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# Symptoms of mental disorders and adherence to ART among adults living with HIV in rural Zimbabwe: a cross-sectional survey



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|---|---|
| Journal: | *BMJ Open* |
| Manuscript ID | bmjopen-2021-049824 |
| Article Type: | Original research |
| Date Submitted by the Author: | 03-Feb-2021 |
| Complete List of Authors: | Haas, Andreas D ; Universitat Bern Institut fur Sozial- und Praventivmedizin,<br>Kunzekwenyika, Cordelia ; SolidarMed<br>Hossmann, Stefanie; CTU Bern and Institute of Social and Preventive Medicine (ISPM), University of Bern<br>Manzero, Josphat; SolidarMed<br>van Dijk, Janneke; SolidarMed<br>Manhibi, Ronald; SolidarMed<br>Verhey, Ruth ; Friendship Bench Zimbabwe,<br>Limacher, Andreas; University of Bern, CTU Bern<br>von Groote, Per M; University of Bern, Institute of Social and Preventive Medicine<br>Manda, Ethel; Friendship Bench Zimbabwe<br>Hobbins, Michael; SolidarMed<br>Chibanda, D; University of Zimbabwe, Department of Psychiatry<br>Egger, Matthias; University of Bern, Institute of Social & Preventive Medicine |
| Keywords: | MENTAL HEALTH, HIV & AIDS < INFECTIOUS DISEASES, EPIDEMIOLOGY |
| | |



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# Symptoms of mental disorders and adherence to ART among adults living with HIV in rural Zimbabwe: a cross-sectional survey

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Running head: Mental disorders and ART adherence among adults living with HIV in Zimbabwe

Word count: abstract 239 words, main text 1557 words, 1 table, 25 references.

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## Abstract

**Objectives:** To examine the proportion of people living with HIV (PLHIV) screening positive for common mental disorders (CMD) and associations between positive CMD screening tests and self-reported adherence to antiretroviral therapy (ART).

**Setting:** Sixteen government-funded health facilities in the rural Bikita district of Zimbabwe.

**Design:** Cross-sectional survey.

**Participants:** HIV-positive non-pregnant adults, aged 18 years or older, who lived in Bikita district and had received ART for at least six months.

**Outcome measures:** The primary outcome was the proportion of participants screening positive for CMD defined as a Shona Symptoms Questionnaire (SSQ-14) score of 9 or greater. Secondary outcomes were the proportion of participants reporting suicidal ideation, perceptual symptoms, and suboptimal ART adherence.

**Results:** Out of 3,480 adults, 18.8% (95% CI 14.8-23.7) screened positive for CMD, 2.7% (95% CI 1.5-4.7) reported suicidal ideations, and 1.5% (95% 0.9-2.6) reported perceptual symptoms. Positive CMD screens were more common in women (adjusted prevalence ratio [aPR] 1.67, 95% confidence interval [CI] 1.19-2.35) than in men and were more common in adults aged 40-49 years (aPR 1.47 95% CI 1.16-1.85) or aged 50-59 years (20.3%; aPR 1.51 95% CI 1.05-2.17) than in those 60 years or older. Positive CMD screen was associated with a higher prevalence of suboptimal adherence (aPR 1.52; 95% CI 1.36-1.70).

**Conclusions:** A substantial proportion of PLHIV in rural Zimbabwe are affected by CMD. There is a need to integrate mental health services HIV programs in rural Zimbabwe.




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**Keywords:** Mental health, HIV & AIDS, epidemiology

## Strengths and limitations of this study

- Inclusion of a large sample of people living with HIV recruited at 16 government-funded primary and secondary care facilities in a rural district of Zimbabwe.
- Use of a locally developed screening tool that showed good psychometric properties for detecting common mental disorders in Zimbabwe in HIV-positive urban populations.
- The screening tool was not validated for the rural setting and the cutoff score was selected based on data from the urban setting.
- Adherence to antiretroviral therapy was self-reported.

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## Background

In 2019, approximately 1.4 million people were living with HIV in Zimbabwe, of whom more than 1.1 million were receiving antiretroviral therapy (ART) [1]. The long-term effectiveness of ART depends on lifelong retention in HIV care and strict medication adherence [2,3].

Common mental disorders (CMD), which include depression and anxiety disorders are highly prevalent among people living with HIV (PLHIV) [4] and are associated with poor HIV treatment outcomes including low adherence, lack of viral load suppression, loss to follow-up and mortality [5–9], but often remain untreated [10,11] In 2013, Chibanda and colleagues showed that in Zimbabwe's capital Harare, over 50% of PLHIV attending a primary care facility met diagnostic criteria for either depression or anxiety and 65% screened positive for CMD [12,13], but data are scarce on the prevalence of CMD in Zimbabwe's rural settings.

We assessed the prevalence of positive CMD screening tests and associations between screening positive for CMD and self-reported adherence among PLHIV receiving ART at 16 health facilities in the rural Bikita district of Zimbabwe.

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## Methods

We conducted a cross-sectional survey to assess the eligibility of individuals for a cluster-randomized trial (FB-ART) on the effect of a community-based psychological intervention (the friendship bench intervention[14] on ART outcomes and symptoms of CMD in PLHIV. We registered the trial with ClinicalTrials.gov (NCT03704805). Two district hospitals, two rural hospitals, and 12 health centres served as study facilities. All 16 facilities are located in Bikita district. Bikita is a rural district of the Masvingo Province about 300 km south of Harare.

Between October 5, 2018, and December 19, 2019, we offered CMD screening at 16 government-funded health facilities in rural Zimbabwe. Trained research assistants offered screening for CMD using the Shona Symptoms Questionnaire (SSQ-14)[12] to HIV-positive non-pregnant adults, aged 18 years or older, who lived in Bikita district and had received ART for at least six months and assessed adherence using a question from the AIDS indicator survey [15]. The SSQ-14 is a locally developed CMD screening tool [12]. The tool assesses if individuals had experienced common mental health symptoms, including sleep disturbance, suicidal ideations, tearfulness, perceptual symptoms, and impairment of functioning in the past seven days. Each of the 14 symptoms is scored dichotomously (symptom present or absent) [16]. The tool showed good psychometric properties for detecting CMD in HIV-positive and HIV-negative urban populations in Zimbabwe [12]. Adherence was assessed based on self-report using the following question: "In the last 30 days, how many days have you missed taking any of your ARV [antiretroviral] pills?"

We defined SSQ-14 scores of 9 or greater as positive CMD screen [12]. Participants who reported that they "felt like committing suicide" in the past seven days (SSQ-14 item 11) screened positive for suicidal ideation. Participants who reported that they "saw or heard things which others could not see or hear" in the past seven days (SSQ-14 item 5) screened positive for perceptual symptoms. Participants who



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indicated that they had missed taking one or more ARV pills in the last 30 days were classified as having suboptimal adherence and those reporting not having missed any ARV pills as having optimal adherence. We categorized age into the following groups: 18-29 years, 30-39 years, 40-49 years, 50-59 years and 60 years or older.

Participants who did not respond to all 14 SSQ items were excluded from the analysis. We calculated the prevalence of non-adherence and positive screening outcomes with logit-transformed 95% confidence intervals that adjusted for intragroup correlation at health facilities. We estimated adjusted prevalence ratios (aPRs) using mixed-effects Poisson regression models with robust standard errors [17]. Models were adjusted for sex, age, and clustering of data at facility-level using a random intercept for study facilities. Statistical analysis was done using Stata (Version 16, Stata Corporation, College Station, TX, USA).

The study protocol was approved by the ethics committees of the Medical Research Council of Zimbabwe (MRCZ), the Research Council of Zimbabwe (RCZ), and the Canton of Bern, Switzerland. Individuals provided verbal consent for eligibility screening and collection and analysis of screening data. Eligible participants provided written informed consent to participate in the trial. Research assistants referred individuals screening positive for suicidal ideation or perceptual symptoms to the nurse in charge for further assessment and care. Individuals screening positive for CMD were offered CMD treatment as part of the FB-ART trial.

## Patient and Public Involvement

Patients with psychiatric morbidity were involved in ethnographic and qualitative research which informed the development of the SSQ-14 [16]. The results of this study were shared with the provincial medical director and the district medical officer.



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## Results

Research assistants assessed the eligibility for CMD screening of 3,707 individuals; 3,543 (95.6%) of eligible individuals participated in CMD screens. Pregnancy, residency outside of Bikita district, and age below 18 years were the most common reasons for ineligibility for screening. Out of 3,543 individuals screened for CMD, 63 (1.7%) did not respond to all SSQ-14 items and were excluded. The remaining 3,480 individuals were included in the study. The median age of the study population was 45 years (IQR 38–53). Three-quarters of the participants (74.9%, n=2,608) were women.

Table 1 shows the prevalence and aPRs for positive screening for common mental disorders, suicidal ideation, and perceptual symptoms. Out of 3,480 adults, 18.8% (95% CI 14.8-23.7, n=655) screened positive for CMD, 2.7% (95% CI 1.5-4.7, n=93) reported suicidal ideation, and 1.5% (95% CI 0.9-2.6, n=52) reported perceptual symptoms. Positive CMD screens were more common in women (21.0%; aPR 1.67, 95% CI 1.19-2.35) than in men (12.4%) and were more common in adults aged 40-49 years (20.6%; aPR 1.47 95% CI 1.16-1.85) or aged 50-59 years (20.3%; aPR 1.51 95% CI 1.05-2.17) than in those 60 years or older (12.6%). Suicidal ideations were more common in adults 18-29 years (4.7%, 95% CI 0.2-9.2) and in adults aged 30-39 years (4.0%, 95% CI 1.1-7.0) than in older adults, but the statistical uncertainty around these estimates was large.

Out of 3,469 individuals who responded to the adherence question (11, 0.32% did not respond), 83.6% (2,900) reported optimal adherence and 16.4% (569) reported suboptimal adherence. Suboptimal adherence was more common in individuals screening positive for CMD (21.3%, 95% CI 16.8-26.6; aPR 1.53 95% CI 1.37-1.70) than in those screening negative (15.3% 95% CI 12.0-19.3).



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## Discussion

We screened over 3,500 PLHIV attending 16 health facilities in rural Zimbabwe using a locally developed CMD screening tool [12]. Less than 20% of PLHIV screened positive for CMD, 2.7% reported suicidal ideation, and 1.5% perceptual symptoms compatible with psychosis. Positive CMD screens were more common in women and middle-aged adults than in men or young or older adults. Of note, positive screens were associated with suboptimal self-reported ART adherence.

The prevalence of positive screens for CMD observed in rural Zimbabwe was much lower than in the urban setting. In 2013, Chibanda and colleagues examined CMD symptoms in PLHIV attending a primary care facility in Zimbabwe's capital, Harare. All participants were screened for CMD using the SSQ-14 and examined by psychiatrists using the Structured Clinical Interview of the DSM-IV (SCID). The prevalence of a positive CMD screen (SSQ-14 ≥9) was 65%, and over 50% of participants met diagnostic criteria for either depression or anxiety according to the SCID [12,13]. A higher depression prevalence in urban than in rural settings was also reported in a study from South Africa [18]. The adjusted odds for depression were almost twice as high among HIV-positive and HIV-affected people in urban compared to rural settings [18].

An important factor that likely contributed to the lower prevalence of CMD in our study compared to earlier studies is the change of national ART guidelines to treat PLHIV at less advanced stages of HIV disease. In the last decade, the CD4 threshold for ART eligibility was successively raised from <250 cells/µL to immediate ART initiation of all PLHIV under WHO's “treat all” guidelines, which was reflected in an increase in the median CD4 at ART initiation in low- and middle-income [19,20]. Low CD4 cell count is associated with a higher risk of CMD [21], and the comparably low prevalence of CMD observed in our study might reflect the higher median CD4 cell count at ART initiation. Also, differences in the



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prevalence of positive CMD screens between the urban and rural setting could partly be explained by cultural differences in symptoms presentation [22].

In contrast to most other studies, we found middle age to be associated with a higher risk of positive screening for CMD. The sample size of our study is much larger than in most previous studies, and earlier studies might have lacked the power to detect associations between age and positive CMD screening.

In line with previous studies, we found that CMDs were more common in women than in men. In our study women had roughly twice the risk of screening positive for CMD. Studies from other settings reported similar or slightly stronger associations.[13,23] Our results also confirm earlier data on associations between symptoms of depression and anxiety disorders and suboptimal adherence to ART [5,24].

Our study has several limitations. We did not validate the SSQ-14 for the rural setting and selected the CMD threshold based on data from the urban setting [12]. Furthermore, we used a self-reported adherence measure which might be prone to underreporting of non-adherence. However, there is evidence for the validity of self-reported measure of ART adherence [25].

In conclusion, while the burden of CMD in adult ART patients in a rural district of Zimbabwe seems to be lower than in the urban setting, there is a need to integrate mental health services in rural ART programs.



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## Funding

The study was supported by the National Cancer Institute (NCI), the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), the National Institute of Allergy and Infectious Diseases (NIAID), the National Institute of Mental Health (NIMH), the National Institute on Drug Abuse (NIDA), the National Heart, Lung, and Blood Institute (NHLBI), the National Institute on Alcohol Abuse and Alcoholism (NIAAA), the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), and the Fogarty International Center (FIC) through the International epidemiology Databases to Evaluate AIDS (IeDEA) (ME, grant number 5U01-AI069924-05) and the Swiss National Science Foundation (SNSF) (ME, grant number 174281 and AH, grant number P2BEP3_178602). The funders had no role in study design, data collection and analysis, decision to publish or preparation of the manuscript.

## Competing interest

None

## Ethical considerations

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. The study protocol was approved by the ethics committees of the Medical Research Council of Zimbabwe (MRCZ) (approval number MRCZ/A/2287), the Research Council of Zimbabwe (RCZ), and the Canton of Bern, Switzerland (approval number 2018-00396). Individuals provided verbal consent for eligibility screening and collection and analysis of screening data. Eligible participants provided written informed consent to participate in the randomized controlled trial.

## Authors' contributions

ME obtained funding for the study. AH, JvD, ME, CK, DC, SH and AL wrote the study protocol. JM and RM assisted with fieldwork and data collection which was overseen by CK and JvD. SH and AH did central data monitoring. AH conducted statistical analysis. AL advised on statistical analysis. AH and wrote the first draft of the paper which was revised by CK, JvD, RV, AL, MH, DC, PvG and ME. All contributed to interpretation of the results, commented on previous versions of the manuscript and read and approved the final manuscript.

## Availability of data

Data cannot be made available online because of legal and ethical restrictions. To request data, readers may contact IeDEA for consideration by filling out the online form available at https://www.iedea-sa.org/contact-us/



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**Table 1: Prevalence of symptoms of common mental disorders, suicidal ideation, and perceptual disorders among people living with HIV in rural Zimbabwe.**

| | | Positive screens | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Common mental disorders[a] | | | Suicidal ideation[b] | | | Perceptual symptoms[c] | | |
| | Total screened N | N | Prevalence[d] (95% CI) | Adjusted prevalence ratio[e] (95% CI) | N | Prevalence[d] (95% CI) | Adjusted prevalence ratio[e] (95% CI) | N | Prevalence[d] (95% CI) | Adjusted prevalence ratio[e] (95% CI) |
| | 3,480 | 655 | 18.8% (14.8-23.7) | | 93 | 2.7% (1.5-4.7) | | 52 | 1.5% (0.9-2.6) | |
| Sex | | | | | | | | | | |
| Female | 2,654 | 547 | 21.0% (16.5-26.2) | 1.67 (1.19-2.35) | 78 | 3.0% (1.2-4.7) | 1.47 (0.71-3.03) | 43 | 1.6% (0.7-2.6) | 1.47 (0.73-2.96) |
| Male | 886 | 108 | 12.4 (6.9-17.9) | 1.00 | 15 | 1.7% (0.2-3.3) | 1.00 | 9 | 1.0% (0.1-2.0) | 1.00 |
| Age in years | | | | | | | | | | |
| 18-29 | 280 | 49 | 17.8% (10.3-25.3) | 1.19 (0.74-1.92) | 13 | 4.7% (0.2-9.2) | 2.21 (0.86-5.66) | 4 | 1.5% (0.0-2.9) | 2.47 (0.69-8.78) |
| 30-39 | 761 | 138 | 18.5% (13.6-23.4) | 1.28 (0.88-1.87) | 30 | 4.0% (1.1-7.0) | 1.65 (0.73-3.71) | 12 | 1.6% (0.0-3.3) | 2.54 (0.44-14.57) |
| 40-49 | 1,292 | 262 | 20.6% (14.9-26.3) | 1.47 (1.16-1.85) | 28 | 2.2% (0.6-3.8) | 0.87 (0.51-1.49) | 23 | 1.8% (0.5-3.2) | 2.73 (0.87-8.54) |
| 50-59 | 746 | 149 | 20.3% (15.2-25.5) | 1.51 (1.05-2.17) | 12 | 1.6% (0.6-2.7) | 0.73 (0.43-1.24) | 10 | 1.4% (0.4-2.4) | 2.13 (0.63-7.20) |
| 60+ | 461 | 57 | 12.6% (6.9-18.3) | 1.00 | 10 | 2.2% (0.7-3.7) | 1.00 | 3 | 0.7% (0.0-1.4) | 1.00 |

Data are numbers of individuals, the prevalence of positive screens, and adjusted prevalence ratios. 95% confidence intervals are shown in parenthesis.

[a] Shona Symptoms Questionnaire (SSQ-14) scores of 9 or greater
[b] Yes to item 11 on the SSQ-14: "At times I felt like committing suicide."
[c] Yes to item 5 on the SSQ-14: "I sometimes saw or heard things which others could not see or hear.
[d] Prevalence of positive screening tests and logit-transformed confidence intervals adjusted for intragroup correlation at health facilities.
[e] Models adjusted for sex, age, and clustering of participants in facilities.

Abbreviations: aPR=adjusted prevalence ratio; CI=confidence interval; SSQ-14= Shona Symptoms Questionnaire.

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# Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

## Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

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In your methods section, say that you used the STROBE cross sectionalreporting guidelines, and cite them as:

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| | | Reporting Item | Page Number |
|---|---|---|---|
| **Title and abstract** | | | |
| Title | #1a | Indicate the study's design with a commonly used term in the title or the abstract | 1 |
| Abstract | #1b | Provide in the abstract an informative and balanced summary of what was done and what was found | 2 |
| **Introduction** | | | |
| Background / rationale | #2 | Explain the scientific background and rationale for the investigation being reported | 3 |
| Objectives | #3 | State specific objectives, including any prespecified hypotheses | 3 |
| **Methods** | | | |
| Study design | #4 | Present key elements of study design early in the paper | 4 |
| Setting | #5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | 4 |



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| | | | |
|---|---|---|---|
| Eligibility criteria | #6a | Give the eligibility criteria, and the sources and methods of selection of participants. | 4 |
| | #7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | 4-5 |
| Data sources / measurement | #8 | For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for exposed and unexposed groups if applicable. | 4-5 |
| Bias | #9 | Describe any efforts to address potential sources of bias | 5 |
| Study size | #10 | Explain how the study size was arrived at | 4 |
| Quantitative variables | #11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why | 4-5 |
| Statistical methods | #12a | Describe all statistical methods, including those used to control for confounding | 5 |
| Statistical methods | #12b | Describe any methods used to examine subgroups and interactions | NA |
| Statistical methods | #12c | Explain how missing data were addressed | NA |
| Statistical methods | #12d | If applicable, describe analytical methods taking account of sampling strategy | NA |
| Statistical methods | #12e | Describe any sensitivity analyses | NA |
| **Results** | | | |
| Participants | #13a | Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give information separately for for exposed and unexposed groups if applicable. | 6 |
| Participants | #13b | Give reasons for non-participation at each stage | 6 |

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| | | | |
|---|---|---|---|
| Participants | #13c | Consider use of a flow diagram | NA |
| Descriptive data | #14a | Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable. | 6 |
| Descriptive data | #14b | Indicate number of participants with missing data for each variable of interest | NA |
| Outcome data | #15 | Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable. | 6 |
| Main results | #16a | Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | No unadjusted estimates reported in this short report |
| Main results | #16b | Report category boundaries when continuous variables were categorized | 12 |
| Main results | #16c | If relevant, consider translating estimates of relative risk into absolute risk for a meaningful time period | NA |
| Other analyses | #17 | Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses | NA |
| **Discussion** | | | |
| Key results | #18 | Summarise key results with reference to study objectives | 7 |
| Limitations | #19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias. | 8 |
| Interpretation | #20 | Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence. | 7-8 |
| Generalisability | #21 | Discuss the generalisability (external validity) of the study results | 8 |
| **Other Information** | | | |

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| | | | |
|---|---|---|---|
| Funding | #22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article is based | 9 |

Notes:

- 16a: No unadjusted estimates reported in this short report The STROBE checklist is distributed under the terms of the Creative Commons Attribution License CC-BY. This checklist was completed on 29. January 2021 using https://www.goodreports.org/, a tool made by the EQUATOR Network in collaboration with Penelope.ai

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# Symptoms of common mental disorders and adherence to antiretroviral therapy among adults living with HIV in rural Zimbabwe: a cross-sectional study



| | |
|---|---|
| Journal: | *BMJ Open* |
| Manuscript ID | bmjopen-2021-049824.R1 |
| Article Type: | Original research |
| Date Submitted by the Author: | 25-May-2021 |
| Complete List of Authors: | Haas, Andreas D ; University of Bern, Institute of Social & Preventive Medicine (ISPM)<br>Kunzekwenyika, Cordelia ; SolidarMed<br>Hossmann, Stefanie; University of Bern, Institute of Social & Preventive Medicine (ISPM); University of Bern, Institute of Social & Preventive Medicine (ISPM)<br>Manzero, Josphat; SolidarMed<br>van Dijk, Janneke; SolidarMed<br>Manhibi, Ronald; SolidarMed<br>Verhey, Ruth ; Friendship Bench Zimbabwe,<br>Limacher, Andreas; University of Bern, CTU Bern<br>von Groote, Per M; University of Bern, Institute of Social and Preventive Medicine<br>Manda, Ethel; Friendship Bench Zimbabwe<br>Hobbins, Michael; SolidarMed<br>Chibanda, D; University of Zimbabwe, Department of Psychiatry; London School of Hygiene and Tropical Medicine, Centre for Global Mental Health<br>Egger, Matthias; University of Bern, Institute of Social & Preventive Medicine; University of Cape Town, Centre for Infectious Disease Epidemiology and Research |
| Primary Subject Heading: | Mental health |
| Secondary Subject Heading: | HIV/AIDS |
| Keywords: | MENTAL HEALTH, HIV & AIDS < INFECTIOUS DISEASES, EPIDEMIOLOGY |
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# Symptoms of common mental disorders and adherence to antiretroviral therapy among adults living with HIV in rural Zimbabwe: a cross-sectional study

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Running head: Mental illness and ART adherence among adults living with HIV in Zimbabwe

Word count: abstract 255 words, main text 2335 words, 2 tables, 36 references

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## Abstract

**Objectives:** To examine the proportion of people living with HIV who screen positive for common mental disorders (CMD) and the associations between CMD and self-reported adherence to antiretroviral therapy (ART).

**Setting:** Sixteen government-funded health facilities in the rural Bikita district of Zimbabwe.

**Design:** Cross-sectional study.

**Participants:** HIV-positive non-pregnant adults, aged 18 years or older, who lived in Bikita district and had received ART for at least six months.

**Outcome measures:** The primary outcome was the proportion of participants screening positive for CMD defined as a Shona Symptoms Questionnaire (SSQ-14) score of 9 or greater. Secondary outcomes were the proportion of participants reporting suicidal ideation, perceptual symptoms, and suboptimal ART adherence and adjusted prevalence ratios (aPR) for factors associated with CMD, suicidal ideation, perceptual symptoms, and suboptimal ART adherence.

**Results:** Out of 3,480 adults, 18.8% (95% confidence interval [CI] 14.8-23.7) screened positive for CMD, 2.7% (95% CI 1.5-4.7) reported suicidal ideations, and 1.5% (95% 0.9-2.6) reported perceptual symptoms. Positive CMD screens were more common in women (adjusted prevalence ratio [aPR] 1.67, 95% CI 1.19-2.35) than in men and were more common in adults aged 40-49 years (aPR 1.47 95% CI 1.16-1.85) or aged 50-59 years (20.3%; aPR 1.51 95% CI 1.05-2.17) than in those 60 years or older. Positive CMD screen was associated with suboptimal adherence (aPR 1.53; 95% CI 1.37-1.70).

**Conclusions:** A substantial proportion of people living with HIV in rural Zimbabwe are affected by CMD. There is a need to integrate mental health services and HIV programs in rural Zimbabwe.


**Keywords:** Mental health, HIV & AIDS, epidemiology

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## Strengths and limitations of this study

- Inclusion of a large sample of people living with HIV recruited at 16 government-funded primary and secondary care facilities in a rural district of Zimbabwe.
- Use of a locally developed screening tool that showed good psychometric properties for detecting common mental disorders in Zimbabwe in HIV-positive urban populations.
- The screening tool was not validated for the rural setting, and the cutoff score was selected based on data from the urban setting.
- Adherence to antiretroviral therapy was self-reported.

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## Background

In 2019, approximately 1.4 million people were living with HIV in Zimbabwe, of whom more than 1.1 million were receiving antiretroviral therapy (ART) [1]. Widespread access to ART has dramatically improved the life expectancy of people living with HIV [2]. However, the long-term effectiveness of ART depends on lifelong retention in HIV care and strict medication adherence [3,4].

Common mental disorders (CMD), which include depression and anxiety disorders are highly prevalent among people living with HIV. In sub-Saharan Africa, the estimated prevalence of major depression in people living with HIV is 15.3%, and of depressive symptoms 27.0% [5]. The median prevalence of anxiety disorders in people living with HIV in developing countries is estimated at 22.8% [6]. The prevalence of depression and anxiety disorders is higher in women than in men [7,8]. In Zimbabwe's capital Harare, over 50% of people living with HIV attending a primary care facility met diagnostic criteria for either depression or anxiety, and 65% screened positive for CMD [9,10]. In Zimbabwe, most people living with HIV receiving ART reside in rural areas [11], and the CMD prevalence in this population is unknown.

The co-occurrence of mental disorders and HIV poses significant challenges in managing and treating HIV. Mental disorders are associated with poor HIV treatment outcomes, including low adherence, lack of viral load suppression, loss to follow-up and mortality [12–16]. Early detection and effective management of mental disorders among people living with HIV may improve the quality of life of affected individuals, ART adherence and viral load suppression [17,18], thus reducing the incidence of HIV-associated complications, preventing drug resistance and HIV transmission. Despite these benefits, there is a large 'treatment gap' in mental health care among people living with HIV in low- and middle-income countries: most people affected by mental illness do not receive appropriate treatment [19,20].



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The Friendship Bench intervention is a culturally adapted evidence-based psychological intervention developed to close the treatment gap for CMD in Zimbabwe [21]. The Friendship Bench team trains community health workers to identify people with CMD symptoms and deliver a brief intervention consisting of six sessions of problem-solving therapy and optional group support [21]. We are conducting a cluster-randomised trial to assess the effectiveness of the Friendship Bench intervention in improving ART outcomes and symptoms of CMD in people living with HIV in rural Zimbabwe. During recruitment, we screened over 3,500 ART patients for CMD and poor adherence. In this paper, we report the prevalence of positive CMD screening tests and associations between positive CMD screens and self-reported adherence among people living with HIV in rural Zimbabwe.

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## Methods

We conducted a cross-sectional study at 16 health facilities in Bikita district to assess the eligibility of individuals for a cluster-randomised trial (FB-ART) on the effect of the Friendship Bench intervention [22] on ART outcomes and symptoms of CMD in people living with HIV. Bikita is a rural district of the Masvingo Province about 300 km south of Harare. We registered the trial with ClinicalTrials.gov (NCT03704805).

Between October 5, 2018, and December 19, 2019, we offered CMD screening at 16 government-funded health facilities in rural Zimbabwe. HIV-positive non-pregnant adults aged 18 years or older who lived in Bikita district and had received ART for at least six months were eligible. Trained research assistants offered screening for CMD using the Shona Symptoms Questionnaire (SSQ-14) [9] and assessed adherence using a question from the AIDS indicator survey [23]. The SSQ-14 is a locally developed CMD screening tool [9]. The tool assesses if individuals had experienced common mental health symptoms, including sleep disturbance, suicidal ideations, tearfulness, perceptual symptoms, and impairment of functioning in the past seven days. Each of the 14 symptoms is scored dichotomously (symptom present or absent) [24]. The tool showed good psychometric properties for detecting CMD in HIV-positive and HIV-negative urban populations in Zimbabwe [9]. An SSQ-14 score of ≥9 had a sensitivity of 88% and a specificity of 76% for depression or general anxiety in HIV-positive adults in Harare [9]. The tool had a high internal consistency in the validation study (Cronbach's α=0.74) and in our study (Cronbach's α=0.82). Adherence was assessed based on self-report using the following question: "In the last 30 days, how many days have you missed taking any of your ARV [antiretroviral] pills?" [23].

We defined SSQ-14 scores of 9 or greater as positive CMD screen [9]. Participants who reported that they "felt like committing suicide" in the past seven days (SSQ-14 item 11) screened positive for suicidal



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ideation. Participants who reported that they "saw or heard things which others could not see or hear" in the past seven days (SSQ-14 item 5) screened positive for perceptual symptoms. Participants who indicated that they had missed taking one or more ARV pills in the last 30 days were classified as having suboptimal adherence. Those reporting not having missed any ARV pills had optimal adherence. We categorised age into the following groups: 18-29 years, 30-39 years, 40-49 years, 50-59 years, and 60 years or older.

Individuals who participated in SSQ screening were eligible for this analysis. Participants who did not respond to all 14 SSQ items were excluded. We calculated the prevalence of non-adherence and positive screening outcomes with logit-transformed 95% confidence intervals (CI) that adjusted for intragroup correlation at health facilities. We estimated adjusted prevalence ratios (aPRs) for factors associated with positive screening for CMD, suicidal ideation, and perceptual symptoms using mixed-effects Poisson regression models with robust standard errors [25]. Models were adjusted for sex, age, and clustering of data at facility-level using a random intercept for study facilities. We used the same models to calculate unadjusted and aPRs for factors associated with suboptimal adherence. Statistical analysis was done using Stata (Version 16, Stata Corporation, College Station, TX, USA).

The study protocol was approved by the ethics committees of the Medical Research Council of Zimbabwe (MRCZ), the Research Council of Zimbabwe (RCZ), and the Canton of Bern, Switzerland. Individuals provided verbal consent for eligibility screening and collection and analysis of screening data. Research assistants referred individuals screening positive for CMD with suicidal ideation or perceptual symptoms to the nurse in charge for further assessment and care. Individuals who screened positive for CMD and provided written informed consent were included in the trial and were offered CMD treatment as part of the FB-ART trial.



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## Patient and Public Involvement

Patients with psychiatric morbidity were involved in ethnographic and qualitative research, which informed the development of the SSQ-14 [24]. The results of this study were shared with the provincial medical director and the district medical officer.

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## Results

Research assistants assessed the eligibility for CMD screening of 3,707 individuals: 3,543 (95.6%) of eligible individuals participated in CMD screens. Pregnancy, residency outside of Bikita district, and age below 18 years were the most common reasons for ineligibility for screening. Out of 3,543 individuals screened for CMD, 63 (1.7%) did not respond to all SSQ-14 items and were excluded. The remaining 3,480 individuals were included in the analysis. The median age of the study population was 45 years (IQR 38–53). Three-quarters of the participants (74.9%, n=2,608) were women.

Table 1 shows the prevalence and aPRs for positive screening for CMD, suicidal ideation, and perceptual symptoms. Out of 3,480 adults, 18.8% (95% CI 14.8-23.7, n=655) screened positive for CMD, 2.7% (95% CI 1.5-4.7, n=93) reported suicidal ideation, and 1.5% (95% CI 0.9-2.6, n=52) reported perceptual symptoms. Positive CMD screens were more common in women (21.0%; aPR 1.67, 95% CI 1.19-2.35) than in men (12.4%) and were more common in adults aged 40-49 years (20.6%; aPR 1.47 95% CI 1.16-1.85) or aged 50-59 years (20.3%; aPR 1.51 95% CI 1.05-2.17) than in those 60 years or older (12.6%). Suicidal ideations were more common in adults 18-29 years (4.7%, 95% CI 0.2-9.2) and in adults aged 30-39 years (4.0%, 95% CI 1.1-7.0) than in older adults, but the statistical uncertainty around these estimates was large.

Out of 3,469 individuals who responded to the adherence question (11, 0.32% did not respond), 2,900 (83.6% 95% CI 80.0-87.2) reported optimal adherence and 569 (16.4% 95% CI 12.8-20.0) reported suboptimal adherence. Suboptimal adherence was more common in individuals screening positive for CMD (aPR 1.53 95% CI 1.37-1.70) than in those screening negative (Table 2). Suboptimal adherence was also more common in men (aPR 1.25 95% CI 1.01-1.53) than in women and adults aged 18-29 years (aPR 1.62 95% CI 1.10-2.38) than in those 60 years or older (Table 2).



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## Discussion

In a rural district of Zimbabwe, about one in five HIV positive adult screened positive for CMD, almost 3% reported suicidal ideation, and 1.5% perceptual symptoms compatible with psychosis. Positive CMD screens were more common in women and middle-aged adults than in men or older adults. Positive CMD screens were associated with suboptimal self-reported ART adherence.

Our results have to be considered in light of two limitations. First, we used a locally developed CMD screening tool that had been validated in urban Zimbabwe, but we did not validate the tool for the rural setting and selected the CMD threshold based on the urban validation study [9]. Second, we used a self-reported adherence measure which might be prone to underreporting of non-adherence. However, there is evidence for the validity of self-reported measures of ART adherence [26]. The strengths of our study include a large sample size and a multicentre design.

In line with the national [10] and international literature [27,28], we found that CMDs were much more common in women than in men. Biological factors, including sex hormones and sex differences in the neuroendocrine response to stress, psychosocial factors such as gender differences in interpersonal orientation, self-esteem, body shaming, and rumination might contribute to the gender gap in CMD [7,8]. In addition to these individual-level factors, gender inequity and higher exposure of women and girls to traumatising life events, including gender-based violence or sexual abuse, may further contribute to the gender gap in CMD [7,10,29].

The prevalence of positive CMD screens observed in our study of a rural HIV positive population was less than a third of the prevalence observed in a study of a similar urban population conducted in Harare in 2013 [9,10]. An important factor that likely contributed to the lower prevalence of CMD in our study compared to earlier studies is the change of national ART guidelines to treat people living with HIV at



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less advanced stages of HIV disease. In the last decade, the CD4 threshold for ART eligibility was successively raised from <250 cells/µL to immediate ART initiation of all people living with HIV under WHO's "treat all" guidelines. These changes were reflected in an increase in the median CD4 at ART initiation in low- and middle-income [30,31]. Low CD4 cell count is associated with a higher risk of CMD [32], and the comparably low prevalence of CMD observed in our study might reflect the higher median CD4 cell count at ART initiation. The gap in CMD prevalence between the urban and the rural setting might also be explained by a high prevalence of adverse living condition in the urban areas: 42% of the HIV positive individuals included in the urban study were unemployed, and 92% reported that they experienced a negative life event (e.g., death in the family, physical or sexual assault, forced eviction, HIV diagnosis, or hospitalisation of the participant or an immediate family member) in the six months before data collection [9,10]. Furthermore, cultural differences in symptoms presentation between urban and rural populations might explain differences in the prevalence between the two settings [33].

Our results confirm earlier data on associations between symptoms of depression and anxiety disorders and suboptimal adherence to ART [12,15]. A meta-analysis of eight studies from low-income countries found that the odds of suboptimal adherence were 92% higher in patients with depressive symptoms than those without depressive symptoms (odds ratio 1.92 95% CI 1.47-2.5) [15]. Another meta-analysis of 11 studies from low- and middle-income countries showed that anxiety disorders were associated with a substantial increase in the odds of suboptimal adherence (odds ratio 1.59, 95% CI 1.29–1.96) [12]. The strength of the association observed in our study was consistent with these meta-analyses.

Our findings show a substantial burden of CMD among people living with HIV in rural Zimbabwe and underline the need to integrate interventions for detecting and addressing CMD in this population. The Friendship Bench project is an evidence-based psychological intervention for delivering mental health care in primary care [21]. The intervention has been rigorously evaluated in a large cluster randomised controlled trial in Harare, which showed that the Friendship Bench intervention substantially improved



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CMD symptoms [21]. As part of the FB-ART trial, we have implemented the FB intervention at the 8 intervention sites participating in the FB-ART trial, and will further roll out to the 8 control sites to provide access to evidence-based mental health services for people attending these clinics.

Treatment of mental disorders among people living with HIV may also positively affect HIV treatment outcomes [17,18]. A meta-analysis of 29 observational studies and randomised trials showed that depression and psychological distress treatment enhances ART adherence [18]. A further meta-analysis of three randomised controlled trials provides weak evidence for the benefit of cognitive behavioral therapy for depression and adherence on viral load suppression [17,34–36]. Despite these promising results, the evidence for the benefit of mental health care for improving HIV treatment outcomes is still limited.

Further work is needed to evaluate the effect of mental health care on the mental health of people living with HIV and HIV treatment outcomes. We are currently evaluating the effect of the Friendship Bench intervention on ART adherence, viral load suppression and symptoms of CMD among people living with HIV in rural Zimbabwe. There is also a need for continued routine program monitoring and implementation science to ensure the quality and effectiveness of the Friendship Bench intervention in various settings.

In conclusion, our findings show a substantial burden of CMD among people living with HIV in rural Zimbabwe and underline the need to integrate mental health services in HIV treatment programs.



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## Funding

The study was supported by the National Cancer Institute (NCI), the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), the National Institute of Allergy and Infectious Diseases (NIAID), the National Institute of Mental Health (NIMH), the National Institute on Drug Abuse (NIDA), the National Heart, Lung, and Blood Institute (NHLBI), the National Institute on Alcohol Abuse and Alcoholism (NIAAA), the National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK), and the Fogarty International Center (FIC) through the International epidemiology Databases to Evaluate AIDS (IeDEA) (ME, grant number 5U01-AI069924-05) and the Swiss National Science Foundation (SNSF) (ME, grant number 189498 and AH, grant number P2BEP3_178602). The funders had no role in study design, data collection and analysis, decision to publish or preparation of the manuscript.

## Competing interest

None

## Ethical considerations

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. The study protocol was approved by the ethics committees of the Medical Research Council of Zimbabwe (MRCZ) (approval number MRCZ/A/2287), the Research Council of Zimbabwe (RCZ), and the Canton of Bern, Switzerland (approval number 2018-00396). Individuals provided verbal consent for eligibility screening and collection and analysis of screening data. Eligible participants provided written informed consent to participate in the randomised controlled trial.

## Authors' contributions

ME obtained funding for the study. AH, JvD, ME, CK, DC, SH and AL wrote the study protocol. JM and RM assisted with fieldwork and data collection which was overseen by CK and JvD. SH and AH did central data monitoring. AH conducted statistical analysis. AL advised on statistical analysis. AH drafted the initial manuscript. CK, SH, JM, JvD, RM, RV, AL, PvG, EM, MH, DC, and ME provided substantive edits to the manuscript. All authors contributed to interpretation of the results and have read and approved the final manuscript.

## Availability of data

Data cannot be made available online because of legal and ethical restrictions. To request data, readers may contact IeDEA for consideration by filling out the online form available at https://www.iedea-sa.org/contact-us/



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**Table 1: Prevalence of symptoms of common mental disorders, suicidal ideation, and perceptual disorders among people living with HIV in rural Zimbabwe.**

| | | Positive screens | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | Common mental disorders[a] | | | Suicidal ideation[b] | | | Perceptual symptoms[c] | | |
| | Total screened N | N | Prevalence[d] (95% CI) | Adjusted prevalence ratio[e] (95% CI) | N | Prevalence[d] (95% CI) | Adjusted prevalence ratio[e] (95% CI) | N | Prevalence[d] (95% CI) | Adjusted prevalence ratio[e] (95% CI) |
| | 3,480 | 655 | 18.8% (14.8-23.7) | | 93 | 2.7% (1.5-4.7) | | 52 | 1.5% (0.9-2.6) | |
| Sex | | | | | | | | | | |
| Female | 2,654 | 547 | 21.0% (16.5-26.2) | 1.67 (1.19-2.35) | 78 | 3.0% (1.2-4.7) | 1.47 (0.71-3.03) | 43 | 1.6% (0.7-2.6) | 1.47 (0.73-2.96) |
| Male | 886 | 108 | 12.4 (6.9-17.9) | 1.00 | 15 | 1.7% (0.2-3.3) | 1.00 | 9 | 1.0% (0.1-2.0) | 1.00 |
| Age in years | | | | | | | | | | |
| 18-29 | 280 | 49 | 17.8% (10.3-25.3) | 1.19 (0.74-1.92) | 13 | 4.7% (0.2-9.2) | 2.21 (0.86-5.66) | 4 | 1.5% (0.0-2.9) | 2.47 (0.69-8.78) |
| 30-39 | 761 | 138 | 18.5% (13.6-23.4) | 1.28 (0.88-1.87) | 30 | 4.0% (1.1-7.0) | 1.65 (0.73-3.71) | 12 | 1.6% (0.0-3.3) | 2.54 (0.44-14.57) |
| 40-49 | 1,292 | 262 | 20.6% (14.9-26.3) | 1.47 (1.16-1.85) | 28 | 2.2% (0.6-3.8) | 0.87 (0.51-1.49) | 23 | 1.8% (0.5-3.2) | 2.73 (0.87-8.54) |
| 50-59 | 746 | 149 | 20.3% (15.2-25.5) | 1.51 (1.05-2.17) | 12 | 1.6% (0.6-2.7) | 0.73 (0.43-1.24) | 10 | 1.4% (0.4-2.4) | 2.13 (0.63-7.20) |
| 60+ | 461 | 57 | 12.6% (6.9-18.3) | 1.00 | 10 | 2.2% (0.7-3.7) | 1.00 | 3 | 0.7% (0.0-1.4) | 1.00 |

Data are numbers of individuals, the prevalence of positive screens, and adjusted prevalence ratios. 95% confidence intervals are shown in parenthesis.

[a] Shona Symptoms Questionnaire (SSQ-14) scores of 9 or greater
[b] Yes to item 11 on the SSQ-14: "At times I felt like committing suicide."
[c] Yes to item 5 on the SSQ-14: "I sometimes saw or heard things which others could not see or hear.
[d] Prevalence of positive screening tests and logit-transformed confidence intervals adjusted for intragroup correlation at health facilities.
[e] Models adjusted for sex, age, and clustering of participants in facilities.

Abbreviations: aPR=adjusted prevalence ratio; CI=confidence interval; SSQ-14= Shona Symptoms Questionnaire.

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**Table 2: Prevalence ratios for factors associated with suboptimal adherences among people living with HIV in rural Zimbabwe.**

| | Unadjusted prevalence ratio (95% CI)[c] | Adjusted prevalence ratio[d] (95% CI) |
|---|---|---|
| CMD screening | | |
| Negative[a] | 1.00 | 1.00 |
| Positive[b] | 1.46 (1.29-1.66) | 1.53 (1.37-1.70) |
| Sex | | |
| Female | 1.00 | 1.00 |
| Male | 1.17 (0.96-1.44) | 1.25 (1.01-1.53) |
| Age in years | | |
| 18-29 | 1.60 (1.10-2.31) | 1.62 (1.10-2.38) |
| 30-39 | 1.29 (0.90-1.85) | 1.31 (0.91-1.89) |
| 40-49 | 1.00 (0.72-1.38) | 0.99 (0.71-1.38) |
| 50-59 | 1.04 (0.72-1.51) | 1.03 (0.71-1.49) |
| 60+ | 1.00 | 1.00 |

Data are unadjusted and adjusted prevalence ratios. 95% confidence intervals are shown in parenthesis.

[a] Shona Symptoms Questionnaire (SSQ-14) scores of smaller than 9.
[b] Shona Symptoms Questionnaire (SSQ-14) scores of 9 or greater.
[c] Models adjusted for clustering of participants in facilities.
[d] Models adjusted for CMD screening, sex, age, and clustering of participants in facilities.

Abbreviations: CI=confidence interval; CMD, common mental disorders ; SSQ-14= Shona Symptoms Questionnaire.

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# Reporting checklist for cross sectional study.

Based on the STROBE cross sectional guidelines.

## Instructions to authors

Complete this checklist by entering the page numbers from your manuscript where readers will find each of the items listed below.

Your article may not currently address all the items on the checklist. Please modify your text to include the missing information. If you are certain that an item does not apply, please write "n/a" and provide a short explanation.

Upload your completed checklist as an extra file when you submit to a journal.

In your methods section, say that you used the STROBE cross sectionalreporting guidelines, and cite them as:

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| | | Reporting Item | Page Number |
|---|---|---|---|
| **Title and abstract** | | | |
| Title | #1a | Indicate the study's design with a commonly used term in the title or the abstract | 1 |
| Abstract | #1b | Provide in the abstract an informative and | 2 |



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| | | | |
|---|---|---|---|
| | | balanced summary of what was done and what was found | |
| **Introduction** | | | |
| Background / rationale | #2 | Explain the scientific background and rationale for the investigation being reported | 4-5 |
| Objectives | #3 | State specific objectives, including any prespecified hypotheses | 5 |
| **Methods** | | | |
| Study design | #4 | Present key elements of study design early in the paper | 6 |
| Setting | #5 | Describe the setting, locations, and relevant dates, including periods of recruitment, exposure, follow-up, and data collection | 6 |
| Eligibility criteria | #6a | Give the eligibility criteria, and the sources and methods of selection of participants. | 6 |
| | #7 | Clearly define all outcomes, exposures, predictors, potential confounders, and effect modifiers. Give diagnostic criteria, if applicable | 6-7 |
| Data sources / measurement | #8 | For each variable of interest give sources of data and details of methods of assessment (measurement). Describe comparability of assessment methods if there is more than one group. Give information separately for for | 6-7 |



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| | | | |
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| | | exposed and unexposed groups if applicable. | |
| Bias | #9 | Describe any efforts to address potential sources of bias | 6-7 |
| Study size | #10 | Explain how the study size was arrived at | 6 |
| Quantitative variables | #11 | Explain how quantitative variables were handled in the analyses. If applicable, describe which groupings were chosen, and why | 6-7 |
| Statistical methods | #12a | Describe all statistical methods, including those used to control for confounding | 7 |
| Statistical methods | #12b | Describe any methods used to examine subgroups and interactions | NA |
| Statistical methods | #12c | Explain how missing data were addressed | NA |
| Statistical methods | #12d | If applicable, describe analytical methods taking account of sampling strategy | NA |
| Statistical methods | #12e | Describe any sensitivity analyses | NA |
| **Results** | | | |
| Participants | #13a | Report numbers of individuals at each stage of study—eg numbers potentially eligible, examined for eligibility, confirmed eligible, included in the study, completing follow-up, and analysed. Give | 9 |

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| | | | |
|---|---|---|---|
| | | information separately for for exposed and unexposed groups if applicable. | |
| Participants | #13b | Give reasons for non-participation at each stage | 9 |
| Participants | #13c | Consider use of a flow diagram | NA |
| Descriptive data | #14a | Give characteristics of study participants (eg demographic, clinical, social) and information on exposures and potential confounders. Give information separately for exposed and unexposed groups if applicable. | 9 |
| Descriptive data | #14b | Indicate number of participants with missing data for each variable of interest | NA |
| Outcome data | #15 | Report numbers of outcome events or summary measures. Give information separately for exposed and unexposed groups if applicable. | 17 |
| Main results | #16a | Give unadjusted estimates and, if applicable, confounder-adjusted estimates and their precision (eg, 95% confidence interval). Make clear which confounders were adjusted for and why they were included | No unadjusted prevalence ratios for CMD, suicidal ideation and perceptual symptoms were reported |
| Main results | #16b | Report category boundaries when continuous variables were categorized | 6-7 |
| Main results | #16c | If relevant, consider translating estimates of | NA |



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| | | | |
|---|---|---|---|
| | | relative risk into absolute risk for a meaningful time period | |
| Other analyses | #17 | Report other analyses done—e.g., analyses of subgroups and interactions, and sensitivity analyses | NA |
| **Discussion** | | | |
| Key results | #18 | Summarise key results with reference to study objectives | 10 |
| Limitations | #19 | Discuss limitations of the study, taking into account sources of potential bias or imprecision. Discuss both direction and magnitude of any potential bias. | 10 |
| Interpretation | #20 | Give a cautious overall interpretation considering objectives, limitations, multiplicity of analyses, results from similar studies, and other relevant evidence. | 11-12 |
| Generalisability | #21 | Discuss the generalisability (external validity) of the study results | 10 |
| **Other Information** | | | |
| Funding | #22 | Give the source of funding and the role of the funders for the present study and, if applicable, for the original study on which the present article | 13 |

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is based

Notes:

- 16a: No unadjusted prevalence ratios for CMD, suicidal ideation and perceptual symptoms were reported The STROBE checklist is distributed under the terms of the Creative Commons Attribution License CC-BY. This checklist was completed on 29. January 2021 using https://www.goodreports.org/, a tool made by the EQUATOR Network in collaboration with Penelope.ai

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