

**MUHIMBILI UNIVERSITY OF HEALTH
AND ALLIED SCIENCES**



**RESEARCH
AGENDA**

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LIST OF ABBREVIATIONS

ACT	Artemisinin Combination Therapy
AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Drugs
TB	Tuberculosis
DRP	Directorate of Research and Publications
FYSRP	Five Years Strategic Rolling Plan
HIV	Human Immunodeficiency Virus
IPT	Intermittent Preventive Therapy
ITN	Insecticide Treated bed Net
LMICs	Low to Middle Income Countries
MDGs	Millennium Development Goals
MDR -TB	Multi Drug Resistant TB
MKUKUTA	Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Tanzania
MUHAS	Muhimbili University of Health and Allied Sciences
NCD	Non Communicable Diseases
NSGRP	National Strategy for Growth and Reduction of Poverty
PLHA	People Living with HIV and AIDS
PMPCT	Prevention of Mother to Child Transmission
RIS	Residue Insecticide Spray
SRPC	Senate Research and Publication Committee
SCD	Sickle Cell Disease
TBV	Transmission Block Vaccines
XDR-TB	Extra Drug Resistance Tuberculosis

This document is the first institutional research agenda to be developed and formally embraced by the Muhimbili University of Health and Allied Sciences (MUHAS). Members of MUHAS community have long recognized the value of such a document for effectively communicating research priorities to numerous MUHAS and other national and international stakeholders, including faculty, students, policy makers, collaborators, administrators, regulatory bodies and funding agencies. Further, coordination of research efforts and interest within the MUHAS units— from research priorities in individual departments to schools/institutes and national initiatives will be enhanced by this strategic document. The development of an institutional research agenda coincides with increasing recognition in higher learning institutions and related agencies of the value and unique contributions of research in development.

For the first time, all MUHAS stakeholders have joined forces to establish a vision for the future. With clear strategic objectives, the stakeholders have taken on the task of defining a Strategic Research Agenda (SRA) and making it happens. Extensive work has gone into formulating this SRA. Stakeholders from all areas including faculty, researchers and students, have taken an active part in this process with Principal Investigators from the sponsored projects taking a leading role. In the process, which has already generated a pool of more than 7 schools and institutions research agenda, these agendas have been condensed into the SRA presented here, which is designed to help create a more efficient, competitive and user friendly document.

The University management expresses its gratitude to all those who have contributed to realizing this SRA. This includes members of the faculty, Principal Investigators, Lead Principal Investigators, collaborators, students and, not least, the SRA writing-team.

Prof. Kisali Pallangyo
Vice Chancellor, MUHAS

The Muhimbili University of Health and Allied Sciences (MUHAS) trains the largest number of human resources for health in Tanzania, a responsibility it has shouldered for almost fifty years. Apart from training health and allied personnel MUHAS, has carried out a number of researches that have been instrumental in informing policy in the areas of HIV and AIDS, Tuberculosis, malaria, reproductive health, nutrition, health financing and other areas. However, despite all this MUHAS has not been guided by a well articulated research agenda. In the 1990's a document that identified some key areas for research was developed and has guided research funding initiatives and negotiations for over a decade.

The University has taken a conscious effort to align itself with national initiatives for development including Vision 2025, the National Strategy for Growth and Reduction of Poverty and the implementation of the health related Millenium Development Goals (MDGs). In this respect the University has identified strategic areas of research that will be engaged by its faculty for the next 10 years to address the need for generating results that will inform policy and therefore contribute to national development initiatives.

The University has therefore identified 10 research themes to which it shall direct resources and efforts to ensure tangible outputs for informing policy and for solving important national health challenges. The research themes include:

THEME 1: HIV AND AIDS

Priority research areas

- 1.1. HIV and AIDS: Prevention, care and treatment in children and adults
- 1.2. Opportunistic infections and malignancies in adults and children
- 1.3. Continued surveillance/monitoring of the HIV and AIDS epidemic and their determinants
- 1.4. Development and evaluation of affordable diagnostics and new treatment modalities.
- 1.5. Novel natural products for HIV and AIDS prevention and treatment.
- 1.6. Vaccine development and evaluation.
- 1.7. Microbicides and male circumcision
- 1.8. Psychosocial aspects of HIV and AIDS

THEME 2: TUBERCULOSIS**Priority research areas:**

- 2.1. Development and evaluation of new drugs, vaccines and diagnostics
- 2.2. Surveillance of MDR and XDR tuberculosis
- 2.3. Development of appropriate tools for diagnosis of TB in children

THEME 3: MALARIA**Priority research areas:**

- 3.1. Pathogenesis and immunology of malaria.
- 3.2. Severe malaria in children, pregnant women, and associated factors.
- 3.3. Chemotherapy of malaria and genetics of anti-malarial drug resistance.
- 3.4. Anti-malarial drug blood levels and pharmacogenetics in different groups
- 3.5. Malaria vaccine development and evaluation in children
- 3.6. Malaria vector control including the use of natural products

THEME 4: REPRODUCTIVE HEALTH**Priority research areas:**

- 4.1. Safe motherhood including obstetric emergencies and postpartum complications.
- 4.2. Factors affecting the quality of maternal health care in rural areas
- 4.3. Involvement of the communities in the prevention of maternal mortality, gender-based violence and child sexual abuse
- 4.4. Innovations in the diagnosis and treatment of gynecological and obstetric conditions

THEME 5: CHILD HEALTH**Research areas identified**

- 5.1. Causes and treatment of diarrhoeal diseases
- 5.2. The role of environmental and genetic factors in paediatric respiratory diseases
- 5.3. Physical and psychosocial factors in child development

THEME 6: NON-COMMUNICABLE DISEASES**Priority research areas**

- 6.1. Conduct studies that will establish the magnitude, associated risk factors and monitoring NCDs in Tanzania.
- 6.2. Develop and evaluate interventions for NCDs.
- 6.3. Operationalize evidence based and known cost effective interventions

- 6.4. Establish/strengthen national policies and plans for prevention and control of NCDs
- 6.5. Cultural, ethnographic and geographical analyses on concepts of health and chronic disease.
- 6.6. Examine outcomes of the use of affordable care and treatment modalities.
- 6.7. Malignancies including gynaecological and paediatric malignancies
- 6.8. Non communicable diseases including haematological diseases in children
- 6.9. Genetic and environmental (e.g. smoking) determinants of diseases and outcomes; e.g. asthma, allergy, respiratory diseases and hypertension
- 6.10. Occupational diseases
- 6.11. Nutrition

THEME 7: INJURIES

Priority Research areas

- 7.1. Magnitude and factors associated with injuries in Tanzania.
- 7.2. Development/adaptation and testing of interventions
- 7.3. Motor vehicle accidents
- 7.4. Economic costs of injuries

THEME 8: HEALTH SYSTEMS RESEARCH

Research areas identified

- 8.1. Human Resource for Health dynamics
- 8.2. Quality of training and continuing education
- 8.3. Health care financing
- 8.4. Health care planning
- 8.5. Public-private partnership
- 8.6. Health systems governance
- 8.7. Health Management Information System
- 8.8. Evaluation of new strategies and policies.

THEME 9: NEGLECTED TROPICAL DISEASES

Priority research areas:

- 9.1. Establish the magnitude of NTDs and associated factors.
- 9.2. Parasite molecular biology and host-parasite interactions
- 9.3. Development of new and improved tools for diagnosis, treatment, prevention of NTDs.

- 9.4. To develop the mechanisms for elimination of some of the NTDs e.g. lymphatic filariasis.

THEME 10: HEALTH PROFESSION EDUCATIONAL RESEARCH

Priority research areas

- 10.1. Innovative teaching/learning methods
- 10.2. Team based learning
- 10.3. Small group teaching
- 10.4. Teaching large classes
- 10.5. Postgraduate students as trainers for undergraduate students
- 10.6. Skills training by lab simulation
- 10.7. Student learning; peer assisted, case based and problem based learning
- 10.8. Student assessment and assessment of teaching
- 10.9. Continuing Education
- 10.10. Professional competencies in the health sector.
- 10.11. Information literacy and communication
- 10.12. Knowledge management and indigenous knowledge systems in health
- 10.13. Information seeking behavior
- 10.14. Health information science and technology systems.
- 10.15. Resource sharing and networking
- 10.16. Library management issues

While these have been identified as the strategic areas of research for MUHAS it is not in anyway suggested that Faculty can not research in other areas of research outside the defined scope.

chapter 1



1.1 INTRODUCTION

Tanzania's development agenda is guided by aspirations that are articulated in the country's Development Vision 2025¹. The National Strategy for Growth and Reduction of Poverty (NSGRP)² also known in Kiswahili as "Mkakati wa Kukuza Uchumi na Kupunguza Umaskini Tanzania" (MKUKUTA) was approved by the Parliament in February 2005 for implementation over five years to provide a framework that will contribute to realization of Tanzania's Vision 2025 and facilitate achievement of the United Nations Millennium Development Goals (MDGs). NSGRP considers Education as a key and cross cutting issue that is required for its implementation. To attain a sustained overall economic growth of 6-8% annually, NSGRP calls for strengthening of the education sector especially expansion of the higher education, scientific, technological and innovation capacity. Regarding health targets, the National Development Vision 2025 aims at achieving high quality livelihood for Tanzanians through increased access to quality primary health care for all; improved access to quality Reproductive Health care for all and reduction in infant and maternal mortality by three quarters of current levels. Cluster II strategies of the NSGRP aims at improvement of quality of life and social well-being by reducing: infant mortality from 95 in 2002 to 50 in 2010 per 1,000 live births; under five mortality from 154 in 2002 to 79 in 2010 per 1,000 live births; maternal mortality from 529 in 2002 to 265 per 1,000 by 2010; prevalence of HIV/AIDS among 15-24 yr old pregnant women; and promoting knowledge based care among health workers.

The prevailing health challenges entail significant improvement on the availability and use of knowledge and technology as key tools for increased productivity and reduced poverty in Tanzania. The ongoing sectoral reforms in the country and the growing needs for well trained human resource provides a rationale for institutions of higher learning to respond accordingly by focusing on priority areas for intervention. In this context, the need for the Muhimbili University of Health and Allied Sciences (MUHAS) to strengthen her engagement in essential health research is of paramount importance in order to identify evidence-based solutions to priority health problems, generate new knowledge, develop innovative and cost effective interventions for these problems and provide objective information for guiding implementation of control and prevention strategies. In this way, MUHAS will be in position to contribute to the reduction of non-income poverty that arises from poor health.

In order to achieve the health - related objectives spelt out in Vision 2025 and the

1.1. INTRODUCTION *(continued)*

MDGs there is a need to make concerted efforts and initiate activities, which are informed by research. In order to contribute meaningfully towards generation of new knowledge for use in solving major health problems in the country, it is necessary to prioritize the areas of research so that the University comes up with an implementable research agenda. The development of this research agenda is in line with the vision of the University to become 'a centre of excellence for training health professionals, quality research and public service, located in a spacious area with a state of the art university hospital, conducive learning and working environment and sustainable resource generation'. The MUHAS research agenda is further underlined by the Mission of the University which is 'to seek for quality health through education, training, research and health services for attainment of equitable socio-economic development'.

MUHAS as a higher learning institution has the responsibility to contribute to the creation and generation of knowledge through research. The number of research programs and projects has increased dramatically over the past few years at MUHAS. Currently MUHAS has a total of 87 research programs and projects. This increase reflects the dynamism of the MUHAS scientific community in carrying out research and forging international links for transfer of technology as most of the research programs and projects are undertaken in partnership with researchers and institutions from developed countries.

MUHAS occupies a unique position in the Tanzanian society. The MUHAS outputs over the last half century have offered distinguished services to Tanzania and beyond. Research results emanating from research by MUHAS staff are used to formulate many of the health policies in Tanzania.

1.2. IMPACT OF MUHAS RESEARCH ON POLICY

MUHAS is the first and the main health professionals training institution in Tanzania, and currently it is responsible for an output of about 70% of health professionals each year. Over the years of MUHAS existence its faculty has been the pillars for informing health policy in Tanzania and has made contributions in many areas of health and allied sciences. Some of its recent contributions informing policy include:

1.2.1. Malaria:

- 1.2.1.1. Developing the national malaria treatment guidelines
- 1.2.1.2. Introduction and use of Insecticides Treated Bed Nets (ITNs) inside and outside Tanzania. This has both direct health impact in reducing malaria transmission and in improving the economy. Tanzania hosts the Factories (e.g A to Z) that produce ITNs for the whole of Africa.
- 1.2.1.3. Contribution to studies on trends of resistance to antimalarials which led to the development of treatment guidelines.
- 1.2.1.4. Involvement in clinical trials leading to the recommendation for use of Artemisinin Combination Therapies (ACTs) and rapid diagnostic tests

1.2.2. HIV and AIDS

- 1.2.2.1. Nutrition studies done at MUHAS in collaboration with Harvard Medical School have made contribution in elucidating the role of micronutrients in the care for HIV and AIDS patients, with impact both nationally and internationally
- 1.2.2.2. A clinical trial on the use of single dose fluconazole (750 mg) instead of daily 150 mg which was done at MUHAS has revolutionized the regime for the management of oral candidiasis and has been adopted worldwide.
- 1.2.2.3. Rapid diagnostic tests and algorithms for use in HIV-1 infection were evaluated at MUHAS and these have been adopted for use countrywide and internationally.
- 1.2.2.4. Validation of different diagnostic equipment procured by the Ministry of Health and Social Welfare for use countrywide.
- 1.2.2.5. MUHAS researchers were involved in the development of Tanzania National HIV and AIDS treatment guidelines.
- 1.2.2.6. MUHAS has developed capacity to conduct clinical trials including vaccine trials.
- 1.2.2.7. The Dar-Dar Mycobacterium vaccae (M. vaccae) study was instrumental in revealing that most HIV infected patients have silent TB infection
- 1.2.2.8. MUHAS researchers were instrumental in establishing the efficacy of zidovudine and lamivudine in PMPCT
- 1.2.2.9. MUHAS Socio-cultural researches have generated information that has been useful for influencing behavioural change.

1.2.3. Clinical trials

1.2.3.1. MUHAS faculty has been instrumental in developing National guidelines for conducting clinical trials.

1.2.4. Sickle cell disease

1.2.4.1. MUHAS has been involved in the development of national standards of care for Sickle Cell Disease (SCD), and has been able to highlight the burden of SCD nationally.

1.2.5. Health financing

1.2.5.1. Research conducted at MUHAS has informed the government on health financing schemes including establishment of health insurance funds which are now becoming the stronghold for healthcare financing.

1.2.6. Dental diseases

1.2.6.1. MUHAS is home to the only dental school in Tanzania. Since its inception in 1978 research done at The School of Dentistry has contributed to a number of areas, in the management and prevention of dental diseases.

1.2.7. Injuries and NCDs

MUHAS has been involved in:

1.2.7.1. Establishment of the extent and burden of injuries in Tanzania and development of intervention strategies.

1.2.7.2. Development of home-based life saving skills in awareness of danger signs, facility delivery and referral acceptances and care seeking during pregnancy complications.

1.2.7.3. Improved knowledge and awareness in health seeking behaviour and reporting of events among survivors of child sexual abuse, rape, and intimate partner violence.

1.3. RATIONALE

A research agenda is a time-bound plan and a focus on issues and ideas in a subset of a defined field, which clearly defines specific identified research goals and the organizing principles around which to work to achieve these goals.

The rationale for having a research agenda is to create a linkage among stakeholders, both internal and external, in addressing research questions of priority to societal needs and in so doing to achieve a focused and guided growth and development. The development of a research agenda is particularly important because MUHAS research activities have not been guided by a well defined research agenda.

1.4. OBJECTIVES OF THE RESEARCH AGENDA

- 1.4.1. To prioritize certain research themes and build on existing strengths
- 1.4.2. To expand capacity for research, innovation and invention
- 1.4.3. To create centers of excellence that address critical health issues in Tanzania.
- 1.4.4. To build and manage multidisciplinary research consortia comprising MUHAS faculty, students, and collaborators that address specific defined strategic research goals.
- 1.4.5. To enhance communication and collaboration among stakeholders
- 1.4.6. To inform and educate health research communities of the research needs and elicit collaboration where appropriate
- 1.4.7. To communicate the research needs and directions to legislators and policy makers
- 1.4.8. To facilitate the translation of basic and applied research findings to the professional community and the public.
- 1.4.9. To stimulate the development of implementation plans that would identify resources available and propose desirable sequencing and timing of research support activities.

1.5. STAKE HOLDERS

The MUHAS research agenda has a number of stake holders. These include individuals both government and non- government institutions, such as policy makers, Ministry of Health and Social Welfare, Ministry of Education and Vocational Training, internal and external funding agencies, research collaborators, students as well as researchers.

- 1.5.1. This Research Agenda will be useful in guiding policy makers in implementing the National Research Policy and formulating future policies.

1.0 BACKGROUND

- 1.5.2. MUHAS is the leading Government institution of Higher learning that is expected to assist the Ministry of Health and Social Welfare in formulating health policies in the country. MUHAS' research agenda therefore among other things is expected to assist the Ministry in addressing health problems in the country.
- 1.5.3. The Ministry of Education and Vocational Training oversees conduct of cost effective and appropriate research. A research agenda will be an important document in guiding allocation of research resources to MUHAS.
- 1.5.4. A well-designed Research agenda is an important document for Internal and external funding agencies and it provides the necessary information on research activities at MUHAS. A considerable proportion of the current research conducted at MUHAS is collaborative research; involving MUHAS researchers and researchers from other research institutions in Tanzania and from other countries. A MUHAS research agenda therefore, is a document intended to give appropriate information to prospective external researchers who would like to do research in collaboration with MUHAS researchers.

1.6. MUHAS RESEARCH GOVERNANCE

The governance and regulation of research has become increasingly complex. Planning, coordination and administration of institutional research requires an increasingly professional approach whereby managers and administrators must provide high quality, client-centred services to diverse internal and external stakeholders. This implies the appointment of both academic and administrative staff to specific research positions and upgrading the capabilities of staff throughout the institution to better manage research.

MUHAS has a Directorate of Research and Publications which manages research and all sponsored programmes. The main function of the Directorate is to provide a conducive environment for conducting research, ensure responsible conduct of research, and provide pre-award and post-award support to faculty, students and collaborators.

The University Senate Research and Publications Committee (SRPC) is a sub-committee of the MUHAS Senate which is responsible for advising the Director of Research and Publications (DRP) on all the research and dissemination activities at MUHAS.

Schools and Institutes have their respective Research and Publications Committees. These committees are responsible for coordinating research and dissemination of research results

at the unit levels. The chairpersons of the schools and institutes Research and Publications Committees are members of the University SRPC and are therefore responsible for reporting implementation and progress of the Schools` and Institutes` research activities to the University SRPC.

A Research Policy, Standard operating procedures for the Directorate are in place and a research bulletin is produced annually. In addition MUHAS has research assurance systems in place including human and animal protection, conflict of interest policy, how to handle research misconduct; contract, subcontract, Intellectual Property Policy & Procedures, Material Transfer Agreement, Format for Memorandum of Understanding, and financial policy. This system provides pre and post award support to researchers.

1.7. METHODOLOGICAL APPROACH

The Deputy Vice Chancellor-Academic Research and Consultancy appointed a five member team to formulate the University Research Agenda. The team prepared a structured questionnaire which explored previous research done at MUHAS, research gaps, and the suggested future research areas which were administered to all principal investigators and University units. Presentations were made from prominent MUHAS researchers and research themes were identified. A draft research agenda was then developed and circulated to stakeholders at MUHAS for inputs.



chapter

2



2.1. THEME 1: HIV AND AIDS

2.1.1. Background

HIV and AIDS is currently a global burden affecting all countries of the world. In 2008 there were an estimated 32 million People Living with HIV and AIDS (PLHA) globally, and an estimated 2.7 million new HIV infections, and 2 million HIV related deaths. Sub Saharan Africa bears the greatest burden of the pandemic. About 67% of all people living with HIV are found in sub-Saharan Africa and 75% of total global AIDS deaths occurred in the region in 2008. Nearly 60% of HIV infection in Sub Saharan Africa is among women.

Tanzania is one of the countries badly affected by the HIV epidemic in Africa. Although the actual prevalence of HIV-infection still varies from place to place, the national average for the adult population is now (2010) estimated to be around 5.7%. It is also estimated that 2.2 million people are living with HIV and AIDS. Continued HIV transmission has occurred despite great efforts with health preventive education and other interventions. Efforts at preventing further transmission of HIV have so far had limited success. Newer efforts need to be developed for the successful prevention of HIV. Novel methods have been developed and are currently being evaluated and operationally tested. These include male circumcision and the use of microbicides. The ultimate goal however in prevention of HIV transmission is the development and evaluation of a potent HIV vaccine. While mother to child transmission of HIV has drastically been reduced in most developed countries, it is still a major problem in sub Saharan Africa. Prevention of mother to child transmission (PMTCT) needs to be stepped up Tanzania.

Of the estimated 2.2 million PLHA in Tanzania, approximately 400,000-600,000 require anti retroviral therapy (ART). The availability and easy access to anti retroviral drugs since 2004 in Tanzania, has greatly improved the survival of HIV infected individuals, improved their quality of lives and greatly increased their economic productivity. A lot more people need to be reached. The long-term effect of ART among HIV infected individuals more so in children is yet to be observed; this includes the effect on HIV transmission.

2.1.2. Research gaps

Despite the fact that the largest number of research projects at MUHAS were in the area of HIV and AIDS, there are still a number of research gaps that need to be

addressed; these include areas of:

- 2.1.2.1. HIV infection prevention such as; HIV vaccine, male Circumcision, the use of Microbicides, and prevention of mother to child transmission (PMTCT),
- 2.1.2.2. HIV diagnosis and monitoring, including development and evaluation of affordable and easy to use diagnostic and monitoring tests.
- 2.1.2.3. HIV care and Treatment in the areas of: availability and accessibility of cost effective and quality HIV drugs and those used to treat opportunistic infections; Growth and Development of Children using ARVs, stigma and disclosure in HIV.

2.1.3 Priority Research areas in HIV and AIDS

MUHAS Research priorities are aimed at addressing MDGs and MKUKUTA and thus in line with the National and MUHAS Research priorities. The priority also takes in account ongoing research as well as the available infrastructure and research staff. Priority will be in the following areas:

HIV and AIDS; This will focus on,

- 2.1.3.1. Continued epidemiological surveillance of the epidemic
- 2.1.3.2. Prevention of HIV Infection, priority will be directed to; PMTCT, development of HIV Vaccines and conducting clinical trials, the use of microbicides, the role of male circumcision in HIV prevention.
- 2.1.3.3. HIV and AIDS care & treatment, stigma, disclosure and adherence to ARVs in children and adolescents,
- 2.1.3.4. Care and treatment of HIV and AIDS such as, development and/or evaluation of affordable diagnostic and monitoring Laboratory tests, development and evaluation of new drugs including those obtained from natural products for use in HIV and AIDS. Priority in care and treatment will be on adherence to ART and associated factors.
- 2.1.3.5. Psycho-social determinants of HIV and AIDS. For example, psychosocial factors enhancing Transmission of HIV or those that influence care and treatment of HIV and AIDS. Other areas of interest will include stigma and disclosure especially in pediatric practice.

2.2 THEME 2: TUBERCULOSIS

2.2.1 Background:

Tuberculosis (TB) is still a major public health problem in Tanzania with the country ranking 8th among the 22 high TB burden countries, which collectively bear 80% of the global burden of TB. The number of TB cases notified in the country was 66,000 cases in 2008. This is a six fold rise compared to 1983 in the pre HIV era. TB is one of the leading causes of mortality in Tanzania.

The TB burden in Tanzania is further compounded by the ongoing HIV/AIDS epidemic. It is estimated that over 50% of the TB notified annually is HIV related. The co-infection of HIV and TB requires concerted efforts of both the TB and HIV programs in an effort to reduce the burden of TB in the country. Tanzania has one of the strongest national tuberculosis programme that has successfully managed to detect and correctly treat most cases of TB and thus reducing the risk for the development of multi drug resistant TB (MDR-TB). Despite the efforts made there is an increasing fear of the occurrence of MDR and XDR-TB.

TB research receives high priority from the Ministry of Health and Social Welfare (MoHSW) and development partners with the aim of achieving the goals of the National TB programme which is to reduce significantly the burden of TB by 2015 in line with the Millennium Development Goals (MDGs). The MDGs targets are to detect at least 70% of the estimated infectious (smear-positive) cases. This also aims at achieving a cure rate of at least 85% of the detected smear-positive cases so as to reduce TB prevalence and death rates by 50% relative to 1990 level by 2015 and to eliminate TB as a public health problem ($\leq 1/1,000,000$ population) by 2050.

2.2.2 Research gaps

- 2.2.2.1. Development and evaluation of new diagnostic tools especially those that will enhance the diagnosis of paediatric TB.
- 2.2.2.2. Development and evaluation of New TB vaccines
- 2.2.2.3. Surveillance of MDR and XDR Tuberculosis
- 2.2.2.3. Development and evaluation of new drug products

2.2.3 Priority areas of research

- 2.2.3.1. Development and/or evaluation of new diagnostic tools especially those that will assist in the diagnosis of paediatric TB.

- 2.2.3.2. Development and evaluation of New TB vaccines
- 2.2.3.3. Surveillance of MDR and XDR Tuberculosis
- 2.2.3.4. Development and evaluation of new drug products for adults as well as for children.
- 2.2.3.5. Factors enhancing treatment outcomes such as nutrition, drug -drug interactions HIV and TB co-infection, Tuberculosis related Immuno-Reconstitution Inflammatory Syndrome

2.3 THEME 3: MALARIA

2.3.1 Background:

Malaria is still a major global health problem despite the great efforts to eradicate it. The World Health Organization estimates that more than 100 countries are endemic for malaria and half of the world's population are at risk of contracting the disease. Malaria is the main cause of morbidity and mortality, particularly in Africa where the transmission rate is high. About 240 million people are reported to suffer from malaria annually and 1.0 million people, mainly children under five years of age and pregnant women die every year in the world because of malaria. Sub-Saharan Africa is the most affected region in the world, accounting for about 85% of the world's malaria cases and 90% of the world's malaria deaths.

In Tanzania malaria is the leading cause of hospital visits and mortality, with a national prevalence of 18.1%. Tanzania mainland is the most affected; with 93% of the population at risk, and nationally 16 million cases, 40% of outpatient visits and 70,000 deaths are reported annually. Recent interventions combining chemotherapy, Insecticide-treated bed nets (ITNs) and residue insecticide spray (RIS) have brought down the prevalence in Zanzibar down to 0.8%.

Malaria research at MUHAS has covered discovery of novel molecules from natural products for treatment and prevention of malaria, development of analytical methods for antimalarials in blood, identification of genetic markers of resistance. Other areas include evaluation of rapid diagnostic tests, clinical trials and validation of new treatment regimens, severe anaemia and cerebral malaria in children. However, malaria is still one of major causes of morbidity and mortality.

2.3.2 Research Gaps:

Gaps in knowledge that still demand answers from research include:

- 2.3.2.1. Factors determining host-parasite interactions and evasion of the host immune system
- 2.3.2.2. The need for effective transmission block vaccines
- 2.3.2.3. The need to further elucidate parasite resistance mechanisms to antimalarials.
- 2.3.2.4. The need to develop new strategies and agents for mosquito vector control, such as for ITNs and residual spray
- 2.3.2.5. The need to develop new drug molecules for combination therapies
- 2.3.2.6. Lack of alternative drugs to be used for IPT in pregnant women in the place of sulphadoxine /pyrimethamine which has shown high levels of resistance.
- 2.3.2.7. Financing strategies for malaria control and treatment
- 2.3.2.8. Malaria control interventions including introduction and evaluation of new interventions and policies
- 2.3.2.9. Management of patients co-infected with malaria and HIV, with focus on drug-drug and drug host interactions
- 2.3.2.10. Malaria treatment in children and resistance to chemotherapy

2.3.3 Priority research areas

- 2.3.3.1. **Pathogenesis and immunology of malaria.** This will include studying factors involved in the predisposition to the severe forms of the disease, identification of surrogate markers for protective immunity development, escape of malaria parasites from host immunity and pyruvate kinase deficiency and malaria and development of evaluation of transmission block vaccines (TBV).
- 2.3.3.2. **Severe malaria in children, pregnant women and associated factors**
- 2.3.3.3. **Chemotherapy of malaria and genetics of antimalarial drug resistance.** This will look at the following research areas: Malaria in co-morbidities, drug-drug interactions and implication to treatment, epidemiology, invitro susceptibility of clinical isolates and molecular markers of resistance. It will also focus on rapid diagnostic tests, development of new artemisinin combination therapy (ACT) alternatives, development of new alternatives for intermittent prevention therapies (IPTs) and antimalarial blood drug levels and pharmacogenetics in different groups.

- 2.3.3.4. **Malarial vaccine development and evaluation in children**
- 2.3.3.5. **Malaria vector control:** The areas of interest include studies on vector biology and ecology, ITNs (improving use and evaluation for efficacy), resistance to insecticides and development of larvicides and insecticides from natural products
- 2.3.3.6. **Novel malaria control tools from natural products.** In the natural products field the interest is on the isolation, characterization and structural modification of new active antimalarial compounds from plants and marine invertebrates.

2.4 THEME 4: REPRODUCTIVE HEALTH

2.4.1 Background

Reproductive health is one of the major health concerns in the developing countries. Sexual and reproductive ill health, such as complications from pregnancy and childbirth, sexually transmissible infections, including HIV and reproductive cancers accounts for over one third of the global burden of diseases of women of child bearing age, and one-fifth of the burden for the whole population. Complications of pregnancy and childbirth are a leading cause of death and disability for women aged 15–49 in most developing countries. Of the estimated 358,000 maternal deaths that occur annually worldwide, 99% occur in developing countries like Tanzania.

Although there has been a decline in the infant and child mortality in Tanzania during the last decade, neonatal mortality remains unacceptably high at 32 per 1,000 births. Up to 50% of the neonatal deaths occur during the first 24 hours after birth. Neonatal deaths contribute to more than 40% of infant mortality; thus no further decline could be expected unless neonatal mortality is also adequately addressed. The main causes of neonatal deaths include birth asphyxia, sepsis and complications of preterm births. Interventions to improve maternal health and reduce maternal mortality such as improved access to quality emergency, obstetric care, utilization of skilled attendance at birth antenatal treatment and prevention of anaemia and malaria will also impact on neonatal mortality reduction.

Improving maternal health and reduction of maternal and child mortality is among the MDGs as well as goals for the MKUKUTA. Subsequently, research in reproductive health contributes towards achievement of both MDGs and MKUKUTA goals.

2.4.2 Research Gaps

- 2.4.2.1. Obstetric emergencies and postpartum complications: particularly targeting clinical management of the main causes of maternal deaths
- 2.4.2.2. Risk factors for disabilities, including obstetric fistula and incontinence.
- 2.4.2.3. Adolescent gynecology, reproductive health, gender based violence and sexual abuse.
- 2.4.2.4. Innovation research for new treatments and diagnostic procedures in reproductive Health
- 2.4.2.5. Fecundity and contraception: fertility, fetal losses, their causes, prevention, contraception methods and use

2.4.3 Priority research areas

- 2.4.3.1. Safe motherhood including obstetric emergencies and postpartum complications
- 2.4.3.2. Factors affecting the quality of maternal health care in rural areas
- 2.4.3.3. Involvement of the communities in the prevention of maternal mortality, gender-based violence and child sexual abuse
- 2.4.3.4. Innovations in the diagnosis and treatment of gynecological and obstetric conditions

2.5 THEME 5: CHILD HEALTH

2.5.1 Background

Infectious diseases are the most common cause of death in children and the most common reason that children under two years of age are admitted to hospitals. World-wide, 10 million children under the age of five die from infections each year.

2.5.2 Research Gaps:

There is more to know about research in children

- 2.5.2.1. Causes and treatment of diarrhoeal diseases
- 2.5.2.2. Inadequate information on environmental and genetic factors in paediatric respiratory diseases
- 2.5.3. Priority research areas
 - 2.5.3.1. Diarrhoeal diseases in children
 - 2.5.3.2. Infectious diseases in children other than HIV/TB/Malaria

- 2.5.3.3. Physical and psychosocial factors in child development
- 2.5.3.4. The role of environmental and genetic factors in paediatric respiratory diseases.

2.6 THEME 6: NON-COMMUNICABLE DISEASES

2.6.1 Background:

Incidence of chronic Non Communicable Diseases (NCDs) is increasing. NCDs account for 60% of mortality in the world with 50% of it coming from Low to Middle Income Countries (LMICs). Deaths due to NCDs are displacing deaths due to infectious diseases even in LMICs. Important drivers for the rising NCDs in Tanzania and Africa in particular include smoking, obesity, high salt intake, sedentary lifestyle, excess alcohol intake, indoor air pollution, and environmental exposures. Significant demands are being made on the health services by patients with these diseases.

To ignore the noncommunicable diseases would inevitably lead to an increase in their burden; the provision of health services for them would be largely undirected by issues of clinical and cost effectiveness, and their treatment and prevention would be left to the mercy of local and global commercial interests.

Improved surveillance of all diseases within sub-Saharan Africa is needed in order to place noncommunicable diseases properly within the context of the overall burden of disease. Research is needed to guide improvements in the clinical and cost effectiveness of resources currently committed to the care of patients with noncommunicable diseases, and to direct and evaluate preventive measures.

2.6.2 Research gaps:

- 2.6.2.1. Lack of reliable data on the overall burden and causes of non communicable diseases in Tanzania
- 2.6.2.2. Lack of data linking public health and clinical care
- 2.6.2.3. Lack of data for evidence based decision making
- 2.6.2.4. Weak public health and clinical surveillance systems
- 2.6.2.5. Non-communicable diseases in pregnancy
- 2.6.2.6. Malignancies and problems of aging, especially urogynecology, cancer screening and menopausal problems
- 2.6.2.7. Causes and treatment of non communicable diseases in children
- 2.6.2.8. Role of Micro nutrients in paediatric morbidity and mortality

2.6.3 Research Priority Areas:

- 2.6.3.1. Conduct studies that will establish the magnitude, associated risk factors and monitoring NCDs in Tanzania.
- 2.6.3.2. Develop and evaluate interventions for NCDs.
- 2.6.3.3. Operationalize evidence based and known cost effective interventions
- 2.6.3.4. Establish/strengthen national policies and plans for prevention and control of NCDs
- 2.6.3.5. Analysis of cultural, ethnographic and geographical factors on concepts of health and chronic disease
- 2.6.3.6. Examine outcomes of the use of affordable care and treatment modalities
- 2.6.3.7. Malignancies including gynaecological and paediatric malignancies
- 2.6.3.8. NCDs including hematological diseases in children.
- 2.6.3.9. Genetic and environmental determinants of disease and outcome
- 2.6.3.10. Promote partnerships for the prevention and control of NCDs
- 2.6.3.11. Monitor NCDs and their determinants & evaluate progress
- 2.6.3.12. Examining variations in disease incidence and prevalence and outcomes of treatment and care
- 2.6.3.13. Occupational diseases.
- 2.6.3.14. Nutrition, specifically to address nutrition and child development and the use of micro nutrients to modify outcomes of paediatric morbidity and mortality

2.7. THEME 7: INJURIES**2.7.1 Background:**

Low- and middle-income countries suffer disproportionately from reduced life expectancy and quality of life as a result of injuries. Injuries are overlooked as contributors to global inequities in health, yet the long-term disabilities they frequently produce represent a significant burden.

Road traffic injuries account for roughly one quarter of the total number of injury deaths worldwide. Ninety percent of this burden is borne by low/middle-income countries, where such injuries are among the leading causes of death and disability in the 5- to 44-year age group. Moreover, significant gender disparities exist; among males in the 15- to 44-year age group, for example, road traffic injuries are the

leading cause of trauma-related death worldwide, whereas suicide is the leading cause among females.

While tremendous resources are consumed caring for injured patients at hospitals, less attention is directed toward gaining a better understanding of injury prevention or initiating organized efforts to improve trauma treatment systems. Knowledge dissemination regarding patterns of injuries, demographic characteristics, and areas where injuries occur would assist in determining how such care can be improved and would most likely have an impact on disability as well as mortality rates.

MUHAS goal is to provide an understanding of the contribution of trauma and injury to the burden of disease in Tanzania. In this research agenda, research gaps are illustrated and priority areas are identified. ...The resulting benefits of addressing the growing burden of trauma and injury to communities in resource-constrained settings around Tanzania would be substantial.

2.7.2 Research Gaps

- 2.7.2.1. Community-based surveys on injuries
- 2.7.2.2. Socio cultural aspects of specific types of injuries
- 2.7.2.3. Development/adaptation and testing of interventions
- 2.7.2.4. Economic costs of injuries

2.7.3 Research Priority Areas

- 2.7.3.1. Magnitude and factors associated injuries
- 2.7.3.2. Development, adaptation and testing of interventions
- 2.7.3.3. Motor vehicle accidents
- 2.7.3.4. Economic costs of injury
- 2.7.3.6. Determining vulnerable populations
- 2.7.3.8. Occupational injuries
- 2.7.3.9. Violence and intimate partner violence
- 2.7.3.10. Injuries in children

2.8. THEME 8: HEALTH SYSTEMS RESEARCH

2.8.1 Background

Health care financing in Tanzania and much of Sub-Saharan Africa has by and large been tax financed. Recent developments underlined deficiencies of this method.

Many governments in the region have therefore initiated pre payment (health insurance scheme) arrangements as a method of financing health care. Community Health funds (CHF) and Social Insurance Schemes have been recommended. The start up has been challenged by a number of operational problems. Enrolments are lower than expected, drop outs are many and accreditation of providers is not working well.

The district level has been Health systems governance identified as the focal point for health care planning in Tanzania and elsewhere in the developing countries. For Tanzania this level has not functioned well. There are problems of financial and human resources, information for planning, evaluation and monitoring. It is common sense that without effective planning the health care services sector can not function. MUHAS has visible gaps in addressing this critical area.

Public/private partnership is a current approach in health care services in the country. This, however, is a new approach in Tanzania. It is necessary to thoroughly know how this partnership is operating in an environment dominated by the public sector. For MUHAS this is also a new area which needs to be studied vigorously.

For effectiveness and efficiency deployed resources and systems need good governance. A review of MUHAS research outputs shows that for the institution this is a research gap area which needs attention.

Accurate information is a necessary input for good planning and decision making. In Tanzania this is a major deficiency that needs to be addressed. A country-wide Health Management Information System (HMIS) has been put in place but its quality is very low and many are hesitant to use it as a source of information. Underlying challenges of HMIS in Tanzania need to be established. So far MUHAS has only minimally addressed this area through postgraduate students training and research. More needs to be done.

2.8.2 Research Gaps

2.8.2.1. Health Care delivery Systems

2.8.2.2.1. Health care financing

2.8.2.3. Qualification and quantification of Community Health Funds and Social Insurance Schemes of operational problems. care planning

- 2.8.2.4. Lack of information for evaluation and monitoring of financial and human resources
- 2.8.2.5. Public-private partnership
 - How does this partnership operates in an environment dominated by the public sector
- 2.8.2.6. Human Resource dynamics
 - How many people, where do they go, what moves them and what retains them are key issues that need to be assessed.
- 2.8.2.7. Health systems governance
 - Lack of effective and efficient resources deployment and systems for good governance
 - Role of decentralization
 - Health sector reforms

- 2.8.2.9. The Health Management Information System
 - Low quality of and poor utilization of Health Management Information System

2.8.3. Research priority areas

- 2.8.3.1. Human Resource for Health dynamics
- 2.8.3.2. Quality of training and continuing education
- 2.8.3.3. Health care financing
- 2.8.3.4. Health care planning
- 2.8.3.5. Public-private partnership
- 2.8.3.6. Health systems governance
- 2.8.3.7. Health Management Information System
- 2.8.3.8. Evaluation of new strategies and policies.

2.9: THEME 9: NEGLECTED TROPICAL DISEASES

2.9.1. Background

The Neglected Tropical Diseases (NTDs) are a group of Parasitic and microbial diseases that are among the most common infections in the developing world and affect the impoverished segment of the population. The impact of the NTDs on populations in the endemic communities is enormous and account for 90% of the global disease burden.

The major NTDs include; Lymphatic filariasis, Onchocerciasis, Schistosomiasis, Soil transmitted Helminths (Ascariasis, Trichuriasis, Hookworm, Strongyloidiasis), Trachoma, Leishmaniasis, Human African Trypanosomiasis, Chagas disease, Dracunculiasis, Leprosy and Buruli Ulcer. Significant progress has been made to control or eliminate some of the NTDs, including, Lymphatic filariasis, Onchocerciasis, Chagas disease and Leprosy. Concerted efforts have been made to raise attention to the NTDs and a solid foundation has been established for effective management of the NTDs and on a broader scale. The global Network for Neglected Tropical Diseases has been established to develop more coherent effective and efficient approaches to NTD control, building on the work already accomplished by a variety of partnerships; including the Global Alliance to Eliminate Lymphatic Filariasis, the African Programme for Onchocerciasis Control and the Partnership for Parasite Control.

NTDs have historically ranked low in research priority with the most attention and funding devoted to HIV/AIDS, malaria and tuberculosis (High profile diseases). However, because of geographical overlap and the synergistic effects the NTDs have on the high profile diseases it has been proposed that NTDs control be directly linked with other vaccine development programs.

2.9.2. Research gaps

- 2.9.1.1 Lack of effective and affordable control tools for several NTDs
- 2.9.1.2 Lack of effective and affordable drugs. The available drugs are toxic, expensive and not very effective due to increasing drug resistance
- 2.9.1.3 Available diagnostic tools perform poorly or have practical limitations
- 2.9.1.4 For NTDS where effective control tools exist there are problems related to poor implementation, poor access and challenges of sustainability
- 2.9.1.5 Lack of research into host parasite relationships for some NTDs (ie. Pathogen Biology and the host response)
- 2.9.1.6 Research needed to generate information on prevalence and other epidemiological indices to inform the ongoing elimination programs for some NTDS

2.9.3 Priority research areas

- 2.9.3.1 The magnitude of NTDs and associated factors.
- 2.9.3.2 Parasite molecular biology and host-parasite interactions
- 2.9.3.3 Development of new and improved tools for diagnosis, treatment, prevention of NTDs.
- 2.9.3.4 To develop the mechanisms for elimination of some of the NTDs e.g. lymphatic filariasis.

2.10 THEME 10: HEALTH PROFESSION EDUCATIONAL RESEARCH

2.10.1 Back ground

The specialty of research in medical education commenced with a small group of clinicians and educational researchers at the medical school in Buffalo, New York just under forty years ago. It has since then expanded worldwide, with inputs to learning, teaching, and assessment in medicine. Sometimes “medical education” is used to mean what it says- education in medicine, but the term is also used to include education in all health professions, i.e. Medicine, Dentistry, Pharmacy and Nursing, among others. To compound the difficulty in terminology some of the other professions have opted for their own territorial terminology, and terms like “pharmacy education” are now in use. To minimize ambiguity, in this research agenda the term “Health Professions Education” is used to connote education in all health professions.

Areas of major development include basic research on the nature of medical expertise, problem based learning, performance assessment, and continuing education/ professional development and assessment of practicing health professionals.

Traditionally improvement of teaching learning has been based largely on curriculum reviews without necessary looking critically at the whole process of methods of teaching and participation of students in the teaching process.

2.10.2 Research Gaps

- 2.10.2.1. Curricular approaches that are most suitable in our setting are not known
- 2.10.2.2. Approaches to faculty recruitment, development and retention that are likely to be effective in enhancing efforts to speed up the production of health professionals are not yet determined

- 2.10.2.3. Effectiveness and efficiency of Distance Learning mode in delivering some Health Profession Education courses need to be determined i.e. research is needed to explore the feasibility of doing some of the theory courses in Distance Learning mode so that students may not need to stay on campus full time.

2.10.3 Research priority areas

Research into various teaching/learning methods is needed to optimize the implementation of curricula at the university. This will include research in such areas as:

- 2.10.3.1. Innovative teaching/learning methods
- 2.10.3.2. Team based learning
- 2.10.3.3. Small group teaching
- 2.10.3.4. Teaching large classes
- 2.10.3.5. Postgraduate students as trainers for undergraduate students
- 2.10.3.6. Skills training by lab simulation
- 2.10.3.7. Student learning; peer assisted, case based and problem based learning
- 2.10.3.8. Student assessment and assessment of teaching
- 2.10.3.9. Continuing Education
- 2.10.3.10. Professional competencies in the health sector.
- 2.10.3.11. Information literacy and communication
- 2.10.3.12. Knowledge management and indigenous knowledge systems in health
- 2.10.3.13. Information seeking behavior
- 2.10.3.14. Health information science and technology systems.
- 2.10.3.15. Resource sharing and networking
- 2.10.3.16. Library management issues

chapter

3



3.0 CHALLENGES FOR IMPLEMENTATION OF RESEARCH AGENDA

MUHAS boasts of the following strengths:

- MUHAS has the best Health research laboratories in the country.
- There is a Directorate of research that oversees administration of research activities.
- Currently MUHAS runs a number of collaborative research projects.
- There are a number of highly qualified faculties who have been instrumental in generating research outputs that informed policy.

However, despite the strengths that MUHAS has there are some challenges that in one way or the other may have impact on the implementation of this research agenda. These include:

- **Uncertainties of obtaining adequate resources:** Successful implementation of this research agenda will depend on the availability of adequate financial and human resources and also adequate infrastructure to host the different research and development and innovation activities. However, it is noted that research at MUHAS is largely donor funded. While the recent commitment by the Government to allocate 1% of its budget to support research may address this bottleneck its implementation still awaits the test of time. The implementation of the proposed research agenda requires adequate and well trained human resources, with new skills and expertise. A solution is needed to deal with difficulties to recruit additional staff, and in the same vain availability of adequate financial resources to train them in priority research and innovation skills which may not get the support or sympathy of the donor community.
- **Inadequate research facilities:** In an ideal situation each academic staff is supposed to have sufficient space for research. This allows the faculty and their students to be able to conduct research freely and also protect intellectual property. Given the financial constraints in this country provision of laboratory space for each academic staff is almost impossible. There is need to have laboratories that will host shared research facilities. This will allow access by many and at the same time make it easy to service the equipment. In addition it will avoid unnecessary duplications.
- **Lack of an appropriate and modern animal house facility:** The MUHAS animal house facility is needs to be improved and have adequate trained staff in order to conduct ethically sound research on animals.

3.0 CHALLENGES FOR IMPLEMENTATION OF RESEARCH AGENDA

- **Inadequate capacity for maintenance of research equipment:**
The University uses maintenance contracts with institutions outside the country which are expensive and time consuming. There is a strong need to train staff for maintenance of laboratory equipment, and establish a workshop for maintenance of laboratory equipment.
- **A limited number of research administrative staff:** MUHAS has a limited number of administrative research staff in the office of the Director of Research and Publications. There is need to employ more administrative staff that will assist in grants management and other research activities.
- **Limited capacity to store and manage research data:**
The Directorate of Research and Publications should be equipped with adequate capacity to store data. This will ensure good management and coordination of research activities.

chapter

4



4.0 OPERATIONALIZATION OF RESEARCH AGENDA

Each researcher and academic unit will determine areas of the research agenda in which they want to excel. Implementation will be supported by the Directorate of Research and Publications (DRP). The DRP's office will support:

- i. Identification of funding opportunities
- ii. Budget preparation
- iii. Routing and clearance of research proposals
- iv. Grants administration
- v. Providing institutional facts and figures
- vi. Grants and contracts negotiations
- vii. Compliance with institutional and sponsor regulations
- viii. Oversight of research and ethics.

In implementation of the research agenda, the Directorate shall ensure that:

- i. Research agenda is implemented in line with the MUHAS Research Policy and Corporate Rolling Strategic Plan.
- ii. MUHAS staff, students, collaborators and funding agents are aware of the research agenda and its objectives.
- iii. Research funds from public, private and external sources are secured with preference to the research priority areas as stipulated in the research agenda.
- iv. A register of all researches and research outputs that are conducted by MUHAS staff, students and collaborators is established.
- v. University Research Bulletins and Research Annual Reports are made available to inform stakeholders on the status of research activities at MUHAS.

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