

South Africa - Implementation Evaluation of a Combination Intervention for Sustainable Blood Pressure Control in Rural KwaZulu- Natal, South Africa

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Identification

SURVEY ID NUMBER

AHRI.ImpactBP

TITLE

Implementation Evaluation of a Combination Intervention for Sustainable Blood Pressure Control in Rural KwaZulu-Natal, South Africa

COUNTRY

Name	Country code
South Africa	ZA

ABSTRACT

IMPACT-BP was an open-label, randomised controlled trial to evaluate the effectiveness of community-based, technology-supported interventions to reduce systolic blood pressure (SBP) and improve blood pressure control among individuals with uncontrolled hypertension in rural KwaZulu-Natal.

The study aimed to determine whether home-based care improves outcomes over standard, clinic-based blood pressure management in rural South Africa.

The study compared three treatment strategies: 1) standard of care (SOC), clinic-based management of hypertension, 2) a community blood pressure monitor-based model, in which individuals received blood pressure cuffs to measure their blood pressure at home, and were monitored by nurses via community health workers (CHW) with treatment decisions made via nurses remotely via a mobile health-based clinical decision support tool, and 3) an enhanced community blood pressure monitor-based model that included home-based blood pressure cuffs that transmitted readings over cellular networks directly to clinic-based nurses (eCHW+). In both intervention groups, CHWs visited participants to record (CHW) or verify (eCHW+) blood pressure readings, dispense medications, and relay instructions from clinic nurses.

KIND OF DATA

Survey Data, clinical data, biomarker data, administrative records data, spatial data

UNIT OF ANALYSIS

Individual-level longitudinal clinical trial data. Each record represents a single participant enrolled in the hypertension trial, with repeated measures of blood pressure, clinical assessments, medication use, and survey-based sociodemographic information collected across multiple study visits (enrolment, 6 months, and 12 months). Data are linked at the individual level using unique study identifiers.

Version

VERSION DESCRIPTION

V1.0.0

Scope

TOPICS

Topic	Vocabulary	URI
Hypertension, Blood Pressure, Blood Pressure Determination, Antihypertensive Agents, Medication Adherence, Community Health Workers, Task Shifting, Telemedicine, mHealth, Patient Care Team, Primary Health Care, Health Services Accessibility, Randomized Controlled Trial, Longitudinal Studies, Treatment Outcome, South Africa	Africa Health Research Institute	www.ahri.org

KEYWORDS

Keyword	Vocabulary	URI
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Hypertension, blood pressure control, community-based intervention, digital health, eHealth, mHealth, community health workers, anti-hypertensive medication, task shifting, primary care, sub-Saharan Africa, South Africa, non-communicable diseases, health systems strengthening, randomized controlled trial, health services access, treatment outcomes	Africa Health Research Institute	www.ahri.org
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Coverage

GEOGRAPHIC COVERAGE

Africa Health Research Institute (AHRI) demographic surveillance area in rural uMkhanyakude district, KwaZulu-Natal

UNIVERSE

Adults aged ≥18 years residing in the catchment areas of Nkundusi and Madwaleni Primary Health Care Clinics in uMkhanyakude District (KwaZulu-Natal, South Africa), with uncontrolled blood pressure. Uncontrolled blood pressure was defined as a SBP > 140 mmHg or a diastolic BP > 90mm Hg with at least one prior elevated reading 6 months or more prior. Participants were screened, enrolled, and observed between 30 November 2022 and 30 June 2025.

Producers and sponsors

PRIMARY INVESTIGATORS

Name	Affiliation
Mark J. Siedner	AHRI; Massachusetts General Hospital; Harvard Medical School
Nombulelo Magula	University of KwaZulu-Natal Medical School; Clairwood Hospital
Thomas Gaziano	Brigham and Women's Hospital; Harvard Medical School; Harvard School of Public Health

PRODUCERS

Name	Abbreviation
Africa Health Research Institute	AHRI

FUNDING AGENCY/SPONSOR

Name	Abbreviation	Role
United States National Institutes of Health	NIH	Primary funder

OTHER IDENTIFICATIONS/ACKNOWLEDGMENTS

Name	Affiliation	Role
Kathy Baisley	AHRI; London School of Hygiene and Tropical Medicine	Statistical oversight
Lusanda Mazibuko	Africa Health Research Institute	Study statistical lead
Dickman Gareta	Africa Health Research Institute	Head of Research Data Management
Siyabonga Nxumalo	Africa Health Research Institute	Data management
Nsika Sithole	Africa Health Research Institute	Project coordination
IMPACT-BP CHW Team	Africa Health Research Institute	Participant engagement and data collection
IMPACT-BP Clinical Team	Africa Health Research Institute	Participant clinical monitoring and data collection
Baptista Joao	iMarketing Namibia	MHealth application development
Hosea Kambonde	iMarketing Namibia	MHealth application development
Sindy Mthethwa	KZN Department of Health	Program partnership

Thabang Manyapelo	Social Science Lead	AHRI Social Science Department
Shafika Abrahams-Gessel	Harvard School of Public Health	Project Management

Sampling

SAMPLING PROCEDURE

Participants were recruited from the Nkundusi and Madwaleni primary health care clinics within the AHRI Health and Demographic Surveillance Site (HDSS). All adults presenting at the clinics for primary care during weekdays were screened for eligibility. Eligible participants were aged ≥ 18 years, resided in the clinic catchment area, had elevated blood pressure at screening (systolic >140 mmHg or diastolic >90 mmHg), and had at least one previous elevated blood pressure reading documented ≥ 6 months prior. Exclusion criteria included pregnancy, breastfeeding, symptomatic elevated blood pressure ($>180/110$ mmHg), advanced chronic kidney disease (glomerular filtration rate <60 ml/min/1.73m²), and use of ≥ 3 full-dose anti-hypertensive medications. Enrolled participants were randomized to one of three study arms (SOC, CHW, eCHW+) in blocks of 9, stratified by clinic and current use of anti-hypertensive therapy.

Data collection

DATES OF DATA COLLECTION

Start	End
2022-11-01	2025-06-30

Data Processing

DATA EDITING

Study data were entered into REDCap and underwent verification and cleaning prior to analysis. Blood pressure outcomes were averaged as specified, and missing values were identified for potential imputation. Randomisation and intervention adherence data were linked with outcome and covariate data. Data were de-identified prior to analysis. Quality control procedures included duplicate entry checks, automated range checks for blood pressure, and consistency checks across visits.

Access policy

ACCESS CONDITIONS

The representative of the Receiving Organization agrees to comply with the following conditions:

1. Access to the restricted data will be limited to the Lead Researcher and other members of the research team listed in this request.
2. Copies of the restricted data or any data created on the basis of the original data will not be copied or made available to anyone other than those mentioned in this Data Access Agreement, unless formally authorized by the Data Archive.
3. The data will only be processed for the stated statistical and research purpose. They will be used for solely for reporting of aggregated information, and not for investigation of specific individuals or organizations. Data will not in any way be used for any administrative, proprietary or law enforcement purposes.
4. The Lead Researcher must state if it is their intention to match the restricted microdata with any other micro-dataset. If any matching is to take place, details must be provided of the datasets to be matched and of the reasons for the matching. Any datasets created as a result of matching will be considered to be restricted and must comply with the terms of this Data Access Agreement.
5. The Lead Researcher undertakes that no attempt will be made to identify any individual person, family, business, enterprise or organization. If such a unique disclosure is made inadvertently, no use will be made of the identity of any person or establishment discovered and full details will be reported to the Data Archive. The identification will not be revealed to any other person not included in the Data Access Agreement.
6. The Lead Researcher will implement security measures to prevent unauthorized access to licensed microdata acquired from the Data Archive. The microdata must be destroyed upon the completion of this research, unless the Data Archive obtains satisfactory guarantee that the data can be secured and provides written authorization to the Receiving

Organization to retain them. Destruction of the microdata will be confirmed in writing by the Lead Researcher to the Data Archive.

7. Any books, articles, conference papers, theses, dissertations, reports, or other publications that employ data obtained from the Data Archive will cite the source of data in accordance with the citation requirement provided with the dataset.
8. An electronic copy of all reports and publications based on the requested data will be sent to the Data Archive.
9. The original collector of the data, the Data Archive, and the relevant funding agencies bear no responsibility for use of the data or for interpretations or inferences based upon such uses.
10. This agreement will come into force on the date that approval is given for access to the restricted dataset and remain in force until the completion date of the project or an earlier date if the project is completed ahead of time.
11. If there are any changes to the project specification, security arrangements, personnel or organization detailed in this application form, it is the responsibility of the Lead Researcher to seek the agreement of the Data Archive to these changes. Where there is a change to the employer organization of the Lead Researcher this will involve a new application being made and termination of the original project.
12. Breaches of the agreement will be taken seriously and the Data Archive will take action against those responsible for the lapse if willful or accidental. Failure to comply with the directions of the Data Archive will be deemed to be a major breach of the agreement and may involve recourse to legal proceedings. The Data Archive will maintain and share with partner data archives a register of those individuals and organizations which are responsible for breaching the terms of the Data Access Agreement and will impose sanctions on release of future data to these parties.

CITATION REQUIREMENTS

Siedner, M. J., & Magula, N. (2026). Implementation Evaluation of a Combination Intervention for Sustainable Blood Pressure Control in Rural KwaZulu-Natal, South Africa [Data set]. Africa Health Research Institute.

DOI: <https://doi.org/10.23664/AHRI.IMPACTBP>

Metadata production

DDI DOCUMENT ID

DDI.AHRI.ImpactBP

PRODUCERS

Name	Abbreviation
Africa Health Research Institute	AHRI

Data Dictionary

Data file	Cases	Variables
AHRI.ImpactBP.Aim 2 Clinical Trial.2025	774	32

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Cases: 774

Variables: 32

Variables

ID	Name	Label	Question
V1545	study_id	Trial Unique Identifier	
V1546	se_sex	Sex	
V1547	se_screening_site	Screening Site	
V1548	se_age_calc	Age at screening (years)	
V1549	se_take_bp_med	Are you taking any medications for your blood pressure?	
V1550	sbp1	SBP at baseline	
V1551	dbp1	1 dbp	
V1552	sbp2	SBP at 6 months	
V1553	dbp2	2 dbp	
V1554	sbp3	SBP at 12 months	
V1555	dbp3	3 dbp	
V1556	se_systolic1	First (out of 3) BP measurement at baseline	
V1557	se_bmi	Body mass index (kg/m ²)	
V1558	se_result_scr_test_egfr	eGFR (ml/min/1.73m ²)	
V1559	ra_study_arm	Randomised study arm	
V1560	sd_runwater	Have internal running water in the household?	
V1561	sd_time2clinic	Time to clinic	
V1562	sd_transport	Main mode of transport to clinic	
V1563	sd_cost2clinic	Cost to clinic (category/code)	
V1564	sd_rand2clinic	Money spent to get to clinic (in Rands)	
V1565	hm_ever_diabetes	Diabetic	
V1566	mh_hivresult	HIV co-infection	
V1567	ageband	Age category	
V1568	bmi_cat	BMI category	
V1569	hiv_status	HIV co-infection	
V1570	education_level	Education level	
V1571	employment_status	Employment status	
V1572	AssetIndexQuintile	Asset Index Quintile (Deprivation)	
V1573	sbp_group	SBPâ€¥160 mmHg at enrolment	
V1574	age60	Ageâ€¥60	
V1575	change_m6	Change at 6 months	
V1576	change_m12	Change at 12 months	

Total: 32

STUDY_ID: Trial Unique Identifier

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0
Type: Discrete Width: 6 Range: - Format: character

SE_SEX: Sex

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0
Type: Discrete Decimal: 0 Width: 8 Range: 1 - 2 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
1	Male	186	24%
2	Female	588	76%

SE_SCREENING_SITE: Screening Site

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0
Type: Discrete Decimal: 0 Width: 9 Range: 1 - 2 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
1	Nkundusi	451	58.3%
2	Madwaleni	323	41.7%

SE_AGE_CALC: Age at screening (years)

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0
Type: Discrete Decimal: 0 Width: 8 Range: 26 - 90 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category
90	90+

SE_TAKE_BP_MED: Are you taking any medications for your blood pressure?

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0
 Type: Discrete Decimal: 0 Width: 8 Range: 0 - 1 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
0	No	23	3%
1	Yes	751	97%

SBP1: SBP at baseline

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0 Minimum: 94 Maximum: 219.5 Mean: 146.95 Standard deviation: 17.2
 Type: Continuous Decimal: 0 Width: 9 Range: 94 - 219.5 Format: Numeric

DBP1: 1 dbp

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0 Minimum: 64 Maximum: 131.5 Mean: 90.918 Standard deviation: 10.458
 Type: Continuous Decimal: 0 Width: 9 Range: 64 - 131.5 Format: Numeric

SBP2: SBP at 6 months

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 762 Invalid: 12 Minimum: 95 Maximum: 213.5 Mean: 139.909 Standard deviation: 16.746
 Type: Continuous Decimal: 0 Width: 9 Range: 95 - 213.5 Format: Numeric

DBP2: 2 dbp

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 762 Invalid: 12 Minimum: 60.5 Maximum: 131 Mean: 87.674 Standard deviation: 9.611
Type: Continuous Decimal: 0 Width: 9 Range: 60.5 - 131 Format: Numeric

SBP3: SBP at 12 months

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 754 Invalid: 20 Minimum: 84.5 Maximum: 203 Mean: 137.68 Standard deviation: 15.125
Type: Continuous Decimal: 0 Width: 9 Range: 84.5 - 203 Format: Numeric

DBP3: 3 dbp

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 754 Invalid: 20 Minimum: 49.5 Maximum: 117.5 Mean: 86.64 Standard deviation: 9.459
Type: Continuous Decimal: 0 Width: 9 Range: 49.5 - 117.5 Format: Numeric

SE_SYSTOLIC1: First (out of 3) BP measurement at baseline

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0 Minimum: 107 Maximum: 227 Mean: 156.796 Standard deviation: 17.13
Type: Continuous Decimal: 0 Width: 8 Range: 107 - 227 Format: Numeric

SE_BMI: Body mass index (kg/m²)

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0 Minimum: 10.2 Maximum: 64.1 Mean: 29.704 Standard deviation: 7.236
Type: Continuous Decimal: 0 Width: 9 Range: 10.1999998092651 - 64.0999984741211 Format: Numeric

SE_RESULT_SCR_TEST_EGFR: eGFR (ml/min/1.73m²)

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0 Minimum: 50 Maximum: 132 Mean: 76.052 Standard deviation: 14.974
 Type: Continuous Decimal: 0 Width: 8 Range: 50 - 132 Format: Numeric

RA_STUDY_ARM: Randomised study arm

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0
 Type: Discrete Decimal: 0 Width: 8 Range: 1 - 3 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
1	SOC	259	33.5%
2	CBPM	257	33.2%
3	eCBPM+	258	33.3%

SD_RUNWATER: Have internal running water in the household?

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 772 Invalid: 2
 Type: Discrete Decimal: 0 Width: 8 Range: 0 - 1 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
0	No	660	85.5%
1	Yes	112	14.5%
Sysmiss		2	

SD_TIME2CLINIC: Time to clinic

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 772 Invalid: 2 Minimum: 2 Maximum: 3000 Mean: 46.595 Standard deviation: 111.877
 Type: Continuous Decimal: 0 Width: 8 Range: 2 - 3000 Format: Numeric

SD_TRANSPORT: Main mode of transport to clinic

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 772 Invalid: 2

Type: Discrete Decimal: 0 Width: 8 Range: 0 - 96 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
0	Walk	338	43.8%
1	Bus/taxi	401	51.9%
2	Car	28	3.6%
96	Other	5	0.6%
Sysmiss		2	

SD_COST2CLINIC: Cost to clinic (category/code)

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 434 Invalid: 340

Type: Discrete Decimal: 0 Width: 10 Range: 0 - 2 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
0	No	21	4.8%
1	Yes	413	95.2%
2	Don't Know	0	0%
Sysmiss		340	

SD_RAND2CLINIC: Money spent to get to clinic (in Rands)

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 413 Invalid: 361 Minimum: 10 Maximum: 200 Mean: 28.68 Standard deviation: 23.372

Type: Continuous Decimal: 0 Width: 8 Range: 10 - 200 Format: Numeric

HM_EVER_DIABETES: Diabetic

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 772 Invalid: 2

Type: Discrete Decimal: 0 Width: 8 Range: 0 - 1 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
0	No	667	86.4%
1	Yes	105	13.6%
Sysmiss		2	

MH_HIVRESULT: HIV co-infection

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 773 Invalid: 1

Type: Discrete Decimal: 0 Width: 10 Range: 0 - 2 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
0	Negative	346	44.8%
1	Positive	360	46.6%
2	Not tested	67	8.7%
Sysmiss		1	

AGEBAND: Age category

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0

Type: Discrete Decimal: 0 Width: 11 Range: 1 - 3 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
1	Under 45	57	7.4%
2	45 - 59	256	33.1%
3	60 or older	461	59.6%

BMI_CAT: BMI category

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0

Type: Discrete Decimal: 0 Width: 11 Range: 1 - 4 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
1	Underweight	17	2.2%
2	Normal	208	26.9%
3	Overweight	198	25.6%
4	Obese	351	45.3%

HIV_STATUS: HIV co-infection

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 773 Invalid: 1

Type: Discrete Decimal: 0 Width: 10 Range: 0 - 2 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
0	Negative	413	53.4%
1	Positive	360	46.6%
2	Not tested	0	0%
Sysmiss		1	

EDUCATION_LEVEL: Education level

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 773 Invalid: 1

Type: Discrete Decimal: 0 Width: 27 Range: 0 - 2 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
0	None	303	39.2%
1	Less or primary education	183	23.7%
2	More than primary education	287	37.1%
Sysmiss		1	

EMPLOYMENT_STATUS: Employment status

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 765 Invalid: 9

Type: Discrete Decimal: 0 Width: 12 Range: 0 - 1 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
0	Not employed	678	88.6%
1	Employed	87	11.4%
Sysmiss		9	

ASSETINDEXQUINTILE: Asset Index Quintile (Deprivation)

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 765 Invalid: 9

Type: Discrete Decimal: 0 Width: 14 Range: 1 - 5 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
1	Most Deprived	162	21.2%
2	Deprived	147	19.2%
3	Moderate	151	19.7%
4	Less Deprived	153	20%
5	Least Deprived	152	19.9%
Sysmiss		9	

SBP_GROUP: SBPâ%¥160 mmHg at enrolment

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0

Type: Discrete Decimal: 0 Width: 9 Range: 0 - 1 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
0	No	618	79.8%
1	Yes	156	20.2%

AGE60: Ageâ%¥60

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 774 Invalid: 0

Type: Discrete Decimal: 0 Width: 9 Range: 0 - 1 Format: Numeric

Questions and instructions

CATEGORIES

Value	Category	Cases	
0	No	313	40.4%
1	Yes	461	59.6%

CHANGE_M6: Change at 6 months

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 762 Invalid: 12 Minimum: -75.5 Maximum: 55 Mean: -7.15 Standard deviation: 18.934
Type: Continuous Decimal: 0 Width: 9 Range: -75.5 - 55 Format: Numeric

CHANGE_M12: Change at 12 months

Data file: AHRI.ImpactBP.Aim 2 Clinical Trial.2025

Overview

Valid: 754 Invalid: 20 Minimum: -85 Maximum: 45 Mean: -9.385 Standard deviation: 18.47
Type: Continuous Decimal: 0 Width: 9 Range: -85 - 45 Format: Numeric

Download related resources

Technical documents

DDI:AHRI.ImpactBP

Title	DDI:AHRI.ImpactBP
Author(s)	Nompumelelo Mkwanazi
Date	2026-02-06
Country	South Africa
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Publisher(s)	Nompumelelo Mkwanazi
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