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Supplementary Table 1a. Government Investment and Policy Frameworks for Mental Health in Selected African Nations

	Ethiopia	Nigeria	South Africa	Uganda	Ghana	Kenya	Togo	Zambia	Senegal	Mali	Cote d'Ivoire	Guinea	Rwanda	Cameroon	Liberia
2020 popn (million)	112.0	200.9	58.5	44.2	30.4	52.5	8.0	17.8	16.3	19.6	25.7	12.8	12.6	25.9	4.9
Stand-alone mental health policy/plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Stand-alone mental health law	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	No	No	No	No	No	Yes
Year of policy / plan	2012	2013	2013	2014	2019	2015	2015	2005	2019	No	2008	No	2019	2016	2016
Year of legislation/law	No	2021	2002	2019	2012	1991	No	2019	1975	No	No	No	No	No	2017
Human Resources are estimated and allocated for implementation of policy/plan	No	–	No	Yes	No	–	No	No	No	No	No	Yes	No	No	No
Financial Resources are estimated and are allocated for implementation of policy/plan	No	No	No	No	No	No	No	No	No	No	No	No	No	No	No
Total Health expenditure(HE)% Gross Domestic Product (GDP)	3.5	3.4	8.6	4.3	4.0	4.5	10.8	6.3	5.2	6.9	3.6	10.8	7.5	3.8	17.0
Government Health Expenditure as% of general government Expenditure	-	4.2	15.2	4.4	6.7	8.9	3.9	10.6	6.5	5.4	6.7	4.5	9.0	-	5.5
Government total Expenditure on mental health as % of the total government expenditure	–	4.1	5.0	2.9	3.0	5.0	-	0.1	-	–	–	5.0	0.02	1.0	0.02
Government Total Expenditure spent on mental hospitals as % of total government	–	100.0	46.8	–	67.8	–	-	96.7	-	–	–	46.8	11.0	-	–

mental health expenditure															
Out of pocket expenditure on health as % of (THE)	33.1	74.7	5.4	34.0	16.4	23.2	16.4	8.1	41.6	16.4	32.0	16.4	10.3	68.3	26.3
Insurance for mental health care and treatment /Reimbursement schemes	Yes	No	Yes	—	No	Yes	Yes	Yes	-	Yes	No	Yes	Yes	No	No

Supplementary Table 1a. Selected mental-health financing and policy indicators for 18 Sub-Saharan African countries, extracted from the 2024 World Health Organization (WHO) Global Health Expenditure Database and the WHO Mental Health Atlas.

Supplementary Table 1b. Government Investment and Policy Frameworks for Mental Health in Selected African Nations, continued

	Algeria	Egypt	Morocco	Tunisia	Libya	Djibouti	Sudan	Central African Republic	Equatorial Guinea	Gambia	DR Congo	Benin	Chad	Mauritania
2020 popn (million)	43.0	100.4	36.5	11.7	6.8	1.0	42.8	4.6	1.4	2.3	86.8	11.8	15.9	4.2
Stand-alone mental health policy/plan	yes	yes	yes	yes	No	yes	yes	yes	yes	Yes	Yes	-	yes	yes
Stand-alone mental health law	yes	yes	yes	yes	No	No	yes	No	No	Yes	No	No	No	No
Year of policy / plan	2017	2015	2013	2013	-	2016	2009	2011	2018	2016	2019	No	2016	2013
Year of legislation/law	1992	2009	1959	1953	-	-	2016	-	-	1964	No	No	-	-
Human Resources are estimated and allocated for implementation of policy/plan	No	Yes	No	No	-	Yes	Yes	-	No	No	Yes	-	No	-
Financial Resources are estimated and are allocated for implementation of policy/plan	No	Yes	No	No	-	Yes	Yes	-	No	No	No	-	No	-
Total Health expenditure(HE)% Gross Domestic Product (GDP)	6.14	4.15	5.84	7.05	-	2.15	3.02	8.99	3.9	3.73	4.05	2.47	5.54	3.99
Government Health Expenditure as% of general government Expenditure	8.83	5.16	7.22	12.49	-	4.28	9.59	4.86	5.35	9.64	6.27	1.45	4.87	8.2
Government total Expenditure on mental health as % of the total government expenditure	-	-	-	-	-	0.003	-	-	-	0.02	0.0	-	-	1.30
Government Total Expenditure spent on mental hospitals as % of total government mental health expenditure	-	-	-	-	-	-	-	-	-	11.0	-	-	-	-

Out of pocket expenditure on health as % of (THE)	37.34	59.31	43.69	33.43	-	26.61	52.96	60.54	74.99	10.27	39.72	51.41	58.79	43.46
Insurance for mental health care and treatment /Reimbursement schemes	Yes	No	Yes	Yes	-	Yes	No	-	Yes	Yes	-	No	No	-

Supplementary Table 1b. Selected mental-health financing and policy indicators for 18 Sub-Saharan African countries, extracted from the 2024 World Health Organization (WHO) Global Health Expenditure Database and the WHO Mental Health Atlas.

Supplementary Table 2. Non-genetic risk factors in African populations

Risk factor categories	Risk factor	Implicated disorder(s)	Example studies
Demographic			
Age	Variable associations, extremes of age, increasing age	Psychotic disorders, cognitive disorders, any mental disorder	Kwobah et al., 2017; Kebede & Alem, 1999
Gender	Male, female, minority gender	Any mental disorder,	Ghanem et al., 2009
Marital status	Being unmarried, separated, divorced or widowed	Mood disorders, anxiety disorders, PTSD, alcohol and substance use disorders, psychotic disorders	Kebede & Alem, 1999; Adewuya et al., 2018; Andersson et al., 2018; Audet et al., 2018; Atwoli et al., 2013
Level of education	Low or high level of education, inverse association	Mood disorders, anxiety disorders, PTSD alcohol and substance use, cognitive disorders	Herman et al., 2009; Audet et al., 2018; Atwoli et al., 2013; Kebede & Alem, 1999
Ethnicity, Racial minority status	Being black in multiracial country	Psychotic disorders	Adjorlolo & Setordzi, 2021
Religion	Not of the Islamic faith	Substance use disorders	Adewuya et al., 2021
Unemployment	Unemployment, retirement	Mood disorders, anxiety, psychosis	Adewuya et al., 2018; Kebede & Alem, 1999
Place of residence	Rural dwelling	Psychosis, intellectual disability,	Adjorlolo & Setordzi, 2021; Roberts et al., 2023; Patel et al., 2007
Poverty			
Socio-economics	Low-income, low middle-income, low socio-economic status, food insecurity	Mood disorders (incl. perinatal), psychosis	Audet et al., 2018; Andersson et al., 2018; Oladeji et al, 2022; Roberts et al., 2023
Trauma & trauma related			
Abuse and violence	Abuse,community violence	Common mental disorders	Steventon et al., 2022
Intimate partner violence	Physical, sexual and psychological Intimate partner violence	Mood disorders, anxiety, PTSD	Umubyeyi et al., 2014
Traumatic life events	Witnessing or experiencing traumatic events, community violence, stressful life events	PTSD, mood disorders	Atwoli et al., 2013; Terasaki et al., 2009; Steventon Roberts et al., 2022
Comorbid medical conditions			
Infection	Living with HIV/AIDS, having a medical comorbidity	Common mental disorders	Kwobah et al., 2017; Steventon Roberts et al., 2022
Social support			
Social connectedness	Lack of perceived social support	Common mental disorders	Steventon Roberts et al., 2022
Migration			
Migration status	Migrant African pops in other countries	Mood disorders	Fenta et al., 2004

Supplementary Table 3. Quantitative genetic estimates for psychiatric conditions

Clinical disorder	Prevalence	Heritability: EUR twin studies	Heritability; EUR families	SNP heritability, h^2	Current major GWAS source
ADHD	~5% in children/adolescents; ~2.5% in adults	0.74	0.64	0.11, s.e. = 0.01; diagnosis-only estimate 0.14, s.e. = 0.01	PMID: 40962958 ; diagnosis-only source PMID: 36702997
PTSD	~15%	0.43	0.29	0.053, s.e. = 0.002	PMID: 38637617
Schizophrenia/SZ	~1%	0.81	0.70	0.24, s.e. = 0.007	Current ancestry-diverse update PMID: 41565822 ; core PGC source PMID: 35396580
Major depressive disorder/DEP	~15%	0.37	0.31	0.084, s.e. = 0.007	PMID: 39814019
Bipolar disorder/BD	~1–2%	0.75	0.68	0.19	PMID: 39843750

Supplementary Table 4. Projects of the NIH Ancestral Populations Network

APN study (acronym & full name)	Primary disorder(s)	Geographic focus /ancestry	Planned sample size†	Key design features
EPIMEX: <i>Genetic Architecture of Early-Onset Psychosis in Mexicans</i>	Early-onset psychosis (child / adolescent schizophrenia spectrum)	Mexico (admixed Mexican)	≈ 1,900 cases + 1,900 controls	Deep trio sequencing, low-pass WGS, harmonised youth-onset phenotypes
LATINO: <i>Latin-American Trans-ancestry Initiative for OCD Genomics</i>	Obsessive-compulsive disorder	15 Latin-American countries + US-Latinx diaspora	≥ 5,000 cases (+ matched controls)	Multi-country recruitment; GWAS plus rare-variant panel
KOMOGEN-D: <i>Korean Mood-Disorder Genomics Depression arm</i>	Major depressive disorder	Republic of Korea (East Asian)	10,000 cases + 10,000 controls‡	Cross-sectional & family cohorts; whole-genome sequencing; socio-environmental data
PUMAS: <i>Powering Genetic Discovery for Severe Mental Illness in Latin America & African Ancestries</i>	Schizophrenia and bipolar I disorder	Seven Latin-American & eight sub-Saharan African sites	40,000 SCZ, 40,000 BIP, 40,000 controls	Low-pass WGS on 120 000 samples; trans-ancestry fine-mapping
SAXII: <i>Genomics of Schizophrenia in the South African Xhosa</i>	Schizophrenia	Eastern Cape & KwaZulu-Natal, South Africa (Xhosa)	11,000 cases + 9,000 controls‡	Community-engaged recruitment; WGS; social-determinant integration
GALA: <i>Genomics of Autism in Latinx Ancestries</i>	Autism-spectrum disorder	Mexico, Brazil, Argentina, US Latinx	8,000 parent–proband trios	GWAS and exome sequencing; ancestry-aware polygenic scores
A-BIG-NET: <i>Asian Bipolar Genetics Network</i>	Bipolar disorder type I	India, Pakistan, Singapore, South Korea, Taiwan	27,500 cases + 16,000 controls	Blend of high-coverage WES and low-pass WGS; rich environmental profiling
PTSD-Africa: <i>Genetics of PTSD in African Ancestry Populations</i>	Post-traumatic stress disorder	Multi-country sub-Saharan Africa	≈ 27,000 PTSD cases + 112,000 trauma-exposed controls	First large Africa-centred PTSD resource; deep trauma phenotyping; capacity-building
GPC: <i>Genomic Psychiatry Cohort</i>	Schizophrenia and bipolar disorder	United States (multi-ethnic: African-, Latino-, European-ancestry)	> 35,000 SCZ, > 35,000 BIP, > 35,000 controls	Long-term clinical cohort; GW genotyping + WGS; longitudinal phenotypes

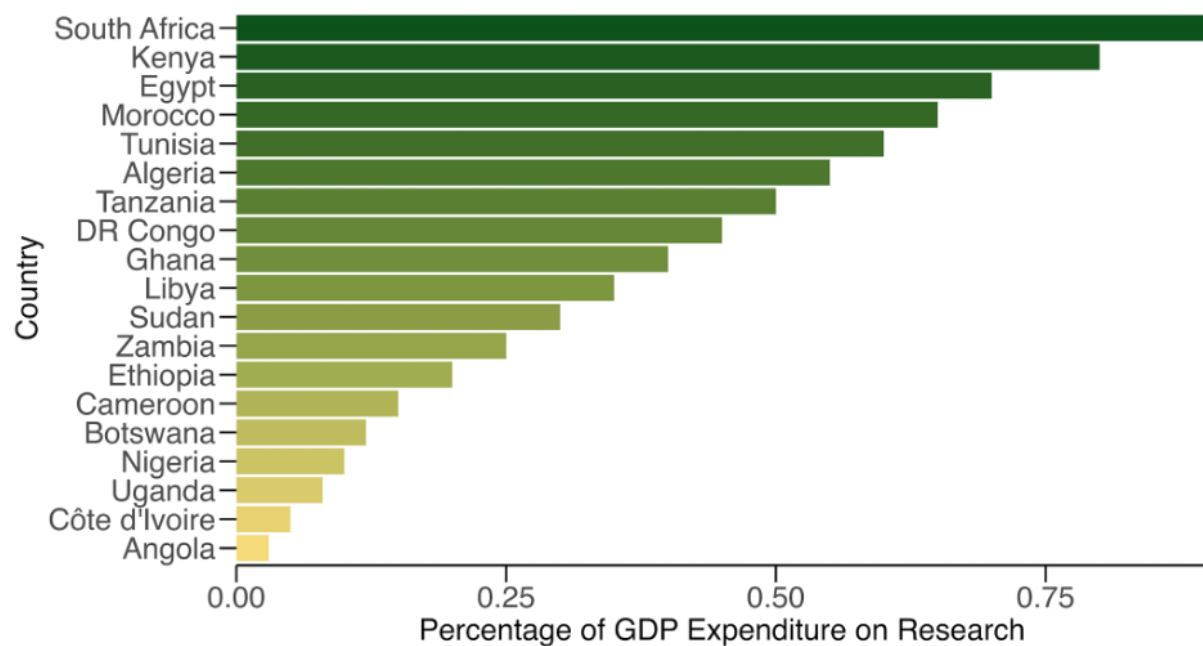
Supplementary Table 4. Together, the nine APN studies encompass psychosis, mood, anxiety/OCD, PTSD and neurodevelopmental disorders across African, Latin-American, Asian and US populations. † Targets reported in funding announcements or public project descriptions (status: mid-2025). ‡ Approximate numbers stated by investigators; final enrolment may change.

Supplementary Table 5. African sequencing initiatives

Project	Aim	Sample size	Sequencing facility	Data type	Reference
African Genome Variation Project	Assess African genetics diversity	320	Wellcome Sanger Institute, United Kingdom	Whole genome	Gurdasani et al. 2015
Gambian Genome Variation Project	Discovery and understanding of genetic variants that influence human disease	773	Wellcome Sanger Institute, United Kingdom	Whole genome	
Schizophrenia in South African Xhosa (SAX)	Genetics of schizophrenia	~2000	Washington University, USA	Whole exome	Gulsuner et al. 2020
NeuroGAP	Genetics of Psychosis	42,000	Broad Institute, USA	Blended Genome Exome	Boltz et al, 2024
Egypt Genome Project	Characterize genomic diversity in Egypt. Establish Egyptian reference genome	Objective 100,000	Egypt Center for Research and Regenerative Medicine	Whole genome	Elmonem et al., 2024
H3Africa	Characterize genomic diversity across Africa	426	Baylor College, the Illumina sequencing centre in San Diego, USA and the Centre for Genomic Research, University of Liverpool, United Kingdom	Whole genome	Choudhury et al., 2020
South African Human Genome programme	Understand population history among South Africans	24	Illumina Service Centre, San Diego, USA	Whole genome	Choudhury et al., 2017
Genome Tunisia Project	Characterize genomic diversity in Tunisia. Establish Tunisia reference genome	Objective 10,000		Whole genome	Hamdi et al. 2024
Botswana	Characterize genomic diversity in Botswana	390	BGI Cambridge, MA, US	Whole genome	Thami et al., 2020

Moroccan Genome Project	Characterize genomic diversity in Morocco and Establish Morocco reference genome.	109	Mohammed VI center of research and innovation	Whole genome	El Fahime et al., 2024
The SEN-GENOME project	Characterize genomic diversity in Senegal and Establish Senegalese reference genome.	1,000	54gene Nigeria Molecular Genetics Laboratory	Whole genome	Gaye et al., 2024
54gene/NCD-GHS, Nigeria	Characterize genomic diversity in Nigeria	449	54gene Nigeria Molecular Genetics Laboratory	Whole genome	Joshi et al., 2023
Ghana Genome Project	Characterize genomic diversity in Ghana	1,000		Whole genome	
Ethiopia	Characterize genomic diversity in Ethiopia	17	BGI Cambridge, MA, US	Whole Genome	Udpa et al., 2014
Sudan	Characterize genomic diversity in hypertensive patients	13		Whole Genome	Ibrahim 2018

Supplementary Figure 1. Domestic expenditure on research and development in Africa



Supplementary Figure 1. Gross domestic expenditure on research and development (GERD) as a share of GDP in Africa. Horizontal bars rank 18 African countries by their mean gross domestic expenditure on research and development (GERD) expressed as a percentage of gross domestic product (GDP). Values represent the three-year average for each nation (calendar years 2020, 2021 and 2022) based on the most recent UNESCO Institute for Statistics data at time of production in mid 2025. Bar length and colour intensity both scale with the share of GDP devoted to R&D, from dark green (highest investment; South Africa $\approx$ 0.83 %) to pale yellow (lowest; Angola $\approx$ 0.02 %). DR Congo = Democratic Republic of the Congo.