BIOGRAPHICAL SKETCH

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NAME: Tumuhimbise, Wilson

eRA COMMONS USER NAME (credential, e.g., agency login): WILSONTUMUHIMBISE

POSITION TITLE: Lecturer, Research Fellow, Mbarara University of Science and Technology

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, include postdoctoral training and residency training if applicable. Add/delete rows as necessary.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	Completion Date MM/YYYY	FIELD OF STUDY
Mbarara University of Science and Technology, Mbarara Uganda	BIT	01/2016	Information Technology
Mbarara University of Science and Technology, Mbarara Uganda	MSc	10/2017	Health Information Technology
Mbarara University of Science and Technology, Mbarara Uganda	PhD	05/2023	Computing (Health Informatics)

A. Personal Statement

I am a Lecturer and a Research Fellow in the Faculty of Computing and Informatics, Mbarara University of Science and Technology (MUST), the second public University in Uganda. My long-term career goal is to be an independent Health Informatics Scientist focused on using mobile health technologies to improve patient centered care in low-resource settings. Throughout my academic journey, I have sought out opportunities that align with my career goals, from my undergraduate degree in 2015, to my masters of science in information technology in 2016 and the PhD in Computing (majoring in Health Informatics) in 2023. I started my research journey by working as a research assistant on Dr. Musiimenta's MATK43 study (1K43TW010388: PI: Musiimenta) that investigated the use of mobile health technologies to support TB medication adherence in rural Uganda in rural southwestern Uganda. For five years, I received research mentorship in screening and recruiting study participants and conducting in-depth interviews, and utilizing real-time adherence monitors to monitor TB patients. I gained more research skills when I enrolled into a PhD program with funding support from on an NIH funded My Mobile Wallet project (R21HD107985: PI: Musiimenta) a novel behavioral and economic intervention that utilizes SMS texts to remind medication adherence and utilize mobile money approaches to provide transport to the clinic and incentivize medication adherence. On this project, I worked as a PhD student Research Assistant, with my research focusing on mobile health interventions for enhancing public private mix in Tuberculosis care in Uganda. During the PhD training I gained skills in scientific writing and published four first author peer- reviewed journal papers. I have a background in Information Communication Technology (ICT), with specific training and expertise in mobile health technologies, implementation research, user-centered design, qualitative and behavioral science methodology, and quantitative research.

I have gained extensive interest and experience in the use of digital technologies and health outcomes in TB patients on treatment. I believe that all these experiences have prepared me well with the necessary skills and expertise to be a leader in digital health advancement in Africa. I have a background in Information Communication Technology (ICT), with specific training and expertise in mobile health technologies, implementation research, user-centered design, qualitative and behavioral science methodology, and quantitative research.

The following publications highlight my research scholarship and productivity as an upcoming researcher in implementing digital health interventions in Africa.

1. **Tumuhimbise,W.,** Theuring, S., Kaggwa, F., Atukunda, E.C., Rubaihayo, J., Atwine, D., Sekandi, J.N. and Musiimenta, A., 2024. Enhancing the implementation and integration of mHealth interventions in resource-limited settings: a scoping review. *Implementation Science*, *19*(1), p.72
2. **Tumuhimbise, W.** and Musiimenta, A., 2021. A review of mobile health interventions for public private mix in tuberculosis care. *Internet Interventions*, p.100417.
3. **Tumuhimbise, W.,** Atwine, D., Kaggwa, F. and Musiimenta, A., 2022. Enhancing Tuberculosis Care in Southwestern Uganda: Facilitators and Barriers to Utilizing Mobile Health Technologies. *Global Implementation Research and Applications*, pp.1-11
4. **Tumuhimbise, W.,** Atwine, D., Kaggwa, F. and Musiimenta, A., 2023. Acceptability and feasibility of a mobile health application for enhancing public private mix for TB care among healthcare Workers in Southwestern Uganda. BMC Digital Health, 1(1), pp.1-11.

B. Positions, Scientific Appointments, and Honors

2024- Present	Founder and Executive Director, African Digital Health Research Advancement Center
2023- Present	Lecturer, Department of Computer Science, MUST
2023- Present	Post-Doctoral Researcher, MUST Grants Office
2023- Present	Editorial Board Member, BMC Digital Health Journal
2023- Present	Research Fellow, Faculty of Computing and Informatics, MUST
2023- Present	External Examiner, School of Public Health (Epidemiology and Bio-Statistics Department), Makerere University
2023- 2024	Information Technology Consultant for the National Emergency Obstetric and Neonatal Care (EmONC) Assessment 2023, Ministry of Health
2022- 2024	Co-Investigator, Adolescent Girls project, MUST Grants Office (German Research Foundation— DFG, Germany funded)
2023- 2024	Lecturer, International University of Applied Sciences, Erfurt Germany
2016- 2023	Volunteer Teaching Assistant, Faculty of Computing and Informatics, MUST
2018- 2022	PhD student with Scholarship at Mbarara University of Science and Technology
2021- 2023	Research Coordinator, MyMobile Wallet Project, MUST Grants Office (NIH USA funded)
2021- 2022	Research Coordinator, MobileMomCare Project, MUST Grants Office (BMBF, GERMANY funded)
2021- 2023	Research Coordinator, DATs Ethics Project, MUST Grants Office (NIH, USA funded)
2016- 2021	Research Assistant, MAT-K43 Project, MUST Grants Office (NIH, USA funded)
2018- 2020	Research Coordinator, MatHealth Project, Grants Office (BMBF, GERMANY funded)
2020- 2021	Project Officer, ROLE Academy Project, Grants Office (SPIDER, SWEDEN funded)
2017- 2019	Project Officer, Mat. H Project, MUST Grants Office (SPIDER, SWEDEN funded)
2015- 2016	Volunteer, IT support Staff, Computing Unit department (MUST)

C. Contributions to Science

Supporting TB/HIV medication using mobile health technologies: I have been involved in conducting a mobile health study as a research coordinator in rural southwestern Uganda (K43TW010388; PI: Musiimenta). This randomized control trial supports TB medication adherence by utilizing a mobile health intervention consisting of (1) use of a real-time adherence monitoring device, and (2) SMS text messages providing adherence reminders to patients and notifications to their social supporters. Adherence is measured electronically using a real-time adherence monitoring device (i.e., Wisepill). Of the 58 TB patients involved, 48 (82.8%) were co-infected with HIV/AIDS, and 23 (39.7%) were females. Findings from this study show that median adherence in the daily SMS, weekly SMS, and control arms was 93.0%, 80.4%, and 70.7%, respectively, over the 6-month study period. Controlling for gender, food security, social support, stigma and HIV status, participants in the daily SMS arm had 9.8% (95% CI -5.3, 24.0; p=0.20) higher adherence than participants in the control arm. While those in the weekly SMS arm had 5.9% (95% CI -9.8, 21.6; p=0.45) more adherence that those in the control arm. The results were similar when considering device non-usage. Female patients had an estimated 7.2% higher adherence compared to their male counterparts and those who had severe food insecurity had 8.1% less adherence than those who were food secure. Those who were HIV positive had 10.7% less adherence than their HIV negative counterparts. Additional findings show that patients faced several challenges such as not taking pills from the real-time monitor (e.g., when traveling to avoid disclosure of TB status) and ii) social supporters' inability to meet the financial needs of patients. Our findings show that digital health interventions can potentially address barriers to TB medication adherence

(e.g. forgetfulness, lack of money to facilitate transport to the clinics, and stigma and discrimination. The MAT K43 study has demonstrated that mobile health interventions can be feasible and acceptable in this setting. Three journal papers have been published from this study. Details of the published papers are as follows:

1. Musiimenta A, **Tumuhimbise W,** Mugaba AT, Muzoora C, Armstrong-Hough M, Bangsberg D, Davis JL, Haberer JE. (2019), Digital Monitoring Technologies Could enhance Tuberculosis Medication Adherence in Uganda: Mixed Methods Study, Journal of Clinical Tuberculosis and Other Mycobacterial Diseases.
2. Musiimenta, A., **Tumuhimbise, W.,** Atukunda, E.C., Mugaba, A.T., Muzoora, C., Armstrong-Hough, M., Bangsberg, D., Davis, J.L. and Haberer, J.E., 2020. Mobile Health Technologies May Be Acceptable Tools for Providing Social Support to Tuberculosis Patients in Rural Uganda: A Parallel Mixed-Method Study. *Tuberculosis Research and Treatment*, *2020*.
3. Musiimenta A, **Tumuhimbise W,** Atukunda EC, Mugaba AT, Musinguzi N, Muzoora C, et al. (2023) The feasibility, acceptability, and preliminary impact of real-time monitors and SMS on tuberculosis medication adherence in southwestern Uganda: Findings from a mixed methods pilot randomized controlled trial. PLOS Glob Public Health 3(12): e0001813.

Mobile Health technologies for supporting access to TB/HIV medication: I have also been involved in conducting a digital health study in rural southwestern Uganda as a doctoral student research assistant and a postdoctoral researcher (R21HD107985: PI: Musiimenta). This novel behavioral and economic intervention utilizes SMS texts to remind medication adherence and utilize mobile money approaches to provide transport to the clinic and incentivize medication adherence. The intervention is aimed at overcoming behavioral issues, critical financial and motivational issues that currently constrain TB medication adherence. The study utilized client-centered approaches to determine the optimal design and development of *My Mobile Wallet intervention.* Findings from this formative assessment showed the perceived usefulness of the intervention in terms of; being reminded to take medication, supported with transport to the clinic, and money to meet other tuberculosis medication–related costs, all of which were perceived to imply care, which could create a sense of connectedness to health care workers. Additionally, we assessed the initial feasibility and acceptability of the developed intervention and all 39 participants reported that the intervention was feasible because it was easy for them to use (eg, access and read SMS text messages) and worked as expected. Almost all SMS text messages (6880/7064, 97.4%) were sent as planned. The transmission of adherence data from the monitor worked well, with 98.37% (5682/5776) of the data transmitted as planned. Currently, we are assessing the refined *My Mobile Wallet* intervention for larger scale feasibility, acceptability, and impact on TB treatment adherence and clinical outcomes. The following papers have been published:

1. Musiimenta, A., **Tumuhimbise, W.,** Atukunda, E., Mugaba, A., Linnemayr, S. and Haberer, J., 2024. Digital Adherence Technologies Linked to Mobile Money Incentives for Medication Adherence Among People Living With Tuberculosis: Mixed Methods Feasibility and Acceptability Study. *JMIR Human Factors*, *11*, p.e47996.
2. Musiimenta, A., **Tumuhimbise, W.,** Atukunda, E., Mugaba, A., Linnemayr, S. and Haberer, J., 2023. Digital adherence technologies and mobile money incentives for management of tuberculosis medication among people living with tuberculosis: mixed methods formative study. *JMIR Formative Research*, *7*(1), p.e45301.

Electronic medication adherence monitoring among people living with HIV/AIDS: Our group has been involved in several NIH-funded studies utilizing digital technologies to monitor medication adherence in the same setting. For example, the Wisepill intervention study (R34MH100940; PI Haberer) which utilized real-time adherence monitoring to support adherence to antiretroviral (ART). Results indicated that the intervention was feasible and acceptable, had a significant impact on ART adherence. In addition, to understanding the dependence on mobile technologies, I have been involved in a follow-up study that explored how the former participants of the Wisepill Intervention study adhere to medications after the withdrawal of the intervention. This research adds important insights about how users perceive their dependency on mobile technology-assisted interventions, and how their perceptions influence medication adherence after removing the interventions from them. Our group identified and fixed some of the acceptability and feasibility/technical challenges associated with the use of real time adherence monitoring, SMS reminders and notifications in the context of the developing world. Three articles from this work have been published in peer reviewed academic journals:

1. Musiimenta A, Atukunda EC, **Tumuhimbise W,** and Haberer JE (2018): Resilience after withdrawing a technology-based medication adherence support intervention from people living with HIV in rural Uganda, AIDS Care.
2. Musiimenta, A., Atukunda, E.C., **Tumuhimbise, W.,** Pisarski, E.E., Tam, M., Wyatt, M.A., Ware, N.C. and Haberer, J.E., 2018. Acceptability and feasibility of real-time antiretroviral therapy adherence interventions in rural Uganda: mixed-method pilot randomized controlled trial. *JMIR mHealth and uHealth*, *6*(5), p.e122.
3. Musiimenta, A., Campbell, J.I., **Tumuhimbise, W.,** Burns, B., Atukunda, E.C., Eyal, N. and Haberer, J.E., 2021. Electronic Adherence Monitoring May Facilitate Intentional HIV Status Disclosure Among People Living with HIV in Rural Southwestern Uganda. *AIDS and Behavior*, *25*(7), pp.2131-2138.

Digital health technologies for enhancing public private mix in Tuberculosis care: I have contributed to the understanding of mobile health interventions for enhancing public private mix in Tuberculosis care in Uganda through my PhD research out of which, four first author peer- reviewed journal papers have been published, as indicated below. Results from my PhD research indicate that mobile health technologies as emerging opportunities for closing gaps in TB care are acceptable and feasible among healthcare workers for following up referred patients from private to public hospitals. Using a mobile health intervention ware reported to enable healthcare workers make quicker medical decisions regarding the referred patients, enhance communication with other healthcare workers, and patient follow up. Results further indicate that a mobile application was reported to have potential to remind the referred presumptive patients to go to the place of referral, notify healthcare workers at the public health facility about the incoming referred patient, which facilitates the communication across facilities and enhances patient based care. Although mHealth technologies have been utilized in enhancing PPM, technical and operational challenges encountered by the users can hinder the technology usability, therefore user involvement during intervention design may play role in developing interventions that are culturally acceptable which effectively meet the needs and expectations of the target populations. The following peer-reviewed journal papers reflect my contribution to science in this area.

1. **Tumuhimbise, W.** and Musiimenta, A., 2021. Barriers and Motivators of Private Hospitals' Engagement in Tuberculosis Care in Uganda. *Global Implementation Research and Applications*, *1*(4), pp.279-290.
2. **Tumuhimbise, W.** and Musiimenta, A., 2021. A review of mobile health interventions for public private mix in tuberculosis care. *Internet Interventions,* p.100417.
3. **Tumuhimbise, W.,** Atwine, D., Kaggwa, F. and Musiimenta, A., 2022. Enhancing tuberculosis Care in Southwestern Uganda: facilitators and barriers to utilizing Mobile health technologies. *Global Implementation Research and Applications*, *2*(4), pp.404-414.
4. **Tumuhimbise, W.,** Atwine, D., Kaggwa, F. and Musiimenta, A., 2023. Acceptability and feasibility of a mobile health application for enhancing public private mix for TB care among healthcare Workers in Southwestern Uganda. *BMC Digital Health*, *1*(1), pp.1-11.

Development of a framework for implementing and integrating mHealth interventions in Low resource Settings: With mentorship from Prof Sekandi and Dr Musiimenta, I conducted a scoping review aimed at synthesizing and developing a framework that could guide the implementation and integration of digital health interventions in low resource settings. We identified eight eligible papers with eight frameworks composed of 102 implementation domains. None of the identified frameworks were specific to the integration of mHealth interventions in low-resource settings. Two constructs (skill impartation and intervention awareness) related to the training domain, four constructs (technical and logistical support, identifying committed staff, supervision, and redesigning) from the restructuring domain, two constructs (monetary incentives and nonmonetary incentives) from the incentivize domain, two constructs (organizational mandates and government mandates) from the mandate domain and two constructs (collaboration and routine workflows) from the integrate domain. Therefore, a new framework that outlines five main domains—train, restructure, incentivize, mandate, and integrate (TRIMI)—in relation to the integration and implementation of mHealth interventions in low-resource settings emerged. The TRIMI framework presents a realistic and realizable solution for the implementation and integration deficits of mHealth interventions in low-resource settings. The following peer-reviewed journal paper published in the Implementation Science Journal.

1. **Tumuhimbise,W.,** Theuring, S., Kaggwa, F., Atukunda, E.C., Rubaihayo, J., Atwine, D., Sekandi, J.N. and Musiimenta, A., 2024. Enhancing the implementation and integration of mHealth interventions in resource-limited settings: a scoping review. *Implementation Science*, *19*(1), p.72

Acceptability of mHealth interventions using user-centred designs. I have contributed to the understanding of the role of user-centered designs in the acceptability of digital health interventions. I have been involved in the implementation of the MatHealth study in rural southwestern Uganda (PI: Musiimenta) funded by the Germany Ministry of Education and Research (01DG18004), that utilized user-centered design approaches to develop a multimedia maternal health application by incorporating input (obtained through series of focus group discussions) from prospective users and health care providers. Through the multimedia application, pregnant mothers and breastfeeding mothers received contained personalized maternal health information in form of videos and audios, set the dates and reminders for their next antenatal care appointment, and communicated with health workers through phone calls. Analysis from this study revealed the importance of getting user perspectives in designing interventions for illiterate populations. The peer-reviewed journal papers below reflect my contribution to science in this critical area.

1. **Tumuhimbise W,** Atukunda EC, Ayebaza S, Katusiime J, Mugyenyi G, Pinkwart N, Musiimenta A. (2020) Maternal Health-related Barriers, and the Potentials of Mobile Health Technologies: Qualitative Findings from a Pilot Randomized Controlled Trial in Rural South western Uganda. J Family Med Prim Care 2020;9:3657-62.
2. Musiimenta, A., **Tumuhimbise, W**., Mugyenyi, G., Katusiime, J., Atukunda, E. and Pinkwart, N., 2020. A Mobile Phone-based Multimedia Application Could Improve Maternal Health in Rural Southwestern Uganda: Mixed Methods Study. *Online Journal of Public Health Informatics*, *12*(1).
3. Musiimenta, A., **Tumuhimbise, W.,** Pinkwart, N., Katusiime, J., Mugyenyi, G. and Atukunda, E.C., 2021. A mobile phone-based multimedia intervention to support maternal health is acceptable and feasible among illiterate pregnant women in Uganda: Qualitative findings from a pilot randomized controlled trial. *Digital Health*, *7*, p.2055207620986296.
4. Musiimenta, A., **Tumuhimbise, W.,** Atukunda, E.C., Ayebaza, S., Kobutungi, P., Mugaba, A.T., Asasira, J., Mugyenyi, G.R., Katusiime, J., Zender, R. and Pinkwart, N., 2022. Challenges in accessing maternal and child health services during COVID-19 and the potential role of social networking technologies. *Digital Health*, *8*, p.20552076221086769.

Complete List of Published Work in MyBibliography:
https://www.ncbi.nlm.nih.gov/myncbi/wilson.tumuhimbise.1/bibliography/public/

List of students supervised/mentored

Name of student	Gender	Programme	Title/Status
1. Mwesigwa Samuel	M	PhD in Computing (MUST)	Evaluating the efficiency of AI-Powered mHealth applications for maternal care in Low resource settings. **Ongoing**
2. Mary Mbabazi Kwetegyeka	F	PhD in Computing (MUST)	A framework for Leveraging Digital Technologies to support Mental Health Knowledge Sharing among Young Mothers in Uganda. **Ongoing**
3. Kamugisha Kenneth	M	Master of Science in Health Information Technology	A Decision Support Based Model for Assessing malnutrition among Children at Mbarara Regional Referral Hospital. **Completed**
4. Mutatina Robens	M	Master of Science in Health Information Technology	MHealth-Based framework to support ART adherence and Retention in Care among Adolescent Girls and Young mothers living with HIV/AIDS in Mbarara District. **Completed**
5. Moreen Kihembo	F	Master of Business Informatics	An E-commerce framework for Small-holder farmers in

			Southwestern Uganda: A feasibility study. **Completed**
6. Elizabeth Twikirize	F	Master of Science in Information Systems	IoT Based Pharmaceutical Waste_water management Model for Regulatory agencies. **Completed**
7. Tumwebaze David	M	Master of Business Informatics	Digital transformation Journey for Small and Medium Enterprises: A framework for SME's in Kamukuzi Ward, Mbarara City. **Completed**
8. Mutatina Crispus	M	Master of Science in Health Information Technology	An Algorithm for Visual Acuity Assessment using the Tumbling E. A case of Mbarara District: **ongoing**
9. Fred Mwebembezi	M	Master of Science in Health Information Technology	Predictive Modelling for Malaria Transmission Using Community-Level Based Data: A case of Bugoye Subcounty**: Completed**
10. Matte Michael	M	Master of Science in Information Systems	A Geospatial Predictive Model for Improving Prostate Cancer Screening: A case of Mbarara Regional Referral Hospital, South Western Uganda: **Completed**
11. Angella Ainembabazi	F	Master of Science in Health Information Technology	A framework for Early Prediction of New Outbreaks in Hospital Settings: **Completed**
12. Kakuru Peter	M	Master of Science in Health Information Technology	A recommender algorithm for an SMS Based Appointment Reminder Module for Retention of Youths on Antiretroviral Therapy: A case of Isingiro District: **Completed**