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Armauer Hansen Research Institute

From Vision to Impact

Celebrating the 10-year journey of the HU-AHRI Joint PhD Program in Medical Microbiology

2015-2025

Dr. Ahmed Mohammed (MD, Pediatrician)

Dear Colleagues at AHRI, all

As we celebrate the ten years anniversary of our joint PhD training program in Medical Microbiology with the Armauer Hansen Research Institute (AHRI), I would like to take a moment to reflect on the remarkable journey we have shared and to extend my deepest gratitude for the invaluable partnership that has made it all possible. Since the signing of the Memorandum of Understanding (MoU) between Haramaya University (HU) and AHRI in 2014/15, the collaboration has evolved into a model of academic excellence, mentorship, and mutual respect. Together, we have built a vibrant and impactful training environment that has not only nurtured a new generation of scholars but has also significantly contributed to advancing knowledge in the field of Medical Microbiology.

The fruits of our joint efforts are clearly reflected in the achievements of our students, the quality and relevance of our research enduring ties that have formed between our institutions. Every milestone—be it co-supervised dissertations, joint scientific publications, or international exchange initiatives has underscored the power of shared vision, trust, and commitment.

As we look to the future, we remain optimistic and energized by the opportunities ahead. Though the landscape of academia and research continues to evolve, the strong foundation we've built together positions us well to meet emerging challenges, pursue innovation, and continue to inspire.

Thank you, AHRI and its senior staff for your steadfast collaboration, dedication, and pursuit of excellence. We are excited about the next phase of our partnership and look forward to achieving even greater successes together.

With warmest regards and sincere appreciation,

Chief Executive Director, College of Health and Medical Sciences and Hiwot Fana Comprehensive Specialized Hospital

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1. Background

1.1. Haramaya University

Haramaya University (HU) is one of Ethiopia's pioneering higher learning institutions, owned and funded by the government. It is located in the eastern part of the country, approximately 510km east of Addis Ababa, covering 440 hectares. The University has undergone six decades of transformations since its establishment as the Imperial Ethiopian College of Agricultural and Mechanical Arts (IECAMA) in the early 1950s.

Recently, HU has undergone academic restructuring, consolidating its former departments into 10 Colleges, the Haramaya Institute of Technology (HIT), and the Academy of Sport Sciences to offer various programs through regular and non-regular formats, including summer, distance, and continuing education. The University operates on two campuses: the main campus, located in the East Hararghe Zone near the town of Haramaya, and the College of Health and Medical Sciences, situated in Harar City, approximately 23 kilometers from the main campus.

The Faculty of Health Sciences was founded in September 1996 by the national health policy and the government's long-term plan, which mandated higher education institutions to train skilled professionals for the nation's development. Currently, the Faculty has been renamed as the College of Health and Medical Sciences (CHMS) and includes one teaching hospital, Hiwot Fana Comprehensive Specialized University Hospital (HFCSH), along with the Hararghe Health and Demographic Surveillance System (HDSS) sites and the Child Health and Mortality Surveillance (CHAMPS) project. As one of the largest academic units within the university, the College is dedicated to education, research, and community service.

The Chief Executive Director leads the College, which has three directors, namely the Chief Clinical Director, the Chief Academic and Research Director and the Chief Administration and Development Director. The College consists of seven Schools: Medicine, Medical Laboratory Science, Pharmacy, Nursing, Midwifery, Public Health, and Environmental Health Science along with one department, Psychiatry. The School of Medical Laboratory Science began training students at the Diploma level in September 1996. In 2003, the school revised its curriculum and commenced training of Medical Laboratory Professionals at the Bachelor (BSc) level,

responding to the rapid change in the field of medical laboratory science , and the rise of emerging/re-emerging diseases including non-communicable diseases.

Since 2013, the school has launched a range of postgraduate programs, including Master's degrees in Medical Microbiology, Tropical and Infectious Diseases, Clinical Chemistry, Medical Parasitology, Laboratory Leadership and Quality Assurance, and Hematology and Immunohematology, as well as PhD programs in Medical Microbiology and Tropical and Infectious Diseases. To enhance its collaboration with research institutions, sister universities, and neighboring East African countries' higher institutions, the school has also jointly initiated postgraduate programs at both master's and doctoral levels.

The school began collaborating with the Armauer Hansen Research Institute (AHRI) in 2015 to offer PhD training in Medical Microbiology. In 2022, aligning with HU's internationalization strategy, it launched joint MSc programs in Medical Microbiology and Tropical and Infectious Diseases in Somaliland, in collaboration with Amoud University and Horn International University, respectively. To further strengthen collaboration with research centers at local sister universities, the school introduced a joint PhD program in Tropical and Infectious Diseases in 2024, in collaboration with Jimma University, Tropical and Infectious Disease Research Center (TIDRC).

1.2. Armauer Hansen Research Institute (AHRI)

The Armauer Hansen Research Institute (AHRI) was established in 1970 through the initiative of the Norwegian and Swedish Save the Children organizations, with support from Ethiopia's Ministry of Health. It was named after the Norwegian physician, Gerhard Henrik Armauer Hansen, who first described the leprosy bacillus (*Mycobacterium leprae*). AHRI was founded as a biomedical research institute and is situated adjacent to the All-Africa Leprosy Rehabilitation and Training Hospital (ALERT).

ARHI was initially established to investigate the pathogenesis and human immune responses of leprosy. However, it now conducts medical research across various diseases, including tuberculosis, malaria, antimicrobial resistance, HIV, various forms of cancer, and other non-communicable diseases. When AHRI was restructured by the Council of Ministers, Regulation Number 530/2023, in addition to the previous tasks and responsibilities, it was mandated to

include vaccine, diagnostics, medical device research and development, traditional and modern medicine research and pharmaceutical industry development sectors. Under this mandate, the research activities at the Institute are organized under seven specialized Research Directorates: the Communicable and Non-Communicable Diseases Research Directorate (CNCDRD), Clinical Trial Directorate (CTD), Knowledge Management Directorate (KMD), Vaccine, Diagnostic, and Medical Devices Research and Development Directorate (VDMDRDD), Traditional and Modern Medicine Research and Development Directorate (TMMRDD), Pharmaceutical Industry Development Directorate (PIDD), and the Pharmaceutical and Biological Product Development Directorate (PBPDD).

In addition to its research endeavors, the Institute is actively involved in research training for young Ethiopian graduates in medicine and other health sciences. By accepting Master's and PhD students from various local universities, AHRI provides technical supervision, laboratory access, and essential research materials such as reagents and supplies to support their postgraduate research activities. Moreover, the Institute offers a range of short-term and human capacity-development training programs in collaboration with local and international institutions.

1.3. Initiation of the Joint PhD program in Medical Microbiology

The program initiation began in 2014 with a discussion between Dr. Abraham Aseffa, the former Director General of AHRI, and Dr. Desalegn Admassu, the former Dean of CHMS, HU.

Dr. Abraham Aseffa

Dr. Desalegn Admassu

This informal discussion was later formalized by the Ministry of Education (MOE) and the Federal Ministry of Health of Ethiopia to realize the collaboration. Following detailed consultations with AHRI, a Memorandum of Understanding (MoU) was signed between HU and AHRI in 2014/15. In parallel, several foundational steps were taken, including structured engagement with key stakeholders, the appointment of honorary staff at HU from AHRI, and the joint development of the PhD curriculum. In the 2015/16 academic year, the School of Medical Laboratory Sciences enrolled the first cohort of three students, officially launching the joint PhD program in Medical Microbiology.

Since the establishment, the joint PhD program has been coordinated by Dr. Ayichew Seyoum (2014–2016), Mr. Fitsum Weldegebreal (2017–2022), and Dr. Getachew Kabew (2023–present).

Dr. Ayichew Seyoum

Mr. Fitsum Weldegebreal Mlashu

Dr. Getachew Kabew

2. Rationale of the collaboration

This joint PhD program was established to foster collaboration among the signatory institutions and support HU's human capacity-development efforts in postgraduate education. Its specific focus is to strengthen PhD-level training in Medical Microbiology and contribute to building a strong biomedical research foundation in eastern Ethiopia. In addition, it provides an opportunity to establish a training network that connects AHRI with both local and international universities and supports curriculum development, organization of course materials, staff exchange initiatives, implementation of a joint postgraduate program, and contributes to the creation of a strong biomedical research hub in eastern Ethiopia.

The HU–AHRI collaboration is further strengthened by various strategic opportunities that enhance its impact and sustainability. These include the ongoing development of a 1,000-bed mega hospital, the implementation of the CHAMPS project, a well-established HDSS, and access to regional laboratories located in Harari, Dire Dawa, and the Somali region. Additionally, Haramaya University is recognized as a center of excellence in research and graduate education, with a strong commitment to expanding laboratory capacity. The university also benefits from its multidisciplinary faculty and training programs, strong support from top leadership, and a unique geographic setting that enables context-specific research including massive production of khat, pastoralist and agropastoral communities, and geographic location prone to cross-border health challenges,

3. Educational Process, Success and challenges

This strategic collaboration was founded on developing human resources at the PhD level to drive health research and innovation by enhancing knowledge and, therefore promoting better human health. Over the past ten years of collaboration, the program has achieved remarkable success despite the challenges. The table below presents the annual intake and study completion status of students enrolled in the joint PhD program.

Table 1: Annual student intake and completion status of the joint PhD Program in Medical Microbiology

	2015/16	2016/17	2018/19	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	Total
Registered	3	2	-	2	3	2	-	2	2	16
Graduated	_	-	-	-	1	1	-	2	-	4

3.1. The process of PhD education

The collaborative activities have led to substantial advancements within the College of Health and Medical Sciences, especially in the School of Medical Laboratory Science. These include enhanced human resource capacity, focused research addressing key community health problems, and the delivery of short-term training programs to resolve critical challenges related to biomedical research [including advanced techniques in immunology, molecular biology and pathogen genomics and bioinformatics] and good laboratory practices and biosafety/biosecurity and data analysis. Furthermore, the key findings from the research have been published in peer-reviewed journals, enhancing the global visibility of the collaborating institutions within the scientific community. These research outcomes offer valuable insights for policymakers and planners, supporting evidence-based interventions to improve the health and well-being of the nation's population.

Honorary staff from AHRI actively contribute to the academic process by leading courses and evaluating students in alignment with the university curriculum. Once a course leader initiates a course, students are given 45 days to complete tasks, including preparing a course seminar, critically reviewing a recent and relevant scientific article, and developing a hypothetical mini-research proposal for each major course. Following this, students present their work during the bi-annual PhD Week.

3.1.1. PhD Week

PhD Week is a bi-annual academic event jointly organized by HU and the AHRI as part of their collaborative PhD training program. The event aims to provide a formal platform for PhD students to present their academic progress and receive feedback from senior scholars and faculty members of both institutions. Major activities conducted during PhD week include the presentation of research concept notes followed by feedback and discussion; course-based presentations, which encompass a literature review and synthesis, a journal club session involving critical analysis of a recent and relevant scientific article, and the presentation of a hypothetical mini research proposal; seminar presentations related to PhD coursework, demonstrating subject mastery and scholarly engagement; progress monitoring and evaluation; and final proposal presentation.

Bridging Knowledge: Scholarly Exchange between Honorary Staff from AHRI, HU Staff, and PhD Students

Snapshots taken during PhD Week

Key activities during the PhD week

a) Concept Note Presentation and Feedback

Students present their research concept notes outlining their doctoral research's background, rationale, objectives, and proposed methodology. This session provides an opportunity for constructive feedback from senior scholars and peers aimed at refining the research plan before full proposal development.

b) Mentee-mentor and supervisory engagement

Once the student presents their PhD proposal and agrees on the topics, a designated primary supervisor will be assigned to mentor the student and project scientifically, financially and technically.

c) PhD course-based presentation

As part of the academic requirements during the PhD Week, students are expected to deliver a series of structured presentations reflecting their analytic skills, subject knowledge, and research readiness. This includes:

Literature Review and Synthesis

Students conduct a comprehensive literature review focused on their area of study. This activity involves identifying, analyzing, and synthesizing key findings from existing scholarly work to highlight research gaps, theoretical frameworks, and methodological trends. The goal is to deepen the student's understanding of the topic and to build a solid foundation for their proposed research.

Journal Club Presentation

In this session, students select recent cutting-edge and relevant peer-reviewed scientific articles related to their field. They critically evaluate the article's objectives, methodology, results, and conclusions, discussing its strengths, limitations, and implications for future research. The journal club promotes critical thinking, scientific discourse, and familiarity with current research developments. It also allows understanding and comprehension of detailed scientific methodological techniques including experimental laboratory animal models, different investigations and analysis and interpretation of results.

Hypothetical Mini Research Proposal

Students must develop and present hypothetical mini research proposals within a specific thematic area in 4 categories [Immunology, Bacteriology, Virology and Mycology]. These exercises test students' ability to formulate clear research questions, outline appropriate methodologies, and demonstrate the feasibility and relevance of their proposed study. It helps strengthen research design skills and prepares them for full-scale dissertation development.

d) Advanced Seminars

PhD seminar presentations focus on topics closely related to the students' field of study and involve in-depth academic discussions. These presentations cover emerging research evidence, advancements in diagnostic technologies, immunopathogenesis, therapeutics and vaccines, recent scientific updates, and disease prevention and control strategies. Students also highlight

current trends, pressing challenges, and potential solutions impacting their scientific or clinical disciplines. By conducting critical literature reviews and synthesizing relevant information, students deliver well-organized seminars designed to foster scholarly dialogue and deepen understanding within the academic community.

e) Progress report (Monitoring and evaluation)

The PhD progress report is an academic presentation delivered by doctoral students to summarize their advancements in both coursework and research. It typically covers completed coursework, a clear outline of the research objectives, updates on research activities, preliminary findings, challenges encountered, and the strategies used to address them. The report also includes planned future activities and highlights any publications or conference presentations achieved during the reporting period. The progress report is reviewed by supervisors and senior academic staff to ensure students are on track with their academic milestones and receive the necessary guidance to successfully complete their PhD journey.

f) Final proposal defense

The PhD proposal defense is a formal academic examination in which a doctoral candidate presents and justifies their proposed research plan to a panel of experts, including supervisors and faculty members. The student outlines the research objectives, significance, theoretical framework, methodology, and expected outcomes during the defense. The panel critically evaluates the proposal's feasibility, originality, and scientific rigor, providing feedback and recommendations for improvement. The successful defense signifies that the candidate's research plan is sound and ready to proceed with the data collection, marking a key milestone in the PhD journey.

3.1.2. Provision of short-term trainings

Collaborating institutions short-term training aims to strengthen research and promote good laboratory practices. It improves research quality and reliability by equipping researchers with essential skills and current methodologies, ensuring accurate and reproducible experiments. The training also promotes standardization and regulatory compliance, reducing errors and enhancing

consistency. Additionally, it increases efficiency through best practices in sample handling, data recording, and equipment use, saving time and resources.

It supports laboratory safety by minimizing risks to personnel and the environment. Beyond technical skills, the training builds confidence and capacity in early-career researchers and fosters collaboration by aligning protocols for effective data sharing. Overall, well-trained staff and adherence to good practices help institutions secure funding, maintain ethical standards, and boost their reputation.

3.1.3. Advanced laboratory attachment

3.1.3.1. Research tuition abroad

This attachment is designed to provide PhD students with international exposure to advanced laboratory and research environments, along with specialized training opportunities that may not be available locally. It enables students to access cutting-edge technologies, engage in high-level collaborative research, and benefit from mentorship by internationally recognized experts in their field.

3.1.3.2. Advanced laboratory attachment

The main objective of the Advanced Laboratory Attachment for PhD students is to provide hands-on experience with advanced microbiological, immunological, and molecular techniques relevant to their research. The attachment enhances technical competence, analytical skills, and understanding of good laboratory practices, biosafety, and quality assurance standards. It also offers exposure to ongoing infectious disease research, thereby strengthening students' capabilities in data analysis, scientific communication, and ethical research. Furthermore, the program supports professional development through close collaboration with experienced researchers in a high-quality research environment.

3.2. Success stories

From the 2015/16 academic year to the 2024/25 academic year, a total of 16 candidates in seven rounds were enrolled in this joint collaboration program. Four successfully graduated and are now actively contributing to the training of competent postgraduate students and advancing biomedical research.

Celebrating Five Years of Academic Excellence: Joint PhD Program in Medical Microbiology

Key public health problems addressed by the joint program

One of the core objectives of the collaborative PhD program is to tackle pressing community health problems through innovative and evidence-based research. By applying advanced scientific methods and technologies, students and faculty work to generate solutions that address real-world health challenges. Research efforts focus on:

- Targeting local health burdens, which are often overlooked globally
- Advancing diagnostic tools for early detection and better outcomes
- Using data to inform public health policies and interventions
- Translating findings into strategies for disease prevention and stronger health systems

The program ensures meaningful impact and strengthens the connection between science and public health practice by aligning research with community needs, especially in underserved areas.

The joint PhD program has addressed a wide range of public health and biomedical research priorities, including leprosy, viral hepatitis, cervical cancer, HIV drug resistance, sexually transmitted infections (STIs), arboviral infections, bacterial and viral pneumonia, tuberculosis, and zoonotic diseases.

Acknowledging the Honorary Staff

3.2.1.1.Research areas addressed by PhD graduates

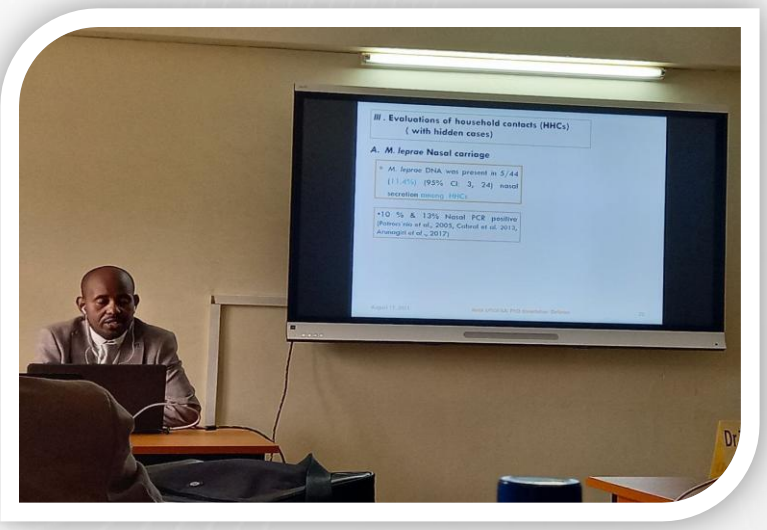
Graduates of this joint PhD program addressed critical public health challenges and proposed practical interventions for relevant stakeholders.

The program's first graduate, Dr. Desalegn, focused his dissertation on the *Hepatitis B Virus* (HBV). His research highlighted that both HBV and *Human Immunodeficiency Virus* (HIV) represent major global health concerns, particularly in Sub-Saharan Africa where both viruses are widespread. Co-infection with HBV and HIV can accelerate liver disease progression and complicate treatment approaches. A key focus of his study was occult HBV infection (OBI), which is characterized by the presence of HBV DNA without detectable hepatitis B surface antigen (HBsAg), making diagnosis and clinical management more difficult. He emphasized the need to understand the serological and molecular features of HBV in both HIV-positive and HIV-negative populations to improve prevention, diagnosis, and treatment efforts. His findings

revealed that occult HBV infection is relatively common, especially among HIV-positive individuals in Eastern Ethiopia. This underscores the importance of molecular HBV DNA testing in patients with indicative serological patterns. He recommended that routine HBV screening—including for occult infections—be incorporated into routine blood transfusion and HIV care services to support comprehensive and effective patient management.

PhD work presentation by Dr. Desalegn Admassu

Dr. Kedir Urgessa, the second graduate of the program, focused his dissertation on the cause of leprosy—*Mycobacterium leprae*. In his work, he highlighted that leprosy (Hansen's disease) is a disabling infectious condition caused by *M. leprae*. He emphasized that relying solely on patients to present themselves at health facilities leaves many leprosy cases undetected in the community. This leads to delayed diagnosis and, consequently, an increased risk of disability. While previous studies in Ethiopia have identified clusters of endemic leprosy, the true extent of undiagnosed, hidden cases in these areas remains unclear. In his summary, Dr. Kedir noted that although Ethiopia declared national leprosy elimination in 1999, localized hotspots persist, particularly involving multibacillary (MB) cases and infections among children. He stressed that active and targeted interventions—including early case detection, post-exposure prophylaxis, and better training of healthcare providers—are essential to interrupt transmission, prevent disabilities, and progress toward genuine leprosy elimination.



PhD Work Presentation by Dr. Kedir Urgessa

Dr. Ayichew Seyoum, the third graduate of the joint PhD program, conducted his dissertation on *Human Papillomavirus* (HPV), the primary cause of cervical cancer. In his research, he emphasized that the World Health Organization (WHO) recommends genotype-specific HPV vaccination as a key strategy to reduce the global burden of cervical cancer. In Ethiopia, where non-vaccine-targeted HPV genotypes remain under-researched, a vaccination campaign was launched in 2018 targeting HPV types 6, 11, 16, and 18 for girls aged 14 to 18 years. The simultaneous presence of both vaccine-targeted and non-targeted HPV genotypes poses a significant concern, as co-infections may accelerate cancer development. To address this, his study aimed to determine the prevalence of non-vaccine-targeted HPV genotypes and evaluated the extent of multiple infections among women in eastern Ethiopia. The findings revealed a considerable prevalence of multiple infections involving non-vaccine-targeted HPV genotypes. Based on these results, it is recommended that federal and regional health authorities reassess the spectrum of high-risk HPV genotypes covered by the current vaccine and consider transitioning from the quadrivalent to the nonavalent vaccine, which protects against seven high-risk HPV genotypes.

PhD Work Presentation by Dr. Ayichew Seyoum

Dr. Abdella Gemechu, one of the four graduates of the joint PhD program, conducted his dissertation research focused on HIV-1, particularly examining pretreatment drug resistance (PDR) in Ethiopia. He highlighted a critical gap in the country's HIV management: the scarcity of routine genotypic resistance testing, which limits the availability of comprehensive data on HIV-1 PDR. This lack of data poses a significant challenge to effectively selecting and monitoring antiretroviral therapy (ART) regimens. The study revealed alarmingly high levels of pretreatment drug resistance, predominantly affecting non-nucleoside reverse transcriptase inhibitors (NNRTIs), which have been commonly used in first-line ART regimens in the region. Furthermore, during clinical follow-up, patients with bedridden functional status were identified as a particularly vulnerable group requiring close monitoring and targeted interventions due to their increased risk of adverse treatment outcomes. He emphasized the urgent need for ongoing surveillance studies to track the accumulation and transmission of drug-resistance mutations over time. Such research is crucial to understanding the long-term implications of PDR on the efficacy of current ART regimens. The findings also underscore the necessity to design and implement appropriate public health strategies and clinical interventions aimed at mitigating the spread of resistant HIV strains. Ultimately, Dr. Abdella's work calls for strengthened HIV drug resistance monitoring systems and tailored treatment approaches to enhance the effectiveness of

ART programs. These efforts are essential to control the HIV epidemic and improve health outcomes for people living with HIV in Ethiopia.

Dr. Abdella Gemechu Answering Questions during PhD Defense

3.2.1.2. Ongoing PhD research projects

Currently, a total of 12 PhD students are actively pursuing their study through this joint collaboration program. The following table summarizes the PhD student and their PhD projects (table 2).

Table 2: Ongoing Research Activities by PhD Students in the Collaborative Program

No	**Name of PhD students**	**Research title**	**Status**
1.	Beker Feto Gemeda (PhD candidate)	Prevalence, Drug Susceptibility Pattern, Molecular Epidemiology of Pulmonary Tuberculosis, and TB care seeking extent among Robe Town Population, Bale zone, south eastern Ethiopia: Community based cross sectional TB survey	In progress
2.	Degu Abate Mengiste (PhD candidate)	Epidemiology of Cryptosporidium infections in under-five children, and young livestock in eastern Ethiopia: One health approach	In progress

No	**Name of PhD students**	**Research title**	**Status**
3.	Dadi Mariami Dadi (PhD candidate)	Rift-valley fever virus, *coxiella burnetii* infections, and associated factors among humans, livestock, and mosquitos, eastern Ethiopia	In progress
4.	Habtamu Mitiku Tesfaye (PhD candidate)	Community acquired viral pneumonia in adult patients: Magnitude, viral variants, treatment outcome and associated factors in selected public hospitals, eastern Ethiopia	In progress
5.	Tewodros Tesfa Hailegiyorgis (PhD candidate)	Colonization, antimicrobial resistance, virulence factors, and molecular diversity of *K. pnumoniae* isolates in eastern Ethiopia: A multi-site study	In progress
6.	Mekuria Edea (PhD student)	Diarrheagenic *Escherichia coli* pathotypes among diarrheic children and their contact animals in Harari regional state, Harar, eastern Ethiopia: Molecular characterization, antimicrobial resistance, Magnitude and determinant factors	In progress
7.	Zelalem Teklemariam Kidanemariam (PhD student)	Molecular Epidemiology, Antimicrobial Resistance and Performance of Syndromic Management for *N. gonorrhoeae and C. trachomatis* among presumptive sexually transmitted infections Patients in Eastern Ethiopia	In progress
8.	Firehiwot Tesfaye (PhD student)	Molecular Profiling, Drug Resistance, and Risk Factors of Mycobacterial Isolates in Lymph Node Extrapulmonary TB Patients in Harar and Dire Dawa, Eastern Ethiopia	In progress
9.	Biruk Abraha (PhD student)	Epidemiology of Zoonotic Diarrheagenic Bacterial Pathogens, Associated Virulence and Antimicrobial Resistance Genes in Human and their Contact Animals in Eastern Hararghe, Ethiopia	In progress
10.	Dagnamyelew Tilahun (PhD student)	Genomic and Geospatial Epidemiology of *Mycobacterium Tuberculosis* Complex and Its Impact on the Environment; A One Health Approach, Among Pastoral and Agro-Pastoral Community of South Oromia, Ethiopia	In progress

No	**Name of PhD students**	**Research title**	**Status**
11.	Wondemagegn Woldu (PhD student)	Distribution, Virulence, Immunological Impact, and Transmission Pathways of *Staphylococcus aureus* in Eastern Hararghe: A One Health Approach	In progress
12.	Bahar Mohammed (PhD student)	Molecular Epidemiology of Selected Foodborne Pathogens in Under-Five Children: A One Health Perspective in Eastern Ethiopia	In progress

3.2.2. Research publications

PhD students' publications represent a vital avenue for enhancing the international visibility of collaborating institutions within the global scientific community. By contributing high-quality research to prestigious journals, they showcase the institutions' academic strength and commitment to innovation. Apart from this, this visibility, amplified through citations and global recognition, helps elevate institutional reputation, attract strategic partnerships, and secure research funding. Moreover, such publications feed into key research metrics—like citation counts and impact factors—which serve as indicators of scholarly productivity and influence.

The following articles have been published in peer-reviewed journals, demonstrating the research achievements of our PhD students and their contributions to advancing knowledge in their fields.

1. **Ayana, D.A.,** Mulu, A., Mihret, A., Seyoum, B., Aseffa, A. and Howe, R., 2019. Hepatitis B virus seromarkers among HIV infected adults on ART: an unmet need for HBV screening in eastern Ethiopia. *PLoS One*, *14*(12), p.e0226922.

2. **Ayana, D.A.,** Mulu, A., Mihret, A. et al. Occult Hepatitis B virus infection among HIV negative and positive isolated anti-HBc individuals in eastern Ethiopia. Sci Rep 10, 22182 (2020). https://doi.org/10.1038/s41598-020-79392-x.

3. **Urgesa K**, de Bruijne N, Bobosha K, Seyoum B, Mihret A, Geda B, et al. (2022) Prolonged delays in leprosy case detection in a leprosy hot spot setting in Eastern Ethiopia. PLoS Negl Trop Dis 16(9): https://doi.org/ 10.1371/journal.pntd.0010695

4. **Urgesa K**, Bobosha K, Seyoum B, Weldegebreal F, Mihret A, Howe R, et al. (2021). Knowledge of and Attitude Toward Leprosy in a Leprosy Endemic District, Eastern

Ethiopia: A Community-Based Study. Risk Management and Healthcare Policy 2020:13 1069–1077.

5. **Urgesa K**, Bobosha K, Seyoum B, Weldegebreal F, Mihret A, Howe R, et al. (2021). Evidence for hidden leprosy in a high leprosy endemic setting, Eastern Ethiopia: The application of active case-finding and contact screening. *PLoS Negl Trop Dis 15(9): e0009640.*

6. **Urgesa, K**., Bobosha, K., Seyoum, B., Weldegebreal, F., Geda, B., Mihret, A. & Aseffa, A. 2021. High rate of *Mycobacterium leprae* infection and nasal colonization among household contacts of previously undiagnosed leprosy patients. *Leprosy Review, 92, 276-286.*

7. de Bruijne ND, **Urgesa K,** Aseffa A, Bobosha K, Schoenmakers A, van Wijk R, et al.(2022) Development of a questionnaire to determine the case detection delay of leprosy: A mixed-methods cultural validation study. *PLoS Negl Trop Dis* 16(1): e0010038.

8. **Seyoum,** A., Seyoum, B., Gure, T., Alemu, A., Belachew, A., Abeje, D., Aseffa, A., Howe, R., Mulu, A. & Mihret, A. 2023. Genotype heterogeneity of high-risk human papillomavirus infection in Ethiopia. Frontiers Microbiology, 14. https://doi.org/10.3389/fmicb.2023.1116685

9. **Seyoum,** A., Seyoum, B., Gure, T., Ashenafi A., Alemayehu, D.H., Alemu, A., Belachew, A., Tefera, D.A., Aseffa, A., Howe, R., Mulu, A. & Mihret, A. 2024. High rate of non-vaccine targeted high-risk HPV genotypes circulate among women in Eastern Ethiopia. Scientific Reports 14, 958 (2024). https://doi.org/10.1038/s41598-024-51594-7

10. **Seyoum A**, Assefa N, Gure T, Seyoum B, Mulu A, Mihret A. Prevalence and Genotype Distribution of High-Risk Human Papillomavirus Infection Among Sub-Saharan African Women: A Systematic Review and Meta-Analysis. Front Public Health. 2022 Jul 8;10:890880. https://doi:10.3389/fpubh.2022.890880. PMID: 35875040; PMCID: PMC9304908

11. **Gemechu, A.,** Mihret, A., Mengesha, M., Alemayehu, D.H., Kidane, E., Aseffa, A., Howe, R., Seyoum, B. and Mulu, A., 2025. Pretreatment HIV-1 Drug Resistance Among Newly Diagnosed People in Eastern Ethiopia. *Health Science Reports*, *8*(4), p.e70672.

12. **Gemechu, A.,** Mihret, A., Aseffa, A., Howe, R., Seyoum, B. and Mulu, A., 2023, November. Loss to Follow-up and Death Among Individuals With Newly Diagnosed Human Immunodeficiency Virus Receiving Dolutegravir-Based First-Line Antiretroviral Treatment in Eastern Ethiopia: Implications for 95% United Nations Targets. In *Open Forum Infectious Diseases* (Vol. 10, No. 11, p. ofad522). US: Oxford University Press.

13. **Gemechu, A.,** Mihret, A., Atire, F.A., Aseffa, A., Howe, R., Seyoum, B. and Mulu, A., 2023. Virological non-suppression among newly diagnosed HIV-positive individuals on dolutegravir-based antiretroviral treatment in eastern Ethiopia: follow-up study. *Tropical Medicine and Infectious Disease*, *8*(8), p.391.

14. **Abate D**., Abdissa A., Seyoum B., Rea T., Dessie Y., Øystein, HJ, David C., Lucy J. Roberson, Kurt H. Genetic diversity of Cryptosporidium from young children and livestock, Eastern Ethiopia. Current Research journals. Accepted

3.2.3. MSc students research works supported by AHRI

As part of its broader commitment to research capacity building, the collaboration between HU and AHRI has extended support to the thesis research of seven MSc students. This support includes technical guidance, access to laboratory facilities, and mentorship from experienced researchers. The students' research projects focused on critical public health challenges, specifically in the areas of viral hepatitis, septicemia, malaria, and cervical cancer—all of which are diseases of major concern in Ethiopia.

Table 3: Key research topics undertaken by MSc students through the support of AHRI

No	**Name of MSc students**	**Research title**	**Status**
1.	Daniel Demisse	Prevalence, Drug Susceptibility Pattern and Associated factors of septicemia among Women attending delivery in Dire-Dawa, eastern Ethiopia	Completed
2.	Fitsum Abebe	Sero-prevalence of HBV and HCV infections and associated risk factors among mothers of Childern visiting Dil-chora Referral Hospital, Dire-Dawa, eastern Ethiopia	Completed
3.	Kenisa Teshome	Bacterial Agents, Antibiotics Susceptibility Pattern and Associated Risk Factors of Neonatal Sepsis in Dire Dawa, Eastern Ethiopia	Completed
4.	Seifedin Usman	Persistence of Antibody Against HBVsag Among Hepatitis B Virus Vaccinated Children in Harar, eastern Ethiopia	Completed
5.	Beza Garedew	Examining the transmissibility of *Plasmodium falciparum* parasites before and after artemether-lumefantrine treatment to mosquitoes in a direct membrane feeding assay among patients visiting Maksegnit Health Center, Gondar Zuria District, Ethiopia	Completed
6.	Miftah Mohammed	Therapeutic Efficacy of Artemether-Lumefantrine for the treatment of uncomplicated P. falciparum malaria In Assosa Town, Benishangul-Gumuz Region, Western Ethiopia	Completed
7.	Daniel Demessie	HPV clearance, persistence and new incidence rate	Ongoing

		among women in eastern Ethiopia: A follow-up study	

3.3. Challenges encountered in the collaboration

The collaborative research and training efforts have faced some notable challenges. These include:

COVID-19 Pandemic

The global COVID-19 pandemic caused unprecedented disruptions to research activities worldwide. Lockdowns, travel restrictions, and social distancing limited access to laboratories, delayed experiments, and hindered face-to-face interactions essential for effective collaboration and mentorship. Many researchers, including PhD students, struggled with conducting fieldwork, laboratory experiments, and attending international conferences or workshops. Moreover, the shift in funding priorities toward COVID-related research redirected resources, further complicating ongoing projects.

Inadequate support for International Experience

One of the significant challenges in this collaboration is the lack of sufficient financial support for mobility and exchange programs. Although international exposure is crucial for researchers, especially those early in their careers, limited funding often restricts their ability to attend conferences, workshops, or research visits abroad. This financial shortfall limits opportunities for networking, skill enhancement, and knowledge exchange, essential for fostering strong and productive global partnerships.

Distance, Financial Problems, and Delays in Procurement

The physical distance complicates regular interaction, monitoring, and resource sharing, often slowing progress. Financial problems, including budget constraints and limited funding, present major obstacles to supporting joint activities, training programs, and infrastructure upgrades. Furthermore, delays in procurement processes can hinder timely access to essential equipment and materials.

System base challenges

Change in leadership across both institutions significantly affected the joint PhD training. Lack of administrative and support staff alignment regarding the joint PhD program from the two institutions was one of the key challenges faced in smooth transitioning of the process. Furthermore, the lack of a clear motivation scheme including academic promotion for the honorary staff, was among the key challenges worth mentioning.

4. Way forward

To maximize the effectiveness and long-term impact of the collaboration between HU and AHRI, the following strategic actions are recommended:

Prepare a joint strategic plan

Develop a clear, shared roadmap that outlines short-term and long-term goals, areas of joint research focus, human capacity development plans, and timelines. This will align priorities and ensure coordinated progress.

Strengthen research capacity

The collaborating institutions should emphasize and invest more in strengthening research capacity by offering advanced training and mentorship to young researchers, particularly graduate and postgraduate students. This can be effectively achieved through targeted initiatives such as specialized workshops, joint research supervision, and academic exchange programs.

Enhance infrastructure and resource sharing

The collaborating institutions should ensure easy access to laboratories, equipment, and digital resources across their facilities. Sharing advanced infrastructure helps avoid duplication and improves overall efficiency.

Securing joint funding and promoting international collaboration

The collaborating institutions should prioritize obtaining joint funding from international funders and research agencies to support collaborative research projects, facilitate international student and staff exchanges, deliver targeted short-term training programs, and promote broader engagement in global research networks.

Building human capital for long-term collaboration success

To sustain and increase the visibility of the joint collaborative program, the partnering institutions should focus on recruiting new PhD students from local and neighboring countries and establish opportunities for postdoctoral fellowships. Furthermore, they should actively engage in providing short-term training programs to strengthen skills and knowledge development.

Promote knowledge exchange

The collaborating institutions should organize regular joint seminars, conferences, and scientific symposiums to share research findings, stimulate new ideas, and foster innovation.

Foster community-oriented research

The collaborating institutions should align their research efforts with national and regional health priorities to ensure that outcomes have practical applications and positively benefit local communities.

Create a joint monitoring and evaluation unit

The collaborating institutions should establish a shared system to track progress, measure impact, and continuously improve the collaboration based on feedback and lessons learned.

Demand-Based Joint Curriculum Development

Collaborating institutions should prioritize the development of demand-driven joint curricula that align academic programs with current research and development priorities. By tailoring educational offerings to real-world challenges and workforce demands, the partnership can strengthen its academic impact, enhance graduate employability, and contribute meaningfully to sustainable development goals.

Strengthen Institutional Commitment

The collaborating institutions should ensure sustained support from both organizations' leadership through formal agreements, dedicated coordination offices, and aligned policies.

Enhancing promotion process of honorary staff

Enhancing the promotion process for honorary staff involves establishing clear, transparent criteria and pathways that recognize their contributions and expertise. As the university senate legislation is being revised, it is important to include provisions that allow honorary staff from research institutes to be considered for promotion. Doing so will enhance their motivation, strengthen their engagement and retention, and ensure their career growth aligns with the university's goals—ultimately contributing to a more robust research and academic environment.