Policy Brief

Strengthening Mental Health Data through Digitalisation

June 2026 | Uganda

hisp Uganda
APHRC African Population and Health Research Center
wellcome
THE REPUBLIC OF UGANDA MINISTRY OF HEALTH
dhis2
UiO : University of Oslo

Uganda Mental Health Data Dashboard v2

DHIS2 eHMIS · Regional Referral Hospitals · 2002–2025 · 18 facilities

Data Cleaning Pipeline — Original DHIS2 Export

Raw Rows	Empty Dx Removed	Duplicates Removed	Final Rows
194,123	2,255	4,577	187,291

WHAT THE OPD DATA ALREADY REVEALS

Return Rate & Dropout

20,843 returning patients (**14.8%**) — continuity of care is invisible in OPD register.
120,055 one-visit patients (**85.2%**) including **61,785** with severe conditions.

Diagnosis Switching

6,992 patients (**5.0%**) changed diagnosis across visits.

Hidden Burden

5,023 visits (**2.7%**) have MH flags not captured as primary diagnosis.

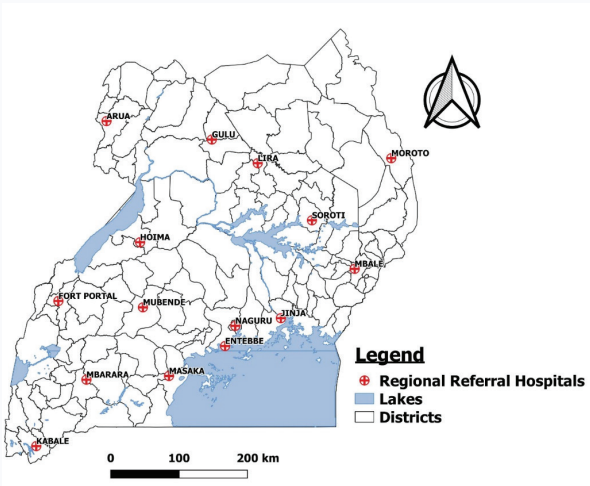
Introduction

According to WHO, more than a billion people live with a mental health condition, yet effective and affordable interventions exist to promote and restore mental health. This makes urgent action essential, as mental health is fundamental to overall well-being and holds both intrinsic and practical value for individuals and societies(WHO, 2022).

Mental health disorders contribute substantially to the global burden of disease. Information systems for tracking prevalence, treatment, and outcomes remain underdeveloped, particularly in LMICs (Alloh, Regmi, Onche, van Teijlingen, & Trenoweth, 2018). The World Health Organisation's Mental Health Atlas 2020 reported that over 70% of LMICs spend less than 2% of their health budgets on mental health, with fragmented data systems being a persistent barrier to effective service planning (WHO, 2021).

In Uganda, mental health data are collected primarily through aggregate reporting tools such as outpatient registers and HMIS summary forms (Ministry of Health, 2010). While useful for basic service statistics, aggregated systems are known to obscure patient trajectories, limit clinical follow-up, and hinder evaluation of treatment effectiveness (Montelongo et al., 2023). The need for more detailed and usable data has driven the adoption of digital solutions that support individual-level data capture.

The Mental Health Data Prize Africa (MHDPA), established by the Wellcome Trust and APHRC, supports innovative, data-driven projects to address the fragmentation and paper-based



Map showing the Scope of the Project: 1 National Referral and 17 Regional Referrals

nature of mental health information systems across Africa. Under this initiative, HISP Uganda, in collaboration with the Ministry of Health, implemented a project at Butabika National Referral Hospital and 17 regional referral hospitals to digitise outpatient mental health records using DHIS2. This effort created a longitudinal dataset from 2022 to 2024, transitioning from aggregate reporting to individual-level digital data capture to improve data quality and accessibility.

Leveraging advanced analytics and machine learning, the project aims to identify risk factors for treatment discontinuation and predict patient outcomes for conditions such as anxiety and depression. The initiative also developed real-time DHIS2 dashboards and digital registers to support evidence-informed planning, budgeting, and resource allocation. Overall, the project demonstrates how digital health systems can transform mental health surveillance and decision-making within Uganda's health sector, fostering a more effective and data-driven approach to mental healthcare.

Project Team participation in the 5th Uganda National Mental Health Conference 2026

Implementation Approach

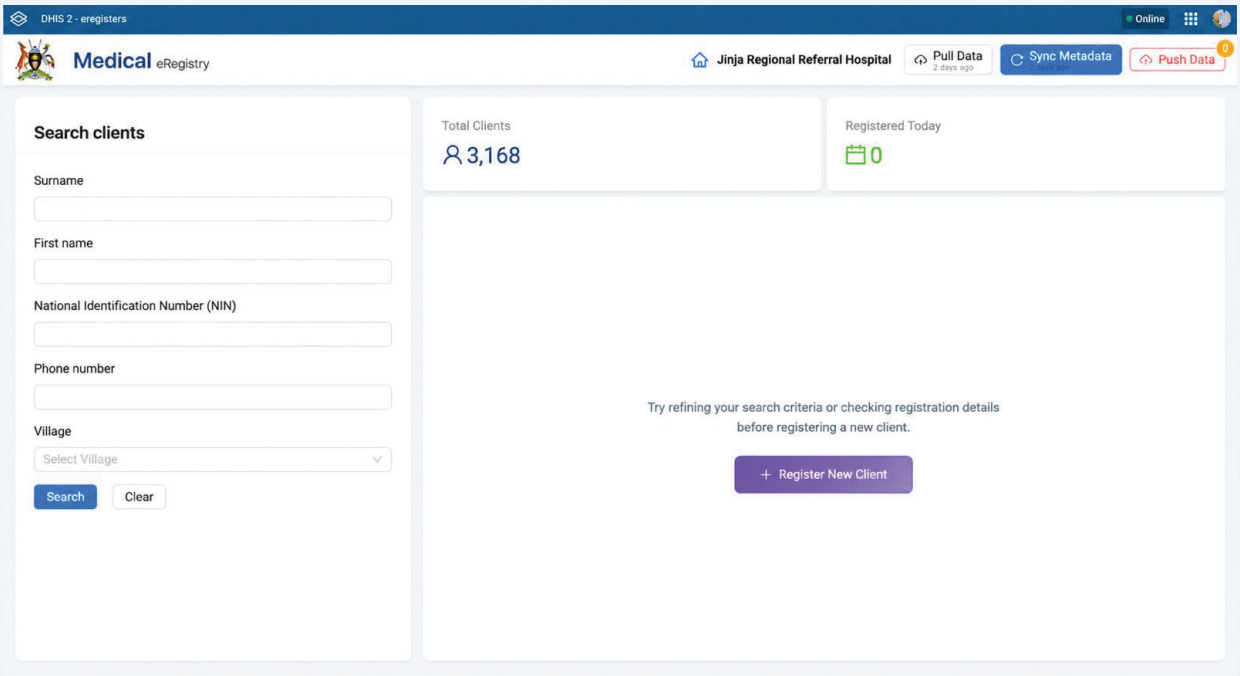
The project, *"Uganda's Digital Mental Health Leap: Harnessing DHIS2 for Data-Driven Insights,"* employed a phased implementation science approach to migrate mental health data from fragmented, paper-based systems to a secure, longitudinal digital ecosystem within the DHIS2 platform. The initial phase involved national stakeholder engagement with the Ministry of Health and Regional Referral Hospitals to align partners and obtain formal authorisation to extract data. On-site assessments revealed significant data management gaps, such as reliance on generic outpatient department (OPD) registers and inconsistent documentation, underscoring the urgent need for a person-centred digital system to track individual patient trajectories.

To facilitate the retrospective digitisation of records from 2022 to 2024, the project developed a customised DHIS2 application configured as a digital replica of the paper-based OPD register and securely hosted on the Ministry of Health's servers. Capacity strengthening was a central component, involving workshops for data clerks and mental health service providers (psychiatrists, counsellors, psychologists, and clinicians) from all 18 participating sites. Participating sites were purposively selected for their capacity (designated mental health units and clinicians) to handle mental health patients. Selected participating sites included 1 National (Butabika) and 17 regional referral hospitals (Arua, Gulu, Hoima, Jinja, Kabale, Lira, Masaka, Mbale, Mbarara, Moroto, Mubende, Naguru, Soroti, Fort Portal, Entebbe, Kayunga, Yumbe).

Data-cleaning and quality-assurance workflows using Stata 14 and Python were also conducted. To address the lack of unique patient identifiers in historical records, a probabilistic patient-linkage approach was implemented using hashed composite identifiers. Additionally, a rule-based algorithm was developed to extract and standardise 47 mental health diagnoses from non-standardised clinical notes. Following harmonisation, secondary data analysis was conducted on the longitudinal dataset of 187,125 visits, and supervised machine learning (Random Forest) was applied to predict return-to-care outcomes. This yielded a two-model framework designed as complementary early warning systems for predicting high service utilisation risk and identifying patients at risk of early disengagement from care.

National and Regional Stakeholders Workshop

To ensure future continuity of care and support prospective patient tracking, the project configured a DHIS2 Tracker architecture. This tracker was designed with integrated modules for triage, screening, clinical assessment, and follow-up, enabling longitudinal monitoring of patient pathways and treatment outcomes. The final phase concentrated on knowledge translation and dissemination, resulting in the development of interactive DHIS2 dashboards, policy briefs, and research manuscripts intended to inform evidence-based planning and resource allocation within the Ministry of Health. Findings are scheduled for dissemination through national and international scientific forums, including the Digital Mental Health International Conference in June 2026.



Mental Health DHIS2 tracker e- registry developed for mental health data

Key Findings

1. Routine mental health data systems remain fragmented, incomplete, and insufficient for longitudinal patient care

Facility assessments conducted across participating regional referral hospitals revealed significant gaps in routine mental health data management systems. Mental health information is primarily recorded in generic outpatient department (OPD) registers such as HMIS FORM 02. The absence of a dedicated mental health register to support comprehensive documentation of patient history, diagnoses, treatments, follow-ups, and outcomes creates gaps in the flow of information for action and decision-making. Existing records frequently lack critical patient-level variables required for continuity of care and outcome monitoring, including demographic information, disability status, risk factors, vital signs, prescription history, and standardised diagnostic classifications. In addition, mental health data are often distributed across multiple uncoordinated digital platforms and paper-based systems, resulting in fragmented reporting, duplication of records, and inconsistencies in patient tracking.

Facility and project team brainstorming meeting at one of the Regional Referral Hospital

The assessment further identified major gaps related to incomplete and inaccurate documentation, limited use of standardised classification b systems, and inadequate integration between mental health services and other hospital information systems. These gaps constrained the ability of health workers and policymakers to monitor patient trajectories, assess treatment continuity, and generate reliable evidence for planning and decision-making. Similar challenges in routine mental health information systems have been reported across low- and middle-income countries, where fragmented and paper-based reporting systems continue to limit the use of data for mental health service improvement and policy development (World Health Organisation [WHO], 2022).

2. Human resource and infrastructure limitations continue to constrain mental health service delivery

The project identified significant human resource and infrastructural constraints affecting the delivery and management of mental health services within participating facilities. Many mental health units reported shortages of trained mental health professionals, data clerks, and personnel with digital data management skills. Limited designated space for mental health patients further constrains the delivery of confidential and patient-centred care. Facilities also reported infrastructural challenges, including inadequate digital equipment, poor connectivity, and limited access to standardised electronic medical systems.

This highlights the need for sustained investment in both health workforce development and digital infrastructure to support the successful implementation of integrated mental health information systems. Evidence from the World Health Organisation indicates that insufficient investment in mental health workforce capacity remains one of the major barriers to strengthening mental health systems globally, particularly in low-resource settings (WHO, 2022).

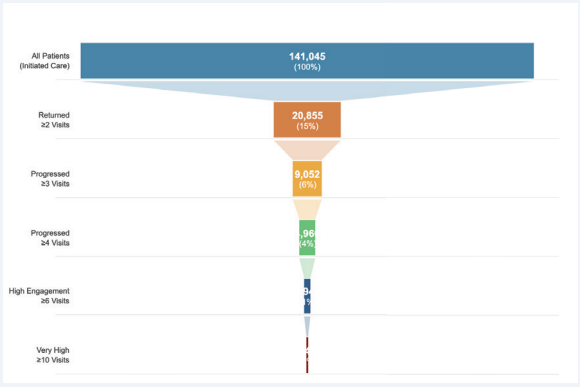
3. Fragmented service delivery and weak patient tracking contribute to duplication and discontinuity of care

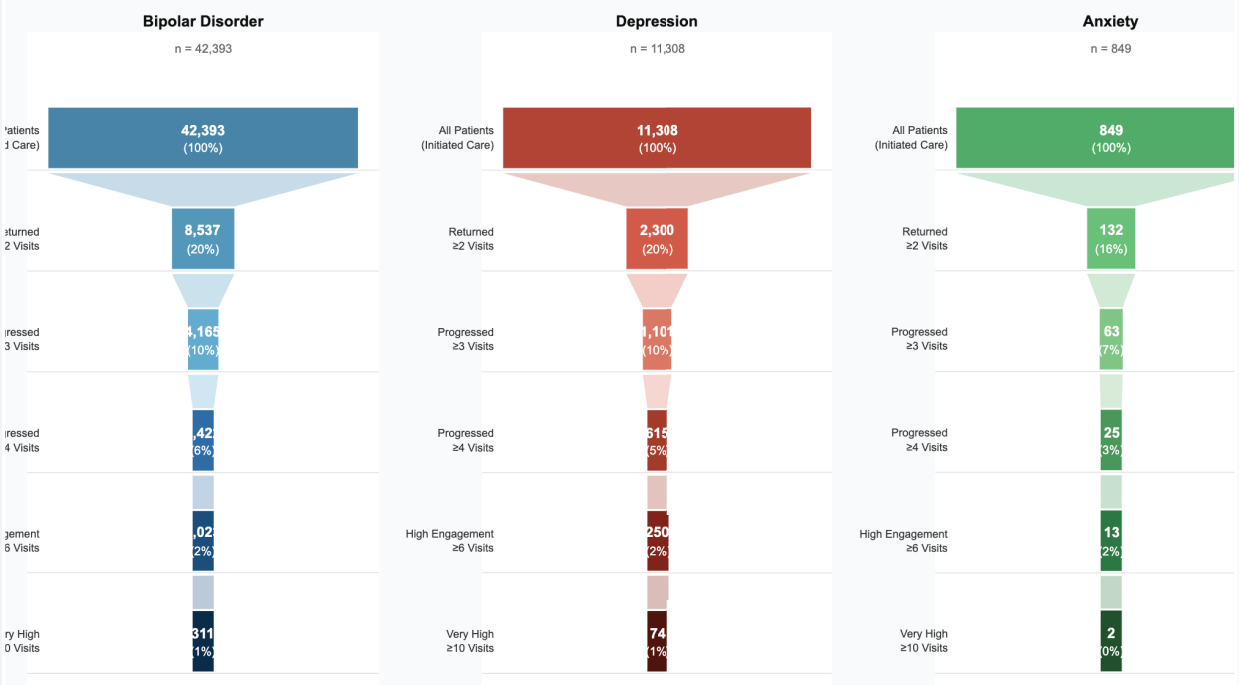
Stakeholder engagements revealed that mental health services are frequently delivered by multiple community- and facility-based partners, with limited interoperability between digital systems. As a result, patients moving between community mental health programs, referral facilities, and partner-supported interventions are often duplicated within reporting systems due to the absence of unique patient identifiers and harmonised tracking mechanisms.

The absence of interoperable digital systems and standardised patient identifiers significantly limits continuity of care and longitudinal patient monitoring. Similar challenges have been documented in digital health implementations across sub-Saharan Africa, where fragmented systems reduce the efficiency of patient referral pathways and contribute to record duplication and reporting burdens (Mehl et al., 2018).

4. Most mental health patients discontinue care after the first clinical visit

Secondary analysis of the longitudinal mental health dataset revealed substantial patient attrition following the initial facility visit. The analysis showed that most patients did not return after their first recorded mental health consultation, indicating significant challenges in continuity of care, treatment adherence, and long-term patient engagement.





Machine learning (ML) Retention Funnel analysis showing the attrition levels from the whole dataset and the 3 Funnels on the core Mental health conditions (Bipolar, depression and anxiety)

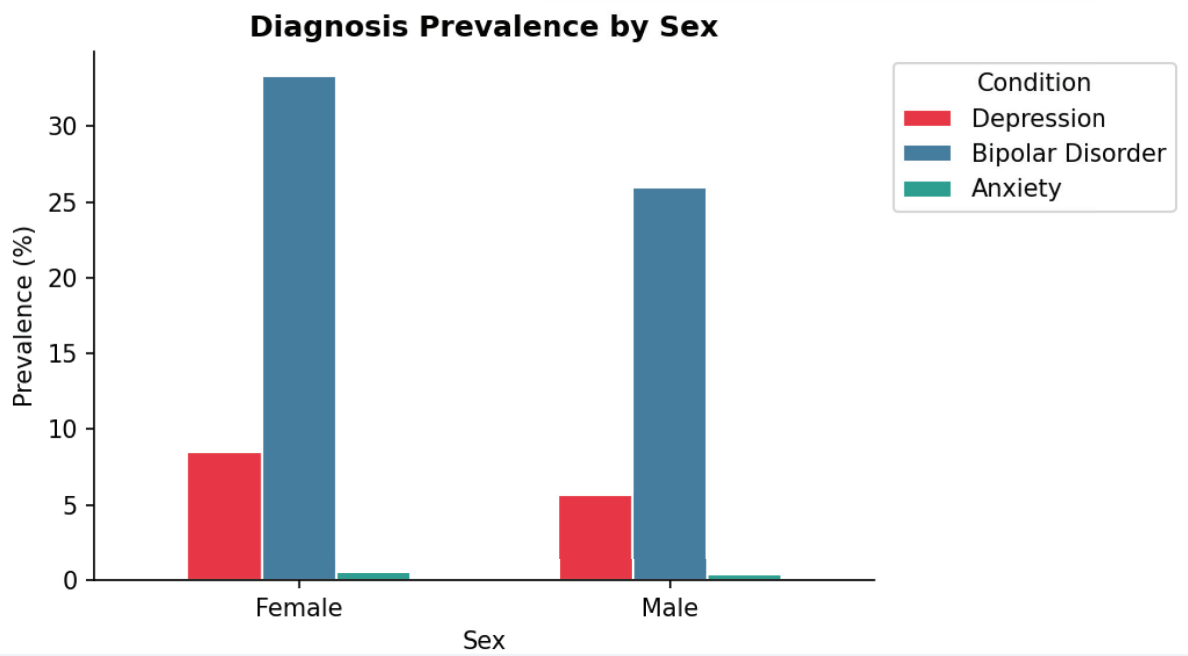
Machine learning analysis further demonstrated that month of visit, sex, district, facility, diagnosis, village, parish, and age are among the strongest predictors of patient revisits and continuity of care. These findings suggest that disengagement from care is influenced by a combination of demographic, geographic, and service-access factors rather than a single clinical determinant.

The findings further underscore the importance of strengthening patient follow-up systems, community-based support mechanisms, and active patient tracing strategies to improve retention in mental health care. Evidence from global mental health research indicates that continuity of care is essential for improving treatment outcomes, reducing relapse, and enhancing long-term recovery among individuals with mental health conditions (WHO, 2021).

5. Bipolar disorder constitutes a major proportion of the mental health burden across participating facilities

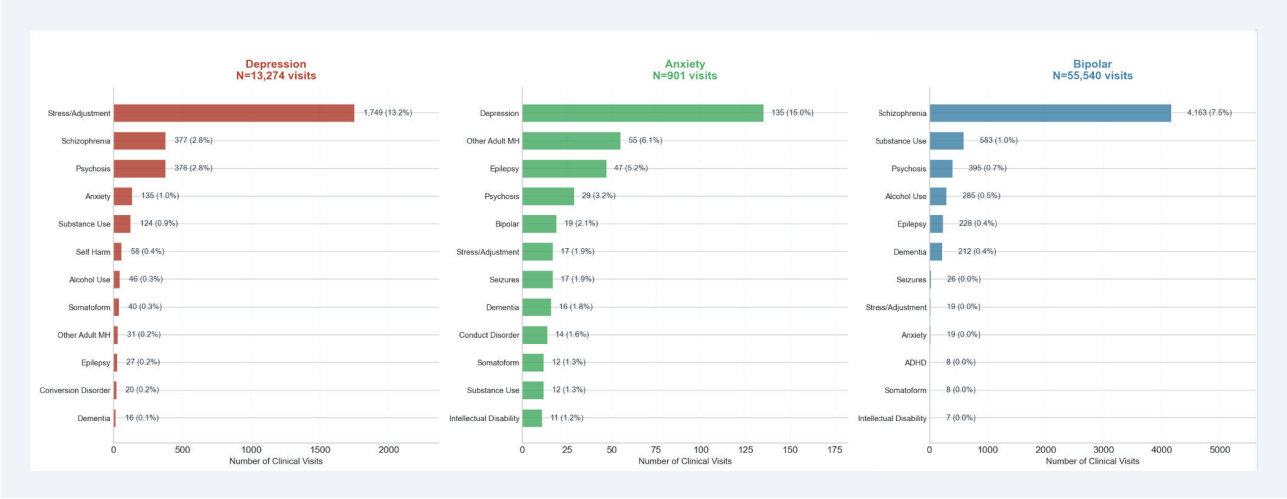
Further analysis from system datasets highlights bipolar disorder as the most commonly recorded mental health condition across participating hospitals, representing the largest proportion of the patient caseload.

Distribution of Depression, Bipolar Disorder, and Anxiety by Sex Among Mental Health Outpatients in Uganda



These findings highlight the growing burden of severe mental health conditions within Uganda's referral health system and emphasise the need for strengthened diagnostic, treatment, and follow-up services for chronic mental health disorders.

Top Co-occurring Diagnoses per Clinical Visit

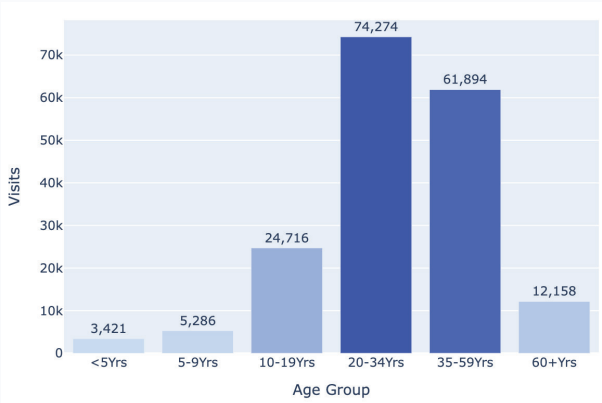


The project identified substantial variations in prescribing practices of medication for mental health cases across facilities. For example, several regional referral hospitals continue to rely on older-generation psychotropic medicines rather than newer treatment approaches defined and aligned with the new clinical guidelines (Uganda Clinical Guidelines, MoH 2013). These findings suggest a need for harmonised clinical pathways, routine training on prescribing practices, and strengthened clinical supervision to ensure quality and standardised mental health care nationwide.

6. Mental health conditions disproportionately affect young people

The project demonstrated that mental health conditions are particularly common among young people, with individuals aged 15–35 years representing a substantial proportion of the mental health caseload across participating facilities. This finding aligns with regional and global evidence showing that adolescents and young adults experience a disproportionately high burden of mental health disorders, often compounded by stigma, delayed care-seeking, unemployment, and social vulnerabilities (United Nations Children's Fund [UNICEF], 2021).

Patient Population by Age group in participating sites



The findings highlight the urgent need for youth-centred mental health interventions, including digital self-assessment tools, school- and community-based awareness programs, and innovative counselling and referral mechanisms to improve early identification and access to care among young people.

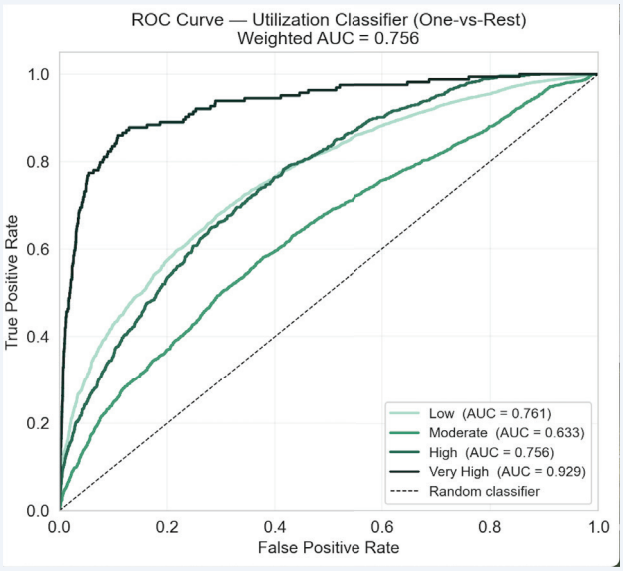
7. Artificial Intelligence and Machine Learning demonstrate potential for mental health decision support

The project demonstrated the feasibility of applying Artificial Intelligence (AI) and Machine Learning (ML) techniques to routine mental health data to generate predictive insights for policy and service improvement. Using Random Forest classification models, the project successfully identified predictors associated

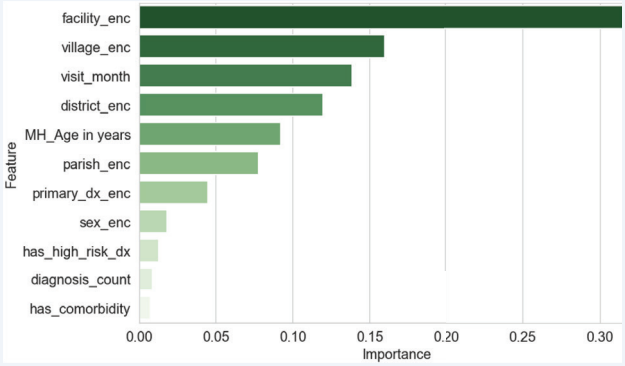
with return-to-care outcomes and patient disengagement.

These findings illustrate the potential of AI and ML tools to strengthen evidence-based mental health planning, identify high-risk populations, support resource allocation, and improve continuity of care through predictive analytics. The increasing use of AI-driven approaches in health systems has been recognised globally as an important opportunity for improving disease surveillance, patient management, and decision support in resource-constrained settings (World Health Organisation, 2021).

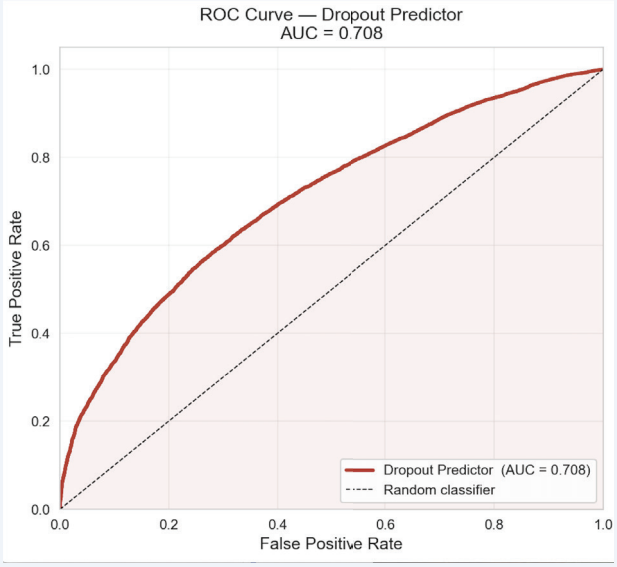
Dropout and Service Utilisation Prediction from Routine OPD Data in Uganda

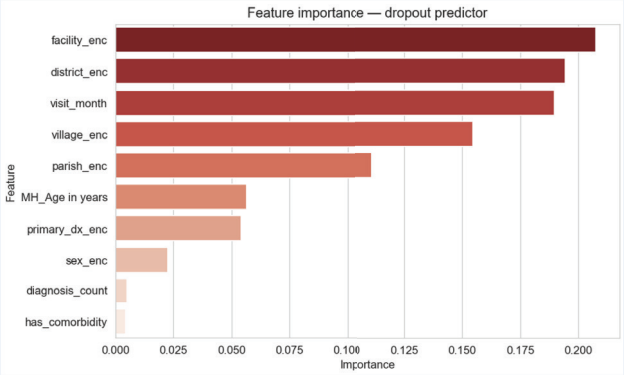


Feature importance for Service utilization



Mental Health Dropout Predictor, Uganda (AUC = 0.708)






Mental health Policy brief

Recommendations

1. Strengthen nationwide digitisation and interoperability of mental health information systems

The Ministry of Health (MoH) should accelerate the transition from paper-based aggregate reporting to integrated digital systems that capture granular, individual-level longitudinal mental health data. Such systems are essential for monitoring patient trajectories, continuity of care, treatment outcomes, and quality of services across all levels of the health system. The Ministry should further strengthen interoperability between the mental health digital ecosystem and other health facility systems, including inpatient departments, Electronic Medical Record (EMR) systems, laboratory systems, and community health platforms.

In addition, the adoption of standardised unique patient identifiers should be prioritised to support cross-system interoperability, accurate patient tracking, and deduplication of records across facilities and community-based programs. Evidence from digital health implementations globally demonstrates that interoperable health information systems are critical for improving care coordination, reducing duplication, and strengthening health system efficiency (World Health Organisation [WHO], 2021).

2. Scale digital mental health systems and strengthen facility-level data use

The Ministry of Health should scale the DHIS2 mental health module beyond the current 18 Regional Referral Hospitals to include general hospitals and lower-level health facilities nationwide. Expanding digital mental health systems across all levels of care would improve access to timely mental health information and strengthen continuity of patient management across referral pathways.

The Ministry should also empower health workers and facility managers to utilise real-time digital dashboards for routine planning, quality improvement, and monitoring of service delivery. Strengthening data use culture at the facility level can improve responsiveness to emerging mental health challenges and support evidence-based resource allocation and supervision. Similar approaches have been shown to strengthen decentralised health system management and accountability in low-resource settings (WHO, 2022).

3. Standardise mental health clinical pathways and quality of care

The Ministry of Health should develop and institutionalise standardised mental health clinical pathways across all public health facilities. This should include harmonised diagnostic classification systems, prescription protocols aligned with the Uganda Clinical Guidelines, standardised follow-up procedures, and routine treatment outcome monitoring. Standardisation would improve consistency in service delivery, strengthen continuity of care, and reduce variations in prescribing practices observed across facilities.

Routine clinical supervision and mentorship mechanisms should be further strengthened to monitor the adoption of standardised digital tools and clinical protocols. Evidence indicates that supportive supervision is critical for improving adherence to clinical standards and enhancing quality of mental health services in resource-constrained settings (WHO, 2021).

4. Invest in human resources and analytical capacity for mental health data systems

The Ministry of Health should prioritise sustained investment in human resources for mental health data management and analytics. This includes continuous capacity-building for hospital data clerks, Mental Health Units, and health workers in digital data entry, data quality assurance, analysis, visualisation, and interpretation. Strengthening digital competencies at the facility level is essential for improving completeness, accuracy, and utilisation of routine mental health data.

The Ministry should also invest in specialised

analytical and Machine Learning (ML) capacity to translate complex datasets into predictive insights for policy and planning. The use of Artificial Intelligence (AI) and ML tools has demonstrated potential to strengthen disease surveillance, identify high-risk populations, and improve evidence-based decision-making within health systems (WHO, 2021).

5. Strengthen mental health research and evidence uptake

The Ministry of Health, academic institutions, and implementing partners should strengthen the utilisation of routine mental health data and research evidence to inform national policy and programming. Particular attention should be given to identifying high-risk populations, including young people aged 20–35 years, who represent a substantial proportion of the mental health caseload identified through this project.

In addition, stakeholders should continue promoting the use of open-source technologies, transparent analytical methods, and collaborative research approaches to strengthen innovation and evidence generation in mental health. Open science approaches can improve accessibility of evidence, encourage interdisciplinary collaboration, and accelerate translation of research findings into policy action (United Nations Educational, Scientific and Cultural Organisation [UNESCO], 2021).

6. Prioritise youth-centred and stigma-reduction mental health interventions

The Ministry of Health should strengthen youth-focused mental health interventions aimed at reducing stigma, promoting early care-seeking, and improving access to mental health services among adolescents and young adults. This should include the development and promotion of digital self-assessment tools, youth-friendly awareness campaigns, and technology-enabled screening platforms.

The Ministry should further explore innovative support mechanisms, such as toll-free counselling lines, USSD-based screening systems, and digital referral platforms, to facilitate timely triage, counselling, and referrals, particularly for underserved populations. Evidence suggests that digital mental health interventions can improve access to care and reduce barriers associated with stigma and limited mental health workforce capacity (UNICEF, 2021).

7. Strengthen patient follow-up and community-based mental health support systems

The Ministry of Health should prioritise active patient tracing and follow-up mechanisms for first-time mental health patients to address the high attrition rates observed following the initial clinical visit. Strengthening continuity of care is essential for improving treatment adherence, reducing relapse, and enhancing long-term patient outcomes.

Community-based mental health support systems, including peer-led support groups and community follow-up mechanisms, should also be strengthened to improve patient engagement and continuity of care beyond the facility setting. Evidence from global mental health programs demonstrates that community-based approaches are critical for improving adherence and reducing loss to follow-up among mental health patients (WHO, 2021).

8. Address diagnostic and monitoring gaps in mental health services

The Ministry of Health should strengthen routine screening, diagnosis, and reporting of under-diagnosed mental health conditions, including anxiety disorders, which remain substantially underrepresented within routine health records despite growing global prevalence. Standardised screening tools, including WHO mhGAP approaches, should be integrated into routine service delivery to improve early identification and diagnosis.

In addition, the Ministry should establish flexible, real-time public monitoring dashboards to improve transparency, accountability, and public awareness of national mental health trends. Strengthening routine reporting and visualisation systems can support more timely evidence-based planning and facilitate public engagement in mental health policy and advocacy.

References

African Population and Health Research Center. (2026). *Mental Health Data Prize Africa*. https://mentalhealthdataprizeafrica.aphrc.org/

Bolukbasi, E. (2025). *How we redesigned our Mental Health Data Prize for scientists in Africa*. Wellcome Trust. https://wellcome.org/insights/articles/redesigning-mental-health-data-prize-scientists-africa

Ministry of Health Uganda. (2020). *Health Management Information System (HMIS) manual*. Ministry of Health Uganda.

Ministry of Health, (MOH), Uganda Clinical Guidelines. National Guidelines on Management of Common Conditions, C. Services, Editor. 2023.

World Health Organization. (2021). *Guidance on community mental health services: Promoting person-centred and rights-based approaches*. World Health Organization.

Mehl, G., Tamrat, T., Bhardwaj, S., Blaschke, S., Labrique, A., & Vasudevan, L. (2018). Digital health vision: Could MomConnect provide a pragmatic starting point for achieving universal health coverage in South Africa and elsewhere? *BMJ Global Health*, *3*(Suppl 2), e000626. https://doi.org/10.1136/bmjgh-2017-000626

United Nations Children's Fund. (2021). *The state of the world's children 2021: On my mind – Promoting, protecting and caring for children's mental health*. UNICEF. https://www.unicef.org/reports/state-worlds-children-2021

World Health Organization. (2021). *Guidance on community mental health services: Promoting person-centred and rights-based approaches*. World Health Organization.

World Health Organization. (2022). *World mental health report: Transforming mental health for al*. World Health Organization.

United Nations Children's Fund. (2021). *The state of the world's children 2021: On my mind – Promoting, protecting and caring for children's mental health*. UNICEF. https://www.unicef.org/reports/state-worlds-children-2021

United Nations Educational, Scientific and Cultural Organization. (2021). *UNESCO recommendation on open science*. UNESCO. https://unesdoc.unesco.org/ark:/48223/pf0000379949

World Health Organization. (2021). *Guidance on community mental health services: Promoting person-centred and rights-based approaches*. World Health Organization.

World Health Organization. (2022). *World mental health report: Transforming mental health for all*. World Health Organization.

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