewalks so as to increase the opportunities for people to stay physically active.
9. To reinforce bi-laws those prohibit the provision of foods in the school surroundings and compounds. As well this should go hand in hand to protecting children by limiting sugar-sweetened beverages that young children use.
10. To revive early morning physical activity (*Mchaka mchaka*) in primary and secondary schools at least thrice a week.

**Specific recommendations**

**A. Care and Treatment of NCDs**

1. To develop risk factor checklist, which is simple, clear and easy to use at the clinic and for self-identification to enhance self-care.
2. To provide education to traditional medicines manufacturers and practitioners to adhere to basic good manufacturing process of their traditional medicines and practise ethical medicine respectively as related to NCDs.
3. To reach many adolescents and youths in school via School Health Programs and Youth Clubs to address NCD issues in this target group who in turn may deliver the same messages to respective communities.
4. To advocate on the potential adverse effects on the use of illicit drugs and hormonal contraception
5. To expand coverage of NHIF among individuals with NCDs.

**B. Risk factors and Control of NCDs**

1. To improve road safety so as to prevent traffic crashes e.g. by improving road engineering, introducing sidewalks, increased speed limit, improve vehicle designs and maintenance and encouraging good behaviours like wearing helmets during motorcycle rides.
2. To involve multisectoral approach in order to realize enough funds for NCD control.
3. To establish effective programmes aiming at educating women of childbearing age about NCDs and their control.
4. To structure policies and regulation on feeding behaviours to children from childhood so that it may henceforth become their habits.
5. To establish efficient and effective screening, treatment and follow up methods for high risk pregnancy using FBG.
6. To create awareness and raise advocacy in the community about risk factors for Gestational diabetes mellitus such as inactive lifestyle, and a non-healthy diet.
7. To design and implement interventions aimed at encouraging food vendors to prepare and sell healthy meals complemented with fruits.

**C. The NCD burden in Tanzania**

1. To develop and scale-up interventions that promote healthy lifestyles (healthy diets, physical activity and medical checks among adult population) and improve the environment.
2. To support community-based programs on the provision of information and counselling on optimal and appropriate complementary feeding practices.
3. To use ambulatory BP measurements to confirm true hypertension, especially in individuals found to have raised office BP but with low cardiovascular risk profile.
4. To use guidelines that will clearly show a specific and appropriate age at which all women will be required to undergo cervical cancer screening.
5. To customize regular screening programs and campaigns on appropriate diet and exercise for healthy living (fight against Diabetes).
6. To train more clinicians on the propensity for dysglycaemia when attending patients as it is prevalent among patients above the age of 50 years.
7. To improve diagnostic services (via screening training, PAP smear, Cervical biopsies, Human papillomavirus diagnostics, *Total Abdominal Hysterectomy* technique workshops)
8. To implement high-quality standards for laboratory and clinical work which is essential for accurate scientific results.
9. To factor in serum urea levels when gauging the individual risk of arterio-venous fistula site bleeding for patients using heparin for anticoagulation during haemodialysis.

**D. Health Systems**

1. To strengthen and align the health system to address NCD through Promotive, Preventive, Curative and rehabilitative services.

2. To strengthen health systems in order to improve capacity and capability in controlling the NCDs.
3. To ensure that all people have access to the full range of health services, from those that protect and promote health, to those that provide treatment, rehabilitation and palliative care.
4. To strengthen leadership, Governance, Multi-sectoral collaboration and accountability to prevention and control of NCD.
5. To raise NCDs community awareness and screening activities and which then are continued to be monitored and evaluated.
6. To build NCDs capacity at district and regional levels and health management teams for immediate response and attention.
7. The MOHCDGEC and PO-RALG need to allocate additional budgets for NCDs short course training in order to equip more of the frontline staff and CHWs with sufficient knowledge on, and skills to manage, NCDs.
8. To ease access to Quality Services by strengthening services at PHC, RRH & Tertiary Hospitals, invest more on health technology and Innovations and strengthen supply chain of NCD commodities.
9. To re-orient Health services to focus more on Prevention and Health Promotion and also observing Universal Health Coverage.
10. To monitor and evaluate any/existing interventions in order to measure their effectiveness and sustainability on NCD.

**E. Co-Morbidities**

1. To do early screening and provision of treatment for hypertension, hyperglycaemia, Dyslipidaemia, HIV, SCD and RHD in all young adults ≥18 years.
2. Establish protocols of diagnostic pathways and care for different levels of health care system to screen for co-morbidities and multi-morbidities.

## CLOSING REMARKS

**By the Honourable Minister of Health, Community Development, Gender, Elderly and Children; Ummy Ally Mwalimu (MP)**

The Conference was closed by the Minister of Health, Community Development, Gender, Elderly and Children who was grateful to participants who had joined together to share experiences, ideas, insights, evidences and afterwards came up with recommendations to guide NCDs prevention and control.

In her remarks, she noted the urgent need to protect people from NCDs and their causes and that measures should be taken to control behaviours that lead to NCDs which include tobacco use, physical inactivity, harmful use of alcohol, unhealthy diet and tracking overweight and/or obesity.

The Minister shared some of main highlights from these behaviours as follows: ***Harmful effects of alcohol:*** Notwithstanding of the economic advantages the brewing industry has to the country, stakeholders should look into ways of regulating the brewers as well as the sale of alcohol to minors.

***Tobacco use:*** The tobacco industry like the brewers, has substantive contribution to the national economy; stakeholders should investigate ways of saving tobacco users whose health are in danger without hampering the economic gains from the industry.

***Unhealthy diet:*** She pointed out that in Tanzania there is increasing consumption of refined foods rich in fat, salt and sugar. Increased processing of our food and eating refined and packaged foods as opposed to home-cooked meals increase our risk for NCDs. People should be made aware of this risk factor. Relevant legislation and regulation should be put into place to counter this trend and protect public health.

***Physical inactivity**:* There is a growing trend in physical inactivity which is probably due to personal behaviour and also to the lack of recreational space in urban and peri-urban settings. People should develop habitual physical exercising as spearheaded by her Excellency the Vice President of the United Republic of Tanzania Honourable Samia Suluhu Hassan.

The Minister assured the participants that the MoHCDGEC will collaborate with sectors and partners in NCD control and that the newly inaugurated NCD Control Program will take the lead to empower individuals to develop healthier lifestyles through various health promotion channels. Further to that, there are issues and actions that should be considered;

1. adopt innovative approaches that will help to improve our care, reduce costs and ultimately deliver better health outcomes for our people.
2. pay particular attention to vulnerable groups in our society, such as those who may not have access to information about better diets and lifestyles or may not be able to look after themselves.
3. foster collaboration, not only within, but also beyond national boundaries. Public-Private Partnerships (PPP) can produce synergistic effects in improving population health outcomes.

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