

Access to Child and Adolescent Mental Health services in Uganda: Investigating the role of Primary Health Care and Traditional Healers

Angela Akol

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Title: Access to Child and Adolescent Mental Health services in Uganda: Investigating the role of Primary Health Care and Traditional Healers

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Abstract

Introduction: Up to 20% of children and adolescents globally suffer from a debilitating mental illness and up to 50% of adult mental illness begins in adolescence. Early detection and management of Child and Adolescent Mental Health (CAMH) disorders reduces the likelihood of long term ill-health and minimizes stress on individuals, families, communities and health systems. Robust health systems are required for optimizing CAMH. However, the coverage of CAMH services in most low-income and middle-income countries (LMIC) is low and health system responses to CAMH have been weak. To increase the coverage of CAMH services, the WHO and others recommend the integration of CAMH into primary health care (PHC) in LMIC. The Mental Health Gap Action Program (mhGAP) and intervention guide (IG) were developed for this purpose. To increase entry into CAMH systems, recent studies recommend collaboration between traditional healers and mental health professionals. The main objective of this research was to investigate access to mental health services for children and adolescents in Uganda through PHC workers and traditional healers.

Methods: This concurrent mixed-methods study was conducted in two districts of Eastern Uganda. The qualitative studies utilized key informant interviews with all public officials (n=7) responsible for supervision of CAMH services (Paper I) and in-depth interviews with 20 purposively selected traditional healers (Paper II). The quantitative studies comprised a pre-test/post-test study (Paper III) nested within a pragmatic randomized controlled trial (RCT). The quantitative sub-studies included nurses, midwives and clinical officers who provide PHC services to children and adolescents in level-3 health centers (HC III) in both districts, and who had not previously undergone CAMH training. The RCT (paper IV) intervention consisted of 1) training 36 PHC providers from 18 randomly selected HC III for five days using a curriculum based on the mhGAP- IG version 1.0; and 2) provision of training handouts as job-aids. The RCT compared the proportion of intervention (n=18) to control (n=18) clinics with a non-epilepsy CAMH diagnosis recorded in the clinic registries over three consecutive months following training. Qualitative data were analysed using thematic analysis. Analysis in paper III was based on two-tailed t-tests to assess differences in mean pre-test and post-test scores between the cadres; hierarchical linear regression tested the association between cadre and post test scores; and logistic regression evaluated the relationship between cadre and knowledge gain at three pre-determined cut off points. Fisher's exact test and logistic regression based on Intention to Treat principles were applied for paper IV. The trial is registered at clinicaltrials.gov registration NCT02552056.

Results: Existing CAMH national laws and policies were found to be sufficient. Insufficient public financing for CAMH services and inadequate quality and quantity of CAMH services was cited by all health managers. CAMH services at lower health centers and integration of mental health and CAMH into other health sector services was absent. The health workforce was insufficient in number and skills. Epistemologies of mental illness in children and adolescents were shared between traditional healers and bio-medical providers, but traditional healers had limited interactions with the biomedical health system for mental illness. Traditional healers expressed distrust in biomedical health systems and believed their treatments were superior to medical therapies. They expressed willingness to collaborate with biomedical providers. However, traditional healers believe clinicians disregard them and would not be willing to collaborate with them (paper II).

Thirty-three participants completed both pre-and post-tests. There was an improvement in the mean scores from pre- to post-test for both clinical officers (20% change) and nurse/midwives (18% change). Clinical officers had significantly higher mean test scores than nurses and midwives ($p < 0.05$) but cadre was not significantly associated with improvement in CAMH knowledge at three cut-off points of knowledge gain: 10% (AOR 0.08; 95% CI [0.01, 1.19]; $p = 0.066$), 15% (AOR 0.16; 95% CI [0.01, 2.21]; $p = 0.170$), or 25% (AOR 0.13; 95% CI [0.01, 1.74]; $p = 0.122$) levels.

The proportion of clinics with a non-epilepsy CAMH diagnosis prior to training was 27.7% (10/36, similar between study arms). Following training, nearly two thirds (63.8%, 23/36) of all clinics identified and recorded at least one non-epilepsy CAMH diagnosis from 40,692 clinic visits of patients aged 1-18 recorded.. Training did not significantly improve intervention clinics' non-epilepsy CAMH diagnosis (13/18, 72.2%) relative to the control (7/18, 38.9%) arm, $p=0.092$. The odds of identifying and recording a non-epilepsy CAMH diagnosis were 2.5 times higher in the intervention than control arms at the end of 3 months of follow-up (adj.OR 2.48; 95% CI [1.31, 4.68]; $p=0.005$).

Conclusion: The CAMH system in Uganda is weak. CAMH workforce development to address the human resource gap; and increased integration of CAMH into primary health care and other sectors are suggestions for improving the availability and quality of CAMH services. Collaboration between traditional healers and biomedical providers is possible but is undermined by a prevailing mutual mistrust and competition between traditional healers and clinicians, calling for the implementation of strategies that harness the complementarity of traditional and biomedical providers. PHC providers are important actors in improving access to CAMH services within Uganda's

CAMH system. PHC provider training using mhGAP-IG v1 improves CAMH knowledge; and learning outcomes are independent on the cadre of the provider being trained. Therefore, an option for integrating CAMH into PHC in Uganda is to proceed without cadre differentiation. However, training alone does not result in significant improvements in clinics' identification and reporting of non-epilepsy CAMH cases. Further task-sharing studies integrating CAMH into a larger sample of PHC clinics are suggested, including a community mobilization component in the intervention to improve CAMH clinic attendance.

Publications

- 1) Akol A, Engebretsen IMS, Skylstad V, Nalugya J, Ndeezi G, Tumwine J. Health managers' views on the status of national and decentralized health systems for child and adolescent mental health in Uganda: a qualitative study. *Child and adolescent psychiatry and mental health*. 2015; 9(1):1.
- 2) Akol A, Moland, KM, Babirye, JN, Engebretsen, IMSE. "*We are like co-wives*": Traditional healers' views on collaborating with the formal Child and Adolescent Mental Health System. *BMC health services research*. 2018. Dec; 18(1):258.
- 3) Akol, A, Nalugya, J, Nshemereirwe, S, Babirye JN and Engebretsen, IMSE. Does Child and Adolescent Mental Health in-service training result in homogenous knowledge gain among cadres of non-specialist health workers in Uganda? A pre-test post-test study. *International journal of mental health systems*. 2017 Dec; 11(1):50.
- 4) Akol A, Makumbi F, Babirye, JN, Nalugya-Sserunjogi J, Nshemereirwe S, Engebretsen, IMSE. Short in-service training of PHC workers is effective in increasing identification of children and adolescents with mental ill health – results from a randomised control trial in eastern Uganda. Accepted for Publication by *Global Mental Health* on 1st June 2018.

Scientific environment

This work is a result of long term collaboration between Makerere University and University of Bergen. The Global Mental Health Research Group at the Centre for International Health, Faculty of Medicine, University of Bergen and the PhD-school at School of Public Health, Makerere University provided the scientific environment for the progression of this PhD-work.

The study involved researchers from the following institutions:

- 1) Center for International Health,
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University of Bergen, Norway
- 2) The School of Public Health
Makerere University College of Health Sciences
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- 3) The Department of Psychiatry
Mulago National Referral Hospital
Kampala, Uganda
- 4) The Department of Paediatrics and Child Health
Makerere University College of Health Sciences
Kampala, Uganda
- 5) Butabika National Mental Health Referral Hospital
Kampala, Uganda

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Acronyms / Abbreviations

ADHD	Attention Deficit Hyperactivity Disorder
AIMS	Assessment Instrument for Mental Health Systems
CAMH	Child and Adolescent Mental Health
CAS	Complex Adaptive System
CME	Continuing Medical Education
DALY	Disability Adjusted Life Years
DSM V	Diagnostic and Statistical Manual Version 5
HC	Health Center
HC II	Health Centre Level 2
HC III	Health Centre Level 3
HC IV	Health Centre Level 4
HDREC	Higher Degrees Research Ethics Committee
HIV / AIDS	Human Immune Virus / Acquired Immunodeficiency Syndrome
HMIS	Health Management Information System
HSD	Health Sub District
IACAPAP	International Association of Child and Adolescent Psychiatry and Allied Professions
ICD 10	International Classification of Diseases Version 10
IDI	In-depth Interview
ITT	Intention to Treat
LMIC	Low and Middle Income Country
mhGAP-IG	Mental Health Gap Action Program Intervention Guide
MNS	Mental, Neurological and Substance abuse
MOH	Ministry of Health
NNT	Number Needed to Treat
NSHW	Non Specialist Health Worker
PHC	Primary Health Care
PTSD	Post-Traumatic Stress Disorder
RA	Research Assistant
RCT	Randomised Controlled Trial
RRH	Regional Referral Hospital
SDGs	Sustainable Development Goals
SRS	Simple Random Sampling
TH	Traditional Healer
THETA	Traditional and Modern Health Practitioners Together Against AIDS
UN	United Nations
UNCST	Uganda National Council of Science and Technology
VHT	Village Health Teams
WHO	World Health Organization

Definition of terms

Child and Adolescent refer to a person aged between 0 and 18 years. A child is every human being below the age of 18 years [3]; and an adolescent is aged between 10 and 19 years [4].

Primary Health Care is a basic level of health care that includes programs directed at the promotion of health, early diagnosis of disease or disability, and prevention of disease. It is socially appropriate, universally accessible, scientifically sound first level care provided by a suitably trained workforce supported by integrated referral systems and in a way that gives priority to those most in need. It maximizes community and individual self-reliance and participation and generally involves routine outpatient care[5].

A traditional healer is a person who is recognized by the community where he or she lives as someone competent to provide health care by using plant, animal and mineral substances and other methods based on social, cultural and religious practices [6].

Mental Health is defined as a state of well-being in which every individual realizes his or her own intellectual and emotional potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community [7].

Mental, Neurological and Substance Use Disorders are a set of conditions varied in symptomatology and generally characterized by combinations of abnormal behavior, thoughts, emotions and / or interpersonal behavior [7].

1. Introduction

Child and adolescent mental health (CAMH) is essential for optimal social and psychological wellbeing. Early detection and management of CAMH disorders reduces the likelihood of long term ill-health and minimizes stress on individuals, families, communities and health systems [8]. However, up to 20% of children and adolescents globally suffer from a debilitating mental illness and up to 50% of adult mental illness begins in adolescence [9]. Robust health service systems are required for optimizing CAMH [2]. However, the coverage of CAMH services in most low-income and middle-income countries (LMIC) is poor and health system responses to CAMH have been weak [1, 2]. This thesis presents health system perspectives to scaling-up access to CAMH services in Uganda, with a focus on primary health care (PHC) and traditional healers in two districts of Eastern Uganda.

1.1 Uganda's health system

Uganda's health system is divided into two tiers - national and district levels (table 1). While the national level consists of semi-autonomous institutions under the Ministry of Health (MOH) and national referral hospitals including Butabika National Mental Health hospital, the district level consists of district based health services organized at level I through level IV. Operating at the junction of the two levels are nine Regional Referral Hospitals (RRH), located in regional hubs and serving district clusters. Each RRH is intended to have specialist doctors including a psychiatrist on staff [10].

The lowest rung of the district –level health system (level I) consists of community health volunteers who deliver predominantly health education, preventive services and simple curative services in communities. The next level is Health Center II (HC II), an out-patient service run by a nurse. It is intended to service 5,000 people in its catchment area. Next in level to HC II is health Center III (HCIII) which serves 10,000 people and provides in addition to HC II services, in-patient, simple diagnostic and maternal health services. It is managed by a clinical officer. Above a HC III is the Health Center IV (HC IV), managed by a medical doctor and providing surgical services in addition to all the services provided at HC III. HC IV is also intended to provide blood transfusion services and comprehensive emergency obstetric care. Some districts also have a general hospital which provides health services to up to 500,000 people in its catchment [11].

Table 1: Structure of Uganda’s health system [10]

Level	Health Center	Coverage and approximate population served	Health services Provided
District	I	Village - 1,000 people	Community-based preventive and promotive services
	II	Parish - 5,000 people	Preventive and out-patient curative services
	III	Sub-county - 50,000	All HC II services Maternity and in-patient health services Laboratory services
	IV	County - 100,000	All HC III services Surgery and blood transfusion
		General Hospital – 500,000 people	All HC IV services In-service training, Research
		Regional Referral Hospital – 2,000,000 people	All general hospital services Specialist service, such as psychiatry, Ear, Nose and Throat (ENT), ophthalmology, dentistry, intensive care, radiology, pathology, higher level surgical and medical services.
National		National Referral Hospital – 41 000,000 people	Comprehensive specialist services, teaching and research.

1.2 Global and national CAMH epidemiology

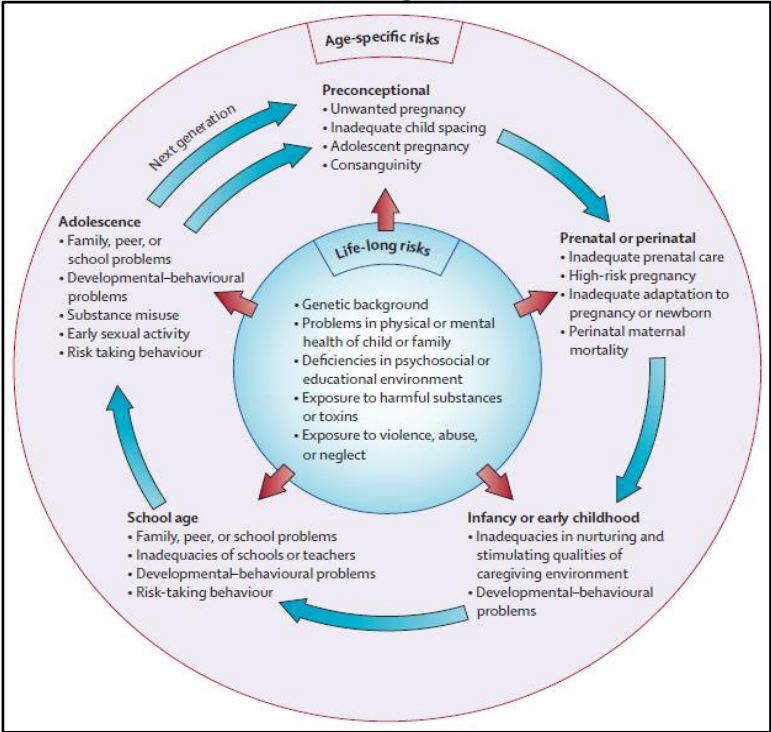
CAMH disorders vary with the child’s growth phase. The WHO has prioritised disorders based on criteria which include therapeutic potential at PHC, frequency of occurrence; degree of impairment and long term consequences [12]. These conditions are classified by the WHO into behavioural, emotional and developmental disorders, based on detailed descriptions in the fifth edition of the Diagnostic and Statistical Manual of Mental disorders, (DSM V) [13, 14].

Table 2: Priority CAMH disorders by developmental phase

Growth Phase	Priority Disorders		
	Behavioral	Emotional	Developmental
Infants and young children (age under five)	Autism Spectrum Disorders	Attachment Disorders Social Communication disorder	Intellectual disability Communication disorders
Middle childhood (ages 6 – 12)	Tic disorders Conduct disorders	Depressive disorders Anxiety Trauma and stressor related disorders	Elimination disorders
Adolescence (ages 13 – 18)	Schizophrenic and psychotic disorder Conduct disorders	Suicide and self-harm Somatic symptom disorders Conversion disorders	

Mental disorders are both a cause and a consequence of a substantial burden of morbidity and mortality among children and adolescents. In LMIC, the risk factors for CAMH disorders are prevalent at all stages of a child’s life, from pre-conception and perinatal stages through school age and adolescence [15-17]. Poverty, for example is closely associated with mental ill-health in both high income and LMIC [18-20]; and socioeconomically disadvantaged children are up to three times more prone to mental ill health than better-off children [21]. Likewise, diminished educational attainment is consistently associated with behavioral difficulty among adolescents [22]; as are drug and alcohol abuse [23] and exposure to violence [24, 25]. Several studies provide evidence of exposure to violence correlating with mental health problems in children in Uganda [26-28]. According to the United Nations these conditions, particularly poverty, poor educational outcomes and violence arising from civil and domestic strife persist in much of sub-Saharan Africa [29]. Predictably therefore, 1 in 7 children in sub-Saharan Africa face significant behavioral difficulties and 1 in 10 have a psychiatric disorder [30]. This estimate is consistent with results from Belfer et al in 2008 which put the global burden of CAMH disorders at up to 20% [9].

Figure 1: Risks for CAMH illness along the Life-course [15]



Discourse on CAMH epidemiology is hindered by limited data from LMIC. Africa in particular is underrepresented in CAMH epidemiological studies [31]. For example, of the 41 studies included in a 2015 meta-analysis by Guilherme and colleagues, only 2 were from Africa. Further challenges arise from non-uniformity of methodological approaches, with subsequent limitations to comparability of estimates. Cultural variations that alter the meaning and interpretation of CAMH symptoms present a further challenge. Nevertheless, the review estimated the global prevalence of CAMH disorders at 13.4%, with anxiety disorders being the most prevalent at 6.5% [32].

The burden of CAMH disorders has not been accurately estimated across Uganda [33]. Much of what is known comes from studies conducted in specific sub-populations (e.g. conflict- and HIV- affected children or within school settings). In all these studies, the magnitude of the problem varies widely and estimates vary by location and study setting. Recent community studies in rural north-eastern Uganda have estimated the prevalence of child and adolescent anxiety disorders at 26.6% [34] and of adolescent suicidality at 6.1% [35]. Another study conducted among school-going adolescents in one district estimated the prevalence of depression at 21% [36] and Okello et. al (2007) estimated that approximately 44% of war-affected adolescents in another district suffered from one or more CAMH disorder [37, 38]. Whereas the prevalence of Attention Deficit Hyperactivity Disorder (ADHD) has been estimated at 11% among children attending pediatric clinics at an urban tertiary hospital [39], lower estimates (6%) are recorded among children living with HIV/AIDS in more rural settings [40]. Possible explanations for the discrepancies in estimates lie in different methodological approaches and in varying exposure to risk and protective factors. Discrepancies notwithstanding, the estimates indicate that CAMH is a problem worthy of addressing through enhanced access to services for detection, treatment and prevention.

1.3 Access to Child and Adolescent mental health services

Access is defined differently by various authors, and the definition of access is frequently context-dependent. A uniform understanding of access is provided by Penchansky (1981) as the extent to which user needs are met by provider characteristics is helpful. Thus, access can be deconstructed into five elements: availability (the quantity and type of services), affordability (perceived and actual cost of services), accommodation (appropriateness of service structure to patient needs), acceptability (how well services meet client attitudes and personal characteristics) and accessibility (the service's geographical convenience of location) [41]. Aday and Andersen in 1974 defined access as "the means through which a patient gains entry into the medical care system and

continues through the treatment process [42p213, 43]. They proposed a theoretical framework for the study of access to health care. This framework proposed that access is a function of both the health delivery system and of the populations that need to use the system. The system in turn is a function of its resources (e.g. staffing, financing), its structure and mechanisms for entry. The focus of this thesis is to examine access to CAMH services through the lens of the availability as defined by Penchansky; and the mechanism for entry into CAMH services in keeping with Aday and Andersen's framework.

The importance of access to mental health services for all is accentuated by the UN Sustainable Development Goals (SDGs) which acknowledge mental health as a development priority for which service coverage is imperative[44]. However, particularly in LMIC, health systems' response to CAMH has been weak, compared to mental disorders in adults and the elderly. In many countries for example, specialized care is scarce; in-patient psychiatric services for children and adolescents lags behind adult care; and research on treatment effectiveness is lacking[45]. As a result, a huge treatment gap for CAMH conditions persists, one that could be addressed by improving access to CAMH care in LMIC [46].

To increase the coverage of CAMH services, the WHO and other global advocates recommend the integration of CAMH into PHC [12, 15, 47-49]. In 2010 the WHO launched the Mental Health Gap Action Program (mhGAP) and its attendant intervention guide (IG) as its flagship mental health program, developed to aid the integration of mental, neurological and substance abuse (MNS) disorders into PHC services provided by non-specialized health-care providers in LMIC [14]. A 2017 systematic review of studies reporting mhGAP implementation concluded that the program has been beneficial to mental health care in LMIC. Several countries in sub Saharan Africa are implementing mhGAP and early work in Uganda suggests that it is feasible to integrate mental health services into PHC [50].

Integration into PHC services is a strategy endorsed by Ugandan mental health managers and health providers to mitigate poor access to CAMH services [51, 52]. Currently, mental health services are provided in a centralized framework at national and regional hospitals, contrary to WHO recommendations for mental health care in low income countries to be provided at lower level PHC clinics and in communities [7, 51, 53, 54]. There are no mental health professionals outside referral hospitals in Uganda; and yet only 10-22% of psychiatric disorders among children are recognizable by Ugandan PHC workers, resulting in a high unmet need for mental health care among children and adolescents [55].

1.4 Traditional healers – a popular option for children and adolescents with mental illness

Traditional healers practice traditional medicine, which is defined as the knowledge, skill and practices based on indigenous belief that are applied in the prevention, diagnosis and treatment of physical and mental illness[6].

Traditional medicine is more widespread in low and middle income countries or present within pockets of traditional communities in high income countries [56]. Estimates are that more than 80% of African populations attend traditional healers for health reasons and that 40%–60% of these have some kind of mental illness [57, 58]. This widespread use can be attributed to the accessibility of traditional healers relative to medical professionals. For instance across sub Saharan Africa, there is a traditional healer for every 500 people, compared to a population/doctor ratio of 1: 40,000 [59].

Several studies in LMIC such as Nigeria, India, South Africa, Malaysia and Zimbabwe, have documented that globally traditional healers are often consulted by patients with mental illness along their journey into orthodox psychiatric care [56]. Several studies have documented satisfactory outcomes of mental health care from traditional healers in these settings [60-62], a factor which could explain their popularity. In Uganda too, research indicates that up to 60% of Ugandan patients attending traditional healers' shrines have moderate to severe mental illness, suggesting that traditional healers are recourse for carers of children and adolescents with mental ill health. It has not been possible to determine the total number of traditional healers in Uganda, but estimates indicate that there is one traditional healer for every 700 Ugandans [63]. In rural areas, four out of five Ugandans visit traditional healers [64]. Recent studies have suggested that traditional healers bear the burden of mental illness in Ugandan communities and re-echo global calls for formal integration of traditional healers in the response to mental illness in developing countries [45, 61, 65]. These studies recommend collaboration between traditional healers and mental health professionals to benefit patients [66].

Several potential hindrances to successful collaboration between traditional healers and formal mental health systems are cited in qualitative studies. Traditional healers express cynicism regarding the value of conventional psychiatric treatments, given their perceptions of the underlying spiritual cause of mental disorders. Other traditional healers express a preference for referring clients to another healer rather than to a doctor, maintaining an 'internal' referral network. Conversely, allopathic providers voice concerns around the safety and efficacy of traditional healer remedies. Specifically, they believe that the

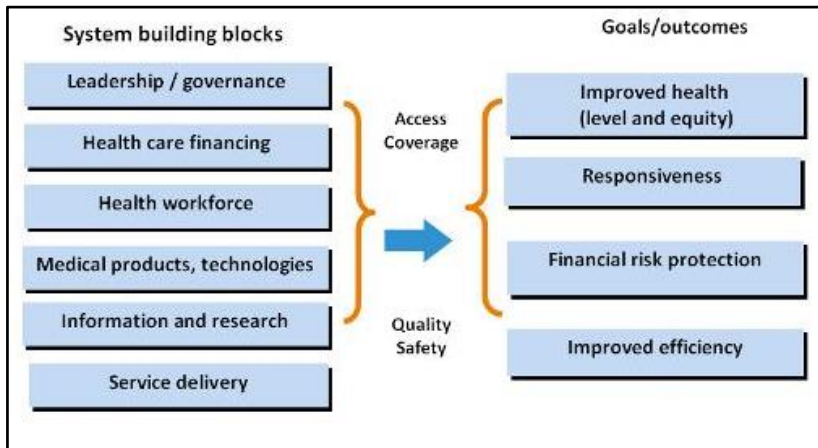
difficulty around establishing the scientific validity of traditional and faith healers' practices; and the lack of regulation impedes collaboration [67].

Collaboration between traditional healers and clinicians for mental health remains unexplored in Uganda, but has been tested for other disease conditions. Traditional and Modern Health Practitioners together Against AIDS (THETA) is an indigenous organisation of traditional healers that has been active since 1992. THETA has established successful collaborations with biomedical providers for HIV / AIDS and family planning [68]. Of all the association of traditional healers in Uganda, THETA has conducted scientific research and writing linking traditional medicine with biomedical health systems.

1.5 Mental health care systems

A health system includes all organizations, people and actions whose '*primary purpose* is to promote, restore or maintain health'[69, pg5], encompassing efforts to influence determinants of health as well as more direct health-improving activities. Thus, the key function of a health-care delivery system is to provide services that improve health. To clarify this function, a health systems framework was defined by the WHO in 2007 to provide a means through which health systems outcomes would be achieved. The framework comprises of six essential building blocks (Figure 1). Whereas each of the building blocks has a unique role in health systems functioning, the blocks are interdependent – changes in one block need to be matched by changes in another to assure access, coverage, quality and safety of health services. For example, improvements in the quantity and skills of the health workforce and the availability of medical technologies is a prerequisite for modifications in service delivery[69]. In articulating equity promotion as a health systems' goal, the framework clarifies the intent of health systems to place users at their center by ensuring that all health interventions benefit entire populations, including marginalized sub-groups, e.g. women, children and the indigent; and groups at particular risk of ill-health.

Figure 2: The WHO health systems framework [69]



A CAMH-care system would therefore function with the primary purpose of promoting and maintaining the mental well-being of children and adolescents, with a central focus on the users of the system. This patient-centered notion of mental healthcare is important for enhancing patient and carer satisfaction with services, thus adherence to treatment [70]. Patient-centered care can take many forms and generally recognises individual experiences and needs in all interactions of the patient with the care system, including their entry into the mental health system, the consultation with the psychiatrist and patient (or carer involvement in care decisions [71].

Patient-centeredness is critically important in sub-Saharan Africa and other LMIC settings, considering the varied trajectories into CAMH care. Several pathways to mental health care are documented for patients in sub-Saharan Africa, with traditional and faith healers featuring prominently as sources of care before, during and after entry into mental health treatment systems. Other sources of care sought on the pathway to mental health treatment include primary care practitioners and schools [72-74]. The assortment of entry points to the CAMH system illustrates the complexity required of CAMH systems to improve access for all patients, catering to their varied beliefs and entry preferences. Indeed, the mismatch between mental health care provision and patients' perceptions of what care they need is one of the failures of person-centeredness within mental health care systems, and impacts the way people gain access into care[71].

As has been outlined above, access to CAMH care is conceptually compound in nature. Moreover, the health systems within which access to CAMH care occurs

are complex, interdependent and multi-faceted. These characteristics render access to CAMH services appropriate for discussion within the realm of complexity science. Complexity science derives its origin in quantum physics and is an entrenched discipline in diverse fields. It has been applied to health care organizations fairly recently [75-77]. Complexity science argues that organisms and organisations are not merely collections of their individual parts. Rather, they are the result of non-linear interactions between constituents, acting in response to changes in the environment, to develop emergent behaviors through self-adaptation. Thus, complexity theory asserts that organisations are complex adaptive systems (CAS) whose output is less a result of their structure than of the processes and relationships between organizational parts [78].

1.6 Complex Adaptive Systems

Complexity science mandates health care organizations as CAS based on the inherent characteristics, behaviors and intended outcomes of health systems [78-80]. The Complex Adaptive Systems (CAS) perspective identifies three main health system components: multiple actors, relationships and networks between the actors (including feedback loops) and emergent health system behaviours [79]. As has been noted, health systems are complex comprised of multiple actors and relationships, with many points of intervention. At the center of health systems' existence is the patient, for whose benefit a health system exists and functions.

The principles of CAS have been applied to analyse the behaviour and outputs of various health-care systems including nursing care, chronic disease management and nursing practice [78, 81-84]. The literature on CAS within mental health care systems is scanty in comparison. Recent work in Australia asserts that adopting a CAS lens translates into improved mental health care [85]. In sub Saharan Africa, the evolution of Tanzanian heroin-abuse policies has been described as the functioning of a CAS in which policy, historical facts, technology and aspirations all function in response to and within a shifting socio-political environment [86]. Aside from disease-specific health systems, CAS principles have been applied to the scale up of health services. Paina and Peters (2011) argue that scale-up of health services happen through non-linear transitions, and not from mere expansion of coverage. They further highlight path-dependence as a critical CAS phenomenon as it demonstrates how processes with a single starting point can adopt non-reversible pathways to result in different outcomes, depending on context [87].

Translating the CAS perspective to CAMH services, the CAMH system should include several elements all interacting with each other with the intended

purpose of improving the wellbeing of children and adolescents with mental health disorders. Thus, CAMH policies and programs should work together and linearly to support multiple actors and individual level interventions that can promote improved access to CAMH services for the improved wellbeing of adolescents. In this thesis I apply a CAS lens to analyzing access to CAMH service systems in Uganda, recognizing that this work did not include the CAS framework a-priori. My justification for applying the CAS framework post-hoc is the relatively recent application in the literature of CAS thinking to mental health systems [85, 86]. At the start of this work in 2014 the literature I accessed relied more on linear analysis of mental health systems. Thus, each of the papers relies on different frameworks depending on the health system theme under study. In due course I encountered new studies on complexity science within mental health systems at scientific conferences and in the literature, hence this new approach. Furthermore, since the CAMH system is sum of its different parts, a CAS lens provides sufficient robustness to enable connection between the conceptual frameworks applied in each individual paper. A CAS lens presents opportunities for analyzing and comprehending the challenges of CAMH system access, particularly the importance of institutions, relationships between actors and the resulting behaviors of systems.

1.7 Rationale for study on access to CAMH services

CAMH service coverage in Uganda and other LMIC is low and health systems have not responded adequately to meet the treatment gap [2, 9, 45]. Global calls for scaling up access to CAMH services in LMIC [12, 49] have been reinforced by the SDGs, which underscore the necessity of increased attention to mental health in general and improved service coverage in particular [44]. In Uganda, the Ministry of Health developed national Child and Adolescent Mental Health policy guidelines in 2014 and revised them in 2017. These guidelines recommend the nation-wide scale-up of CAMH services through integration of CAMH into PHC .They also highlight the need to collaborate with traditional community structures as a strategic priority. However, there is no evidence base for these interventions in Uganda. This study sought to inform implementation of these new guidelines.

Traditional healers are widely consulted worldwide for mental health care, resulting in a global rationale for greater collaboration between traditional healers and biomedical providers for alleviation of mental suffering. The collaboration between traditional healers and clinicians in alleviating mental suffering among children and adolescents is particularly important in settings where access to CAMH services is poor, such as Uganda.

Access to CAMH services is partially determined by the availability of trained health providers. In settings like Uganda where specialized CAMH care is scarce, the WHO's mhGAP-IG is designed to aid the integration MNS disorders into services provided by non-specialized health care workers (NSHW) in PHC settings. NSHW are not homogenous and comprise nurses, midwives, medical assistants or clinical officers and community health workers. In Uganda, nurses and midwives receive less exposure than clinical officers to MNS disorders in pre-service training [88, 89], which may affect the outcome of mhGAP-IG training. Specifically, it is not clear whether mhGAP implementation would have the same level of effectiveness across the different cadres of Ugandan NSHW. Furthermore, the available evidence points to beneficial effects of mhGAP-IG implementation on adult oriented psychiatry, with scant literature on CAMH-focused mhGAP implementation with PHC providers.

The *SeeTheChild - Mental child health in Uganda (SeeTheChild)* project worked both with a cohort established under the PROMISE EBF study (2006-2008) [90] to understand development of mental health problems for children and health system studies from the user and provider perspectives. This current project is a separate and independent entity within the SeeTheChild-Mental child health in Uganda project focusing on the health system context for CAMH. Specifically, *SeeTheChild* sought to understand the main obstacles to and opportunities for health system implementation of CAMH interventions at scale. This study helped to describe Uganda's health system's capability to meet the CAMH needs of the population at national and district levels.

2. Main objectives

The main objective of this thesis was to investigate access to mental health services for children and adolescents at the primary health level so as to inform the implementation of the Child and Adolescent Mental Health policy in Uganda.

2.1 Specific objectives

- 1) To explore strengths and weaknesses of CAMH systems at the national and district level in Uganda from a management perspective (*paper I*)
- 2) To explore collaboration between traditional healers and bio-medical health systems for improved access to CAMH services in Uganda. (*Paper II*)
- 3) To describe the process and outcomes of health work-force CAMH training (*Paper III*)
- 4) To evaluate the effect of health work-force training on CAMH diagnosis in Eastern Uganda (*Paper IV*)

3. Materials and Methods

3.1 Study Setting

The study was conducted in Uganda, a landlocked country in East Africa, bordered to the West by Kenya, to the North By South Sudan, East by the Democratic Republic of Congo and South / Southwest by Tanzania and Rwanda (Figure 3). The two study districts, Mbale and Sironko, are situated around Mt Elgon in Eastern Uganda, bordered to the North by the nomadic pastoralist tribes of Karamoja, a region which is prone to civil conflict. Mbale town is a major urban center, but also contains large rural populations. The main economic activities in the two districts are trade and agriculture with Arabica coffee being the most important cash crop in the two districts.

Figure 3: Map of Uganda showing Eastern Uganda

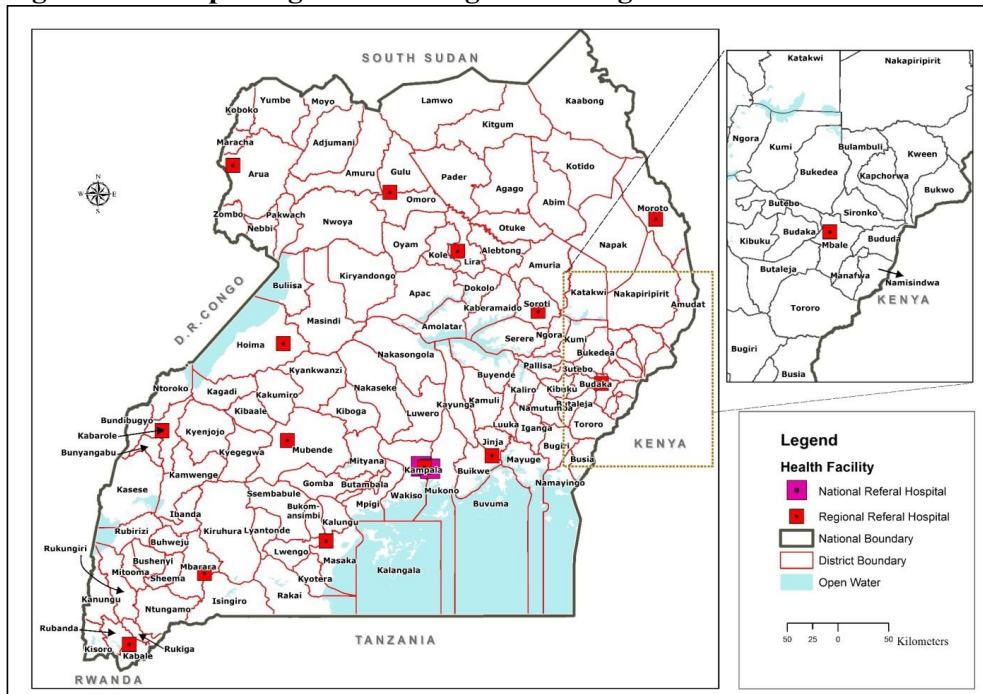
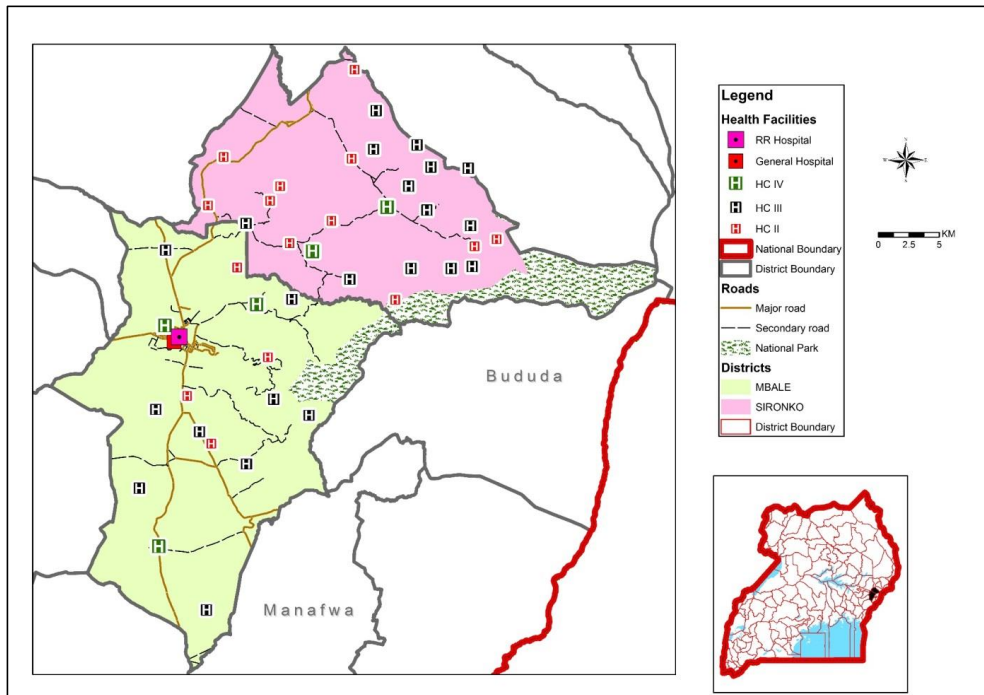


Figure 4: Map of Mbale and Sironko districts, Eastern Uganda, showing health centers



The districts were selected for this study because they were mhGAP naïve, as determined through interviews with the Ministry of Health and the district health office. mhGAP is the WHO’s Mental Health Gap Action Program which aims at scaling up services for mental, neurological and substance use disorders through the integration of mental health into non-specialist settings. Mbale was also the site for the SeeTheChild-Child and Adolescent Mental Health in Uganda study, which included Sironko in its catchment area and aimed to characterize the most common psychiatric conditions among children and assess the related health system aspects.

The two districts combined possess all levels of health service, from Regional Referral Hospital (RRH) to village level and are in close proximity to the psychiatric unit at Mbale RRH. Further, because of the cultural practice of circumcision which is unique to this region, traditional healers and circumcisers are accessible through local associations.

3.2 Study Population

Whereas paper I, which examined the strengths and weaknesses of the CAMH system included all public officials responsible for management and supervision of CAMH services at national (Kampala) and district level (Mbale), paper II included traditional healers from Eastern Uganda who were known to have experience treating children and adolescents with mental illness. The quantitative studies included nurses, midwives and clinical officers who provide PHC services to children and adolescents in HC III in Mbale and Sironko and who had not previously been trained in identification of CAMH problems; and eligible traditional healers. The PHC workers were approached through the national Ministry of Health and the district health authorities while traditional healers were recruited through the national indigenous non-governmental organization THETA, whose mandate is to improve health and access to health care through promotion of collaboration between the traditional and biomedical health care systems [91].

Level III health centers typically have more than 3 health workers, including a clinical officer, and were selected because they are the lowest level at which comprehensive primary health care services are provided. In addition, the presence of at least four staff at the HC III made it possible for two staff members to attend CAMH training without disabling service delivery.

3.3 Study Design

This thesis used a concurrent mixed-methods study design, including quantitative and qualitative approaches as defined by Burke et.al, (2004). According to these authors, this research typology in which a single study incorporates both quantitative and qualitative approaches across the study process offers an epistemological solution to help researchers answer their research question(s) [92]. Further, the multi-faceted and dynamic nature of health systems limits the applicability of purely quantitative methods that quantify the effectiveness of health systems interventions, and calls for methods that address the mechanisms and contextual factors that underlie modifications [93]. Figure 5 is a graphic representation of the study design. Each of the four papers in this thesis is based on either qualitative or quantitative methods, with mixed methods manifesting in the overall analysis and interpretation of findings.

Qualitative Design

Qualitative research refers to methods that enable understanding of concepts from the perspectives of study participants informed by their lived experiences [94]. Qualitative researchers assume a largely relativist or interpretivist orientation, in which reality is construed by people based on their interactions with their surroundings and social systems [95]. This relativist orientation influences the researcher's epistemological (theory of knowledge) and ontological (nature of reality) positions [95]. Specific to this study, the relativist orientation has a bearing on our interpretation of the nature of the CAMH system (ontological position) and our beliefs and opinions about the scope of the CAMH system (epistemological position).

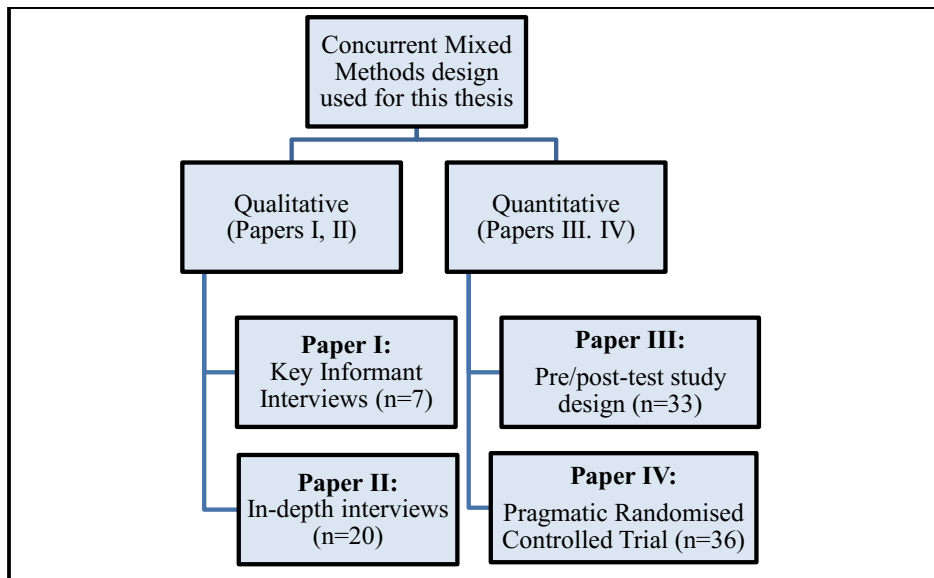
The qualitative sub-studies utilised key informant interviews and in-depth interviews (Papers I and II). In paper I, key informant interviews, a technique in which individuals with information acquired by virtue of their position in society are interviewed to provide insights into a subject of interest [96], were utilized. Key informant interviews were judged to be an appropriate methodology because they delve into perceptions of the subject in question from the perspective of individuals who have knowledge of the subject by virtue of their natural position [97]. Seven key informant interviews with all public officials at national and district level responsible for management and supervision of CAMH services were conducted between July and October 2014 in Kampala and Mbale district, Eastern Uganda.

In paper II, in-depth interviews (IDIs) were used as the method of enquiry because IDIs employ the use of open-ended semi-structured discussion guides. They have the ability to elicit rich descriptions of individual experiences (31). Thus, twenty IDIs with purposively selected traditional healers were held between May and July 2015.

Quantitative design

The quantitative study was a pragmatic randomised controlled trial with a pre-test post-test study nested within (Papers III and IV). This study compared the clinic-level outcomes of CAMH training on CAMH case identification and recording compared to non-CAMH trained sites. Whereas paper III utilized a pre-test / post-test study design to respond to study objective 3, paper IV was a randomized controlled study that compared the impact of a CAMH integration package on yield of CAMH cases diagnosed and recorded compared to non-CAMH integrated sites.

Figure 5: Study design



3.4 Sampling and data collection

Qualitative studies (Papers I and II)

Sampling: The qualitative components of this study relied on purposive sampling for the selection of participants. As suggested by Mays and Pope (1995), such non-probabilistic sampling methods are appropriate when the aim is to identify groups of individuals with characteristics of interest, or representing the social circumstances of the phenomenon of interest [98]. In paper I, the aim was to identify and interview health system managers who had knowledge of the CAMH system while paper II my interest targeted traditional healers who had experience with children and adolescents suffering from mental illness.

In paper I, seven key informant interviews were held. Seven interviews were judged to be sufficient because as noted by Guest et al., 6 – 12 interviews is sufficient to deliver data saturation in a homogenous, purposively selected sample, with enquiry into a concise subject, as was the case for this research [99]. The seven officials represented all managers at national and district level commissioned with the responsibility for supervision of CAMH services. A list of all CAMH-related managers at the Ministry of Health, Mulago national referral hospital and Butabika national psychiatric referral hospital was made

and all the officials on that list were approached for interviews. All officials who were approached accepted to participate.

For paper II, 20 IDIs were conducted and these were deemed an appropriate sample size for achieving saturation [100]. Nevertheless, we considered the point of saturation in collaboration with the research assistant in the course of the study. THETA's representation in Eastern Uganda provided a list of twenty traditional healers in Mbale district and surrounding areas who he knew to be engaged in treating mental health cases.

Instruments: For paper I, interviews were conducted with a semi-structured interview guide divided into the following CAMH-related domains of enquiry:

- Policy
- service delivery
- health workforce
- medicines availability
- partnerships
- Health information

The selection of these domains was guided by the World Health Organization's Assessment Instrument for Mental Health Systems (WHO AIMS) Version 2.2 [101], on which the interview guide was based. Using this instrument as a guide, I developed open ended questions around assessment items listed, adapting the questions to the context and cadre of manager. For example, under Domain 1 of the WHO-AIMS tool, open ended questions were designed to elicit managers' views on the items comprising policy and legislative framework as listed by WHO-AIMS.

Paper II on the other hand, utilized an interview guide (appendix 1) that explored the following major themes: 1) The experiences of traditional healers with mental ill health among children and adolescents; 2) Their willingness to collaborate with biomedical health systems; and 3) Traditional healers' perceived willingness of clinicians to collaborate with them. From these objectives, the interview guide was structured along three domains which encompassed traditional healers' experiences with CAMH; Views on traditional healer participation in the formal CAMH health system; and perceived barriers, facilitators and benefits of integration with the formal health system

Data collection procedures: While I conducted the key informant interviews for paper I in English, the IDIs for paper II were conducted in local languages (Lumasaaba and Luganda) by a research assistant with a sociology background, experienced in qualitative research. I selected the research assistant based on her

residence in the area; fluency in the two local languages and experience conducting research with traditional healers. Prior to conducting the interviews I trained the research assistant on the main objectives of the study and the study tool. I did not participate in the interviews because as a medical doctor, I wanted to eliminate the risk of inhibiting the traditional healers' responses and restricting access to their premises. In Uganda, negative perceptions about traditional healers and their healing practices prevail, particularly among medical practitioners [102]. Therefore, to avoid tainting the interview process with these perceptions, I excluded myself.

All interviews were tape recorded and lasted approximately 45 minutes each. Whereas key informant interviews took place in the officials' offices, IDIs were held at a location convenient to the traditional healer, mostly at their homes and workplaces. One key informant interview was conducted on-line as a voice interview using the application Skype due to the official's absence from their duty station. For all interviews, particularly for the IDIs, care was taken to build rapport with the interviewees to facilitate an open environment in which it was safe to share experiences. As a result, interviewees were willing to talk and open up. Where participants' responses were deemed too brief, the interviewer carefully probed to obtain a more in-depth response. All interviews were audio-taped and notes were taken.

Quantitative studies (Papers III and IV)

Sampling: Paper III describes a pre-post study nested within a pragmatic randomized controlled trial (paper IV). Both papers rely on random sampling of eligible clinics. A list of all eligible clinics in Mbale and Sironko districts were randomly assigned to intervention and control groups by an independent collaborator who was not part of the research team, using computer-generated random numbers. During the randomization, the following procedures were followed: first the list of clinics was sorted alphabetically. Second, a random sequence number was generated using the command 'randomize' in stata v.12 (StataCorp Texas, USA 2011). This method resulted in 18 clinics being allocated each to the intervention and control arms.

The primary outcome was the proportion of primary care clinics that diagnosed and recorded at least one non-epilepsy CAMH diagnosis. The outcome measure was a written non-epilepsy CAMH diagnosis in the health facility records. In the study districts the detection rate was estimated at 0.5% and it was assumed that the intervention would increase its detection rate to 50% of the clinics. Using these assumptions, the sample size estimation in intervention and control groups was based on the formula below for estimation of sample size for adequate power:

$$n = \frac{(z_1 + z_2)^2 \times 2p(1 - p)}{(p_2 - p_1)^2}$$

Where n = number of subjects required in each group

z_1 is the 95% confidence / ∞ error – 1.96

z_2 is the 90% power / β error – 1.28

p_1 is the proportion that gets the outcome in the intervention group – 50%

p_2 is the proportion that gets the outcome in the control group –0.5%

p is the average of p_1 and p_2

This sample size resulted in 36 clinics in total, 18 in each study arm. The unit of randomization was the clinic.

In each of the clinics in the intervention arm a maximum of 2 most senior PHC staff engaged in offering PHC services to children and adolescents were invited for the training. The purpose of selecting two staff was to avoid disabling PHC services while the medical staff were undergoing CAMH training. The two most senior staff were selected on the assumption that they would later orient the junior PHC providers to the training content, and institute procedural and organizational changes in the PHC clinics that would facilitate CAMH case detection. However, these assumptions were not a requirement for enrollment into the study. Paper III is based on the outcomes of training the PHC providers from the HC III in the intervention arm, while paper IV is based on outcomes at the level of the clinics.

Inclusion and exclusion criteria: Clinics were included if they were HC IIIs in Mbale and Sironko districts, owned and managed by the government. Clinics were ineligible for study inclusion if they had a psychiatric nurse or clinical officer, or if their health workers had been exposed to the mhGAP-IG prior to the study. None of the targeted clinics met the exclusion criteria. The selected health workers were approached for study inclusion and all consented to participate in the study.

Data collection instruments: All PHC providers who participated in CAMH training were registered at the beginning

Box 1: Thematic areas assessed by the pre- and post-training evaluation instrument

- Parental behavior and mental health status
- Childhood behavior
- Depression
- Psychosis
- Epilepsy
- Developmental delay
- Suicidal and self-harming behaviour
- Alcohol and substance abuse
- Treatment options for CAMH disorders

of the training and submitted bio-data forms containing information on their age, gender, number of years in service, the name of the health center at which they work, and a record of in-service trainings undertaken in the previous year. Paper III utilized variables from both the participant registration and biodata forms.

In addition to the participant registration and bio-data forms, a CAMH knowledge test derived from a standardized assessment designed by the WHO for trainings on the mhGAP-IG was administered on day 1 before training and on day 5 after the training. The face and construct validity of the assessment tool were determined based on the expert opinion of local professionals and by evidence of its use in the sub-Saharan African context [103]. The tool explored PHC provider CAMH attitudes and knowledge using binary true/false responses and multiple choice questions along the themes in box 1.

Paper IV did not utilize a specific instrument. Rather, it relied on digital recordings of patient registers in all intervention and control clinics during the study period.

Data collection procedures: For paper III, primary data from health providers was collected using participant registration and bio-data forms administered at the before (day 1) and after (day 5) the training. For paper IV, data was obtained from health facility records. All children screened by the PHC workers and identified with CAMH were recorded in the clinics' patient registers (HMIS 031 records). Photographs of service delivery records containing information on patient age, sex, residence and 1-3 diagnoses from clinic registers, was captured using electronic tablets for the month preceding the intervention (baseline) and for each of three months subsequent to the intervention (follow-up months 1,2 and 3). Photographs of the service delivery records were taken to hasten data collection and to ensure retention of a copy of the source documents. For each patient, clinic registers include a provision for a first and second diagnosis to enable recording of co-morbidities. Both first and second diagnoses were captured.

3.5 The intervention

For the intervention arm, all PHC providers were trained for 5 days to screen children and adolescents for CAMH conditions. Training was conducted using a curriculum based on the mhGAP-IG version 1.0 [104], from which the modules on Developmental Disorders and Behavioral disorders were selected. The content in the mhGAP-IG was supplemented with related material from the International Association of Child and Adolescent Psychiatry and Allied Professions (IACAPAP) textbook [105]. The IACAPAP Textbook of Child and

Adolescent Mental Health ISBN: 978-0-646-57440-0 is an online textbook first published by the IACAPAP, Geneva in 2012. Designed for mental health professionals and trainees, the textbook delves into the range of possible clinical presentations and treatment options for CAMH disorders. Thus, it is a highly applicable resource for specialist and non-specialist health workers for contexts similar to Uganda. The training materials were extracted from the current version posted in 2015. In Uganda the text book is currently used to train specialist and non-specialist health workers who are engaged in treating children. Psychiatrists, Paediatricians, Medical Doctors, Nurses, Clinical Officers, Social Workers, Clinical Psychologists, Occupational Therapists and Speech and language therapists undergo a two year modular multidisciplinary course whose curriculum was developed by the Butabika – East London Link [106], is accredited by the Uganda National Council for Higher Education and taught at Butabika National Mental Referral Hospital.

Using both mhGAP and IACAPAP material, a 5-day curriculum (appendix 2) was developed at a 2-day workshop of trainers. At this workshop, the trainers who had extensive experience with training of students, colleagues and other health workers using both mhGAP and IACAPAP, agreed on the methods of instruction and interactive activities for each session. For example, it was agreed that to keep the learners engaged, lecture methodology was reserved for the mornings and group work and clinical practice were scheduled for afternoon sessions. Sessions appropriate for role-play methodology were carefully chosen and additional trainers with session-specific skills sets were identified to conduct training. All training materials were reviewed and approved by the Ministry of Health mental health department prior to training.

Training

The aim of the training was to equip the PHC providers with knowledge and skills in identification, assessment and referral of children and adolescents with mental health problems so as to facilitate early referral and enrollment into care. The 5-day residential training took place in September – October 2015 at the post-graduate center at the psychiatric referral hospital at Butabika in Kampala, Uganda and was delivered by two psychiatrists and a psychologist with special interest and training in child and adolescent psychiatry and mental health. Together, this team led both classroom and clinical practicum sessions. Classroom training was delivered using a mix of teaching methods including lecture (using pre-prepared PowerPoint slides), group discussions, case vignettes and role plays while practicums involved two hours of clinical demonstration on the children’s ward. The participants all received reference material. Training was evaluated through written pre- and post- tests of knowledge and attitudes towards mental health, as well as daily informal participant feedback sessions.

Intervention package

Intervention clinics received a package comprising of:

- 1) A five-day training of eligible PHC providers (midwives, nurses and or clinical officers) on how to screen and refer for CAMH, based on WHO mhGAP implementation guide.
- 2) CAMH screening and training reference materials comprised of copies of PowerPoint slides and training handouts.

Clinics in the control arm continued to provide treatment as usual, characterized by routine PHC services to children and adolescents

Blinding

Blinding helps to prevent bias in clinical trials; whereas blinding of study participants helps to prevent information bias arising from participant knowledge of the intervention, and improves retention and compliance in trials, blinding of investigators helps reduce differential assessment of outcomes [107]. In this study, PHC providers could not be blinded to the intervention. However, we did not independently check patients' awareness of the training. Data entry personnel and the two RAs who were responsible for capturing clinic records were blinded to clinic allocation.

Training of Research Assistants (RAs)

A well-trained research work-force is one consideration for increasing the value of a clinical trial through standardized recording and documentation of results [108]. Therefore for this study, two RAs who were familiar with the functioning of PHC clinics were recruited and trained for one day on the protocol and study procedures.

Data entry and cleaning

Records for papers III and IV were entered into Epidata V3.1 (The EpiData Association, Odense, Denmark) by a team of trained and experienced data entrants. Double entry was done and inconsistencies checked and corrected. Epidata files were exported to STATA v13 (statacorpIC) for cleaning and analysis.

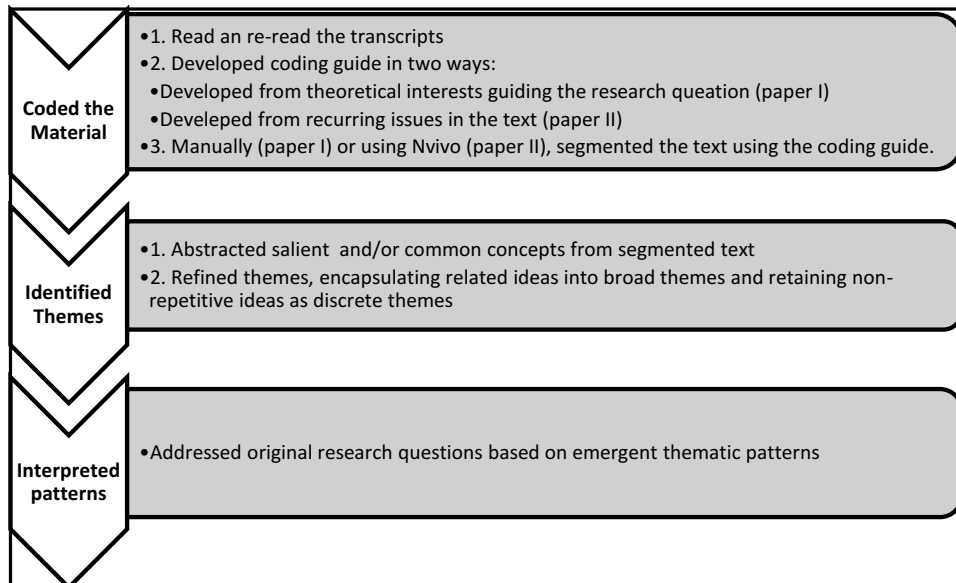
3.6 Data Management and Analyses

Qualitative studies

The study employed conventional content analysis, which allows diversity of conceptions and to get richer understanding [109], using methods described by Guest et al. [110] and Vaismoradi et al. [111]. In keeping with this methodology, the recorded interviews were transcribed; and the transcripts were read and re-read to obtain immersion and a good understanding of the data. Manual analysis was used for paper I, in which the text contained in the transcripts was reduced to thematic codes and within those themes, content codes were developed into a code-sheet with all the relevant themes. Patterns were then identified in the relations among the codes.

For paper II, interviews were transcribed directly into English by the same research assistant who conducted the interviews, while taking care to preserve important local language concepts. Transcripts were imported into QSR NVivo 11 (QSR International Pty Ltd. Version 11, 2015). Open coding was then conducted to categorise data and organise it into themes. An iterative process of labelling and extraction of data into themes and subthemes, comparing and contrasting them with other themes followed. Figure 6 below illustrates the process followed in analysis, moving from codes to themes in papers I and II.

Figure 6: Thematic analysis process flow chart



Quantitative studies

Measures: For paper III, a comparison of knowledge scores before and after training was conducted to establish a difference in knowledge gain between the two cadres of PHC provider. CAMH knowledge gain was assessed for all 36 participants using two measures. First, the CAMH knowledge possessed by the participants after training was considered (absolute measure), assessed using the posttest score as the outcome variable. Secondly, we considered the change in CAMH knowledge possessed by the participants as a result of training (relative measure). This measure was important because it takes participant baseline CAMH knowledge into account and is recommended for understanding longitudinal learning outcomes [112]. To assess relative knowledge gain, the percentage difference in participant pre-and post-tests was the dependent variable. Knowledge gain was assessed at three cut-off points (10%, 15% and 25%) to detect the cut-off point useful for assessing knowledge change in the two cadres.

In paper IV, the primary outcome was the proportion of clinics in the intervention relative to the control arm that diagnosed and recorded at least one non-epilepsy CAMH case over the three-month follow-up period. The secondary outcome was the likelihood of patients receiving a non-epilepsy CAMH diagnosis in the intervention compared to the control arms. Epilepsy was excluded based on available information showing that epilepsy is already being diagnosed and managed in PHC settings [53, 113]

Statistical tests: In paper III, participant characteristics, including demographic information and occupational particulars (cadre, number of years in service and place of work) were analyzed descriptively using proportions and measures of central tendency. Differences in mean pretest and posttest scores were assessed using two-tailed student's t-test. Outcome measures were assessed in two ways. In the first measure (absolute measure), hierarchical linear regression was applied to test the association between participant cadre and post test scores, confirming using skewness/kurtosis and Breusch-Pagan / Cook-Weisberg tests that the outcome variable was normally distributed and homoscedastic. In the second measure (relative measure), logistic regression tested the relationship between NSHW cadre and the three cut-off points of increase in knowledge gain.

For paper IV, explanatory and outcome variables were treated as follows: first, only cases aged 1-18 years were selected clinic record books. Secondly, patient age was re-categorised into 1-4, 5-9, 10-14 and 15-18 age groups, following which all diagnoses were reclassified and re-coded into WHO's International

Statistical Classification of Diseases and Related Health Problems, version 10 (ICD-10) categories [114]. CAMH disorders were further classified according to the fifth edition of the Diagnostic and Statistical Manual of Mental disorders, (DSM-V) [115] and the frequencies analyzed by study arm and month of study. Reclassification into ICD-10 was necessary to collapse the numerous diagnoses into manageable categories (e.g. all cough, cold, upper respiratory tract infections into one category – respiratory). At the second level, re-categorisation into DSM-V diagnostic categories was necessary to manage the various CAMH conditions identified by the providers, e.g. anxiety, which are not included in mhGAP v1 (but were later incorporated into v2). Besides, the WHO reports that the mhGAP diagnostic criteria are aligned with ICD-10 and DSM [116].

Intention to Treat (ITT) analysis was used for paper IV, given that this was a pragmatic trial aimed at informing CAMH policy implementation. The unit of analysis was a health facility, and the primary outcome was a facility reporting at least a diagnosed non-epilepsy CAMH case in the clinic register, coded as 1=yes or else 0=no if no such case was reported. I compared the primary outcome between study arms using Fisher's exact test [117]. The choice of analysis approach was decided based on the number of expected observations in the table cells that were five or less in either or both study arms. Statistical significance was determined at $p < 0.05$.

The secondary outcome was “patients diagnosed with non-epilepsy CAMH”. All patients diagnosed with non-epilepsy CAMH were coded as 1=yes or 0=no if no such diagnosis was made. The odds of a non-epilepsy CAMH diagnosis were compared between intervention and control arms to obtain the odds ratio (OR) as the measure of association. The ORs were obtained via a logistic regression model with corresponding 95% confidence intervals (CI). In the multivariable logistic regression model, factors such as X1, X2 etc. were included. All models accounted for clustering of observations at the clinic level to obtain robust standard errors of the estimates. Stata version 14 was used for all the statistical analyses.

Table 3: Data Analysis Plan by Objective

Study Objective	Study design	Tools	Analysis
To understand national and district level CAMH systems in Uganda (<i>paper 1</i>)	Qualitative	Key informant interview guide	Inductive thematic analysis
To explore collaboration between traditional healers and bio-medical health systems for improved access to CAMH services in Uganda. (<i>paper 2</i>)	Qualitative	In depth interview guide	Framework and Content Analysis
To describe the process and outcomes of health work-force CAMH training (<i>Paper 3</i>)	Quantitative: pre-post study design	-	two-tailed t-test hierarchical linear regression logistic regression
To evaluate the effect of health work-force training on CAMH services in Eastern Uganda (<i>Paper 4</i>)	Quantitative: RCT	-	Fisher's exact test Logistic regression

3.7 Ethical considerations

Ethics review and approval was provided by Makerere University's School of Public Health Higher Degrees Research Ethics Committee (HDREC) and the Uganda National Council for Science and Technology (UNCST). Written informed consent was obtained from all PHC providers. Permission for the study was obtained from the Ugandan MOH and from the two district health offices. The study was registered in ClinicalTrials.gov (number NCT02552056).

Written informed consent was obtained from all study participants after the risks and benefits of participating in the study had been explained. For the qualitative studies, study participants' travel costs for research activities were reimbursed; and they received a locally appropriate compensation for the time they spent being interviewed. All interviews were tape recorded after obtaining participants' consent. For the quantitative studies, PHC provider costs while they participated in training were reimbursed at locally appropriate rates. All ethical guidelines involving human subjects were adhered to throughout this study.

4. Results

This chapter summarises the quantitative and qualitative results from papers 1-IV.

4.1 The National and District CAMH system in Uganda

Paper I explores strengths and weaknesses of CAMH systems at the national and district level in Uganda from a management perspective. I chose to use a management perspective because managers are best placed to provide users' understanding of system-wide operations, including analysis of non-clinical aspects like finances, supplies and personnel. Results are presented according to domains in the WHO AIMS version 2.2.

Adequacy of CAMH laws and policies

Existing global agreements and national laws supportive of CAMH were considered as sufficient for the promotion of CAMH, both by administrative and clinical managers at the central level. The Ministry of Health representative highlighted that physical, mental and social dimensions of child health were represented in these laws, which obligated the country to ensure child protection. Moreover, CAMH policy guidelines had been recently drafted to complement the national mental health policy. Nevertheless, managers at the district level were not aware of these laws and policies and noted that the national mental health policies were inadequate.

CAMH financing

Insufficient public financing for CAMH services was emphasized by all managers. This stems from underfunding of all health services and results in district managers using scarce PHC resources for CAMH. Neither was any donor funding for CAMH noted. However, in-kind support in the form of collaborations, workforce development and refurbishment of infrastructure was acknowledged at a small scale.

CAMH service delivery

Inadequate quality and quantity of CAMH services was cited by all managers at national and district level, and the absence of CAMH or other mental health services at lower health centers (HC II and HC III) contributes to this status. Only tertiary level services are acknowledged as having CAMH services. District level managers confirm that lower level CAMH services primarily deal with epilepsy. Inpatient services are considered to be sufficient at the national

level, but are as a particular challenge at the district level. Managers at all levels agreed that the range of CAMH services being provided is limited; and psycho-social services exist only in the national referral hospital. There are no community outreaches or CAMH promotional campaigns.

Integration

Integration of mental health and CAMH into other health sector services is lacking. HIV services are specifically mentioned as an example where integration is absent as is linkage of CAMH to child and adolescent services outside the health sector, including outreaches to schools, communities, traditional healers and collaboration with the police and social welfare departments. Action from police and social welfare was cited in relation to forensic CAMH services. Attempts by the district health office to address substance and alcohol abuse in schools were curtailed by a lack of funding. The need for integration of CAMH into education services is highlighted as a potential deterrent to school drop-out.

CAMH workforce

The insufficiency of the health workforce is widely cited. The numbers are small, the placement is inappropriate and the civil service staffing norms do not support recruitment and placement of mental health workers at lower level clinics. To strengthen the existing workforce small-scale training initiatives were ongoing at the national level, in collaboration with foreign donors. However at the district level no CAMH training had been conducted.

CAMH health information management and research

The health management information system (HMIS) is generally considered adequate for planning at the national level and inadequate to support district-level CAMH planning and implementation, largely because it does not disaggregate data into child and adolescent ages. There are no periodic reports on mental health in general and CAMH in particular. The only opportunity to report on the national mental health status is in the Annual Health Sector Performance Report, in which a paragraph on mental health can be published.

4.2 Potential for collaboration between traditional healers and bio-medical health systems to improve access to CAMH services in Uganda

Epistemological basis of CAMH: the traditional healer perspective

In keeping with traditional healers' belief in ancestors' ability to interfere in the lives of the living, ancestral spirits play a major role in their explanations of mental illness. A commonly held view is that ancestral spirits are unhappy because ancient customs and rituals have been abandoned; and that children and adolescents who resisted their destiny to become traditional healers inevitably developed mental illness, which was only curable by initiation into traditional healing. Traditional healers also believe that a conflict between traditional and modern 'born again' religions is responsible for protracted mental ill-health among children and adolescents. Other causes are ghosts, spirits and witchcraft, which are sent by enemies and encountered by people who walk outside the house at night, causing them to descend into mental illness.

Traditional healers also ascribed mental ill health among adolescents to non-spiritual causes like substance abuse, high fever and cerebral malaria. According to them, this category of mental illness was best treated in hospitals and clinics.

In summary, three types of explanations for mental illness were found to be part of the epistemology of the traditional healer: Spiritual explanations including unhappy ancestors and conflict with neo-Pentecostal worship; social explanations including witchcraft and evil eye and physical or natural agents like infections and substance abuse.

Traditional healers' Interaction with the health system

All traditional healers held the view that traditional medicine is the only effective treatment for mental ill health, due to the spiritual nature of the condition. We found very little experience of referral from health clinics to traditional healers. However, self-referrals were commonly reported, in which patients discharged themselves from health clinics to consult traditional healers.

Although biomedicine was seen as limited, addressing only the natural / physical causes of disease, all informants had referred patients to biomedical clinics. The commonly cited reasons for referral were for rehydration, or for blood transfusion. Others referred patients whom they deemed to have biomedical conditions, particularly malaria, which they were not well suited to manage. Despite great skepticism of the effectiveness of biomedicine, some elements

were integrated into the treatment regime of traditional healers. One example is the traditional healer who professed to routine use of largactil® on all violent patients who were brought to him, prior to administering his herbal treatments.

The view that clinical practitioners are not competent to manage mental health conditions was unanimous. The reasons cited were that clinical practitioners do not comprehend spiritual matters and are poorly placed to treat conditions with a spiritual origin. It was widely acknowledged that they could manage conditions that arose from malaria and other fevers. To prove their points, many of the traditional healers cited examples of patients who had been repeatedly treated at health clinics but only got better after visiting traditional healers. A lack of trust in biomedical practitioners was clearly expressed in convictions among the traditional healers that clinicians beat up mental patients who were violent, and that the remedies provided in clinics are temporary; the only lasting effect was believed to come from traditional healers.

Prospects for collaboration

Even if nearly all traditional healers expressed willingness to collaborate with clinicians in alleviating mental suffering in children and adolescents, their willingness was conditional on clinicians' reciprocating this goodwill which was considered unlikely. All of the participants believed that clinical providers are not at all willing to collaborate with traditional healers as they consider them dirty, unsanitary and of a lower education status.

We found distrust in biomedical practitioners among traditional healers. In addition to the belief that medical providers viewed them negatively, most traditional healers thought that clinicians would only get knowledge out of the traditional healers and use it for their own credit.

To eliminate barriers, necessary conditions for collaboration were described. The majority of the traditional healers mentioned the government as needing to take a lead in integrating them with formal health systems, without which collaboration wouldn't be possible. The required government intervention mostly suggested was a law or policy recognising traditional healers and compelling clinicians to collaborate with traditional healers.

4.3 CAMH knowledge gain among PHC provider cadres in Uganda following short in-service training

In this section I present results of an intervention aimed at improving CAMH skills among PHC providers, as a means of ameliorating CAMH workforce

inadequacies and improving prospects for entry into care. Most of the participants trained (63.9%, n=23) were nurses or midwives aged less than 35 years of age. Fifteen of the 36 (41.7%) had been in service for less than five years. Equal proportions of men and women participated in the study

Absolute measure of CAMH knowledge

The post-test score was used as the measure of absolute CAMH knowledge after training. After ascertaining the normality and homoscedasticity of the post-test variable, simple linear regression of posttest results at the 5% significance level was performed on all the independent participant factors. Only cadre ($p=0.003$) and pre-test score ($p<0.001$) significantly influenced the post-test result in the crude model. Participant age, sex, health unit, years of service had no influence on post-test results (p value >0.05)

During hierarchical linear regression, the inclusion of pre-test score into the model increased the correlation coefficient for participant cadre, suggesting a confounding effect of pretest score on cadre and training outcome. Therefore, we re-run the regression using the interaction term $\text{pretest} \times \text{i.cadre}$. The results show a significantly stronger influence of cadre on knowledge gain than in the crude model: when pretest score is accounted for, nurses and midwives were 46% less likely than clinical officers to gain any knowledge from the training ($p=0.032$).

Relative measure of CAMH knowledge gain

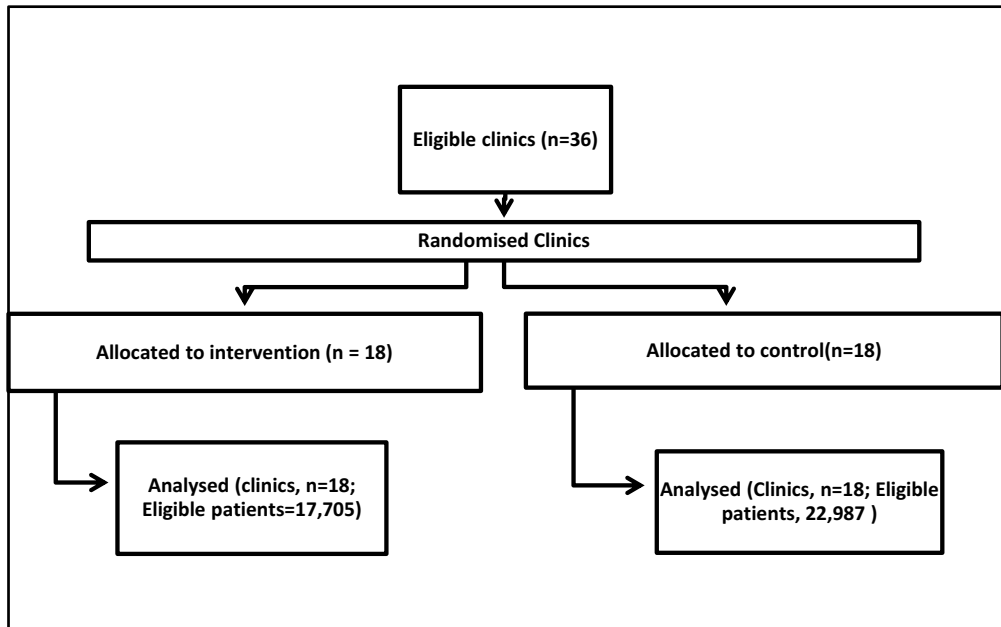
The change in CAMH knowledge, measured as the difference between pre-test and post-test results was used as a relative measure of CAMH knowledge gain. First, a two-tailed t-test performed to assess the difference in mean knowledge change between the two cadres showed no significant difference ($p=0.410$). We divided the sample along three cut-off points of knowledge gain: 10%, 15% and 25% gain in knowledge; and applied logistic regression to determine the association between PHC provider cadre and a gain in CAMH knowledge at these cut-offs.

Logistic regression revealed that cadre was not significantly associated with relative knowledge gain at the 95% confidence level for all three selected cut-off points of knowledge gain. The participants' pretest score was significantly associated with relative knowledge gain ($p<0.05$) at all cut-offs; a higher pretest score was significantly associated with lower odds of achieving CAMH knowledge gain.

4.4 The effect of health work-force training on CAMH services

This section presents results on the effect of CAMH integration into PHC on CAMH case identification among PHC providers in Mbale and Sironko districts in Eastern Uganda. Figure 7 is the trial flow-chart showing how clinics participated in the trial.

Figure 7: CONSORT flow chart of CAMH integration effectiveness trial



Forty-two percent of clinics in Mbale (n=11) and 46.2% in Sironko (n=7) were allocated to the intervention arm. Clinics were equally distributed by district in the intervention and control arms, but the number of recorded patient visits was significantly different ($p < 0.001$) in intervention and control clinics.

Twenty-three clinics overall (63.8%) recorded a CAMH diagnosis; 14 (77.8%) of these were in the intervention arm. Over the three months' follow-up period the number of CAMH-diagnoses at intervention clinics ranged from 0-7, with half (n=18) of the diagnoses in the intervention arm being recorded by three clinics. On the other hand, in control clinics, CAMH diagnoses ranged from 0-5 in number with one clinic providing 36% of diagnosed patients. The most prevalent disorders were somatic symptom disorders (31.3%, n=20), accounting for two-thirds of all CAMH diagnoses recorded in the baseline month, 44.4%

(8/18) of all CAMH disorders identified in the control and 26% (12/46) in the intervention arms.

Overall a total of 20 out of 36 clinics made and recorded at least one CAMH diagnosis over the three-month follow-up period. The proportion of clinics with a CAMH diagnosis tended to be higher in the intervention (13/18, 72·2%) relative to the control (7/18, 38·9%) arm but this difference was not statistically significant ($p=0·092$).

Over the three-month study period, the adjusted odds of a patient being diagnosed as a CAMH case were 2·5 times higher in the intervention relative to the control arm, (AOR=2·5; 95% CI [1·31, 4·68], $p<0·05$). The effect of the intervention on patient diagnosis tended to be highest in the first follow up month (AOR 3·98; 95% CI [0·43, 36·67], $p>0·05$).

5. Discussion

This chapter discusses the results and findings of this study, highlighting linkages between the sub-studies and applying a CAS lens to the findings. It also discusses the key methodological issues and how these may affect the interpretation of the results and findings of this study. Finally, it presents the conclusions and relevant research and policy implications of the findings.

5.1 Discussion of the Results

Four main findings arise from this study: 1) The CAMH system in Uganda is inadequate for sufficient access to services and closing the CAMH treatment gap; 2) Collaboration between agents of the system is possible to enhance access; 3) Training results in knowledge improvement among cadres of PHC providers; 4) Improvements in health system behavior after intervention are not sustained over time.

Table 4: Summary of main findings by paper

Paper I: Health managers' views of the national and decentralized CAMH system in Uganda	CAMH laws and policies are adequate
	There is insufficient public financing for CAMH
	CAMH services are inadequate
	Integration of CAMH into other health services and outside the health sector is lacking
	The CAMH workforce is inadequate in number; and PHC providers have limited CAMH knowledge
	CAMH medicines are sufficient but medicines availability is dependent on workforce
	District health managers consider the HMIS inadequate to support CAMH planning and implementation
	Periodic reports on CAMH are lacking and CAMH research is scanty
Paper II: Traditional healers' views on collaborating with the formal Child and Adolescent Mental Health System in Uganda	Epistemologies of mental illness in children and adolescents are shared by traditional healers
	Traditional healers have limited interactions with the biomedical health system for mental illness
	Traditional healers' willingness to collaborate with biomedical providers is hampered by mistrust of biomedical providers

Paper III: Effect of CAMH in-service training on knowledge gain among cadres of non-specialist health workers	Non-specialist health worker cadre influences pre- and post-training knowledge
	Non-specialist health workers cadre does not influence knowledge gain from short in-service CAMH training
Paper IV: Effect of PHC providers' mhGAP training on the identification of CAMH disorders	There was no significant difference in the proportion of intervention and control clinics diagnosing non-epilepsy CAMH
	The odds of a patient being diagnosed with non-epilepsy CAMH were significantly higher in the intervention than control clinics

The CAMH system in Uganda is inadequate

Paper I found that health managers assessed the CAMH system as inadequate, based on their evaluation of the status of health systems components required for optimal health systems' functioning. According to the health managers interviewed, only two components of the CAMH system were considered sufficient: medicines and laws and policies. However, medicines sufficiency was moderated by lack of qualified workforce; medicines were available but a lack of staff sufficiently qualified to dispense these treatments meant that patients who needed the medicines couldn't access them. This finding reinforces the co-dependency of health system components outlined by the WHO. According to the WHO Health Systems Framework, changes in a health system building block require corresponding modifications in another block for health to be delivered [69].

CAMH laws and policies was the second element considered sufficient. However, sufficient laws and policies did not translate into improved availability of services. A possible explanation for this finding is that only managers at national level were engaged or consulted in the drafting of the legal instruments that impact CAMH services. This suggestion finds support in the fact that legal and policy sufficiency was felt at the central health system level, and not at the decentralized level where services are provided. Because managers at the decentralized level are not part of the policy discussion at the central health system level, they are likely to be unaware of the relevant laws and policies, and thus unlikely to enforce their implementation.

This finding illustrates the idea that a complex adaptive system cannot be controlled but should be influenced [79, 84]. With regard to CAMH services, the sufficient legal and policy framework cannot influence access to services.

Rather, access is influenced by other elements that interact with laws and policies.

Insufficient CAMH systems mirror the state of the entire Ugandan mental health system, which is also inadequate [89]. Weak CAMH and mental health systems are not unique to Uganda. The WHO reports that there is wide variation in mental health and CAMH system functioning between high income and LMIC. Further, even if there is improvement over the last decade, mental health systems in LMIC are characterized by insufficient workforce, inadequate services and poor financing [46, 118]. Inclusion of the mental health into the SDGs is an opportunity to spur increased investments into mental health systems and improve services [119].

Potential for collaboration within agents of the CAMH systems exists

Paper II concluded that there is potential for collaboration between traditional healers and biomedical providers for enhanced access to CAMH services. However, this potential was undermined by mistrust of clinicians by traditional healers. These findings are in line with findings in other parts of sub Saharan Africa. For example, Gureje et al. report in a 2015 systematic review that traditional healers have a role in filling the existing treatment gap, working collaboratively with bio-medical providers [120]. Other studies have documented mistrust between traditional healers and clinicians with regard to provision of mental health services [121, 122]. In Ghana, traditional healers who perceived their treatments as powerful were more desirous of collaboration with formal health systems [123].

These findings are applicable to building an understanding of access to CAMH services as a CAS. In particular, the findings bring to mind the bi-directional relationship and feedback loops between agents of a CAS. In this study, I use the interaction between traditional healers and biomedical providers to illustrate the relationship between two of several elements of the CAMH system. Other possible agents not assessed in this study include schools, police, social welfare departments in addition to other sections of health services including maternal and child health and HIV care services [12, 53].

Specific to CAS, I found that traditional healers have experience with managing mental illness in children and adolescents, yet do not communicate with clinicians by way of referral. A prominent reasons provided by traditional healers for this lack of communication is that clinicians are perceived to hold traditional healers in disdain. Alternatively, it is believed that clinicians will ‘steal’ traditional healer remedies and use them to their own credit. This finding uncovers the absence of mutual trust between the two categories of healer. Yet

trust drives cooperation between agents of the health system; without it, collaboration breaks down, corroding the interactive nature of CAS [124]. In this case, clinician-traditional healer mistrust is counter to bidirectional feedback loops. Therefore, based on the findings of this study, I infer that trust facilitates the functioning of CAMH as a CAS – any strategies to improve collaboration between agents of the CAMH system will need to include approaches for building and maintaining trust within and between elements of the health systems.

This study (Paper I) found no knowledge of CAMH integration within and outside the health sector, counter to global recommendations [2, 12, 45, 125]. Integration is important for facilitating entry of children and adolescents with mental illness into the CAMH care system. Within the context of CAS, which is comprised of multiple players at different levels [79], this lack of integration highlights the absence of complexity within Uganda’s CAMH system. For additional understanding of Uganda’s CAMH system as a CAS, the nature and role of networks within which CAMH can be integrated needs to be explored and investigated.

A possible reason for lack of integration is insufficient skills among health care workers in other health sector services; and among front-line workers in non-health sector services. As postulated by Stiffman et al., (2004), the attitudes and skills of front-line service providers directly determine entry of youth with mental illness into the care system [126]. The lack of CAMH skills among front-line workers, e.g. PHC providers and teachers has been documented in Uganda and elsewhere [127]. Yet the rationale for integrating CAMH into these services integration is strong [128, 129] and the feasibility and acceptability is high [113, 130]. This calls for interventions to improve capacity of front-line health and non-health providers to identify and manage CAMH cases within their contexts. Papers III and IV respond to this need, with a focus on PHC services.

CAMH training results in equivalent knowledge gain among cadres of PHC provider

This study (Paper I) revealed that Uganda’s CAMH system is afflicted with work-force shortages. Health work-force shortages have been cited as a barrier to improved access to CAMH services [125, 131]. In Uganda’s case, it is true that workforce shortages are a cause of limited access to child and adolescent mental health, acting directly by limiting contact of patients with competent workforce, and indirectly through the effect of workforce shortages on availability of medicines to patients [51, 53].

In addition to insufficient quantities of CAMH providers, inadequate CAMH knowledge and skills of existing health care providers presents a further barrier to access [12, 54, 132]. In-service training of PHC providers is one way in which provider knowledge and skills can be enhanced in a task-sharing strategy, as a means of improving access to care [52, 133]. Therefore in this study (paper III) I investigated the effect of CAMH training on learning outcomes among cadres of PHC providers. I found that following five days of in-service training of nurse/midwives and clinical officers from PHC settings in eastern Uganda, nurse/midwives and clinical officers exhibited a CAMH knowledge gain that was not significantly different among the two cadres of provider.

This finding is important for two reasons. First, it endorses the mhGAP intervention guide's (mhGAP-IG) appropriateness for improving CAMH knowledge among PHC providers. Second, it confirms that the mhGAP-IG is equally suited to nurse/midwives and clinical officers, who are situated on different tiers in the health workforce hierarchy, and who enter into PHC provision with varying exposure to CAMH concepts during pre-service training [11, 88]. Such beneficial effects of the mhGAP-IG have been documented in other low-income settings in and outside sub Saharan Africa [103, 134, 135].

Additionally, this finding contributes to our understanding of Uganda's CAMH system as a CAS. According to CAS theory, agents within a CAS are intelligent; they learn as they gain experience, and as they are exposed to new knowledge [79]. If we conceptualize PHC providers as agents in Uganda's CAMH CAS, this finding demonstrates that CAS agents learn from exposure to new knowledge and experiences. According to CAS theory, such learning should result into behavior adaptations based on the new knowledge. Sure enough, paper IV demonstrates improved CAMH case detection by individual PHC providers following training. PHC providers who received short in-service training were 3.4 times more likely than un-trained providers to make a CAMH diagnosis, suggesting that their patient-screening behavior adapted in response to new knowledge learned. However, as I will discuss below, behavior adaptations at the individual provider level are insufficient for systematic improvements.

Training results in short-term improvements in CAMH detection

In paper IV, I found that short in-service CAMH training of PHC providers resulted in improved CAMH case detection in primary care settings, but this effect wore off progressively; at the end of three months, CAMH case detection by PHC clinics was equivalent to pre-training levels. Similar findings are presented by Jenkins et al., (2013) who found that in Kenya, PHC provider

training did not improve the detection of mental health problems in PHC settings [136].

Paper IV argues that interventions targeting one element of the health system are ineffective in inducing system-wide changes. This argument is in line with systems thinking and is supported by Ellis et al., (2017) who have presented a conceptual understanding of mental health providers as operating within synergistic, inter-connected, non-linear pathways interacting with health policies, research/system interventions and care-givers [85]. Using this understanding, it is evident that to effect change in the system, interventions which affect more than one element within this collaborative network need to be implemented. It is unsurprising therefore that in this study and in the Kenyan study cited above, training alone was insufficient for inducing system-wide improvements in mental health case detection. Rather, as demonstrated by Jerene et al (2017) in their Ethiopian study, a lack of attention to important system contextual factors inhibits sustainability of improvements realized from mental health training [137].

This argument carries direct relevance for conceptualising Uganda's CAMH system as a CAS. Within a CAS, behaviors emerge, in response to changes in other agents or actors within the system. When these changes are viewed as incentives, productivity improves. Thus productive emergent behaviors within a CAS are not created; rather, they emerge as a result of incentives delivered by synergistic changes within other agents [79]. My study therefore suggests that corresponding interventions to improve other system-level factors like patient load, health worker numbers and their skills-mix, as well as clinic management would have form incentives necessary for sustaining improved case identification over time.

5.2 Methodological considerations

Several strengths and limitations need to be considered in the interpretation of study findings in this thesis. Therefore, in this section I discuss the strengths and primary limitations of the methods used in this thesis.

Mixed methods

Mixed methods were relevant to this study because the research questions posed epistemological and ontological challenges that could not be addressed by a single design paradigm. Much as mixed methods designs carry many challenges [138], I found this design useful for addressing the objectives of the thesis, which were both exploratory and analytical in nature. The central idea behind

mixed methods is to utilise the strengths of qualitative and quantitative research to answer complex research problems [139]. In this study, the mixed methods design was a concurrent one, given that quantitative and qualitative data were conducted at the same time. Further, the data from quantitative and qualitative sub-studies were not compared. Rather, they were juxtaposed to provide a composite assessment of the research problem. Thus, the study was able to *explore* under-researched areas of the CAMH system, and *measure* the effects of a training intervention, and combine results from these approaches to assess the complexity of access to CAMH services.

A central challenge of mixed-methods designs is the extent to which qualitative and quantitative findings are integrated to mutually reinforce each other in answering the research questions [138]. In this thesis, I attempt to overcome this barrier by utilizing findings from one paper in the rationale for another paper. For example, in paper I, integration of CAMH in health and non-health sectors was found to be weak or absent. Therefore, in paper II I explored the potential for integrating CAMH into traditional healers' practices and investigated the effect of CAMH-PHC integration in paper III and IV. Nevertheless, the quantitative and qualitative findings in this study carry equal weight; the research typologies are used separately to answer different research questions and gain perspectives from different levels of the health system.

Qualitative study design

In qualitative research designs, researchers apply strategies to systematically collect, arrange and interpret textual data acquired through conversations with or observations of people experiencing phenomena of interest, for purposes of exploring the meanings of those events or phenomena [140]. In this study, qualitative methods were appropriate for the studies on which papers I and II were based, given the descriptive (paper I) and exploratory (paper II) nature of the research questions. Specifically, the need to obtain an in-depth understanding of the CAMH system (paper I) and potential for integration with traditional healers (paper II). In both papers, I followed a qualitative description method of enquiry in which I used the research questions to develop a relativist ontological position, leading to an interest in individuals' lived experience and their interpretation of that experience [141]. This method of enquiry brings to the fore the role of the researcher, particularly their role in interpreting the participants' experiences. Other threats to trustworthiness of qualitative studies are cited, which are discussed in the next sections, with emphasis on issues that were not addressed sufficiently in papers I and II. They include clear detailing of the methods of data collection and analysis; triangulation; respondent validation; attention to negative cases; and fair dealing [142].

Reflexivity: Reflexivity refers to sensitivity to the ways in which the inherent epistemological and ontological positions of the researcher might shape the research process and the collected data. Specifically, reflexivity recognises that researchers' prior assumptions and experience can influence the conduct and outcome of a qualitative enquiry. To enhance reflexivity, the researcher needs to scrutinise and discuss the effects of their socio-demographic characteristics (such as age, sex, professional status) on the data collected, and how self-awareness of these characteristics was used to design strategies to enhance the "distance" between the researcher and those researched[142].

In both qualitative papers, I was acutely aware of my position as a Ugandan medical practitioner with broad experience of the Ugandan health system. In paper I this position is discussed as a strength, in that it provided me with relevant context on overall health system performance. However, my prior knowledge and perceptions may have caused me to readily agree with the health system managers interviewed, without deeper probing for meanings.

In paper II on the other hand, I recognise my professional status as a potential hindrance to objective assessment, given that I belong to a sector of health care that is epistemologically opposed to traditional medicine in the Ugandan context. To enhance objectivity therefore, I excluded myself from interviews with the study participants, opting to work with a qualified social scientist that had prior experience working with traditional healers. In this way, the interview was protected from my biases while simultaneously increasing the study participants' likelihood of providing un-inhibited views. However, since I led the study analysis, reflexivity in interpretation of study findings was not completely guaranteed; the likelihood that any biases I held in analysing the data were carried through to interpretation of study findings was not counterbalanced by another researcher's interpretations.

Information bias: Errors can be introduced during the process of transcription of data and translation of transcripts [143]. Potential threats to validity arising from the way data is collected and transcribed were addressed by audio recording all KIIs and IDIs, and verbatim transcription of all recordings. In paper I, the interviews were conducted in English by the researcher, negating the need for translation. This eliminates the threat of errors arising from translation. In paper II however, direct translation of interviews into English during transcription could have introduced a bias resulting from the transcriber's own interpretation of the data; and threatened linguistic equivalence since back-translation of local language transcripts was not done. Secondly, I recognize that the reliance on a single coder in the analysis of both qualitative studies precluded the possibility of inter-coder checks on the codebook.

Information bias might also arise by virtue of interviewer / interviewee dynamics. In paper I where I conducted the interviews, my position as a medical doctor experienced with Uganda's health system, and carrying an introductory letter from the Ministry of Health could have biased the responses of the lower level managers leading them to exaggerate their depictions of the health system. On the other hand, this position might have influenced the interviewees to provide more candid information than it would have been if the interviewer were from outside the field.

Selection bias: Errors arising from the way study participants were identified and recruited might arise if the sample did not include the full range of possible cases to enable conceptual generalization [142]. In both qualitative papers I employed purposive sampling, a form of convenience sampling, to select study participants. This carries a potential for selection bias as efforts to obtain data that might challenge or adjust the study conclusions were not made. In the same vein, attention to negative cases as defined by Mays and Pope (2000) was not addressed, to examine elements that might contradict the emerging themes [142].

Transferability: Transferability refers to the application of study findings to other settings. The central question the concept of transferability aims to address is to what extent the study findings are applicable to a wider population [144]. In paper I the study utilised a sample of seven key informants, who formed the universe of health managers responsible for CAMH at national level and in Mbale district. In paper II, I relied on a sample of twenty traditional healers selected for their experience with CAMH. In both papers, the sub-national participants selected were from Eastern Uganda, the study setting, which might appear to limit transferability of findings to other Ugandan contexts. However, like with other qualitative studies, my goal was to identify information-rich participants who can be expected to provide in-depth understanding based on lived experiences regarding the phenomenon of interest [145]. Working within specific resource constraints limited my ability to include other regions of the country. However, given the overall homogeneity of Ugandan health systems and community health-seeking at the district level, it would have been futile and costly to select participants from other regions. For this reason I am able to conclude that the study findings are generalizable to other district health systems and traditional healers in Uganda.

Member checking: Member checking refers to a process through which research participants are given the opportunity to check the researchers' interpretations of their accounts. The aim is to reduce errors arising from correspondence between

the two parties. One drawback of member checking is that it may result in new information being generated, which would also have to be analysed [142]. In my studies, a formal process of member checking was deliberately omitted, as time and resource constraints did not favour making additional contact with the study participants after analysis. Specifically, the time constraints I was working under precluded the possibility of generating additional data that would require analysis. Nevertheless, the central problem that member checking is meant to address, i.e. error reduction arising from correspondence, was managed by summarising the key points raised by participants at the end of each interview and giving the participants an opportunity to comment.

Quantitative Study design

Papers III and IV were based on a pragmatic randomised controlled trial (RCT). I used a pre-test /post- test study design nested within the RCT for paper III. Much as the RCT is presented as the ‘gold standard’ of experimental studies[146], potential threats to the validity of these designs exist and will be discussed in the following sections, emphasizing areas which threatened the internal validity of my study.

Sampling error: The quantitative studies were based on a simple random sample (SRS) of all level-3 health centers in two districts of Eastern Uganda. SRS is a probabilistic sampling method that provides the researcher with the best possible chance of arriving at sample representative the target population [146]. In arriving at my sample, alphabetic sorting of all clinics was first done with computer-generated numbers by a colleague external to the research team. Alphabetic sorting of clinic lists could have introduced a bias if there was a systematic way in clinics were named, based on location or other criteria. Fortunately, this was not the case, and in fact, alphabetic sorting could have averted a sampling error. Since lists were obtained by district, alphabetic sorting was necessary to scramble the clinics and destroy the sorting by district.

Type II Error: A type II, or ‘false negative’ error occurs when a researcher fails to reject the null hypothesis, concluding that there is no relationship between the variables under observation, whereas such a relationship exists. Such an error typically arises in situations with insufficient power, i.e. in which the sample size is too small to enable the researcher to detect statistically significant relationships [146]. In paper IV of my study, I believe a type II error exists since large differences in the intervention and control arms with regard to the primary outcome did not reach statistical significance. The sample for the primary objective was based on 18 clinics in each arm of the study. I believe that a larger sample of clinics was necessary, given the low incidence of CAMH cases reporting to PHC in the two districts. My sample size calculation was based on a

50% detection rate, yet per the study findings, a 0.1% detection rate was found in intervention clinics.

Selection bias: A selection bias is a non-random, systematic error that arises due to errors in the process of selecting the study population, particularly factors that influence study participation, comparison groups not coming from the same study base, or groups not being representative of the population [146]. My study population for paper III was the senior-most two PHC providers from all randomised public sector HC III, with no previous additional pre- or in-service mental health training. Out of 36 target participants, the analysis was based on 33 who filled both pre-and post-test tools. Therefore, errors in participation could have resulted in a possible selection bias. However I believe the 92% response rate (33 / 36) was large enough to protect the internal validity of the findings. In paper IV on the other hand, the exclusion criteria I applied enabled me to avert a selection bias that would arise from selected clinics not being representative of typical PHC settings across the country.

Information bias: This is a systematic error that arises from the procedures used for measurement of the outcome, the exposure, or other relevant variables [146]. In the context of this thesis, potential for an information bias in the quantitative studies lies in the study tools used and from classification of CAMH cases.

With regard to the measurement tools, the pre/post-test tool used in paper III was derived from a standardised assessment designed by the WHO for trainings on the mhGAP-IG. The face and construct validity of the assessment tool were determined based on the expert opinion of local professionals and by evidence of its use in the sub-Saharan context. With regard to paper IV, however, measurement was based on routinely collected HMIS data, which is widely recognised for limitations with completeness and correctness of entries [147]. Thus, records with missing age and diagnosis entries were excluded. Nevertheless, analysis was based on all included data; entries with incomplete age and diagnosis were not included in the study, so ‘missingness’ was averted.

Further potential for information bias lies in misclassification of CAMH cases as a result of exclusion of epilepsy cases, which frequently carry co-morbidities [148]. Because the study outcome was ‘non-epilepsy CAMH’ it is possible that non-epilepsy CAMH diagnoses co-existing with epilepsy were also excluded. However, any misclassification arising from exclusion of epilepsy was non-differential i.e. cases in intervention and control arms carried an equal chance of being misclassified. This reduces impact on study validity. Moreover, the clinic register records more than one diagnosis for each patient. Therefore, any epilepsy CAMH co-morbidities would have been captured.

This study relied on DSM-V diagnostic categories to classify mental and behavioral disorders among children and adolescents. Frances (2013) has criticized the DSM-V somatic-symptom diagnostic criteria as being so inclusive that they increase the risk of healthy patients being classified as mentally ill [149]. In this study, we found a high prevalence of somatic-symptom disorders. Moreover, these disorders were commonly diagnosed in the baseline month and by clinics in the control arm. This finding suggests that the ability of PHC providers in our study to diagnose somatic-symptom disease is independent of CAMH training, potentially lending support to Frances' DSM-V criticism. However, since we did not confirm the PHC providers' diagnoses we cannot use our study findings to assess the validity of DSM-V diagnostic criteria for somatic-symptom disease.

Confounding: Confounding is a mixing or blurring of effects that occurs as a result of a third variable. When confounding occurs, a researcher attempts to relate an exposure to an outcome, but actually measures the effect of a third factor. Measures to control for confounding include random sampling and multi-variable regression [146]. In both qualitative studies, confounding was adequately dealt with using these measures.

Clustering: Some studies collect data from naturally occurring groups. Such observations are inherently related or clustered [150]. In paper IV of this study, CAMH cases were identified from naturally occurring units (health centers), introducing the likelihood of clustering effects. In the analyses therefore, we accounted for clustering by running the final model with clinics as clusters. This model confirmed that clinics in the intervention arm had 3.4 times higher odds of diagnosing CAMH in the intervention relative to control arm clinics, confirming the absence of clustering effects, particularly since the confidence intervals in the adjusted model were not markedly different from those in the unadjusted model.

External Validity: External validity is the degree to which study findings may apply or be relevant to a wider population [151]. In this study we sampled HC III from two districts in Eastern Uganda; the central question then is how representative is this sample to the rest of Eastern Uganda (19 districts) and other districts in Uganda (125 districts) and neighbouring countries? Since this study utilised a random selection of all public HC III in the two districts, which are similar in health system characteristics to other rural Ugandan districts, I believe the results are generalisable to other HC III in Uganda and other similarly rural settings in sub-Saharan Africa.

5.3 Conceptual frameworks used in this thesis

Multiple analytical frameworks were used in this study, reflecting the complexity of health systems research. The WHO framework for health systems [69] was convenient for paper I; the building blocks provided a useful blueprint for describing the CAMH system. However, the complexity of this broad framework was difficult for managing analysis of sub-components of the health system presented by papers II – IV.

In paper II the classical Explanatory Models of Illness theory proposed by Kleinman and others [152] was used to analyse the potential for collaboration between traditional healers and biomedical health systems. Under this model, health care is composed of different sectors each with its unique institutions and each relying on different patient explanatory models. The model states that while the professional / biomedical sector is one sought by patients who ascribe illness to biological causes, the folk and popular sectors tend to attract clients who attach a social or a cultural explanation to illness. Each of the sectors offers unique remedies, related both to the expertise of providers within the sector and to the perceived cause of illness. Clients may utilise a combination of two or more sectors for a single episode of illness and therefore, an interaction between the sectors is required to achieve access to and satisfaction with care.

Paper III relied on a conceptual model of the effectiveness of continuing medical education (CME) proposed by Marinopoulos and Baumann (2009) [153]. This model advances the idea that a suitable mix of techniques delivered by appropriate educators in a facilitative external environment to motivated learners with the correct social and professional attributes will deliver knowledge outcomes that persist over the long term. This model was applicable to this study because I sought to examine how PHC provider characteristics (including cadre and years of service), influenced CAMH learning outcomes.

Stiffman and colleagues' Gateway Provider Model addresses mental health service access and articulates the importance of decision makers who influence health system trajectories into care. In the context of children and adolescents, these decision makers are called Gateway Providers, and their knowledge of and attitudes to CAMH influence access to care [126]. Therefore, it is a central model for sub-study IV, which investigated access to mental health services for children and adolescents. Moreover in rural Uganda, PHC providers are an important category of gateway provider [53] whose role in increasing access to CAMH services in Uganda is unknown.

Whereas each analytical framework used is individually useful in enhancing understanding of the CAMH system sub-component under study, they are individually inadequate in application to this thesis. Therefore, to consolidate all the individual analytical frameworks into a meaningful whole, in this thesis I use complex adaptive systems (CAS) theory as a guiding principle against which collective judgements of the CAMH system can be made.

6. Conclusions

This thesis set out to describe and analyse the characteristics, behaviour and outputs of Uganda's child and adolescent mental health-care system from a CAS perspective. The results indicate there are many challenges to CAMH-system access, and highlight the importance of relationships between actors in the system and how these relationships influence CAMH-system behavior.

From the results in this thesis, the CAMH system in Uganda operates under a strong regulatory framework but is otherwise weak, plagued by inadequate quality and quantity of services, sparse human resources, and non-integration within health and non-health sectors. Current CAMH-system interventions appear to focus on only one component of the health system.

To enhance children and adolescents' entry into the CAMH system from communities, the thesis demonstrates that collaboration between traditional healers and biomedical providers is possible, based on shared epistemologies and patients' movement across the two sectors. However this potential is undermined by a prevailing mutual mistrust and competition between traditional healers and clinicians.

Further, results indicate that PHC providers are important actors in improving access to CAMH services within Uganda's CAMH system. PHC provider training using mhGAP-IG v1 improves CAMH knowledge; and learning outcomes are independent on the cadre of the provider being trained. However, training alone does not affect CAMH system behavior; training does not result in significant improvements in clinics' identification and reporting of non-epilepsy CAMH cases. Other health system characteristics e.g. workforce motivation, workload and system financing may affect resulting behaviour. However, these elements were not investigated.

7. Recommendations

This study shows that within a CAS framework, Uganda's CAMH system is weak and relationships between system actors are absent, impacting system behaviours. These findings suggest several policy, programmatic and research recommendations which are presented below.

Program and policy implications

Behaviors of complex adaptive systems usually can be influenced more than they can be controlled. In Uganda, CAMH policy and laws exist but have not influenced access to, availability and quality of CAMH services. Therefore, more effective dissemination and implementation of national policies is a suggestion for improving the availability and quality of CAMH services.

CAMH policy implementation and dissemination should be implemented alongside CAMH workforce development to address the human resource gap; and increased integration of CAMH into primary health care and other sectors. The study's main implication for the improvement of human resources for CAMH in Uganda is that nurses and clinical officers are equally capable of improving their CAMH knowledge from short in-service training, in spite of varying exposure to mental health concepts during pre-service training. Roll out of CAMH integration into PHC using the mhGAP-IG in Uganda can therefore proceed without cadre differentiation.

The findings further highlight the need for implementation of strategies that harness the complementarity of traditional and biomedical sectors of mental health care as a means of improving access to CAMH services. This involves finding mutually acceptable ways to stimulate collaboration, recognising that the two sectors have a complementary role to play in stimulating access to CAMH services. This should include, among others, improving clinicians' acceptance of traditional healers' explanatory models for illness; and vice versa. Secondly, trust between the two categories of provider needs to be enhanced to improve interaction between the two sectors, which currently operate in isolation. In particular, the perceived negativity by clinicians of traditional healers needs to be addressed.

Research implications

Our findings characterize Uganda's CAMH system as a CAS, with emphasis on the role of networks, system agents and behaviors. However, this work is limited in scope. For example, whereas it identifies multiple players at different levels

within the CAMH system, it falls short of investigating the relationships between all the players. Therefore, further CAS- focused research investigating the nature, directions and triggers for collaborative relationships and networks between different CAMH-system agents.

Additionally, this thesis investigated two agents of Uganda's CAMH system; traditional healers and PHC providers. With regard to CAMH, other agents including school systems, correctional and social welfare departments in addition to other sections of health services including maternal and child health and HIV services play a role in improving access. These agents are not investigated and further research to identify the types and roles of agents that have a role in enhancing CAMH-service access is recommended.

Regarding system behavior, findings that CAMH training of PHC providers in Uganda does not result in improved clinic-level competence to diagnose CAMH conditions suggests the influence of other factors; and that training should recognize the complexity of the CAMH system and be supported by complementary improvements in other health system areas. Research into what combination of interventions is required for improving CAMH system identification of CAMH cases is required. However to confirm that training alone is insufficient, further task-sharing studies integrating CAMH into a larger sample of PHC clinics are suggested.

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Appendix 1: Qualitative Interview guides

KEY INFORMANT INTERVIEW GUIDE

Interviewer name: _____

Date of interview: -- / -- / ----
(Day / Month / Year)

Category of Respondent: []

Respondent Categories: Ministry of Health =1, National Referral Hospital =2, Regional Referral Hospital = 3; General Hospital = 4, District Health Official =5; Health Unit Manager = 6; Health worker = 7

SECTION A POLICY AND LEGISLATIVE FRAMEWORK

1. Please mention the mental health policies which you are aware of in Uganda
2. What mental Health Plans and / or strategies are you familiar with for Uganda?
3. Please comment on the legislative environment for child mental health in Uganda (probe for existing laws, gaps in laws, enforcement of laws)
4. What legislative provisions exist concerning protection from discrimination of children and adolescents solely on account of mental disorder (exclusion from school, etc)
5. What is the state of child protection and /or human rights with relation to the mental health of children and adolescents in Uganda?
6. Please comment on Financing for Child and adolescent mental health in Uganda

SECTION B HEALTH SERVICES

7. What are the most common mental health problems affecting children and adolescents in your experience?
8. At what level of facility are child mental health services available?
9. What is the extent of integration of child mental health services with other routine child and adolescent health services?
10. How many facilities in this district / country provide child mental health services?
11. To what extent are psychosocial facilities for children and adolescents provided in mental health facilities?

12. What public education and awareness campaigns on mental health are conducted in Uganda?
13. What formal collaboration links exist between mental health and with other sectors? What activities are undertaken?
14. What mental health promotion and prevention activities are undertaken in in primary and secondary schools?

SECTION C HUMAN RESOURCES

15. Please comment on the adequacy of human resource available for managing child mental health in Uganda. (*probe numbers and distribution*)
16. What programs exist for training professionals in mental health? (*Examine for pre-service and in-service training programs; bursaries/scholarships available*)
17. What initiatives have been implemented to improve the quantity and quality of human resources for child mental health in Uganda? (*probe for task sharing and any other operational strategies*)

SECTION D MEDICINES AND COMMODITIES

18. Which mental health medicines used by children and adolescents are included on Uganda's Essential Drug List?
19. To what extent are medicines for management of child mental health conditions available at mental health facilities at all times?
20. What category of medicines is most frequently stocked-out?
21. (if stock-outs are mentioned) In your opinion what do you think are the causes of the medicines stock situation?
22. What recommendations do you have for improving the availability of child mental health medicines in mental health facilities?

SECTION E: HEALTH INFORMATION ON CHILD MENTAL HEALTH

23. How effectively is Child Mental Health information captured by the national health information system? (DHIS-2 or HMIS)
24. What type of information is routinely collected by the national and/or district HMIS?
25. How adequate is this information for planning and implementation of child mental health programs?
26. Please name a report covering child mental health data that has been published by the Ministry of Health in the last year.

27. Please name any interventions that have been implemented to address child mental health information systems in the last 5 years in Uganda.

SECTION F: GENERAL RECOMMENDATIONS

Do you have any final comments on the state of the health system with regard to Child Mental Health in Uganda, and how it can be addressed?

READ: Thank you for taking the time to talk to me today. The information you have shared with us is very helpful. Our study team will make every effort to keep private the information you have shared. Do you have any questions? [Make note of questions/concerns].

INTERVIEWER COMMENTS:

IN-DEPTH INTERVIEW GUIDE

Name of Interviewer _____

Date _____

Name of Interviewee _____

Good morning. I am _____ (introduce self).

This interview is being conducted to get your input about engagement of traditional healers in Child and Adolescent Mental Health. I am especially interested in your attitudes, concerns and perspectives on the engaging with traditional healers in the care of children and adolescents with mental health disorders.

If it is acceptable to you, I will be tape recording our conversation. The purpose of this is so that I can get all the details but at the same time be able to carry on an attentive conversation with you. I assure you that all your comments will remain confidential. I will be compiling a report which will contain your comments without any reference to individuals. Do you agree to this interview and the tape recording?

I'm now going to ask you some questions that I would like you to answer to the best of your ability. If you do not know the answer, please say so.

I'd like to start by having you briefly describe your perceptions of mental health problems. What do you believe leads to mental disorders in children and adolescents?

1. What experience do you have managing children and adolescents with mental health disorders?
2. In your opinion how competent are traditional healers with dealing with CAMH?
3. What is your perception of the formal health system?
4. Describe your engagements with the mental health system in the past
5. Please comment on the effectiveness of formal health systems in handling CAMH disorders

I would now like to ask about traditional healers working with the formal health system for treatment of child and adolescent mental health

6. How willing would you and your colleagues be to identify children with mental health disorders and refer them to the formal health system for care (*probe to gather information on acceptability and reasons for chosen stance*)
7. What effect would such an intervention have on the sense of empowerment among traditional healers?

8. What barriers to successful integration do you foresee?
9. What facilitators are necessary to be in place for a successful integration initiative?
10. Which government and traditional healer structures need to be consulted?
11. How do you rate patients' acceptance of integration?
12. How do you rate health workers' acceptance of integration?
13. Is there any other information that you think would be useful for me to know?

Appendix 2: Curriculum for PHC Providers' CAMH training

Time	Day 1	Day 2	Day 3	Day 4	Day 5
8.00 - 9.00am	Registration, introductions, ground rules, expectations, course objectives	Recap The clinical examination of children, adolescents and their families	Recap Managing difficult behaviour	Recap Depression Suicide + self-harming behaviour	Recap Somatoform disorders
9.05- 10.40 am	Pre-test (15 minutes) Introduction to child and adolescent mental health and mhGAP-IG Overview of etiology, diagnosis and treatment planning for child and adolescent mental health problems, symptomatology and terminology	General principles of care Psychosocial treatments Paediatric psychopharmacology	Autism spectrum disorders, Enuresis Encopresis Epilepsy	Bipolar disorder Psychosis Tic disorders	Physical illness and mental health (HIV/AIDS, diabetes, SCD, etc)
10.40 – 11.00am	Break				
11.05- 1.00 pm	Normal development- infancy, childhood and adolescence	school underachievement and specific learning difficulties Intellectual disability	Practical skills Children's ward	Anxiety disorders, separation anxiety, OCD	Alcohol use disorders Substance use disorders + internet addiction Evaluation, planning Post test

1.00 - 2.00 pm	Lunch						
2.00- 4.00 pm	Attachment Positive parenting (parenting capacity and its relationship to attachment and child development)- parental mental illness	Externalising disorders (ADHD, conduct disorder, oppositional defiant disorder)	Group discussion of cases	PTSD Bereavement	Departure		
4.00- 5.00 pm	Group work Discussion/ tea	Group work using case examples feedback/ planning for clinic day	Group work using case examples feedback	Group work using case examples feedback			

RESEARCH ARTICLE

Open Access



Health managers' views on the status of national and decentralized health systems for child and adolescent mental health in Uganda: a qualitative study

Angela Akol^{1*}, Ingunn Marie Stadskleiv Engebretsen¹, Vilde Skylstad¹, Joyce Nalugya², Grace Ndeezi³ and James Tumwine²

Abstract

Background: Robust health systems are required for the promotion of child and adolescent mental health (CAMH). In low and middle income countries such as Uganda neuropsychiatric illness in childhood and adolescence represent 15–30 % of all loss in disability-adjusted life years. In spite of this burden, service systems in these countries are weak. The objective of our assessment was to explore strengths and weaknesses of CAMH systems at national and district level in Uganda from a management perspective.

Methods: Seven key informant interviews were conducted during July to October 2014 in Kampala and Mbale district, Eastern Uganda representing the national and district level, respectively. The key informants selected were all public officials responsible for supervision of CAMH services at the two levels. The interview guide included the following CAMH domains based on the WHO Assessment Instrument for Mental Health Systems (WHO-AIMS): policy and legislation, financing, service delivery, health workforce, medicines and health information management. Inductive thematic analysis was applied in which the text in data transcripts was reduced to thematic codes. Patterns were then identified in the relations among the codes.

Results: Eleven themes emerged from the six domains of enquiry in the WHO-AIMS. A CAMH policy has been drafted to complement the national mental health policy, however district managers did not know about it. All managers at the district level cited inadequate national mental health policies. The existing laws were considered sufficient for the promotion of CAMH, however CAMH financing and services were noted by all as inadequate. CAMH services were noted to be absent at lower health centers and lacked integration with other health sector services. Insufficient CAMH workforce was widely reported, and was noted to affect medicines availability. Lastly, unlike national level managers, lower level managers considered the health management information system as being insufficient for service planning.

Conclusion: Managers at national and district level agree that most components of the CAMH system in Uganda are weak; but perceptions about CAMH policy and health information systems were divergent.

Keywords: Child Adolescent Mental Health, Health systems (decentralized), Qualitative research, Sub-Saharan country, Uganda, Africa

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Background

Child and adolescent mental health (CAMH) is essential for optimal social and psychological well-being and development. Early detection and management of CAMH disorders reduces the likelihood of long term ill health and minimizes stress on individuals, families, communities and health systems [1]. Robust health service systems are required for the promotion of CAMH [2]. Up to 20 % of children and adolescents globally suffer from a debilitating mental illness and up to 50 % of adult mental illness begins in adolescence [3]. In low and middle income countries such as Uganda, the associated disability-adjusted life years (DALYs) from neuropsychiatric illness in childhood and adolescence represent 15–30 % of all DALYs lost [4, 5]. In spite of this burden, service systems in countries with the largest proportion of children and adolescents are weak [6].

Three out of four objectives in the World Health Organization's (WHO) mental health plan of action focus on improving the mental health care system [7]. Under this plan, the WHO aspires to increase service coverage for mental health disorders in all countries. Because provision of CAMH services depends on the availability of necessary policies, funding, integrated services, preventive and therapeutic services underlined by evaluation and research, [8] the expansion of CAMH services necessitates strengthening of all these areas.

In Uganda, a mental health policy was developed in 2000. However the policy did not address CAMH until it was complemented and improved by child and adolescent mental health policy guidelines developed in 2014. Nevertheless, important areas not addressed by policy are mental health financing; service quality improvement; the role of psychologists and social workers; and conflict and mental health [9]. Mental health policy is governed under the overarching second national health policy (2010) and its attendant health sector strategic and investment plan (HSSIP III). The HSSIP III makes a reference to mental health as a government priority within the non-communicable diseases cluster of the minimum health care package. However CAMH is not mentioned [10].

The policies are supported under several legislative instruments which protect the needs and rights of children. Specifically, Article 34 of the 1995 Constitution of the Republic of Uganda provides for the following rights and protection of children: the right to know and be cared for by their parents or other people; the right to basic education; the right not to be denied medical treatment or any social or economic benefits; protection from all exploitation including employment and work that is harmful to their health or education; and the right of child offenders not to be detained with adults.

The Children Act 1996—chapter 59 laws of Uganda—puts into effect the constitutional provisions on children while the Mental Health Treatment Act (1964) provides for custodial care of mentally ill persons, but according to Kigozi et al. [9] “is not in accordance with contemporary international human rights standards regarding mental health care” [9, page 3].

Uganda's health system is divided into national and district-based levels. At the national level are the National Referral Hospitals, Regional Referral Hospitals (RRH) and semi-autonomous institutions like the Uganda Blood Transfusion Services and the Uganda National Health Research Organization [11]. The lowest rung of the district-based health system consists of Village Health Teams (VHTs), who are community health volunteers delivering predominantly health education and preventive services in communities. The next level is Health Center II (HC II) which is an outpatient service run by a nurse. Next in level is health Center III (HC III) which provides in addition to HC II services, in patient, simple diagnostic and maternal health services. It is managed by a clinical officer who does not have a medical degree. Above a HC III is the Health Center IV, run by a medical doctor and providing surgical services in addition to all the services provided at HC III. The HC IV is also referred to as a health sub district (HSD) and has supervisory responsibility over HC IIIs and HC IIs in its catchment area. Thus, the medical doctor who runs the HC IV is also called the HSD manager [10].

The most recent information on the organization of mental health services in Uganda comes from a 2005 survey based on the World Health Organization's assessment instrument for mental health systems (WHO-AIMS). This survey reports that mental health services in Uganda consist of 28 outpatient and 27 in-patient units in the country, at the psychiatric units of all hospitals outside the national mental health referral hospital. While 15 % of the 382 mental hospital beds in these units are reserved for children and adolescents, none of the outpatient clinics is specialised for CAMH. One 500-bed mental hospital with a forensic in-patient unit serves as a national referral hospital. There are 1.28 psychiatric beds per 100,000 Ugandans, below the global and high-income country averages of 6.5 and 41.8, respectively [12]. All services are coordinated by one principal medical officer at the Ministry of Health. Mental health services receive approximately 1 % of Uganda's health sector budget [9, 13, 14], compared to a global median of 2.8 and 5.1 % in high income countries [15].

The burden of CAMH disorders in Uganda has not been accurately estimated. Nalugya et al. [16] estimated the burden of depression among Ugandan secondary school students in one district at 21 %; and Okello et al.

[17] estimated that approximately 44 % of war-affected adolescents in another district suffered from one or more CAMH disorder. A discussion of CAMH disorders in Uganda is limited by a paucity of epidemiologic data.

To our knowledge, besides quantitative studies undertaken in 2001 and 2005 as part of global WHO-led surveys, no qualitative assessment of CAMH systems has been conducted in Uganda. Thus, the objective of our assessment was to explore strengths and weaknesses of CAMH systems at the national and district level in Uganda from a management perspective, in order to inform the implementation of national mental health policy. We present findings from the health system at national level and one decentralized health system, in Mbale district, eastern Uganda. A management perspective is selected because managers are best placed to provide users' understanding of system-wide operations, including analysis of non-clinical aspects like finances, supplies and personnel. A managers' viewpoint is also considered necessary to complement previous work, which has only been done from an external evaluator's viewpoint as part of global WHO mental health surveys. Two such surveys using quantitative methods were conducted in 2001 and 2005.

Methods

Study site

Uganda is situated in East Africa with a population of 34.9 million [18]. Mbale district in eastern Uganda is the site for the ongoing study "SeeTheChild—Mental Child Health in Uganda" which aims to characterize the most common psychiatric conditions among children and assess the related health system aspects. Mbale also provides an informative case study because it personifies all levels of decentralized health services from (RRH) to village health workers. Mental health in- and out-patient services in Mbale district are provided at the psychiatric unit of the Mbale RRH, which does not have a psychiatrist on staff. The leader of the district health system is the District Health Officer (DHO).

Study design

Seven key informant interviews were held with all public officials responsible for management and supervision of CAMH services at national (Kampala) and district level (Mbale). All seven eligible managers were interviewed. Interviews were conducted during July to October 2014 in Kampala and Mbale district, Eastern Uganda. Key informant interviews are judged to be an appropriate methodology because they delve into the subject in question from the perspective of individuals who have knowledge of the subject by virtue of their natural position [19]. Guest and colleagues noted that 6–12 interviews

are sufficient to deliver data saturation in a homogenous, purposively selected sample, with enquiry into a concise subject [20]. As this corresponds to our research, seven interviews were considered sufficient for our purpose.

Four of the key informants were female and six were medical doctors; two with specialization as psychiatrists. Four of the informants were district based managers and three were based at the national level. The management experience of the managers ranged from 3 months to 20 years, with a median duration of 4 years. All officials who were approached for interviews accepted to participate.

Data collection

The interviews were conducted with a semi-structured interview guide divided into the following CAMH-related domains of enquiry:

- Policy and legislation
- Financing
- Service delivery
- Health workforce
- Medicines
- Health information management and research

The interview schedule was developed by the principal investigator (PI), based on domains in the World Health Organization's Assessment Instrument for Mental Health Systems (WHO AIMS) Version 2.2 [21]. Using this instrument as a guide, open ended questions were developed around assessment items listed, adapting to context and cadre of manager. For example, under Domain 1 of the WHO-AIMS tool, open ended questions were crafted to elicit managers' views on the items comprising policy and legislative framework as listed by WHO-AIMS. Items that were not appropriate for the health managers were excluded from the interview guide, for example questions on national monitoring of human rights.

The interviews were conducted in English by the PI (AA) and recorded verbatim. All the interviews took place in the officials' offices, except for one interview which was conducted on-line as a voice interview using the application Skype due to the official's absence from their duty station. The interviews lasted 25–40 min, were audio-taped and notes were taken.

Analysis

The recorded interviews were transcribed, followed by inductive thematic analysis applied to all the data, based on methods described by Guest et al. [22] and Vaismoradi et al. [23]. A code-sheet was developed by the principal investigator with all the relevant themes. The text

contained in the transcripts was reduced to thematic codes and within those themes, content codes were developed. Patterns were then identified in the relations among the codes. The PI lead the analysis and the raw material was co-read by one of the co-authors (IE).

This assessment was conducted within the research project “SeeTheChild—Mental Child Health Study in Uganda” (Research Council of Norway (<http://www.rcn.no>) project number: 220887), an ancillary study to the follow-up study ‘The PROMISE Saving Brains study in Uganda and Burkina Faso’ (ClinicalTrials.gov #NCT01882335). The assessment commenced after ethical approval was received from the Research ethics committee, School of Medicine, Makerere University reference number 2012-177. Written informed consent was obtained from the participants.

Results

Results are presented according to domains in the WHO-AIMS version 2.2. Eleven themes emerged under each of the six domains of enquiry (Table 1). Adequacy of each of the domains became apparent as an overarching theme, and participants discussed the competence or insufficiency of the different domains. Illustrative quotes from the interviews are provided for each theme.

CAMH laws and policies

Two predominant themes emerged under CAMH laws and policies: (1) adequacy of CAMH laws and policies; and (2) awareness of CAMH laws and policies.

Adequacy of CAMH laws and policies

Existing global agreements and national laws supportive of CAMH include the United Nations Convention on the Rights of the Child; the 1995 Constitution of the Republic of Uganda; The Mental health Treatment Act, 1964; and the Children Act 1996. These were considered as sufficient for the promotion of CAMH, both by administrative and clinical managers at the central level. The Ministry of Health representative highlighted that physical, mental and social dimensions of child health were represented in these laws, which obliged the country to ensure child protection. It was reported at the national level that CAMH policy guidelines had been recently drafted to complement the national mental health policy.

Awareness of CAMH policies

However, even if CAMH policy was acknowledged at the national level, the managers at the district level were not aware of it. At the district level it was also noted that the national mental health policies were inadequate.

Table 1 Themes that emerged during the analysis of the data

Domain	Main themes	Content code	Tally of responses by level of manager			Total
			National	District	Health sub district	
CAMH policy and legislation	1. Adequacy of CAMH laws and policies; 2. Consciousness of CAMH laws and policies	Mental health policy exists	3	1	0	4
		CAMH policy exists	3	0	0	4
		Adequate CAMH related laws	1	0	0	1
Financing for CAMH	1. Government financing 2. Donor financing	Inadequate public funding	3	1	3	7
CAMH service delivery	1. Service adequacy 2. Integration	Availability of adequate services	0	0	0	0
		Inadequate services	3	1	1	5
		Services integrated	0	0	0	0
		Complementary services exist	1	0	0	1
CAMH health workforce	1. Numbers of CAMH workforce 2. Training	Adequate Numbers of CAMH work force	0	0	0	0
		Inadequate numbers of CAMH workforce	3	1	2	6
		Training of CAMH personnel present	3	1	0	4
CAMH medicines	Medicines sufficiency	CAMH medicines included on essential drug list for Uganda (EDLU)	3	1	2	6
		Adequacy of available medicines for CAMH	2	1	2	5
CAMH health information management and research	1. HMIS competence 2. Mental health reporting	HMIS adequacy	3	0	2	5
		Reports on CAMH exist	0	0	0	0
		CAMH research exists	1	0	0	0

"We have the draft policy on mental health...But it is not widely distributed. The one I have is old, from around 2002. The policies are not adequate and they do not have direct focus on children and adolescent mental health."—District Health Official

CAMH financing

Government and donor financing emerged as themes under financing. Insufficient public financing for CAMH services was emphasized by all informants. This stemmed from an experienced underfunding of all health services leading to the district managers using scarce primary health care (PHC) resources for CAMH. Neither was any donor funding for CAMH noted.

"We do not have any particular development partners supporting mental health"—District health official

However, in-kind support in the form of collaborations, workforce development and refurbishment of infrastructure was acknowledged at a small scale.

CAMH service delivery

Service Adequacy and Integration were emergent themes identified under CAMH service delivery.

Service adequacy

Inadequate quality and quantity of CAMH services was cited by all managers at national and district level, and the absence of CAMH or other mental health services at lower health centers (HC II and HC III) was mentioned as a contributor to this status. Only tertiary level services were acknowledged, as the excerpt illustrates:

"What you can call reasonable services are at the National Referral Hospital and Mulago National Hospital...from general hospital below, (there is) nothing"—Ministry of Health official

This was confirmed by district level managers who mentioned that lower level CAMH services were primarily dealing with epilepsy:

"At HC II and III the only condition they handle is epilepsy."—District health official

Inpatient services were considered to be sufficient at the national level, but were noted as a particular challenge at the district level. Managers at all levels agreed that the range of CAMH services being provided is limited; and psycho-social services were quoted only in the national referral hospital. There were no community outreaches or promotional campaigns as noted by the managers in the following quotations:

"I have never seen any [promotional] campaigns in this district. Not even in Kampala."—Health sub district manager

"The other modalities of treatment—behavioral therapy and so on they are not really [provided]"—Ministry of Health official

Integration

Integration of mental health and CAMH into other health sector services was also described as lacking. HIV services were specifically mentioned as an example where integration is absent:

"...Many of them (People living with HIV/AIDS) get some mental health problems. Some of them get obvious psychosis, depression, suicide attempts...but they (HIV services) are not capturing them."—Ministry of Health official

Linking CAMH to child and adolescent services outside the health sector was also mentioned to be lacking; including outreaches to schools, communities, traditional healers and collaboration with the police and social welfare departments. Action from police and social welfare was cited in relation to forensic CAMH services:

"...they wait for children to commit crimes; that is when they appear to take the children to remand homes."—Ministry of Health official

Attempts by the district health office to address substance and alcohol abuse in schools were curtailed by a lack of funding, as mentioned:

"We did some outreaches in schools mainly on drug abuse. Mainly in primary schools. Due to funding we are not consistent."—District health official

The need for integration of CAMH into the education services was mentioned as a deterrent to school dropout and misunderstanding of children's behavior.

"If you talk about epilepsy...the stigma that is associated with it means that these people cannot attend school and sometimes they drop out of school. If you can educate the student and the teachers I think that can help to improve mental health. ADHD for example, when they [teachers] see someone squirming and fidgeting they punish them—yet they can be helped."—Official at national referral hospital

CAMH workforce

Insufficient CAMH workforce and training emerged as the main themes under CAMH workforce. The

insufficiency of the health workforce is widely cited. The numbers are few, the placement is inappropriate and the civil service staffing norms do not support recruitment and placement of mental health workers at lower level facilities, as illustrated by the informant from the Ministry of Health:

"It is not adequate. At the moment we have only three child and adolescent psychiatrists in the country."—Official at national referral hospital

"The human resources have been very lacking"—Ministry of Health official

However, one lower level manager felt that staffing at his clinic was adequate:

"At this health center I think they are adequate—if we have the psychiatric nurse, and the other nurses, and the medical officers in my opinion that should really be adequate."—Health sub district manager

To strengthen the existing workforce small scale training initiatives were ongoing at the national level, in collaboration with foreign donors. However at the district level no CAMH in-service training had been conducted.

"We are not doing in service training on mental health. Almost all our staff have not been sensitized on mental health and it is one of our missing links."—District health official

CAMH medicines

Medicine sufficiency was the only theme identified under CAMH medicines. Managers at all levels agreed that the Essential Drug List for Uganda (EDLU) included sufficient CAMH medicines and that availability of medicines at lower levels health facilities was adequate. *"The medicine supplies have improved of recent."—District health official*

Nevertheless, managers noted that where trained staff were present, medicines were procured; thus medicines availability was dependent on staffing. They specifically noted that specialty medicines were not included on the EDLU due to lack of specialized staff to administer them.

"...but we only put at those levels where there is a service [provider] because we could not justify ... special medicines when we know that the prescribers will not know how to use them... Availability is limited by human resources."—Ministry of Health official

CAMH health information management and research

Competency of health management information system (HMIS) and sufficiency of mental health reporting

are the themes that emerged under this domain of the CAMH health system.

The HMIS is generally considered adequate for planning at the national level. However at the district level health managers consider the HMIS inadequate to support their planning and implementation of CAMH, partly because it does not disaggregate data into child and adolescent ages. However, there were divergent views on this lumping of CAMH data, exemplified by these two excerpts from national and district officials:

"It captures just a line "childhood mental disorders ... for the time being we are contented to ... lump ... childhood mental disorders."—Ministry of Health official

"It is inadequate...they do not break it down into specific diagnostic conditions...we do not capture 5–17 years. It does not tell us much and we do not have information on what occurs in the community."—District health official

The lack of periodic reports on mental health in general and CAMH in particular was noted. The only opportunity to report on the national mental health status is in the Annual Health Sector Performance Report, in which a paragraph on mental health can be published. Ongoing CAMH research was noted by two national level managers,

"[in] The Annual Health Sector Performance report we have a page. Unfortunately [there is] no paragraph on child mental health—there are very small numbers who are being seen."—Ministry of Health official

Discussion

This assessment set out to explore the strengths and weaknesses of the health system for CAMH at the national and district levels in Uganda, with a focus on Mbale district, from a management perspective. We undertook a qualitative assessment of health managers' perspective on policies and laws, financing, partnerships and collaboration, service delivery, health workforce, CAMH medicines and health information systems.

Contrary to previous research [13], in this study health managers report that the laws of Uganda promote CAMH. Even if the Mental Health Treatment Act of 1964 does not mention CAMH, subsequent laws, notably the 1995 Constitution of Uganda, which is the supreme law [24] and subordinate laws including the Children Act 1996 provide for protection of the child, implicitly including CAMH. These laws were perceived by the health managers as sufficient for supporting CAMH. The

difference between our findings and previous research might be attributed to the fact that unlike previous studies, we did not undertake an analytic review of the laws and policies.

Similarly, unlike studies done before the CAMH policy was drafted, we found a perception among health managers that Uganda's health policies promote CAMH. The draft National Mental Health Policy mentions the specific need for a CAMH policy, a new draft of which is in place. This reflects a recent priority placed on CAMH. As noted elsewhere, policy is an important aspect of mental health service scale-up [25].

The recent prioritization may be responsible for the fact that managers at district and sub district levels are unaware of the draft CAMH policy. However, it is worth noting that sub-district managers were unaware too of the draft mental health policy which has been in place since 2000. This points to a lack of policy dissemination from national to lower levels and is consistent with previous research in Uganda and elsewhere that cites insufficient dissemination of mental health policies as a barrier to mental health policy implementation [26, 27]. Policy dissemination usually involves distribution of policy booklets, accompanied by dissemination workshops if resources are available [27]. Suggestions for strengthening policy dissemination and implementation cited in the literature include involvement of district-level managers in policy development processes; engagement of different sectors that are relevant to CAMH and commitment of sufficient technical and financial resources to ensure policies are disseminated and implemented [13, 26, 27]. Investigation into barriers to effective policy dissemination specific to Uganda is warranted.

Opportunities for promoting CAMH lie in other child and adolescent service sectors [28, 29]. This assessment however reveals no knowledge among health managers of integration of CAMH within and outside the health sector. The lack of referral linkages with traditional healers contributes to the gap between CAMH conditions and the health system, bearing in mind that traditional healers in Eastern Uganda manage a substantial burden of mental ill health in communities [30]. The feasibility of integrating CAMH into other child and adolescent services; police services; and engaging with traditional healers to improve CAMH referral could be further explored.

We found that according to health managers, CAMH services are provided mainly at national and regional levels with no community outreach. At the health service levels below the RRH, managers acknowledged that CAMH services are largely absent. This is in direct contrast to recommendations that services should be decentralized from referral hospitals and cities to the communities [28, 31, 32]. In addition to being highly

centralized, CAMH services in Uganda were considered by managers to be largely psycho-pharmacologic in nature in spite of a wide body of evidence in favor of non-pharmacologic forms of therapy, including psychotherapy and behavioral therapy [28, 33, 34].

The centralized nature of services can be attributed to inadequate numbers and distribution of CAMH workforce. The inadequate workforce is however not limited only to lower levels but affects the national level as well. As noted by a manager at national level, only three child psychiatrists serve the entire country. The difference in opinion regarding workforce sufficiency between the lower level managers on the one hand; and district and national level managers on the other hand reflects relativism, where the lower level managers' opinions might be shaped by their contextual understanding of the health system, which is driven by perceptions of their sub-district.

Insufficient workforce was believed by managers to have limited the range of CAMH services being offered. The unavailability of behavioral therapy even at the national referral hospital is attributed to a scarcity of clinical psychologists in the country. This scarcity is confirmed by surveys which estimated at most two psychologists working in the mental health sector per 10,000,000 Ugandans [9, 15] and points to the need to implement CAMH workforce development strategies e.g. task sharing to non-specialist staff in primary care settings [35, 36].

Workforce insufficiency impacts availability of medicines as well. As noted by multiple informants, the availability and sufficiency of CAMH medicines in lower level clinics depends on the presence of staff competent enough to procure and prescribe the required medicines. At the national level however, we found agreement that the CAMH medicines were available for commonly treated conditions, such as epilepsy.

Disagreement between national and lower level managers on HMIS sufficiency for service planning existed, with lower level managers believing that the HMIS is insufficient. Lower level managers particularly felt that the current inability of the HMIS to capture children and adolescents is a major gap. This finding is consistent with results from the WHO's 2005 mapping of CAMH resources which suggested a disconnect between availability of epidemiological data and planning needs [6]. This disconnect is likely to impact the development of evidence-based CAMH policies and programs.

Overall, the results of this assessment complement the quantitative results in previous studies, including the 2005, 2011 and 2014 Mental Health Atlas reports from WHO, which found that mental health financing, service access, human resources and medicines were insufficient

in Uganda [9, 12, 15]. This assessment highlights an improvement in mental health policy since the 2011 Mental Health Atlas report.

We recognize some limitations of this study. While these data come from all the health managers responsible for CAMH at national level, the opinions of district health managers in this research cannot be generalized to all districts. Additionally, the research did not include an analytic review of policies, laws and government documents to validate the managers' opinions. Lastly, the position of the PI as a Ugandan medical doctor with extensive experience in national and district health systems could have inhibited the lower level managers and biased their depictions of the health system. The PIs position is also a strength, however, as it might have influenced the interviewees to provide more candid information than it would have been if the interviewer were from outside the field.

Conclusion

There are divergent perceptions among CAMH managers in Uganda on availability and adequacy of CAMH policy and laws; and the sufficiency of health information systems. However, managers agree that most components of the CAMH system in Uganda are weak, characterized by poor financing, inadequate quality and quantity of services, sparse human resources, and non-integration within health and non-health sectors. More effective dissemination of national policies to address the disparate policy opinions; CAMH workforce development to address the human resource gap; and increased integration of CAMH into primary health care and other sectors are suggestions for improving the availability and quality of CAMH services.

Abbreviations

CAMH: Child and Adolescent Mental Health; DALY: disability adjusted life years; DHO: District Health Officer; EDLU: essential drug list of Uganda; HC: Health Center; HIV: human immunodeficiency virus; HMIS: Health Management Information System; HSD: Health Sub District; PHC: primary health care; PI: principal investigator; RRRH: Regional Referral Hospital; WHO: World Health Organization.

Authors' contributions

AA developed the study instruments, conducted data collection and analysis and led writing of the manuscript. IE is the principal investigator (PI) for SeeTheChild-mental child health in Uganda and led the development of the study protocol, co-read the raw data and contributed to the writing of the manuscript. VS and JN contributed to the design and protocol development, provided logistical support in Mbale and reviewed the manuscript. GN is the site co-PI of Saving Brains in Uganda and JT is the PI of Saving Brains in Uganda and Burkina Faso. GN and JT are co-investigators of SeeTheChild-mental child health in Uganda. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

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RESEARCH ARTICLE

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“We are like co-wives”: Traditional healers' views on collaborating with the formal Child and Adolescent Mental Health System in Uganda

Angela Akol^{1,2*} , Karen Marie Moland¹, Juliet N. Babirye² and Ingunn Marie S. Engebretsen¹

Abstract

Background: Early identification and management of mental illness in childhood and adolescence helps to avert debilitating mental illness in adulthood but the attention given to Child and Adolescent Mental Health (CAMH) has until recently been low. Traditional healers are often consulted by patients with mental illness and in Uganda, up to 60% of patients attending traditional healers have moderate to severe mental illness. Poor access to CAMH care in Uganda creates a treatment gap that could be met through enhanced collaboration between traditional healers and biomedical health systems. The aim of this study was to explore traditional healers' views on their collaboration with biomedical health systems so as to inform the implementation of strategies to improve access to CAMH services in Uganda.

Methods: In-depth interviews with 20 purposively selected traditional healers were conducted in November 2015. A semi-structured interview guide was used to explore: 1) The experiences of traditional healers with mental ill-health in children and adolescents; 2) their willingness to collaborate with the formal health system; and 3) their perception of clinicians' willingness to collaborate with them. Interviews were conducted in local languages and tape recorded. Data were analysed using thematic analysis.

Results: Traditional healers described several experiences managing children and adolescents with mental illness, which they ascribed to spiritual and physical causes. The spiritual explanations were a consequence of unhappy ancestral spirits, modern religions and witchcraft, while physical causes mentioned included substance abuse and fevers. No traditional healer had received a patient referred to them from a medical clinic although all had referred patients to clinics for non-mental health reasons.

Traditional healers expressed distrust in biomedical health systems and believed their treatments were superior to medical therapies in alleviating mental suffering. They expressed willingness to collaborate with biomedical providers. However, traditional healers believe clinicians disregard them and would not be willing to collaborate with them.

Conclusion: Potential for collaboration between traditional healers and biomedical health systems for improving access to CAMH services in Uganda exists, but is undermined by mutual mistrust and competition between traditional healers and clinicians.

Keywords: Traditional healers, Mental health, Child and adolescent, Health system

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Background

Early identification and management of mental illness in childhood and adolescence is important for averting debilitating mental illness in adulthood [1]. Child and Adolescent Mental Health (CAMH) refers to a range of mental, neurological and substance use (MNS) disorders that occur in childhood and adolescence. Mental health has been a neglected global health area and the attention given to CAMH has until recently been disproportionately low, compared to mental disorders in adults and the elderly [2]. As a result, a huge treatment gap for CAMH conditions persists, one that could be addressed by improving access to CAMH care in LMIC [3].

The importance of access to mental health services for all is accentuated by the UN Sustainable Development Goals (SDGs), which acknowledge mental health as a development priority for which service coverage indicators are imperative [4]. The inclusion of mental health in the SDGs came in the wake of global discussions in the last decade on eliminating barriers to equitable care [5–7], a position adopted by the World Health Organization (WHO) in 2001 [2].

Access to mental health services is important for Primary Health Care (PHC) [2]. This opinion is reinforced by the 2008 World Health Report which revisited the Alma Ata goals and emphasised the need for engaging culturally competent providers who respect patient beliefs [8]. By providing care in line with indigenous knowledge and belief systems, traditional healers fit this description [9, 10]. Two WHO strategies currently endorse the involvement of traditional healers in care: the WHO's traditional and complementary medicine strategy 2014–2023 which highlights traditional healers as a potential solution to achieving universal health coverage [11]; and the WHO mental health action plan 2013–2020 which encourages greater collaboration with traditional healers to promote mental wellbeing [12]. However, there are no clear examples of collaboration between traditional healers and the biomedical health system for mental health care.

Collaboration between traditional healers and clinicians in alleviating mental suffering among children and adolescents is particularly important in settings where access to CAMH services is poor, such as Uganda, which has fewer psychiatric facilities than the global average [13]. However, hindrances to successful collaboration between traditional healers and biomedical mental health systems are cited in qualitative studies. For instance, traditional healers express a preference for referring clients to another healer rather than to a clinician, maintaining an 'internal' referral network. Other traditional healers express skepticism regarding the value of biomedical psychiatric treatments because of their perceptions of the underlying spiritual cause of mental

disorders [14]. Conversely, biomedical service providers think that the difficulty around establishing the scientific validity of traditional and faith healers' practices makes referral to traditional healers very difficult [15]. These attitudes reflect a lack of trust between traditional healers and biomedical providers. Yet trust drives cooperation between agents of the health system; without it, collaboration breaks down, corroding the interactive nature of health systems [16].

The interaction between the different agents of health care is embodied by the classical Explanatory Models of Illness theory proposed by Kleinman and others. Under this model, patient satisfaction with care is more likely with providers who explore and address patients' explanatory models of illness [17]. Thus, health care is composed of different sectors each with its unique institutions and each relying on different patient explanatory models (Fig. 1). The model states that while the professional / biomedical sector is one sought by patients who ascribe illness to biological causes, the folk and popular sectors tend to attract clients who attach a social or a cultural explanation to illness. Each of the sectors offers unique remedies, related both to the expertise of providers within the sector and to the perceived cause of illness. Clients may utilise a combination of two or more sectors for a single episode of illness and therefore, an interaction between the sectors is required to achieve access to and satisfaction with care [18].

Estimates indicate that more than 80% of African populations attend traditional healers for health reasons and that 40–60% of these have some kind of mental illness [11, 19]. In fact, traditional healers are the first recourse for approximately half of individuals seeking care for mental disorders in Africa [20]. In Uganda, available

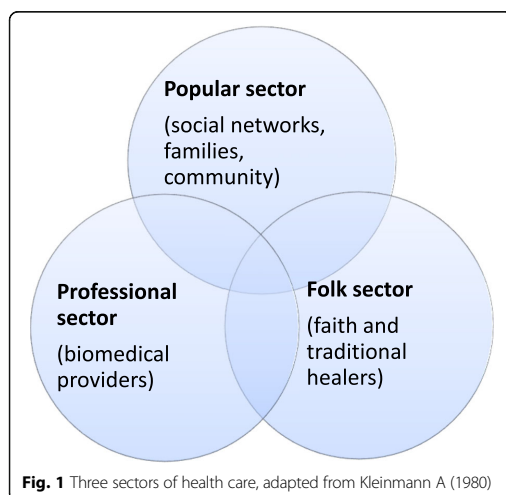


Fig. 1 Three sectors of health care, adapted from Kleinmann A (1980)

research indicates that up to 60% of Ugandan patients attending traditional healers' shrines have moderate to severe mental illness [21]. Several studies have documented positive outcomes among adults of mental health care from traditional healers in sub Saharan Africa [21–23], a factor which could explain traditional healer popularity. The widespread use of traditional healers could also be attributed to the accessibility of traditional healers relative to medical professionals; across sub Saharan Africa, there is a traditional healer for every 500 people, compared to a doctor: population ratio of 1: 40,000 [24]. While it has not been possible to determine the total number of traditional healers in Uganda, estimates indicate that compared to a doctor: population ratio of 1:8547, there is one traditional healer for 700 Ugandans [25].

Traditional healers are widely consulted worldwide for treatment of various ailments and practice traditional medicine, which is defined as knowledge and remedies based on beliefs indigenous to different cultures used in the prevention, diagnosis or management of physical and mental illness [11]. For purposes of this paper, traditional medicine refers to such practices applied with the aim of diagnosing, treating or otherwise alleviating mental suffering among children and adolescents. In this paper, the term 'bio medical personnel' is used interchangeably with 'clinicians'. The aim of this study was to explore traditional healers' views on their collaboration with biomedical health systems so as to inform the implementation of strategies to improve access to CAMH services in Uganda. Specifically, we aimed to examine the experiences of traditional healers with CAMH; their perception of and attitude towards collaboration with biomedical mental health systems.

Methods

Design

This qualitative study employed semi-structured interviews with 20 purposively selected traditional healers, held in November 2015. Twenty was the number of participants designated before the onset of the study, based on local estimates of traditional healers with CAMH experience. Twenty was also deemed an appropriate sample size for achieving saturation [26] while preserving validity. Study participants were selected by the leader of the traditional healers in the Eastern region of Uganda, based on his knowledge of traditional healers engaged in mental health treatment. The traditional healers ranged in age from 26 to 80, with a mean age of 53. Six of them were female, and the median years of practice was 23 (range 6–52). All except one traditional healer had directly managed children and adolescents with mental illness, with 11 as the mean number of reported patients.

An interview guide (Additional file 1) developed by the principal investigator (PI) was used to explore: 1) The experiences of traditional healers with mental illness in children and adolescents; 2) Their willingness to collaborate with biomedical health systems; and 3) their perceptions about the willingness of clinicians to collaborate with traditional healers. Semi-structured interviews were selected as the method of choice because of their ability to elicit rich descriptions of individual experiences (31).

Data collection

Interviews were conducted in local languages (Lumasaaba and Luganda) by a research assistant with a sociology background, experienced in qualitative research. The research assistant was selected based on residence in the area, fluency in the two local languages and experience conducting research with traditional healers. Prior to conducting the interviews, the PI trained the research assistant on the main objectives of the study and the study tool. The PI did not participate in the interviews due to language limitations and because we believed that the presence of a medical doctor might inhibit the traditional healers' responses and restrict access to their premises.

All interviews were tape recorded. Interviews lasted approximately 45 min and were held at a location convenient to the traditional healer, mostly at their homes and workplaces.

Data analysis

Interviews were transcribed directly into English by the same research assistant who conducted the interviews, while taking care to preserve important local language concepts. Data were analysed using thematic analysis. In keeping with this methodology, the transcripts were read and re-read to obtain immersion and a good understanding of the data.

Transcripts were imported into QSR NVivo 11 (*QSR International Pty Ltd. Version 11, 2015*). Open coding was then conducted by a single coder to categorise data and organise it into themes. An iterative process of labelling and extraction of data into themes and sub-themes, comparing and contrasting them with other themes followed. Coding and analysis were led by the lead author (AA), a medical doctor with broad experience of the public health system. The last author (IMSE) reviewed all interview transcripts.

Ethical considerations

The study received approval from the Makerere School of Public Health Higher Degrees Research and Ethics Committee and from the Uganda National Council for Science and Technology. All ethical guidelines involving human subjects were adhered to throughout this

study. All interviews were tape recorded after obtaining participants' consent.

Results

Two main themes arise from the data: 1) Treating mental illness is cultural; and 2) Mistrust hampers collaboration. The theme "Treating mental illness is cultural" presents data on epistemologies of mental illness in children and adolescents; and on interactions between traditional healers and biomedical providers. "Mistrust hampers collaboration" is categorized into two sub-themes: willingness to collaborate and barriers to collaboration.

Treating mental illness – A culturally founded skill

Traditional healers' narrative on their experiences treating mental illness focused on: explanations for mental suffering in children and adolescents and accounts of their interactions with biomedical health systems. The two issues are closely interlinked. As will be illustrated in this section, different explanations of illness based on different epistemologies resulted in treatment regimes that determined the nature of interaction with the formal health system.

Mixed explanations of mental illness

"What I know is that some of the mental health problems in children and young people is caused by ancestral clan spirits, especially if these spirits want the person initiated into being a traditional healer and the person resists... and not until this person is initiated into traditional healing his mental disorder never heals" – Traditional healer 13, twenty-seven years' practice

In keeping with traditional healers' belief in ancestors' ability to interfere in the lives of the living, ancestral spirits played a major role in explaining mental illness. All traditional healers cited unhappy ancestral spirits as a cause of mental ill-health among children and adolescents. A commonly held view was that ancestral spirits were unhappy because ancient customs and rituals have been abandoned; and that children and adolescents who resisted their destiny to become traditional healers inevitably developed mental illness, which was only curable by initiation into traditional healing.

We also found prevalent perceptions of mental suffering being consequent to conflict between traditional customs and modern 'born again' religions, as illustrated by this excerpt *"...it happens very much especially to those people who have abandoned issues with traditions and opted for the religion of born again..."* This conflict between traditional and modern 'born again' religions was considered responsible in particular, for protracted

mental ill-health among children and adolescents. Other causes mentioned by all traditional healers were ghosts, spirits and witchcraft, which are sent by enemies and encountered by people who walk outside the house at night, causing them to descend into mental illness. Prosperous families were considered particularly prone to witchcraft from jealous people, leading to mental illness among children.

Traditional healers also ascribed mental ill-health to non-spiritual and non-social causes. All traditional healers implicated substance abuse as a cause of mental illness among adolescents. Substances mentioned were a local potent brew, *waragi*; narcotic drugs - *enjaga*; tobacco and aviation fuel, taken singly or in combination. Most also cited high fever and cerebral malaria as a cause of mental disturbances in children. According to them, this category of mental illness was best treated in hospitals and clinics.

A common view was one of unsanitary conditions at birth and early childhood leading to mental illness. The pathway through which such conditions were believed to cause mental disease is through breathing difficulty, as illustrated by this elderly traditional healer with 45 years of practice, *"I know that if a baby is born in a dirty environment, or...if a child's head is not protected from the cold air...that child automatically gets a mental disorder when he grows up...the child's brain is affected directly...begins by having difficulties in breathing...with time this child gets worse and then one realises that a mental disorder has set in"*.

Worms and maggots growing in the child's brain, were also widely implicated, as explained by the elderly traditional healer: *"once a child starts getting difficulty in breathing it means that he has a maggot in his brain...as the child grows the maggot also grows...this can bring about terrible mental disorder."* We found that many of the treatments described by the traditional healers were aimed at expelling these maggots; unless the maggot was expelled, the patient would not get well.

"...usually those who have a maggot in the brain, when it moves, they become very violent ... but once the maggot comes out then that person gets completely healed... I remember very well was a 14-year-old girl, who was brought to my place when very violent. So, what I did, I mixed herbs and I poured it through her nose... later she sneezed and two maggots popped out of her nose..."

Traditional healer 09, eleven years' practice.

In summary, three types of explanations for mental illness were found to be part of the epistemology of the traditional healer: Spiritual explanations including ancestors and neo-Pentecostal worship; social explanations including witchcraft and evil-eye, and physical

or natural agents like maggots, infections and substance abuse.

No interaction with the formal health system

"...nobody should deceive you that mental illness can be managed by hospitals...." Traditional healer 04, eight years' practice

Traditional healers' interaction with clinicians was characterised by views about referral to and from health clinics, and by opinions about the competence of clinical practitioners. We found all traditional healers believed that traditional medicine is the only effective treatment for mental ill-health, due to the spiritual nature of the condition. Several traditional healers cited the inability of clinical providers to expel maggots from patients' brains.

We found very little experience of referral from health clinics to traditional healers. Two participants reported such referral for mental ill-health, after repeated treatments at the medical clinics had failed to make them better:

"There is one ...in the main hospital who one time directed a man with his son to me for management, I hear they had gone to the hospital several times but the boy never got well... I worked on him and he became okay..." Traditional healer 17, twenty years' practice.

However, self-referrals were commonly reported, in which patients discharged themselves from health clinics to consult traditional healers.

Although biomedicine was considered limited in approach, addressing only the physical causes of disease, all informants had referred patients to biomedical clinics. The commonly cited reasons for referral were for rehydration, or for blood transfusion. Others referred patients whom they deemed to have biomedical conditions, particularly malaria, which they were not well suited to manage. One older, more experienced traditional healer mentioned that it was his policy to treat a patient thrice only, following which he would refer to medical clinics. However, such referrals were reportedly not well received by clinicians, if it was known that the patient had consulted a traditional healer:

"One time I referred a child to Mbale Hospital after I had smeared herbs on the child. On arrival, the doctors chased the patient away accusing them of being dirty...I always send patients to them for management, but for them they have never done so." Traditional healer 10, ten years' practice

Despite great skepticism of the effectiveness of biomedicine on mental illness, some traditional healers integrate biomedical elements into their mental health treatment regime. One example is the traditional healer who professed to routine use of larcartil[®] on violent patients who were brought to him, prior to administering his herbal treatments:

"...I love using it because it really puts a person to sleep...I'm a traditional healer but I have found out that [larcartil[®]] is a very effective drug when it comes to calming down the person with mental health disorders especially when they are violent..." – Traditional healer 02, forty-five years' practice

The view that clinical practitioners are not competent to manage mental health conditions was unanimous. The reasons cited were that clinical practitioners do not comprehend spiritual matters and are poorly placed to treat conditions with a spiritual origin. It was widely acknowledged that they could manage conditions that arose from malaria and other fevers. To prove this point, many of the traditional healers cited examples of patients who had been repeatedly treated at health clinics but only got better after visiting traditional healers. According to the traditional healers, the remedies provided in clinics are temporary; the only lasting effect was believed to come from traditional healers.

Mistrust hampers collaboration

"I don't see it happening easily because those doctors despise all our work. They regard it as satanic and dirty" – Traditional healer 09, eleven years' practice.

Even if nearly all traditional healers expressed willingness to collaborate with clinicians in alleviating mental suffering in children and adolescents, their willingness was conditional on clinicians' reciprocating this goodwill, which was considered unlikely. All the participants believed that clinical providers are not willing to collaborate with traditional healers as they consider them dirty, unsanitary and of a lower education status:

"You know they regard us as ...illiterate and of low class...they regard themselves as people of high class..." – Traditional healer 02, forty-five years' practice

Different from their views on clinicians, we found the traditional healers unanimous in their conviction that patients would welcome their collaboration with the formal health system. According to the traditional healers, all patients needed was to get well, so it did not matter through which means they received treatment. They also

argued that patients would cease to consult them in secrecy once collaboration was implemented.

"I see that they will be happy for the collaboration because they will no longer come to the traditional healers in hiding as they do now. They will consult us openly as they do with the clinics" – Traditional healer 12, ten years' practice.

We found several perceived barriers to collaboration among the traditional healers. Some of the barriers such as the competence of peers were intrinsic to the traditional healers themselves. Traditional healers viewed their peers who are not 'specialized' in mental illness as largely being incompetent for handling CAMH and mental ill-health in general. Advertisement in news media was viewed as a sign of incompetence. It was widely held that competent traditional healers need no advertisement to enhance their reputation; Competence was thought to increase with experience and years of practice.

"What I would like to tell you is that a real traditional healer does not advertise him / herself over the radio or TV, so once you see one doing this, then know that this person is incompetent in his work...you know there is a lot of joblessness in Uganda, so we have so many who call themselves that they are traditional healers, when they are not, they are simply looking money so that they are able to put food on the table." – Traditional healer 07, thirty-four years' practice.

Another intrinsic barrier perceived by the traditional healers is their lack of English language knowledge. According to the traditional healers, clinical providers would use English language as a means for excluding the less educated traditional healers

"The barrier I foresee...our counterparts the doctors want always to use English so as to push us away...I see that as a problem" – Traditional healer 07, thirty-four years' practice.

We found that traditional healers did not trust biomedical practitioners. In addition to the belief that medical providers viewed them negatively, most traditional healers thought that clinicians would extract knowledge from the traditional healers and use it for their own credit.

"Working with them is not easy because they don't like us at all, we are like co-wives who don't like each other and share one man..." – Traditional healer 18, fifty years' practice

"What I see is that the formal health worker will only take our ideas and use them, therefore, this will only benefit them by them getting more money and traditional healers will not benefit at all." –

Traditional healer 13, twenty-seven years' practice

To eliminate barriers, necessary conditions for collaboration were described. Most of the traditional healers mentioned the government as needing to take a lead in integrating them with formal health systems, without which collaboration wouldn't be possible. The required government intervention mostly suggested was a law or policy recognising traditional healers and compelling clinicians to collaborate with traditional healers;

"Once government makes a policy for us to be recognized as formal health workers things will just fall in place"– Traditional healer 15, thirty-seven years' practice

"...If a law is put in place then they will accept." – Traditional healer 6, fourteen years' practice

Alongside laws and policies, increased recognition by government, sensitisation of communities, traditional healers and medical providers was cited as a necessary condition for successful collaboration.

Discussion

The main findings of the study were: 1) Epistemologies of mental illness in children and adolescents are shared by traditional healers; 2) traditional healers have limited interactions with the biomedical health system for mental illness; and 3) traditional healers' willingness to collaborate with biomedical providers is hampered by mistrust. Whereas previous studies [21, 27] have addressed traditional healers' views on help-seeking behaviour and have characterised mental health conditions and outcomes, this is the first study in Uganda that has explored the views of CAMH-experienced traditional healers on their integration with formal health systems.

In line with the classical Explanatory Models theory proposed by Kleinman, the epistemological view of mental illness among traditional healers was tinged by their belief systems. Specifically, their reliance on spiritual and supernatural explanations of mental disorders is in line with their identity as traditional healers. This has been found in other studies as well [28]. Nevertheless, some causes of CAMH illness they identified, namely substance abuse and fevers, are shared by biomedical practitioners, illustrating the intersection between the traditional and professional sectors of CAMH care.

That traditional healers are engaged in managing CAMH cases is unsurprising and has been documented

by other studies in Uganda and elsewhere [19, 29, 30]. What hasn't been widely reported, however, is the cross-over between biomedical and traditional treatments, exemplified in the present study by the traditional healer who routinely uses largactil®, a brand name for chlorpromazine. The use of biomedical remedies by traditional healers reinforces the notion that epistemologies are not clear cut – one sector of health care may borrow technologies from another. It also further highlights Kleinman's conceptual overlap between the professional and folk sectors of care. As suggested by Kleinman therefore, this overlap is one that can be explored in enhancing collaboration between the two sectors.

As in this study, Van Niekerk et al., (2014) reported a low level of referral from clinical practitioners to traditional healers in South Africa. Likewise, Musyimi et al., (2016) found that traditional healers in Kenya had no experience of referral from clinical practitioners [15, 31]. In keeping with Kleinman's theory [17], the most prevalent referrals found are self-referrals. Patients appear to use the traditional and biomedical sectors interchangeably, possibly depending on factors that may include access and illness interpretation.

The low levels of referral between traditional healers and clinicians could be related to the lack of mutual trust between traditional healers and clinical practitioners found in this study. As noted, trust is a prerequisite for successful collaboration between health care managers and practitioners [16, 32, 33]. In this study, the mistrust is limited to mental health conditions, exemplified by the non-mental health referrals being made. Lack of trust for mental health services has been found elsewhere [15, 34], and is justified by recent findings from sub-Saharan Africa that confirm clinicians' perception of traditional healers as dirty and unprofessional [15, 34, 35]. Suggested ways of addressing this negativity is creating means for dialogue between traditional healers and clinical providers, which has been successful in Kenya (30). Specifically, the health system needs to address the negativity with which patients referred from traditional healers are received at biomedical clinics. Trust of other traditional healers is also poor, and may seem surprising until one considers the high mean age of 53 in this sample; older, more experienced traditional healers whose reputation is based on years of practice could be wary of younger healers who advertise their services and charge exorbitantly for their services, jeopardizing the quality of their occupation. However, this finding suggests too that traditional healers are not homogenous, and potential for competition exists alongside potential for collaboration.

In this study, traditional healers believe themselves to be superior to biomedical providers in treating CAMH disorders, as biomedical providers possess no understanding of

spiritual matters. This finding is in sharp contrast to their belief that clinicians regard them as inferior; and suggests that adoption of biomedical explanatory models, treatments and remedies by traditional healers is as unlikely as the adoption of traditional models by clinicians might be. At first look this would appear to raise a conflict that would constrain collaboration. However, viewed in light of the different sub-sectors of health care suggested by Kleinman [17, 18], this finding reinforces the need for a collaborative model, in which the relative competencies of the different sub sectors are recognized and respected.

Traditional healers perceive their devaluation by biomedical providers as a hindrance to collaboration. On the other hand, traditional healers also tend to devalue doctors' CAMH epistemologies, even as they borrow certain treatments from the biomedical sector. This suggests that traditional healers, whilst professing superior knowledge, find value in biomedical sector therapies. This contradiction is one that appears to mask a willingness to collaborate more with biomedical providers. In fact, willingness to collaborate has been documented elsewhere [15, 34, 35]. The fact that willingness in this study is conditional on traditional healers' contributions not being overshadowed by the clinical providers suggests strongly that an element of competition exists between the two categories of provider. Competition is counter to the Explanatory Models of Illness theory which is more collaborative than competitive. It is worth noting that whereas the traditional healers' attitude to biomedical epistemologies is dismissive, clinicians are perceived as less of a threat than 'neo-Pentecostalism'.

The results of this study have several implications for improving access to CAMH services through traditional healers' collaboration with clinical mental health systems. First, advocates for collaboration should consider the different explanatory models existent among the two categories of provider; and find mutually acceptable ways to stimulate collaboration, recognising that the two categories have a complementary role to play in stimulating access to CAMH services. This should involve, among others, improving clinicians' acceptance of traditional healers' explanatory models for illness; and vice versa. Secondly, trust between the two categories of provider needs to be enhanced to improve interaction between the two sectors, which currently operate in isolation. In particular, the perceived negativity by clinicians of traditional healers needs to be addressed. Thirdly, quality of care by traditional healers needs to be addressed to improve hygiene and eliminate unethical practices like extortion of money from clients. These could form suggestions for inclusion in policy suggested by traditional healers to guide collaboration between the two sectors of care.

Some strengths of this study are recognised. The use of a purposive sample of traditional healers with CAMH experiences provides experience-based views. Thus, we believe that these views are transferable to all traditional healers with CAMH experience in Uganda considering that the health system and policy context is uniform across the country. Also, given that traditional healers believe they are disliked by clinicians, conducting interviews at traditional healers' place of work and the use of a non-medical interviewer probably improved the traditional healers' ability to express their views freely. As limitations, we note that clinicians' views were not sought to validate traditional healers' impressions; however, the aim of this study was to explore CAMH services from the traditional healers' perspective. Secondly, we recognize that the reliance on a single coder, and the direct translation of interviews into English during transcription could have introduced a bias resulting from the coder's and transcriber's own interpretation of the data; and threatened linguistic equivalence since back-translation of local language transcripts was not done. Thirdly, the absence of the PI at interviews might have limited deeper enquiry into the subject matter as the data were collected.

Conclusion

These findings show that potential for collaboration between traditional healers and biomedical health systems for improving access to CAMH in Uganda exists, based on shared epistemologies and technologies; and patients' movement across the two sectors. However this potential is undermined by the prevailing mutual mistrust and competition between traditional healers and clinicians. The findings highlight the need for implementation of strategies that harness the complementarity of traditional and biomedical sectors of mental health care as a means of improving access to CAMH services.

Additional file

Additional file 1: In-depth Interview guide: A semi-structured question guide to facilitate interviews with traditional healers. (DOCX 16 kb)

Abbreviations

CAMH: Child and Adolescent Mental Health; LMIC: Low- and Middle-Income Countries; MNS: Mental, Neurological and Substance Use; PHC: Primary Health Care; PI: Principal Investigator; THETA: Traditional and Modern Health Practitioners Together Against AIDS; WHO: World Health Organisation

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Availability of data and materials

The datasets analysed during the current study are available from the corresponding author on reasonable request.

Authors' contributions

AA, IMSE and KMM contributed to the conception and design of the study. AA coded the data, led the analysis and interpretation of the data; and drafting the paper. IMSE, KMM and JNB drafted sections of the manuscript. All authors approved the final manuscript

Ethics approval and consent to participate

The study received approval from the Makerere School of Public Health Institutional Review Board and from the Uganda National Council for Science and Technology under research registration number HS 1874. Prior to the interviews individual traditional healers provided signed written informed consent, improvised with a thumbprint for those who were not able to write.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

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Does child and adolescent mental health in-service training result in equivalent knowledge gain among cadres of non-specialist health workers in Uganda? A pre-test post-test study

Angela Akol^{1,2*} , Joyce Nalugya³, Sylvia Nshemereirwe⁴, Juliet N. Babiryè² and Ingunn Marie Stadskleiv Engebretsen¹

Abstract

Background: Early identification and management of child and adolescent mental health (CAMH) disorders helps to avert mental illness in adulthood but a CAMH treatment gap exists in Uganda. CAMH integration into primary health care (PHC) through in-service training of non-specialist health workers (NSHW) using the World Health Organisation (WHO) Mental Health Gap Action Programme (mhGAP) Intervention Guide (IG) is a strategy to address this gap. However, results of such training are not supported by information on training development or delivery; and are undifferentiated by NSHW cadre. We aim to describe an in-service CAMH training for NSHW in Uganda and assess cadre-differentiated learning outcomes.

Methods: Thirty-six clinical officers, nurses and midwives from 18 randomly selected PHC clinics in eastern Uganda were trained for 5 days on CAMH screening and referral using a curriculum based on the mhGAP-IG version 1.0 and PowerPoint slides from the International Association of Child and Adolescent Psychiatry and Allied Professions (IACA-PAP). The residential training was evaluated through pre- and post- training tests of CAMH knowledge and attitudes using the participants' post-test scores; and the difference between pre-test and post-test scores. Two-tailed t-tests assessed differences in mean pre-test and post-test scores between the cadres; hierarchical linear regression tested the association between cadre and post test scores; and logistic regression evaluated the relationship between cadre and knowledge gain at three pre-determined cut off points.

Results: Thirty-three participants completed both pre-and post-tests. Improved mean scores from pre- to post-test were observed for both clinical officers (20% change) and nurse/midwives (18% change). Clinical officers had significantly higher mean test scores than nurses and midwives ($p < 0.05$) but cadre was not significantly associated with improvement in CAMH knowledge at the 10% (AOR 0.08; 95% CI [0.01, 1.19]; $p = 0.066$), 15% (AOR 0.16; 95% CI [0.01, 2.21]; $p = 0.170$), or 25% (AOR 0.13; 95% CI [0.01, 1.74]; $p = 0.122$) levels.

Conclusion: We aimed to examine CAMH learning outcomes by NSHW cadre. NSHW cadre does not influence knowledge gain from in-service CAMH training. Thus, an option for integrating CAMH into PHC in Uganda using the mhGAP-IG and IACAPAP PowerPoint slides is to proceed without cadre differentiation.

Keywords: Child, Adolescent, Mental health, Training, Non-specialist health worker, Cadre, Primary care

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Background

Globally, up to 20% of children and adolescents live with some kind of mental and neurological disorder [1–3]. The burden of CAMH disorders in Uganda has not been accurately estimated but various studies indicate a high prevalence of depression (21%) among school going adolescents [4] and disadvantaged children in four districts (8.6%) [5]. Okello et al. (2007) estimated that approximately 44% of war-affected adolescents in another district suffered from one or more CAMH disorder [6, 7] and a high prevalence of anxiety disorders (26.6%) and adolescent suicidality [8, 9] are documented.

The absence of accurate estimates notwithstanding, a mental health treatment gap is recognized for child and adolescent mental health (CAMH) conditions in low and middle income countries [10–12]. To close the treatment gap, global advocates recommend among other approaches, the integration of CAMH into primary health care (PHC) [3, 13–16], as a task-shifting strategy aimed at improving the human resource availability for the treatment and care of individuals living with mental illness. However, this strategy is challenged by the limited skills and knowledge of non-specialist health workers (NSHW) to provide quality mental health services, a challenge particularly seen with adolescents and children [17–20].

To help correct the skills gap among NSHW, the World Health Organisation (WHO) launched the Mental Health Gap Action Program (mhGAP) in 2008, with the objective of scaling up evidence-based services for the prevention and management of mental, neurological and substance use (MNS) disorders. The attendant mhGAP Intervention Guide (mhGAP-IG) was developed 2 years later as a tool to aid the integration of priority MNS disorders into services provided by NSHW in PHC settings in low- and middle-income countries (LMIC) [21]. As a technical tool, the mhGAP-IG provides simple procedures to aid clinical decision making around a set of priority MNS conditions, including behavioral disorders in children and adolescents. Recent work in Uganda suggests that it is feasible to integrate mental health services into PHC by training NSHW to identify and treat common mental health problems. For example, a 2007 initiative found that mental health training of community health workers and PHC providers from northern Uganda was followed by increased mental health awareness, identification and referral of mental health patients [22, 23]. However, task-shifting interventions such as these to date have all had an adult psychiatry orientation in Uganda.

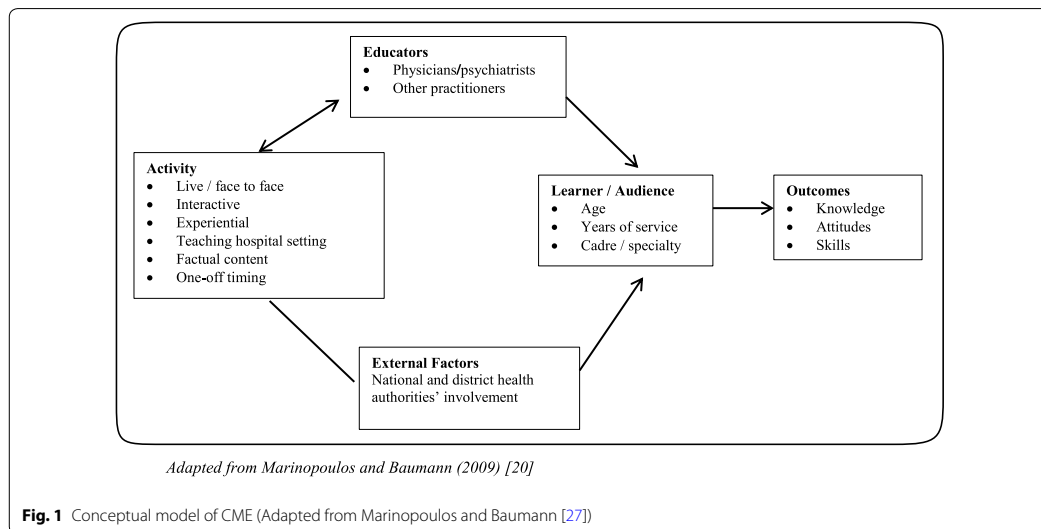
In-service training of NSHW using the mhGAP-IG falls within the realm of continuing medical education (CME), a globally endorsed strategy for improving human resources for health [3, 16, 21]. In Uganda, CME is policy-endorsed strategy for improving access to

CAMH services that is not being implemented at scale [11]. CME may take several forms, ranging from short sessions, computer modules, workshops or courses, each associated with varied learning outcomes [24]. Recent work on CME effectiveness identifies that in the hierarchy of CME teaching and learning, interactive and clinically integrated activities are most effective in impacting learner knowledge, attitudes, behavior and learning outcomes [25, 26]. Such CME initiatives integrate passive classroom teaching with interactive group activities and clinically oriented practicums.

Conclusions on CME method effectiveness are limited by poor reporting on contextual factors such as the training settings, teacher-learner interactions and educational background of the learners, which may affect delivery of the intervention and the outcomes of training [26]. A conceptual model of CME effectiveness has been proposed by Marinopoulos and Baumann [27] to guide analysis of the covariates of successful CME (Fig. 1). This model advances the idea that a suitable mix of techniques delivered by appropriate educators in a facilitative external environment to motivated learners with the correct social and professional attributes will deliver knowledge, skill and attitudinal outcomes that persist over the long term. Learner characteristics (including cadre and years of service), the nature of the CME activity, the CME educators and external factors all interact to influence learning outcomes. It is not known which of these factors is most important for influencing CAMH learning outcomes for NSHW in Uganda.

Non-specialist health workers are not homogenous and comprise nurses, midwives, medical assistants or clinical officers and community health workers. In Uganda, nurses and midwives receive less exposure than clinical officers to MNS disorders in pre-service training [28, 29], which may affect the outcome of mental health CME. Specifically, it is not clear whether mhGAP training would have the same effect across the different cadres of Ugandan NSHW.

The benefits of mhGAP CME for NSHW are established in the literature [22, 23], but findings are not differentiated by cadre of health worker; and limited information is available on how training is developed, delivered and evaluated [30–33]. Furthermore, the available evidence points to beneficial effects of CME on adult-oriented psychiatry, with scant literature on CAMH training for NSHW. We aim to describe an interactive and clinically-integrated short in-service CAMH training for NSHW in Uganda and to examine how learning outcomes differ by cadre of NSHW. This paper is part of a larger trial which seeks to evaluate the effect of NSHW training on identification of child- and adolescent mental, neurological or substance use disorders through a randomised controlled trial in Uganda.



Methods

Study area and study clinics

Eighteen health centers from Mbale and Sironko districts in Eastern Uganda were selected for CAMH training as part of a wider study on access to CAMH services through PHC. These districts were selected for study because they were mhGAP naïve and were in close proximity to the psychiatric unit at Mbale regional referral hospital. Eligible clinics comprised level 3 health centers (HC III) because this is the lowest level at which comprehensive PHC services are provided in Uganda. In addition, the presence of at least four clinical staff at the HC III, made it possible for two staff members to attend CAMH training without disabling service delivery.

A list of all eligible HC III in Mbale and Sironko districts was obtained from the district health offices and 18 clinics were randomly selected using computer generated numbers, by a collaborator who was external to the research team. In randomizing, the clinic list was sorted alphabetically before a random sequence number was generated using the command `randomize` on `stata v.12` (StataCorp. 2011).

Participants

Participants were clinical officers, nurses and midwives selected from the 18 primary care clinics. The officers in charge of health services in the two districts nominated trainees from each of the selected health facilities, choosing the two most senior NSHW available, with the assumption that senior staff would be able to cascade the

training and knowledge to other PHC staff. All selected health facilities sent two NSHWs for the training.

Intervention

Curriculum development

The curriculum was developed at a 2-day workshop attended by mental health professionals from the two national referral hospitals, who had extensive experience with CAMH training of students, mental health professionals and other health workers. During the workshop, the trainers reviewed available training curricula which had been utilized in Uganda and determined, based on their experience, that WHO's mhGAP-IG [21] modules on developmental disorders and behavioral disorders had appropriate content for training NSHW on CAMH screening, referral and management. Using the mhGAP-IG, a 5-day curriculum (Additional file 1: attachment 1) was developed. The trainers augmented the training with PowerPoint presentations from the International Association of Child and Adolescent Psychiatry and Allied Professions (IACAPAP) textbook [34] to deliver additional detail on conditions included in the mhGAP-IG and on conditions not included in the mhGAP-IG, but which were considered important in the NSHWs' contexts. The IACAPAP Textbook of Child and Adolescent Mental Health ISBN: 978-0-646-57440-0 is an online textbook first published by the IACAPAP, Geneva in 2012. Designed for mental health professionals and trainees, the textbook delves into the range of possible clinical presentations and treatment options for CAMH disorders.

Once the curriculum had been agreed upon, the trainers reviewed each session and agreed on session flow, session-leads, methods of instruction and interactive activities for each session. For example, it was agreed that to keep the learners engaged, lecture methodology was reserved for the morning sessions and in the afternoons, group work and clinical practice were incorporated. Sessions appropriate for role-play methodology were carefully chosen and additional trainers with session-specific skills sets were identified.

Additionally, the trainers contextualized the content to Uganda. In particular, they prefaced the training with a presentation on Uganda's mental health status; and illustrative examples in the mhGAP-IG and the IACAPAP slides were reviewed for local applicability and replaced with context-appropriate examples where necessary. Similarly, group discussion topics were contextualised to the Ugandan setting. Due to cost constraints, and basing on the trainers' experience using these materials with NSHW in other parts of the country, the training curriculum was not pre-tested. However, all training materials were reviewed and approved by the Ministry of Health mental health department prior to training.

Training

Thirty-six NSHW were trained. The aim of the training was to equip the NSHW with knowledge and skills in identification, assessment and treatment or referral of children and adolescents with mental health problems, to contribute to early referral of children into care. The 5-day residential training took place in September–October 2015 at the post-graduate center at the main psychiatric referral hospital located in a suburb of the capital city, and was delivered by two psychiatrists and a psychologist with special interest and training in child and adolescent psychiatry and mental health. Together, this team led both classroom and clinical practicum sessions. Classroom training was delivered using a mix of teaching methods including lecture, group discussions, case vignettes and role plays while practicums involved 2 h of clinical demonstration on the children's ward. The participants all received reference material. Training was evaluated through written pre- and post- tests of knowledge and attitudes towards CAMH.

Data collection and analysis

Instruments

The participant registration form collected participant names, place of work and gender while a participant bi-data form collected age, place of work, cadre and years of service. A CAMH knowledge test derived from a standardised assessment designed by the WHO for trainings on the mhGAP IG (Additional file 2: Attachment 2) was

administered on day 1 before training and on day 5 after the training to explore NSHW attitudes and knowledge using binary true/false responses and multiple choice questions along the themes in Box 1. The face and construct validity of the assessment tool were determined based on the expert opinion of local professionals and by evidence of its use in the sub-Saharan context [35].

Box 1: Thematic areas assessed by the pre- and post-training evaluation instrument

- Parental behavior and mental health status
- Childhood behavior
- Depression
- Psychosis
- Epilepsy
- Developmental delay
- Suicidal and self harming behaviour
- Alcohol and substance abuse
- Treatment options for CAMH disorders

Measures

For purposes of analysis, nurses and midwives were condensed into one cadre and compared with clinical officers. Participant knowledge scores before and after training were assessed to establish a difference in knowledge gain between the two cadres of NSHW. CAMH knowledge gain was evaluated using two measures. First, the CAMH knowledge possessed by the participants after training was considered (absolute measure), assessed using the post-test score as the outcome variable. Secondly, we considered the change in CAMH knowledge possessed by the participants as a result of training (relative measure). We considered this measure important because it takes participant baseline CAMH knowledge into account and is recommended for understanding longitudinal learning outcomes [36]. To assess relative knowledge gain, the percentage difference in participant pre- and post-tests was the dependent variable. We assessed knowledge gain at three cut-off points (10, 15 and 25%) to detect what cut off point is helpful for assessing knowledge change in the two cadres. A literature search for appropriate cut-off points yielded no information and these cut-off points were determined based on our estimation of three possible, realistic points of knowledge gain for this group of NSHW.

Statistical tests

Demographic and occupational information (cadre, number of years in service and place of work) were analyzed descriptively for all participants using proportions and measures of central tendency. Differences in mean

pre-test and post-test scores were assessed using the two-tailed student's *t* test. Outcome measures were assessed in two ways. In the first measure (absolute measure), hierarchical linear regression was applied to test the association between participant cadre and post-test scores, confirming using skewness/kurtosis and Breusch–Pagan/Cook-Weisberg tests that the outcome variable was normally distributed and homoscedastic. In the second measure (relative measure), three cut-off points (10, 15 and 25%) of knowledge gain were set; and logistic regression tested the relationship between NSW cadre and these cut off points of increase in knowledge gain.

Results

Analysis was based on the 33 participants who completed both pre-and post-tests. Most of the participants (69.7%, $n = 23$) were nurses or midwives aged less than 35 years of age. Thirteen (39.4%) had been in service for 5 years or less; and equal proportions of men and women participated in the study (Table 1).

Knowledge scores by cadre

Clinical officers had significantly higher mean pre-and post-test scores than nurses and midwives ($p < 0.05$). Mean scores for both cadres improved from pre- to post-test; the difference between the mean pre- and post-test scores was 20% for clinical officers and 18% for nurses and midwives. Whereas the clinical officers' lowest knowledge score improved by 16 points after training, the nurses and midwives maintained the same lowest knowledge score after training, resulting in a non-improvement

in the minimum score for the entire sample of participants (Table 2).

Absolute measure of CAMH knowledge

The post-test score was used as the measure of absolute CAMH knowledge after training. Simple linear regression of post-test results at the 5% significance level was performed on all the independent participant factors after ascertaining the normality and homoscedasticity of the post-test variable. Only cadre ($p = 0.002$) and pre-test score ($p < 0.001$) significantly influenced the post test result in the crude model. Participant age, sex, health unit, years of service had no influence on post test results (p value >0.05).

During hierarchical linear regression (Table 3), the inclusion of pre-test score into the model (model 2) increased the correlation coefficient for participant cadre, suggesting a confounding effect of pre-test score on cadre and post-test score. Therefore, we re-run the regression using the interaction term pre-test**i*.cadre (model 3). The results show a significantly stronger influence of cadre on post-training knowledge than in the crude model: when pre-test score is accounted for, nurses and midwives were 46% less likely than clinical officers to have a high post-test score ($p = 0.032$). Further analysis with disaggregation of the nurse/midwife cadre shows that this significant result is contributed to by nurses (data not shown): whereas there was no significant difference between midwives' and clinical officers' post-test results, nurses were significantly (46.8%) less likely than clinical officers to have a high post-test score ($p = 0.018$).

Relative measure of CAMH knowledge gain

The change in CAMH knowledge, measured as the percentage difference between pre-test and post-test results was used as a relative measure of CAMH knowledge gain. First, a two-tailed independent samples *t*-test performed to assess the difference in mean knowledge change between the two cadres showed no significant difference ($p = 0.410$).

We then divided the sample along three cut-off points of knowledge gain: 10, 15 and 25% gain in knowledge and applied logistic regression to determine the association between NSW cadre and a gain in CAMH knowledge at these cut-offs. Logistic regression (Table 4) revealed that cadre was not significantly associated with relative knowledge gain at the 95% confidence level for all three selected cut-off points of knowledge gain. Relative knowledge gain was significantly associated with participants' pre-test score ($p < 0.05$) at all cut-offs; a higher pre-test score was significantly associated with lower odds of achieving CAMH knowledge gain.

Table 1 Participant profile

Characteristic	n (%)
Age (years)	
18–24	3 (9.1)
25–29	9 (27.3)
30–34	9 (27.3)
35–39	8 (24.2)
>40	4 (12.1)
Gender	
Male	16 (48.5)
Female	17 (51.5)
Cadre	
Clinical officer	10 (30.3)
Nurse/midwife	23 (69.7)
Years of service experience	
1–5	13 (39.4)
6–10	12 (36.4)
>10	8 (24.2)

Table 2 Pre and post training test results by cadre for all participants

	Mean score (95% CI)	Min	Max	IQR	Percentage change ^a	p value (95% CI)
Pre-test						
Clinical officer	64.0 (57.0, 71.0)	52	88	8		0.022
Nurse/midwife	52.9 (47.3, 58.5)	32	84	12		
All	56.2 (51.6, 60.9)	32	88	16		
Post-test						
Clinical officer	76.8 (72.4, 81.2)	68	88	8	20.0	0.002
Nurse/midwife	62.4 (56.9, 68.0)	32	84	16	18.0	
All	66.8 (62.4, 71.4)	32	88	20	18.9	

^a Percentage change: (Post-test score – pre-test score/pre-test score * 100)

Table 3 Hierarchical Linear Regression of post-test results

	Model 1 B-coefficient (80% CI)	Model 2 B-coefficient (80% CI)	Model 3 B-coefficient (80% CI)
Cadre	–14.4 (–23.1, –5.7)*	–8.0 (–15.5, –0.4)*	–46.2 (–88.0, –4.4)*
Pre-test		0.6 (0.3, 0.9)*	0.1 (–0.5, 0.7)
Cadre*pre-test			0.6 (0.1, 1.3)

* $p < 0.05$

Table 4 Logistic regression of CAMH knowledge change

	10% Knowledge gain			15% Knowledge gain			25% Knowledge gain		
	AOR	95% CI	p value	AOR	95% CI	p value	AOR	95% CI	p value
Cadre	0.08	(0.01, 1.19)	0.066	0.16	(0.01, 2.21)	0.170	0.13	(0.01, 1.74)	0.122
Pre-test	0.90	(0.83, 0.99)	0.024*	0.87	(0.77, 0.98)	0.022*	0.87	(0.78, 0.98)	0.018*
Sex	1.72	(0.25, 11.97)	0.582	0.93	(0.13, 6.76)	0.941	0.50	(0.07, 3.48)	0.485
Age	1.21	(0.94, 1.57)	0.143	1.43	(1.02, 1.99)	0.039*	1.31	(0.98, 1.75)	0.069
Years of service	0.57	(0.11, 3.09)	0.514	0.26	(0.04, 1.50)	0.137	0.37	(0.06, 2.17)	0.271

* $p < 0.05$

Discussion

We aimed to describe an interactive and clinically integrated short in-service CAMH training for NSHW in Uganda and to determine the effect of participant cadre on learning outcomes from such training. Clinical officers had significantly higher pre- and post-training knowledge than nurses and midwives, suggesting that cadre influences pre- and post-training knowledge. However this effect was not observed for three levels of knowledge gain. A higher pre-test score was significantly associated with lower odds of achieving CAMH knowledge gain.

The training in this study met the definition of CME [27]. Further, training was conducted as an interactive and clinically integrated learning activity, which is cited as the most effective form of in-service training for imparting knowledge and skills [27, 37]. Thus, the

improved participant knowledge scores after training in this study support the CME theoretical framework by demonstrating that interactive and clinically integrated CME results in improved learning outcomes.

We found that our CME resulted in an overall knowledge gain of 18.8%, consistent with findings reported in other low resource settings. For example, a 35% point change in mental health knowledge was observed for 1000 PHC staff trained in Kenya [38] and in India, a 4 day interactive mental health course resulted in a significant improvement in community health workers' ability to recognize common conditions [39]. A significant knowledge gain was also observed from mhGAP in-service training of PHC workers in Nigeria [35]. However, those findings were not disaggregated by cadre. A cadre-disaggregated study in Lebanon showed that nurses achieved

higher post-training mental health competency scores than doctors following a 12 day training [40], contrary to our finding of lower post-training knowledge scores among nurses than clinical officers. Instead, our findings are similar to those from a mental health training in post-tsunami Sri Lanka which showed better learning outcomes among doctors than among mid-level personnel [41].

The contextual setting of training matters for CME outcomes. The residential CAMH training in our study was conducted at a national teaching hospital, some distance from the city centre, reducing opportunities for late coming and absenteeism while optimising opportunities for clinical practice on the children's ward. This type of setting is upheld by Bluestone et al. [37] who postulate that a setting that reduces absenteeism and situates the learning in an environment that offers opportunities for clinic-based simulations is critical to knowledge gain. On the other hand, the potentially prohibitive cost of a residential off-site training at a referral facility near the city needs to be considered in planning such a CME in a low resourced-setting like Uganda.

We found that participant cadre was statistically significant for one measure of knowledge (absolute measure) and not for the relative measure of knowledge gain. Specifically, clinical officers were significantly more likely to have higher post-training knowledge scores. This finding seemingly implies that nurses and midwives require more training time and/or different methods, until one considers the fact that clinical officers also had significantly higher pre-training knowledge than nurses and midwives, negating the significantly higher post-training knowledge among clinical officers. The inconsequentiality of the higher post-training knowledge scores among clinical officers is amplified when considered alongside the finding that none of the three set levels of gain in CAMH knowledge were significantly influenced by participant cadre in this study. Thus, our findings when considered together imply that both cadres of NSHW can be expected to achieve equivalent knowledge gain from similar CAMH training.

The evidence on the influence of participant characteristics on CME outcomes is inconclusive for age, gender, years in service or cadre [42, 43] and hinders a discussion on the role participant cadre plays in influencing mental health learning outcomes. Nonetheless, this study agrees with the findings of Lowe et al. [42] who found no significant relationship between participant age, gender and years in service on training outcomes. We attribute the missing link between these characteristics (particularly age and years in service) and training outcomes in this study to a low CAMH patient load at the PHC clinics where the NSHWs routinely practice, which deters

the experiential learning that these characteristics are expected to confer. This finding implies that within Uganda's PHC setting, all NSHW irrespective of gender, age or years in practice would be equally eligible for training as proposed by the existing CAMH policy [11].

We found that higher pre-test scores were significantly associated with a lower change in knowledge. This finding supports Warr et al. [36] who argue that variations in trainee competence before the training will impact learning outcomes and implies the necessity for pre-training screening of potential CAMH trainees, with priority for training given to low-performing NSHWs in low-resourced settings. The relatively higher pre-test scores seen among clinical officers in our study can be attributed to relatively higher exposure to mental health concepts clinical officers receive during pre-service training, especially considering that almost 40% of the participants had been in practice for 5 years or less. It can thus be expected that the knowledge gained in school influenced their level of pre-training CAMH knowledge. However, pre-service exposure to CAMH concepts would not explain the significant difference observed between nurses and midwives with respect to clinical officers' post-training knowledge. There's no clear explanation for this discrepancy. Nevertheless, the entire group achieved an 18.8% increase in knowledge from the training, reminiscent of the 18% increase observed in the Lebanese study cited [40].

Overall, the pre-training knowledge was high, as shown by a mean pre-test score of over 50%. This might be due to the nature of the test itself, i.e. one that does not delve deep into psychiatric knowledge, but rather relies on simple true/false and multiple-choice responses to gauge rudimentary knowledge of child and adolescent behaviour. Additionally, the test was a theoretical paper-based one without practical clinic-based assessments. Surprisingly, the mean score increased at the post-test but the range of scores remained the same, indicating that, at least one participant did not improve in knowledge.

Knowledge gain, measured with the relative measure in this study, was uniform across all participant characteristics, confirming that the mhGAP-IG is well suited for non-specialist clinicians in PHC settings, regardless of pre-service qualifications. These findings are consistent with those from a 4 week training based on the mhGAP that showed increases in knowledge across all cadres of nurses and community health workers in Pacific island countries [44]; and agree with Uganda's policy guidelines which support CAMH training for all NSHW cadres.

We consider the individual nature of the pre and post-test to be a strength of the study, since no discussion between participants was permitted to obscure the results. The small sample size in this study is a limitation. However,

the study represents a random selection of level 3 primary care facilities in two districts and we believe these findings can be generalised to all providers in the two districts. Another limitation is that only knowledge gain and not post-training competence of the NSHWs was assessed as a training outcome. A further limitation is that the assessment tool was not set up to identify what parts of the training curriculum were particularly challenging, information which would help in the design of future trainings.

Conclusion

Non-specialist health workers cadre does not influence knowledge gain from short in-service CAMH training in spite of clinical officers being significantly more likely than nurses and midwives to achieve higher post-training knowledge scores. The study's main implication for the improvement of human resources for CAMH in Uganda is that nurses and clinical officers are equally capable of improving their CAMH knowledge from short in-service training, in spite of varying exposure to mental health concepts during pre-service training. Thus, an option for the integration of CAMH into PHC in Uganda using the mhGAP-IG and PowerPoint training slides from the IACAPAP textbook is to proceed without cadre differentiation. Based on results from this study, we suggest that selection of training participants in a low resource setting like Uganda should be preceded by a pre-test of all candidate NSHWs, with training priority given to the lowest performing NSHWs; and that training should be interactive and experiential, conducted by highly proficient CAMH practitioners in a teaching hospital setting.

Additional files

Additional file 1. Training curriculum.

Additional file 2. Pre and Post-training assessment test.

Abbreviations

CAMH: child and adolescent mental health; CME: continuing medical education; HC III: health center level 3; IACAPAP: International Association of Child and Adolescent Psychiatry and Allied Professions; IG: implementation guide; LMIC: low and middle income country; mhGAP: Mental Health Gap Action Program; MNS: mental, neurological and substance abuse; NSHW: non specialist health worker; PHC: primary health care; WHO: World Health Organisation.

Authors' contributions

AA, IMSE and JNB contributed to the conception and design of the study. AA led the analysis and interpretation of the data; and drafting the paper. JN and SN led the training of NSHW. IMSE and JNB contributed to the drafting of the manuscript. All authors read and approved the final manuscript.

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Competing interests

The authors declare that they have no competing interests.

Availability of data and materials

The datasets analysed during the current study are available from the corresponding author on reasonable request.

Consent for publication

Not applicable.

Ethics approval and consent to participate

The study received approval from the Makerere School of Public Health Institutional Review Board and from the Uganda National Council for Science and Technology under research registration number HS 1874. The study was assented to by the Ministry of Health and District Health Offices. Prior to the interviews the NSHWs provided signed informed consent to participate in the study.

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Does mhGAP training of primary health care providers improve the identification of child-and adolescent mental, neurological or substance use disorders? Results from a randomized controlled trial in Uganda

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Does mhGAP training of primary health care providers improve the identification of child- and adolescent mental, neurological or substance use disorders? Results from a randomised controlled trial in Uganda

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ABSTRACT

Background: Integrating Child and Adolescent Mental Health (CAMH) into Primary Health Care (PHC) using the WHO Mental Health Gap Action Program (mhGAP) is recommended for closing a mental health treatment gap in low and middle income countries, but PHC providers have limited ability to detect CAMH disorders. We aimed to evaluate the effect of PHC provider mhGAP training on CAMH disorder identification in Eastern Uganda.

Methods: Thirty-six PHC clinics participated in a randomised controlled trial which compared the proportion of intervention (n=18) to control (n=18) clinics with a non-epilepsy CAMH diagnosis over three consecutive months following mhGAP-oriented CAMH training. Fisher's exact test and logistic regression based on Intention to Treat principles were applied. (clinicaltrials.gov registration NCT02552056).

Results: Nearly two thirds (63·8%, 23/36) of all clinics identified and recorded at least one non-epilepsy CAMH diagnosis from 40,692 clinic visits of patients aged 1-18 recorded over four months. The proportion of clinics with a non-epilepsy CAMH diagnosis prior to training was 27·7% (10/36, similar between study arms). Training did not significantly improve intervention clinics' non-epilepsy CAMH diagnosis (13/18, 72·2%) relative to the control (7/18, 38·9%) arm, $p=0\cdot092$. The odds of identifying and recording a non-epilepsy CAMH diagnosis were 2·5 times higher in the intervention than control arms at the end of 3 months of follow-up (adj. OR 2·48; 95% CI [1·31, 4·68]; $p=0\cdot005$).

Conclusion:

In this setting, mhGAP CAMH training of PHC providers increases PHC clinics' identification and reporting of non-epilepsy CAMH cases but this increase did not reach statistical significance.

Key words: Child, Adolescent, Mental Health, Primary Care, mhGAP, Africa

INTRODUCTION

One in five children globally (Belfer, 2008) and one in seven in sub-Saharan Africa (Cortina et al, 2012) suffers a mental, neurological or substance use (MNS) disorder, but the coverage of child and adolescent mental health (CAMH) services in most low- and middle-income countries (LMIC) is poor (Patel et al, 2007a; Patel et al). Global discussions in the last decade have recommended task-shifting to integrate mental health services into PHC as a means of improving CAMH service access (Eaton et al, 2011; Kieling et al, 2011; World Health Organization, 2003; 2008a; b; World Health Organization et al, 2008)..

Task shifting is a strategy designed to improve the efficiency of available human resources for health through redistribution of selected roles from highly qualified to lower-trained personnel, freeing up the highly qualified staff to pursue more specialized roles (World Health Organization, 2007). Task-shifting has increasingly been applied to various health care systems over the last decade, with demonstrated dividends for population health and cost-saving (Seidman & Atun, 2017). In Uganda, task-shifting strategies in which tasks are typically transferred from medical doctors to nurses, or nurses to community health workers are conspicuous in HIV/AIDS care (Kalibala et al, 2016), maternal and child health (Nabudere et al, 2011), family planning (Janowitz et al, 2012) and have been explored for non-communicable disease management (Katende & Donnelly, 2016). Task-shifting has also been shown to improve reach and effectiveness of mental health services in low-resourced settings with scarce human resources (Hoeft et al, 2018).

Available literature from Uganda suggests that task-shifting in mental health systems is a necessary, feasible and acceptable strategy (Mendenhall et al, 2014; Mugisha et al, 2017) which has been applied successfully in scaling up child mental health services in schools (Huang et al, 2015). However, the ability of PHC providers to detect and manage CAMH conditions is lacking (Patel et al, 2007a). Consequently, mental health services are not integrated into PHC services in spite of several available opportunities (Kigozi & Ssebunnya, 2009b; Lund et al, 2016; Ovuga et al, 2007) and the mental health needs of children and adolescents in Uganda largely go unmet (Ministry of Health Uganda, 2017).

Whereas the burden of CAMH disorders in Uganda has not been accurately estimated, mental health professionals agree that mental ill-health is an increasing problem, exacerbated by poor access to mental health services (Akol et al, 2015). Currently, mental health services are provided in a centralized framework at national and regional hospitals, contrary to WHO recommendations for mental health care in low income countries to be provided at PHC clinics and in communities (Akol et al, 2015; Kigozi et al, 2010; World Health Organization, 2001; 2008a). Health system research aimed at increasing the availability of and access to mental health care for children and adolescents in settings like Uganda's is an important public health priority (Patel et al, 2007b; Tomlinson et al, 2009).

WHO's Mental Health Gap Action Program (mhGAP) and its attendant Intervention Guide (IG) were developed through rigorous, evidence-based methodologies, to aid integration of selected, priority MNS disorders, including developmental and behavioral disorders in children and adolescents, into PHC services in LMIC. The IG provides algorithms for simplified clinical assessment, diagnosis, management, follow-up and referral where indicated as well as a trainer's guide to facilitate standardized implementation (World Health

Organization, 2010). Based on evidence and extensive feedback from mhGAP-IG practitioners, the WHO in 2016 launched a second version of the mhGAP-IG with revised modules for Child and Adolescent Mental and Behavioural Disorders (World Health Organization, 2017). Several countries in sub-Saharan Africa are implementing mhGAP; a 2017 systematic review of studies reporting mhGAP implementation concluded that the program has been beneficial to mental health care in LMIC.

Stiffman and colleagues' Gateway Provider Model (Figure 1) addresses mental health service access and articulates the importance of decision makers who influence health system trajectories into care. In the context of children and adolescents, these decision makers are called Gateway Providers, and their knowledge of and attitudes to CAMH influence access to care (Stiffman et al, 2004). In rural Uganda, PHC providers are an important category of gateway provider (Kigozi & Ssebunnya, 2009a) whose role in increasing access to CAMH services in Uganda is unknown. Further, scanty literature exists on the effectiveness of integrating CAMH into PHC through mhGAP-IG implementation in LMIC. This study aimed to evaluate the effect of a PHC provider mhGAP-IG-oriented CAMH training on identification of MNS disorders among children and adolescents in Eastern Uganda.

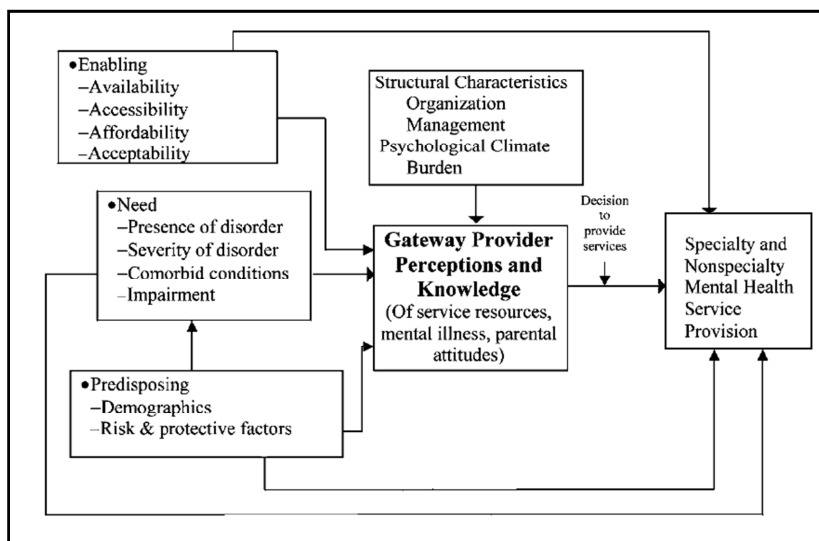


Figure 1: The Gateway Provider Model of youth access to mental health services, from Stiffman et al., 2004

METHODS

Study area

The study was conducted in Mbale and Sironko districts in Eastern Uganda, selected because both were mhGAP naïve; and Mbale was the site for previous CAMH work in the “SeeTheChild—Mental Child Health in Uganda” (SeeTheChild) study (Center for International Health), which included Sironko district in its catchment area. We concluded that there was no mhGAP exposure in the districts prior to our study based on our knowledge of the area, and on confirmation with the district health authorities.

The two districts possess all levels of health service, including rural health posts and a psychiatric unit at the Regional Referral Hospital (RRH) in Mbale town. They are mostly rural, characterized by a steep mountainous terrain that presents a physical barrier to psychiatric and other health services. Pathways to mental health care typically include

traditional healers (Abbo, 2011; Akol et al, 2015), and psychiatric referral facilities where they exist (Kisa et al, 2016).

The study included Level-3 health clinics (HC III) because they are the lowest level at which comprehensive PHC services are provided. In addition, the presence of at least four staff at the HC III enabled two staff members to attend CAMH training without disabling service delivery. In 2014, Mbale district had 25 public HC-III compared to 12 in Sironko. At these HC III, PHC services are provided by clinical officers, nurses and midwives. Clinical officers have three years of pre-service training compared to nurses and midwives who hold a certificate following 1-2 years of pre-service training. Exposure to MNS disorders during pre-service training varies for these cadres; clinical officers' training typically has more content on MNS disorders than nurse or midwife training (Collins et al, 2015).

Study design

This was a randomised controlled study that compared the clinic-level outcomes of CAMH training on CAMH case identification and recording compared to non-CAMH trained sites. A list of all eligible clinics in Mbale and Sironko districts was obtained from the district health offices and randomly assigned to intervention and control by an independent collaborator who was separate from the research team, using computer-generated random numbers. In randomizing, first the clinic list was sorted alphabetically to eliminate clinic sorting by district, before a random sequence number was generated using the command 'randomize' in stata v.12 (StataCorp Texas, USA 2011). This method resulted in 18 clinics being allocated each to the intervention and control arms.

Inclusion and exclusion criteria

Clinics were included if they were HC IIIs owned and managed under the government health system in the two districts; and excluded if they had a psychiatric nurse or clinical officer on staff or had been exposed to the mhGAP-IG prior to the study. None of the clinics met the exclusion criteria.

Sample size calculation

The sample size determination was done using the formula by Fleiss for sample size in cohorts and trials (Fleiss et al, 2013). The following assumptions were made: estimated CAMH diagnosis rate of 0.5% (based on district records), a 50% detection rate in exposed clinics, a power of 90%, type-I rate of 5% with a two-sided confidence interval. Applying these assumptions gives us an estimated number of 18 clinics required in each arm.

Procedures for intervention

Control arm

Treatment as usual, characterized by routine PHC services to children and adolescents

Intervention package

1. Training PHC workers (midwives, nurses and/or clinical officers) on how to screen and refer for priority CAMH conditions, based on the WHO mhGAP-IG v1.
2. Provision of reference training materials (handouts from the training slides) on patient screening using the mhGAP-IG v1.

Training: Two PHC workers from each intervention clinics were trained for 5 days to screen children and adolescents for CAMH conditions, based on the mhGAP-IG curriculum version 1.0 (World Health Organization, 2010). Most of the PHC workers were nurses or midwives and just over 40% had been in service for less than five years. The aim of the training was to

equip the PHC workers with knowledge and skills in assessment, identification and treatment or referral of children and adolescents with mental health problems so as to contribute to early referral of children into care. An account of the PHC workers, training and outcomes is published separately (Akol et al, 2017).

Blinding

PHC workers could not be blinded to the intervention. However, we did not independently check patients' awareness of the training. Data entry personnel and the two research assistants (RAs) who were responsible for capturing clinic records were blinded to clinic allocation.

Data collection

The principle investigator and two RAs (clinicians resident in the districts, familiar with the district health system) captured service delivery records containing information on patient age, sex, residence and diagnosis from clinic registers, using electronic tablets. Data were collected for the month preceding the intervention (baseline) and for each of three months subsequent to the intervention (follow-up months 1,2and 3). For each patient, clinic registers include a provision for a first and second diagnosis to enable recording of co-morbidities. Both first and second diagnoses were captured.

Data processing

Records were then entered into Epidata V3.1 (The EpiData Association, Odense, Denmark) by a team of trained and experienced data entrants. Epidata files were exported to STATA v13 (statacorpIC) for cleaning and analyses.

Explanatory and outcome variables were treated as follows: first, only patients aged 1-18 years were selected, and patient age was re-categorised into 1-4, 5-9,10-14 and 15-18 age

groups. Secondly, all diagnoses were reclassified and re-coded into WHO's International Statistical Classification of Diseases and Related Health Problems, version 10 (ICD-10) categories (World Health Organization, 2004). In doing this, all possible diagnoses in the clinic register fitting under an ICD-10 category were replaced with the ICD-10 category name using appropriate commands in stata. Thus, the ICD-10 category 'Mental and Behavioral' replaced all mental health diagnoses. Mental and Behavioral disorders were further classified according to the fifth edition of the Diagnostic and Statistical Manual of Mental disorders, (DSM V) (American Psychiatric Association, 2013) and the frequencies analyzed by study arm and month of study.

Outcome measures

The primary outcome was the proportion of clinics in the intervention relative to the control arm that diagnosed and recorded at least one non-epilepsy CAMH case over the three-month follow-up period while the secondary outcome was the likelihood of patients receiving a non-epilepsy CAMH diagnosis in the intervention compared to the control arms. Epilepsy was excluded based on available information showing that epilepsy is already being diagnosed and managed in PHC settings (Kigozi et al, 2010; Lund et al, 2016)

Statistical Methods

We used Intention to Treat (ITT) principles. The unit of analysis was a health facility, and the primary outcome was a facility reporting at least a diagnosed non-epilepsy CAMH case, coded as 1:yes or else 0:no if no such case was reported. We compared the primary out between study arms using Fisher's exact test (Fisher, 1922). The choice of analysis approach was decided based on the number of expected observations in the table cells that were five or less in either or both study arms. Statistical significance was determined at $p < 0.05$.

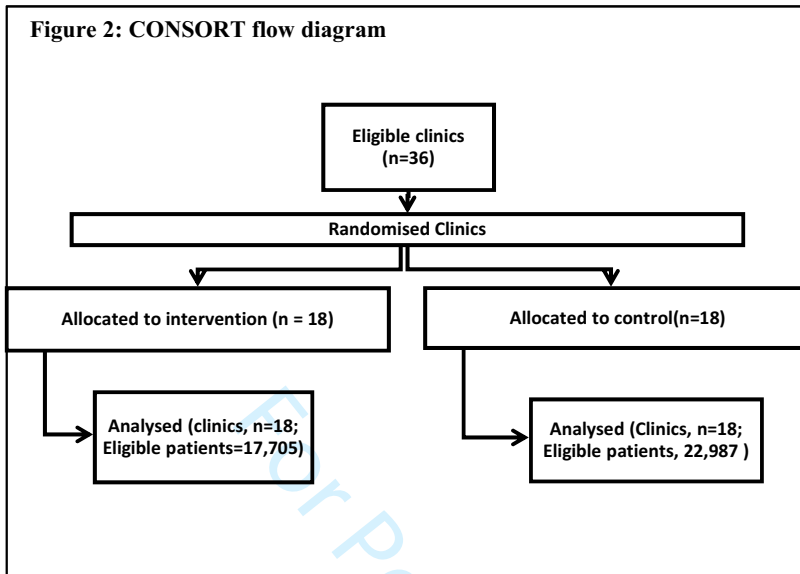
The secondary outcome was “patients diagnosed with non-epilepsy CAMH”. All patients diagnosed with non-epilepsy CAMH were coded as 1=yes or 0=no if no such diagnosis was made. The odds of a non-epilepsy CAMH diagnosis were compared between intervention and control arm to obtain the odds ratio (OR) as the measure of association. The ORs were obtained via a logistic regression model with corresponding 95% confidence intervals (CI). In the multivariable logistic regression model, factors such as age and sex were included. All models accounted for clustering of observations at the clinic level to obtain robust standard errors of the estimates. Stata version 14 was used for all the analyses.

Role of the funding sources

The study sponsors had no role in study design or management; data collection or handling; interpretation of findings or writing of the manuscript. AA, IMSE and JNB had full access to all study data and are responsible for the decision to submit for publication.

RESULTS

Figure 2 shows the trial profile, including all clinics and patients aged 1 – 18 whose data was analysed.



Forty-two percent of clinics in Mbale (n=11) and 46.2% in Sironko (n=7) were allocated to the intervention arm. Clinics were equally distributed by district in the intervention and control arms, but the number of patient visits was significantly different ($p < 0.001$) in intervention and control clinics (Table 1a).

Participants were equally distributed across study arms for age group and sex (Table 1b). Clinics in the intervention arm received 44.5% of all patients seen across the four months. Equal proportions of patients were seen at intervention and control clinics in all months, except in November, when increased numbers of patients were recorded in both intervention and non-intervention clinics. Sixty percent of patients in both arms were female and the mean age of patients across study arms was nine years.

Table 1a: Characteristics of clinics by study arm

	Intervention N (%)	Control N (%)	p-value
Total	18 (100)	18 (100)	
District			0.480
Mbale	11 (61.1)	13 (72.2)	
Sironko	7 (38.9)	5 (27.8)	
Under 19 patient visits			<0.001
Total	17,705 (100)	22,987 (100)	
Baseline	4,310 (24.3)	5,003 (21.8)	
Follow-up month 1	4,210 (23.8)	5,752 (25.0)	
Follow-up month 2	4,773 (27.0)	7,084 (30.8)	
Follow-up month 3	4,412 (24.9)	5,148 (22.4)	

Table 1b: Background characteristics of patients 1-18 years by study arm

	Baseline month		Study month 1		Study month 2		Study month 3	
	Intervention N=4310 (%)	Control N=5003 (%)	Intervention N=4210 (%)	Control N=5752 (%)	Intervention N=4773 (%)	Control N=7084 (%)	Intervention N=4412 (%)	Control N=5148 (%)
Age group								
1-4	1,122 (26.0)	1,391 (27.8)	1,064 (25.3)	1,508 (26.2)	1,358 (28.5)	2,109 (29.8)	1,159 (26.3)	1,523 (29.6)
5-9	1,014 (23.5)	1,202 (24.1)	984 (23.4)	1,513 (26.3)	1,257 (26.3)	1,925 (27.2)	1,285 (29.1)	1,393 (27.1)
10-14	1,249 (29.0)	1,323 (26.4)	1,244 (29.5)	1,712 (29.8)	1,288 (27.0)	1,745 (24.6)	1,061 (24.0)	1,160 (22.5)
15-18	925 (21.5)	1,087 (21.7)	918 (21.8)	1,019 (17.7)	870 (18.2)	1,305 (18.4)	907 (20.6)	1,072 (20.8)
Sex								
Male	1,662 (38.6)	1,944 (38.9)	1,690 (40.1)	2,282 (39.7)	1,870 (39.2)	2,746 (38.8)	1,647 (37.3)	1,932 (37.5)
Female	2,524 (58.6)	2,958 (59.1)	2,487 (59.1)	3,397 (59.0)	2,796 (58.6)	4,254 (60.0)	2,729 (61.9)	3,184 (61.9)
missing	124 (2.9)	101 (2.0)	33 (0.8)	73 (1.3)	107 (2.2)	84 (1.2)	36 (0.8)	32 (0.6)
District								
Mbale	3,055 (70.9)	3,818 (76.3)	3,043 (72.3)	3,990 (69.4)	3,135 (65.7)	5,362 (75.7)	2,939 (66.6)	3,385 (65.8)
Sironko	1,255 (29.1)	1,185 (23.7)	1,167 (27.7)	1,762 (30.6)	1,638 (34.3)	1,722 (24.3)	1,473 (33.4)	1,763 (34.2)

Disease profile: Respiratory conditions were the most prevalent across the follow-up months (40.5%); followed by infectious and parasitic infections (39.6%). Mental and behavioral conditions represented 0.1% (n=64) of all diagnoses recorded. Except for mental and behavioral conditions, all other disease categories were equally distributed between the two arms (data not shown).

Types of CAMH cases diagnosed: Twenty-three clinics overall (63·8%) recorded a CAMH diagnosis; 14 (77·8%) of these were in the intervention arm. Over the three months' follow-up period the number of CAMH-diagnoses at intervention clinics ranged from 0-7, with half (n=18) of the diagnoses in the intervention arm being recorded by three clinics. On the other hand, in control clinics, CAMH diagnoses ranged from 0-5 in number with one clinic providing 36% of diagnosed patients (data not shown).

Table 2 presents the CAMH diagnoses. The most prevalent disorders were somatic symptom disorders (31·3%, n=20), accounting for two-thirds of all CAMH diagnoses recorded in the baseline month, 44·4% (8/18) of all CAMH disorders identified in the control and 26% (12/46) in the intervention arms.

Table 2: CAMH profile by month and study arm

	Baseline Month (n)		Study month 1 (n)		Study month 2 (n)		Study month 3 (n)		Totals (n) ^b	
	Int*	Control	Int	Control	Int	Control	Int	Control	Int	Control
Anxiety disorders	0	1	2	0	5	2	4	2	11	5
Depressive disorders	0	0	1	0	5	0	0	1	6	1
Elimination disorders	0	0	0	0	2	0	4	0	6	0
Intellectual disability	0	0	3	0	0	0	1	0	4	0
Schizophrenic spectrum	1	1	0	0	0	1	2	0	3	2
Somatic symptom	6	2	5	3	0	0	1	3	12	8
Trauma and stressor	1	0	2	1	0	1	0	0	4	2
Totals	8	4	13	4	12	4	12	6	46	18

*int = intervention arm

^b64 diagnoses were recorded from 63 unique patients

Primary Outcome: A total of 20 out of 36 clinics made and recorded at least one CAMH diagnosis over the three-month follow-up period. The proportion of clinics with a CAMH diagnosis tended to be higher in the intervention (13/18, 72·2%) relative to the control (7/18, 38·9%) arm but this difference was not statistically significant (p=0·092). (Table 4)

Table 3: Percent of clinics with CAMH diagnosis by study arm

Study Month	Percent of clinics with CAMH diagnosis		Fishers Exact test
	Intervention	Control	
Baseline month	33.3	22.2	0.711
Follow up month 1	38.9	11.1	0.121
Follow up month 2	33.3	22.2	0.711
Follow up month 3	44.4	22.2	0.289
Follow up months 1 – 3	72.2	38.9	0.092

Secondary outcome: Over the three-month follow-up period, the adjusted odds of a patient being diagnosed as a CAMH case were 3.4 times higher in the intervention relative to the control arm, and this effect was statistically significant (aOR=3.38; 95% CI [1.34, 8.52], $p=0.010$). The effect of the intervention on patient diagnosis was highest in the first follow up month (aOR 4.16; 95% CI [0.73, 23.72], $p>0.05$) and decreased sequentially for the second (aOR 3.82, 95% CI [1.16, 12.60], $p=0.027$) and third (aOR 2.56, 95% CI [0.80, 8.21], $p>0.05$) follow-up months. The odds of a CAMH diagnosis in the 3rd follow up month were the same as the odds of a CAMH diagnosis in the baseline month.

Table 4: Logistic regression of a CAMH diagnosis between study arms (controlling for age and sex, and accounting for clustering effects at clinic level)

	OR (95%CI)	aOR (95% CI) [†]
Baseline month	2.57 (0.78, 8.55)	2.57 (0.86 , 7.69)
Follow-up month 1	4.16 (1.36 , 12.78)**	4.16 (0.73 , 23.72)
Follow-up month 2	3.82(1.23, 11.86)**	3.82 (1.16, 12.60)**
Follow-up month 3	2.56 (0.96, 6.81)	2.56 (0.80, 8.21)
Follow-up months 1-3	3.38 (1.83 , 6.26)**	3.38 (1.34, 8.52) **

[†]Accounting for clustering effects at the clinic level

** $p<0.05$

At baseline, the odds of diagnosing a patient with a non-epilepsy CAMH condition were higher in the intervention than in the control arm, but this was not statistically significant; this

finding may suggest some level of residual imbalance in the assigned study arms. Therefore, the final model was adjusted for baseline identification of CAMH at the facility level. This model confirmed that clinics in the intervention arm had 3.4 times higher odds of diagnosing CAMH in the intervention relative to control arm clinics, (aOR 3.38; 95% CI [1.34, 8.52]; $p=0.010$).

DISCUSSION

This study examined the effect of CAMH training on non-epilepsy CAMH case identification among PHC providers in Eastern Uganda. We found no significant difference in the proportion of intervention and control clinics diagnosing non-epilepsy CAMH. However, the odds of a patient being diagnosed with non-epilepsy CAMH were significantly higher in the intervention than control clinics.

To our knowledge, this study is one of the first on CAMH integration into PHC in Uganda, and one of the first to report clinic-level impacts of PHC worker CAMH training. Available studies on mental health training for PHC providers are oriented to adult-psychiatry and most report provider-level effects (Liu et al, 2016). Our study found that mhGAP CAMH training of PHC workers did not significantly affect clinic-level non-epilepsy CAMH diagnoses. Similarly, a cluster randomised trial in Kenya revealed that non-specialist health worker (NSHW) mental health training improved patient outcomes but did not enhance the detection of mental health problems in primary health care (Jenkins et al, 2013b).

We attribute the lack of impact to three factors: first, the CAMH diagnoses made over the three-month follow-up period (51 in both intervention and control arms) were likely too few to generate a visible effect. The scantiness of diagnoses might be a result of a low prevalence

of non-epilepsy CAMH illness in this community, estimates of which are not available. Another likely reason is poor help-seeking behavior to the public health system for non-epileptic CAMH conditions. However, we were unable to find evidence of this in the CAMH literature in settings similar to Uganda's. Third, half the diagnoses in the intervention clinics came from three clinics; and over a third in the control clinics were provided by one facility. This suggests unique motivational factors affecting providers in those facilities, skewing the diagnoses towards a few clinics. Such system-level factors like patient load, health worker numbers and their skills-mix, as well as clinic management have been identified as factors that influence health system performance (Jerene et al, 2017; Murray & Frenk, 2000; Rowe et al, 2005). However, we did not investigate these factors in our study.

Nevertheless, we found significantly higher CAMH diagnoses in intervention than in control clinics. Previous studies evaluating task-shifting for mental health in similar contexts have also reported positive results. Gureje et al. found analogous results in their 2015 study in Nigeria (Gureje et al, 2015) and a 2013 Cochrane review found that the use of NSHW resulted in positive treatment outcomes compared to usual services for depression, anxiety, post-traumatic stress and alcohol use disorders in seven LMIC (Van Ginneken et al, 2013). This review was oriented to adult psychiatry and like our study, focused on NSHW training, though it assessed the utility of NSHW for improved treatment outcomes, rather than for enhanced detection of mental health conditions.

Except for the second follow up month, we did not find any beneficial effect when data were examined at a month-on-month basis. Rather, the benefit was detectable after the three month follow up period. The most plausible explanation for this is that the incidence and prevalence of CAMH cases in the two districts was too low to result in a perceptible difference at a single

month, particularly since our intervention did not include community mobilization to encourage CAMH clinic attendance. Thus, over the three month follow up period, only 64 CAMH cases were identified among 63 patients, corresponding to a clinic-prevalence rate of 0.1%. A study in neighboring Kenya was able to enroll 166 CAMH patients over an equivalent 12 week period, (Kamau et al, 2017) but this study was conducted at a tertiary hospital in an urban setting. A possible explanation for the significant result in the second follow-up month is the comparatively higher under-19 patient visits in that month compared to the other follow-up months (51.6%, n=11,867).

We found that the effect of the intervention on non-epilepsy CAMH was strongest in the first follow up month, reducing progressively until the third follow-up month when the effect size was equivalent to that in the baseline month. This finding strongly suggests that the knowledge and skills acquired during training diminish over time, requiring regular 'refresher' trainings. This suggestion is backed by similar findings elsewhere with PHC providers in sub Saharan Africa (Gureje et al, 2015; Tilahun et al, 2017). In addition to declining health worker knowledge and skills, other health system weaknesses may account for a reduced effect on diagnoses over time. Jenkins et al., (2013) report that inadequate information systems, district level supervision and medicines supply may frustrate mental health integration into PHC (Jenkins et al, 2013a). These factors are present in Uganda's health system and may have played a role in declining performance (Akol et al, 2015; Kigozi et al, 2010).

CAMH case profile

We found a low CAMH morbidity rate with high prevalence of somatic-symptom and anxiety disorders. The CAMH disorder profile we found is similar to that seen in a recent study in urban Kenya which found that alcohol and substance use disorders were the most prevalent,

followed by depression and anxiety-related disorders (Kamau et al, 2017). Alcohol use disorders were not identified in our study but somatic symptom disorders were commonly diagnosed in the baseline month and by clinics in the control arm, suggesting that the ability of PHC workers to identify them is independent of CAMH training. This proposition is supported by recent opinions suggesting that the DSM-V somatic symptom diagnostic criteria are so inclusive that they increase the risk of healthy patients being classified as mentally ill (Frances, 2013). This over-diagnosis is a possibility we can neither rule out nor confirm in our study since we did not validate the PHC providers' diagnoses.

Strengths and limitations

The following limitations should be considered in the interpretation of our study findings. First, we recognize the reliance on routinely collected health information from clinic-based registers, which have known limitations with completeness and correctness of entries (World Health Organization, 2011). We excluded several records from the study for incomplete or incorrect reporting of either age or diagnosis or both. Thus, though we cannot quantify the excluded records, we believe that the prevalence of CAMH disorders may be under-estimated in this study.

Second, our estimated sample size was based on a 0-1% detection rate in the unexposed, based on CAMH-diagnosis records in the District Health Information System (DHIS). An estimate closer to the rate we found in the un-exposed clinics would have yielded a larger sample size. Thus, using estimates from DHIS led to a small sample size, effectively under-powering the study. This might explain the lack of statistical significance in the primary outcome despite the higher percent (72.2%) of intervention compared to control (38.9%) clinics with a CAMH diagnosis. Third, during data collection we encountered several instances in which trained staff were absent from the clinics for extended periods. Such

absenteeism was foreseen; hence the training of two PHC providers per clinic. Thus, much as all intervention clinics retained at least one trained staff for the duration of the study, we cannot exclude the likelihood that not all patients received CAMH screening, with consequent under-detection of CAMH cases.

Fourth, we did not consider clinic characteristics such as staff numbers per clinic and health worker cadre and work experience in analysis. Lack of data on these potential confounders may limit our ability to make more clear conclusions of the effect of the intervention on diagnosing of non-epilepsy CAMH. Finally, although the intervention and control arms shared several similarities, they were dissimilar in the number of patient visits during the follow-up period. This bias was addressed by adjusting for the clinic variable in the multivariable analyses. On the other hand, we note some strengths of this study. The robust study design we applied enables us to draw conclusions about the utility of PHC provider CAMH training on the studied clinic-level CAMH outcomes. Additionally, we addressed the potentially confounding effect of clinics' baseline ability to identify CAMH cases by adjusting for this factor in the multivariable logistic regression.

CONCLUSIONS

In this setting, mhGAP CAMH training of PHC providers increases PHC clinics' identification and reporting of non-epilepsy CAMH cases but this increase isn't statistically significant. However, training significantly improves the likelihood of a non-epilepsy CAMH diagnosis

This study utilised a random selection of all public HC III in two districts which are similar in health system characteristics to other rural Ugandan districts; therefore, the results from this study are generalisable to other HC III in Uganda and other similarly rural settings in sub-Saharan Africa. Our findings suggest that much as CAMH training of PHC providers in

Uganda would not result in improved clinic-level competence to diagnose CAMH conditions, it would lead to increased identification of CAMH disorders. Further task-sharing studies integrating CAMH into a larger sample of PHC clinics are suggested, including a community mobilization component in the intervention to improve CAMH clinic attendance.

Contributors

AA led study conceptualization and design, managed the study, conducted statistical analysis, and led article writing. FM led statistical analysis, data interpretation and contributed to the final version. JN and SN led training and clinical procedures and reviewed the final report. JNB and IMSE contributed to protocol design and review of data and final report. IMSE also conceived the parent SeeTheChild study.

Declaration of interests

We declare no conflicts of interest

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Ethical standards

Ethics review and approval was provided by Makerere University's School of Public Health Higher Degrees Research Ethics Committee (HDREC) and the Uganda National Council for Science and Technology (UNCST). Written informed consent was obtained from all PHC providers. Permission for the study was obtained from the Ugandan Ministry of Health and

from the two district health offices. The study was registered in ClinicalTrials.gov (number NCT02552056).

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