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Incidence, prevalence and risk factors for comorbid mental illness among people with hypertension and type 2 diabetes in West Africa: protocol for a systematic review and meta-analysis

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ABSTRACT

Introduction Mental illness remains a significant global health concern that affects diverse populations, including individuals living with hypertension and/or type 2 diabetes, predominantly in lower-income to middle-income countries. The association between non-communicable diseases (NCDs) and mental illness is firmly established globally, however, this connection has yet to be comprehensively explored in West Africa. Our systematic review and meta-analysis aim to synthesise existing evidence on the prevalence, incidence, and risk factors for comorbid mental illness with hypertension and/or type 2 diabetes in West Africa. This effort seeks to contribute to bridging the knowledge gap and facilitating the implementation of interventions tailored to this context.

Methods and analysis A comprehensive search will be conducted across multiple databases (PubMed, Google Scholar, PsycINFO, Carin Info and CINAHL), supplemented by searches on the websites of the WHO and various countries' ministries of health, and references cited in relevant papers. Inclusion criteria specify studies conducted in countries from the Economic Community of West African States, reported from January 2000 until date of search, focusing on adults with hypertension and/or type 2 diabetes and mental illness. Exclusion criteria encompass studies outside the specified time frame, involving pregnant women, or lacking relevant outcomes. There will be no language restrictions for inclusion. Study selection, data extraction and risk of bias assessment will be carried out independently by at least two reviewers. We will employ pooled proportions of OR, risk ratio and mean differences to assess prevalence, and incidence of mental illness and heterogeneity will be assessed.

Ethics and dissemination This protocol does not require ethical approval; however, it is a part of a larger study on NCDs, which has received ethical clearance from the Ghana Health Service (ID NO: GHS-ERC 013/02/23). The results will be presented to stakeholders (policymakers and practitioners) and disseminated through conferences and peer-reviewed publications.

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STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ The study employs a robust, structured methodology to ensure a comprehensive analysis of the available literature, facilitating a thorough examination of the relationship between mental illness and coexisting hypertension and/or type 2 diabetes within the West African context.
⇒ By following predefined inclusion and exclusion criteria, this protocol minimises selection bias and ensures the transparency and replicability of the review process.
⇒ A possible limitation is the unavailability of previous data to compare our review with as this is the first review performed to investigate the incidence and prevalence of mental illness among people living with hypertension and/or type 2 diabetes in West Africa.

INTRODUCTION

Mental illness is a pressing global health concern that affects diverse populations, with roughly 970 million individuals, with one in every eight people worldwide, being affected by a mental illness in 2019 according to the WHO.[1] This worrying fact has wide-ranging effects, including significant impairment such as; disturbance in an individual's cognition, emotional regulation or behaviour, decreased quality of life and socioeconomic consequences.[1]

In addition, mental health disorders are one of the known major contributors to the non-communicable disease (NCD) burden.[2] The risk of experiencing certain mental illnesses, most frequently, depression, anxiety and stress increases when these NCDs (hypertension and type 2 diabetes) exist.[3] Both NCDs and mental illness share certain common risk factors such as unhealthy diet,

physical inactivity, tobacco, and alcohol use, influencing their comorbidity.[4 5] Additionally, there is evidence of a bidirectional relationship between NCDs and mental illness,[6 7] indicating a reciprocal inter-relationship between the onset and severity of each condition, mutually influencing their development and exacerbation.[8] Studies show that the coexistence of NCDs with depression and other psychological morbidities leads to decreased adherence to treatment, poor metabolic control, less continuity of care, higher complication rates, decreased quality of life and higher mortality rates.[2 9–11]

The correlation between NCDs and mental illness is well documented on a global scale and several studies have demonstrated a positive association between these two categories of health conditions. Globally, the estimated prevalence of comorbid depression with NCDs ranges from 9.3% to 23.0%.[12] A systematic review and meta-analysis conducted in 2020 on the epidemiology of depressive disorders in people living with hypertension in Africa reported a pooled prevalence rate of 28.8%.[13] Additionally, a hospital-based cross-sectional study conducted in Addis Ababa, Ethiopia, in 2022 found that the prevalence of depression among Ethiopians with hypertension was 37.8%.[14] These studies collectively demonstrate a high prevalence of depression among patients with hypertension, ranging from 28.8% to 37.8%, which is substantially higher than the estimated depression prevalence of approximately 5% reported by the WHO in the general population.[15]

On the other hand, the prevalence of depression among people with type 2 diabetes is typically in the 10%–15% range, which is nearly twice that of those without diabetes.[16] Numerous studies show a bidirectional relationship between diabetes and depression; individuals with depression face a 17% increased risk of developing type 2 diabetes, while individuals with diabetes are 29% more likely to develop depression.[12] In addition, Park *et al* found that patients with diabetes who were depressed had an OR of 1.5 (1.35–1.66) for all-cause mortality.[17]

Regarding anxiety disorders, a systematic review and meta-analysis conducted in China in 2017 on individuals with hypertension revealed a significant association between anxiety and hypertension, with a pooled OR of 1.18 (95% CI 1.02 to 1.37).[18] Similarly, another study conducted by the University of Southampton, UK, in 2021 found that individuals with anxiety disorders were 1.3–1.9 times more likely to have hypertension compared with those without anxiety disorders with ORs of 1.37 (95% CI 1.21 to 1.54) in cross-sectional studies and 1.40 (95% CI 1.23 to 1.59) in a systematic review and meta-analysis.[19]

Similarly, recent studies showed that the frequency and incidence of anxiety disorders are higher in patients with type 2 diabetes than in the general population.[20 21] A meta-analysis by Smith *et al* revealed a positive association between type 2 diabetes and anxiety disorder, showing an OR of 1.20 (1.10–1.31).[22] This finding further supports the notion that type 2 diabetes is linked to a heightened likelihood of experiencing anxiety disorders and elevated anxiety symptoms.[22]

Furthermore, in the context of co-occurring hypertension and stress, a meta-analysis by Liu *et al* indicated that people with hypertension in China experience more psychosocial stress than people with normal blood pressure, with an OR of 2.69 (95% CI 2.32 to 3.11).[23] In addition, individuals who suffer psychosocial stress have a 2.40 times higher risk of developing hypertension compared with those without such stress.[23]

Regarding the comorbidity of type 2 diabetes and stress, Vedantam *et al* demonstrated that stress elevates glucose levels and initiates the release of counter-regulatory hormones, detrimentally affecting the management and control of type 2 diabetes.[24] Moreover, individuals with inadequately managed mental illnesses are at a heightened risk of encountering complications associated with type 2 diabetes and experiencing a reduced quality of life.[24]

Despite the wealth of data highlighting the interconnection between NCDs and mental illness, this connection has not been fully examined in light of the distinct occurrences and prevalence rates of mental illnesses among people living with hypertension and type 2 diabetes in West Africa. A critical knowledge gap persists in our understanding of the epidemiology of comorbid mental illness and NCDs which underscores the urgent need for more targeted research and interventions, particularly in the West African region, where cultural, social and economic factors might influence the manifestation and impact of mental illnesses among people living with hypertension and type 2 diabetes.

The Economic Community of West African States (ECOWAS) comprises 15 countries, namely, Ghana, Burkina Faso, Niger, Ivory Coast, Nigeria, Sierra Leone, Liberia, Togo, Benin, Mauritania, Senegal, Mali, Gambia, Guinea, Cape Verde. The subregion faces a high prevalence of hypertension and type 2 diabetes.[25] For the already overburdened healthcare systems in this area, the coexistence of mental illness among people living with hypertension and type 2 diabetes has a major impact on treatment outcomes, healthcare costs and overall quality of life.[7 26]

The paucity of studies focusing on mental illness among individuals with hypertension and type 2 diabetes in West Africa has created a significant knowledge gap. For instance, when considering the prevalence of mental illness among this population in West Africa, the available research is limited. Moreover, very few studies have explored the incidence of mental illness in people living with type 2 diabetes and hypertension, with much fewer studies exploring the new occurrence of hypertension and/or type 2 diabetes among mentally ill patients.[27] As a result, the strength of the association between hypertension and/or type 2 diabetes and mental illness in this region remains uncertain.

To bridge this knowledge gap and achieve a more profound understanding of the connection between

mental illness and these chronic conditions in the West African population, a preliminary search was conducted using PROSPERO, the Cochrane Database of Systematic Reviews and PubMed on 10 June 2023. The search revealed a dearth of existing systematic reviews specifically addressing the incidence, prevalence and risk factors of comorbid mental illness among people with hypertension and/or type 2 diabetes within the West African subregion, considering the scope of this response.

While a systematic review and meta-analysis focusing on the epidemiology of depressive disorders in individuals with hypertension in Africa provided valuable insights into prevalence of depression among individuals with hypertension, it did not specifically target individuals with type 2 diabetes or those with concurrent type 2 diabetes and hypertension. Moreover, its scope encompassed a broader perspective on Africa as a whole, rather than primarily concentrating on the West African region. As such, the necessity for a comprehensive systematic review and meta-analysis that specifically evaluates the prevalence, incidence and risk factors of mental illness among people with hypertension and type 2 diabetes in West Africa is underscored. Such an endeavour will significantly contribute to closing the existing knowledge gap, furnish invaluable insights for healthcare professionals, researchers and policymakers, establish a solid foundation for future studies, and potentially inspire further investigations into this important area of study.

Review question

The overarching review question is: what is the incidence, prevalence and risk factors for mental illness, with hypertension and/or type 2 diabetes comorbidity in West Africa?

Specific review questions are:

- What are the most common types of mental illnesses observed among people living with hypertension, type 2 diabetes or both conditions, in West Africa?
- What is the incidence of mental illness among people living with hypertension, type 2 diabetes or both conditions, in West Africa?
- What is the prevalence of mental illness among people living with hypertension, type 2 diabetes or both conditions, in West Africa?
- What are the risk factors for co-occurring mental illness and hypertension and/or type 2 diabetes, in West Africa?
- What are the effects of mental illness, pre-existing or new onset on clinical outcomes such as morbidity and mortality among people living with hypertension, type 2 diabetes or both conditions, in West Africa?

Aim and specific objectives

Our systematic review and meta-analysis aim to synthesise the available evidence on the incidence, prevalence and risk factors for mental illness, hypertension and/or type 2 diabetes comorbidity in West Africa.

Specifically, the objectives of this review are to synthesise the available evidence on:

- Identifying the common types of mental illnesses observed among people living with hypertension, type 2 diabetes or both conditions, in West Africa.
- Identifying the incidence of mental illness among patients living with hypertension, type 2 diabetes or both conditions, in West Africa.
- Identifying the prevalence of mental illness among people living with hypertension, type 2 diabetes or both conditions, in West Africa.
- Assessing the risk factors for co-occurring mental illness and hypertension and/or type 2 diabetes, in West Africa.
- Seeing the effects of mental illness, either pre-existing or new onset on clinical outcomes such as morbidity and mortality among people living with hypertension, type 2 diabetes or both conditions, in West Africa.

METHODS AND ANALYSIS

The review process will be conducted and reported following the Preferred Reporting Items for Systematic Reviews and Meta-Analysis Protocols (PRISMA-P) checklist[28] for comprehensive reporting and transparency. In the following write-up, we outline our approach to implementing the recommended methodological steps outlined in these guidelines.

Information sources and search strategy

The search strategy will be comprehensive within practical limits to ensure the inclusion of both peer-reviewed published papers and published grey literature sources.

A three-step search approach will be employed for this study. The first step involves a preliminary limited search of at least two relevant online databases, namely Medical Literature Analysis and Retrieval System Online (MEDLINE) or PubMed and Google Scholar. This initial search will be followed by an analysis of keywords present in the title and specific objectives.

In the second step, we will conduct a comprehensive search for peer-reviewed published papers and published grey literature. This search will cover databases such as PubMed, Google Scholar, PsycINFO, Carin Info and Cumulative Index to Nursing and Allied Health Literature (CINAHL), as well as the websites of the WHO, various countries' ministries of health, and references cited in relevant papers. We will use all identified keywords and alternate terms. The search concept and strategy are detailed in online supplemental table 1.

Finally, complementary sources will be obtained using the software 'Research Rabbit'. Also, the review management software 'Rayyan' will be employed to manage all searched articles. The complete search query to be used for the databases is provided in online supplemental table 2. The search process will be carried out by two independent reviewers/authors, supported by a research librarian.

Criteria for considering studies

The CoCoPop (Condition, Context, and Population) framework, as recommended by Cochrane handbook framework will be used to guide the selection of papers for the review.

CoCoPop framework

Condition or domain being studied

Mental illness among patients living with hypertension and/or type 2 diabetes.

Mental illnesses such as anxiety, depression, stress, bipolar disorder and schizophrenia.

Context

Studies conducted in the ECOWAS countries, Ghana, Burkina Faso, Niger, Ivory Coast, Nigeria, Sierra Leone, Liberia, Togo, Benin, Mauritania, Senegal, Mali, Gambia, Guinea, Cape Verde.

Participants or population

Adults who are 18 years and above, living in West Africa, with hypertension and/or type 2 diabetes, who have been diagnosed with any mental illness or have reported mental illness.

Outcomes

Burden of mental illness as measured by the incidence and prevalence of mental illness.

1. The odds of having a mental illness among patients living with hypertension and/or type 2 diabetes compared with those without these conditions.
2. The risk of developing a mental illness among patients living with hypertension and/or type 2 diabetes compared with those without these conditions.
3. The impact of mental illness on health outcomes of patients living with hypertension and/or type 2 diabetes.

Study designs to be included

Cross-sectional studies and cohort studies.

Eligibility criteria

We will include studies conducted in ECOWAS countries, Ghana, Burkina Faso, Niger, Ivory Coast, Nigeria, Sierra Leone, Liberia, Togo, Benin, Mauritania, Senegal, Mali, Gambia, Guinea, Cape Verde or with a specific focus on the West African population. These studies will involve patients aged 18 years or above who have been diagnosed with hypertension and/or type 2 diabetes and have also been diagnosed with or have reported mental illness. Additionally, we will include studies that report the prevalence or incidence of mental illness among people living with hypertension and/or type 2 diabetes, as well as those that assess the impact or association of hypertension and/or type 2 diabetes on the development or worsening of pre-existing mental illness.

Studies conducted in settings that encompass both West African countries and other countries, where the data specifically for West African countries cannot be extracted separately, will be excluded. Furthermore, studies that involve both adults and children, where it is not possible to extract data separately for participants above 18 years of age, will be excluded. Similarly, studies that primarily focus on individuals with mental illness not associated with hypertension and/or type 2 diabetes will be excluded, and studies conducted on pregnant women will also be excluded.

The reason for excluding pregnant women is that they represent a distinct population group with unique physiological changes and specific health considerations. Their comorbidity profiles and risk factors may differ significantly from the general population of individuals with mental illness, hypertension and type 2 diabetes. Also, pregnancy introduces additional biological and hormonal changes that can confound the relationship between mental illness, hypertension and type 2 diabetes; pregnancy has the tendency to induce certain mental illnesses such as stress, postpartum blues, postpartum depression, postpartum psychosis and these may influence the outcomes of the research, hence by excluding studies conducted on pregnant women, potential confounding factors will be minimised and will enhance the internal validity of the review.

Furthermore, case studies, case reports, scoping reviews, systematic reviews, meta-analyses, and studies for which the full text cannot be accessed despite efforts to contact the authors and search through multiple databases will be excluded from the review.

Studies published in English, French or Portuguese, which are languages commonly spoken in West Africa, will be included in the review. Studies published in languages other than these will not be included in the review.

The review will include studies published from January 2000 until date of search. Studies outside this time frame will be excluded from the review.

Study selection process

The search output will be de-duplicated using the Rayyan software. The study selection process will be in two steps. First, two reviewers will independently screen titles and abstracts for eligibility using the predefined criteria specified in online supplemental figure 1. Prior to the selection of data, a pilot test will be carried out using a random 5% of the studies retrieved to verify our eligibility criteria. The full text of potentially relevant studies will be retrieved independently for inclusion. Observational studies (cross-sectional, cohort studies that report on the incidence, prevalence, or risk factors of mental illness among people living with hypertension and/or type 2 diabetes in West Africa) will be included. Any disagreements will be settled by discussion or consultation with a third reviewer. In the second step of the selection process, full paper review of studies that meet the inclusion criteria will be conducted.

The review will extract data including a detailed description of the process. A flow chart (see online supplemental figure 2), conforming to the PRISMA guidelines will be generated to provide a detailed overview of the data

selection process, beginning with the sources searched and data obtained from each source, and progressing through data selection, duplicate removal, full-text article retrieval details, any additional sources obtained through a third search, excluded sources, and reasons for exclusion.

Data management

Rayyan will be employed to streamline the study selection process. It will assist in removing duplicates, tracking decisions and storing full-text articles. This software will also enhance communication between the reviewers and aid in identifying and resolving any discrepancies that may arise during the study selection process. Zotero will be used to manage references – to add citations and to generate a bibliography.

Assessment of quality and risk of bias of included studies

The Newcastle-Ottawa Scale (NOS)[29] will be used to assess the quality and risk of bias of the cross-sectional and cohort studies included in the review.

Two independent reviewers will conduct the quality assessment, and any disagreements will be settled by discussion or consultation with a third reviewer. The quality assessment will be detailed in the review to provide transparency and facilitate the interpretation of the results.

The NOS has three main domains: selection, comparability and outcome. For each domain, the scale has several specific criteria or items that are scored based on the information provided in the study, in order to assess the quality of the study.

Each criterion is assigned a score of one or two stars, with a maximum possible score of nine stars across all domains. The NOS also provides thresholds for converting the scores to categories of study quality: good, fair and poor.

We will apply the NOS criteria to each study included in our review.

For the selection domain, we will assess the representativeness of the exposed and non-exposed cohorts, the ascertainment of exposure, and the demonstration that the outcome of interest was not present at the start of the study. Here, each item can receive a maximum of one star.

For the comparability domain, we will assess whether the cohorts are comparable based on the design and whether the study controls for important confounders, such as age, sex and marital status or whether the study controls for other factors such as socioeconomic status, lifestyle factors, etc. This item can receive a maximum of two stars.

For the outcome domain, we will assess the methods used to assess the outcome of interest, the length and completeness of follow-up and the adequacy of follow-up of cohorts. Each item can receive a maximum of one star.

We will extract the relevant data for each criterion and assign a score of one or two stars based on the information provided in the study. Studies will be assigned a quality rating based on the total score, with good quality studies receiving three or four stars in the selection domain, one or two stars in the comparability domain, and two or three stars in the outcome domain. Fair quality studies should have two stars in the selection domain, one or two stars in the comparability domain, and two or three stars in the outcome domain. Poor quality studies should have zero or one star in the selection domain, zero stars in the comparability domain, or zero or one star in the outcome domain. Thus, seven to nine stars for good quality, four to six stars for fair quality, and zero to three stars for poor quality. Overall, the use of the NOS in our review will help ensure that we only include high-quality studies in our analysis.

Data extraction

Data extraction will be conducted by two reviewers independently using a predesigned standardised data extraction form in Microsoft Excel, provided in online supplemental table 3. Any disagreements will be resolved through discussion or by consulting a third reviewer. The data extraction form will include the following fields:

Study characteristics: author(s), year the study was conducted, publication year, country, study design, sample size, setting, duration of the study.

Population characteristics: age, sex, ethnicity.

- Incidence and prevalence of mental illness.
- Common types of mental illnesses co-occurring with hypertension and/or type 2 diabetes.
- Risk factors associated with having comorbidity of hypertension, type 2 diabetes and mental illness.
- Effects of mental illness on health outcomes for patients with hypertension and type 2 diabetes.

Management of missing data

The authors of the included studies will be contacted for any missing or unclear data. In cases where it is not possible to obtain the missing data, the analysis will be performed using only the available data with complete outcome data, and the proportion and reasons for the missing data will be documented. The accuracy of the data will be verified independently, and any discrepancies will be resolved through discussion.

Strategy for data synthesis

RevMan V.5.4 will be used for data analysis. First, a descriptive analysis of the included studies will be conducted, summarising their characteristics such as author(s), year of publication, country, study design, sample size, setting, study duration, demographics of participants, diagnosis of mental illness, hypertension, and type 2 diabetes, comorbidities, and outcomes. This analysis will provide an overview of the included studies.

Estimating the incidence of mental illness among patients diagnosed with hypertension and/or type 2 diabetes

To estimate the incidence of mental illness among patients diagnosed with hypertension and/or type 2 diabetes, a meta-analysis of primary studies will be conducted. The

pooled proportions of OR or risk ratio (RR) and mean differences (MDs) will be used to assess the incidence rates. The results will be presented alongside their respective 95% CIs. Heterogeneity will be evaluated using the I^2 statistic, and subgroup analysis will be performed.

Estimating the prevalence of mental illness among patients diagnosed with hypertension and/or type 2 diabetes

To estimate the prevalence of mental illness among patients living with hypertension, type 2 diabetes or both, a meta-analysis of primary studies will be conducted to determine the pooled prevalence rates. The pooled proportions of OR or RR and MDs will be used to assess prevalence rates. The results will be presented along with their 95% CIs. Heterogeneity will be assessed using the I^2 statistic, and if significant heterogeneity is discovered, subgroup analysis will be conducted to explore potential sources of heterogeneity such as study design, sample size and diagnostic criteria.

Identifying the common types of mental illnesses co-occurring with hypertension and/or type 2 diabetes

A narrative synthesis of primary studies will be conducted to determine the prevalent types of mental illnesses that coexist with hypertension and type 2 diabetes. The review will present a summary of the various types of mental illnesses observed in the included studies, along with their relative frequency.

Identifying the risk factors associated with the co-occurrence of hypertension, type 2 diabetes and mental illness

A narrative synthesis of the primary studies will be performed. This synthesis will summarise the identified risk factors and their relationship with comorbidity. A summary of the identified risk factors will be presented in the review.

Exploring the impact of mental illness on health outcomes of patients with hypertension and/or type 2 diabetes

A narrative synthesis of the primary studies will be conducted. This synthesis will present a summary of the identified impact of mental illness on morbidity and mortality for patients living with hypertension, type 2 diabetes or both.

Patient and public involvement

None.

ETHICS AND DISSEMINATION

Although the review does not require ethical approval as it involves extracting data from published studies without privacy concerns, it is part of a larger study on NCDs involving primary data collection and has received ethical clearance from the ethics review committee of the Ghana Health Service (ID NO: GHS-ERC 013/02/23). The results of the review will be presented to stakeholders (policymakers and practitioners) and disseminated through conferences and peer-reviewed publications.

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Contributors Conceptualisation and design of the protocol: RNBA, IAA, TM. Drafting the manuscript (including initial drafting and subsequent revisions to ensure accuracy and clarity): RNBA, YJ, MA-C, SO, EAn, EAw, IAA. Data collection, analysis and interpretation: RNBA, NYA-B, YJ. Pledged responsibility for ensuring the precision and ethical integrity across all facets of the research: RNBA, YJ, MA-C, SO, EAn, IAA. Final approval of the version to be published: RNBA, YJ, MA-C, SO. Guidance and oversight of this work: MA-C, SO, IAA. Study submission for publication: RNBA.

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Competing interests None declared.

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