OCTOPUS: One Collaborative Training Program for Outbreak Preparedness and Universal Surveillance

Co-funded by the European Union

CEPI

Global Health EDCTP3

TRIPLE-SYNBIO: Triple-Duty Indigenous Synbiotics to Sustainably Alleviate Health and Nutrition Challenges for African Perinatal Women and Children Under-Five

MINISTRY OF FOREIGN AFFAIRS OF DENMARK

Danida Fellowship Centre

Co-funded by the European Union

OCTOPUS

One Collaborative Training Program for Outbreak Preparedness and Universal Surveillance

EU-HORIZON-JU-GH-EDCTP3
€1 299 926



KENYA

Chuka University (CU)

Kenya Medical Research Institute (KEMRI)
Aga Khan University Kenya (AKU)



RWANDA

Rwanda Biomedical Center (RBC)

University of Rwanda (UR)



UGANDA

Ministry of Health (MOH-Uganda)

Mbarara University of Science and Technology (MUST)



TANZANIA

Kilimanjaro Christian Medical College (KCMUCo)



BURUNDI

Institut National de Santé Publique (INSP)



DR CONGO

Université Evangélique en Afrique (UEA)



DENMARK

BENEFICIARY

Technical University of Denmark (DTU)
Patrick Njage
Rene Ndoyi
Beatrice Muchiri

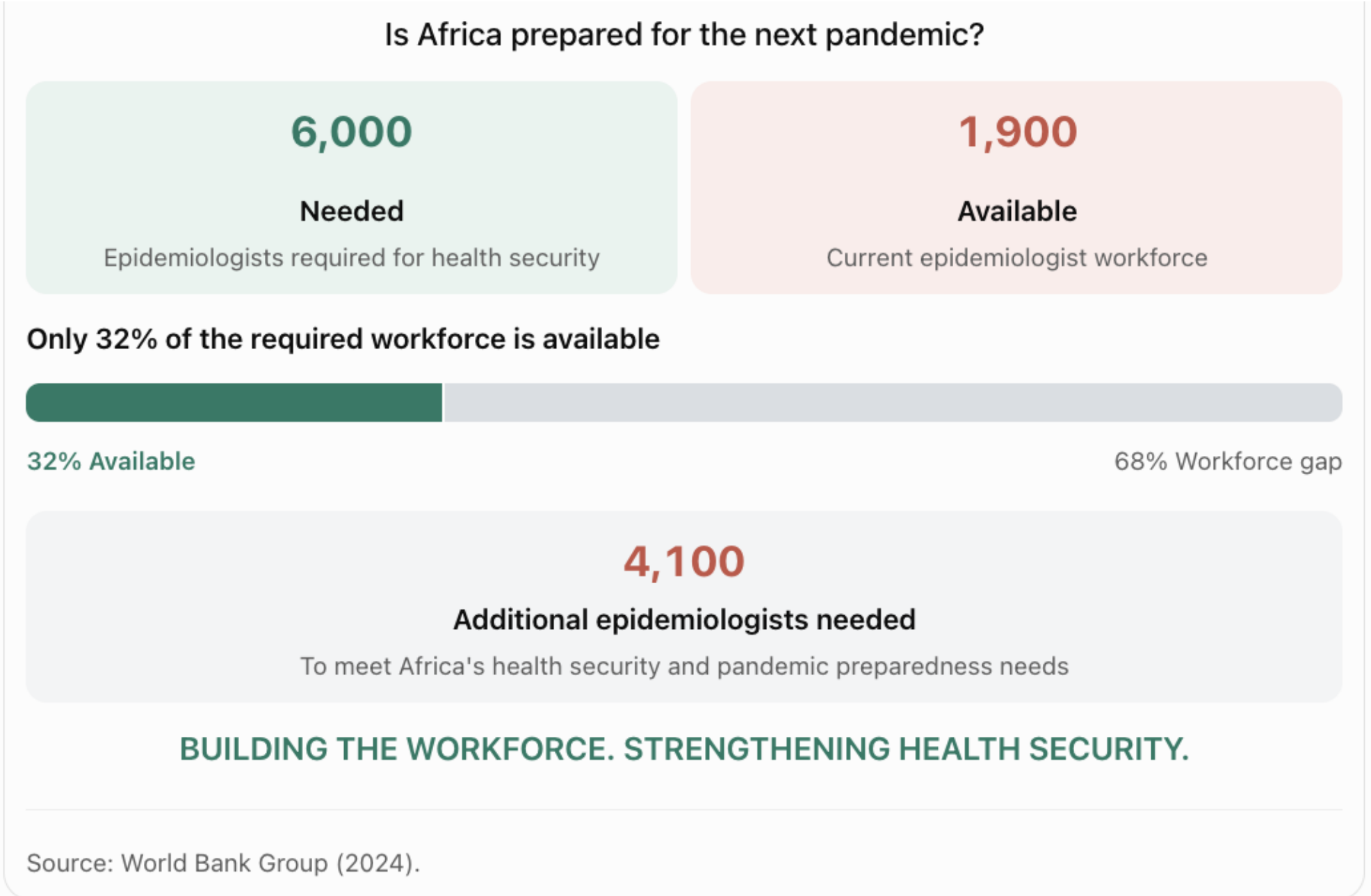


NETHERLANDS

CONSORTIUM COORDINATOR

European & Developing Countries Clinical Trials Partnership (EDCTP Assoc)

Why OCTOPUS? Africa's Epidemiology Workforce Gap



Why OCTOPUS?

The region needs people, tools and institutions ready before the next public health emergency.



Capacity gap

Recurrent infectious disease threats

- Scarce advanced epidemiology, biostatistics and modelling capacity.

OCTOPUS

- Train skilled fellows
- Embed in real institutional problems
- Produce usable outputs
- Sustainable regional knowledge dissemination

Six project objectives

1 Increase public health experts

Master’s fellows, modelling trainees and cascade training.



2 Integrate field research

Fellows apply skills in public health institutions.



3 Produce actionable data insights

Dashboards, maps, forecasts, pipelines and policy briefs.



4 Strengthen collaboration

Data sharing, exchanges, communities and symposia.



5 Improve retention

Career pathways, mentoring, alumni hub and evidence.



6 Communicate for uptake

Website, stakeholder engagement, EDCTP Forum and outputs.



OCTOPUS at a glance

A regional training-to-implementation engine for outbreak preparedness and universal surveillance.

48 months

6 East African countries – Great lakes

45 master's fellows

6-7 Training Workshops

≥ 4,500 cascade trainees

16 work packages

- Capacity building through Master's training and semester modelling courses
- Field attachments in public health institutions to generate usable outputs
- Data and analytics infrastructure supporting dashboards, maps, forecasts and policy briefs
- Institutional collaboration, workforce retention and dissemination for sustainability

OCTOPUS | THE MULTIPLIER MODEL

Decentralized Expertise Dissemination

Advanced training- locally led knowledge-sharing across Sub-Saharan Africa

1 | BUILD EXPERTISE

45

OCTOPUS fellows receive advanced training in epidemiology, biostatistics and modelling

2 | CASCADE

4 × 25

Each fellow leads four online workshops, reaching around 25 professionals per workshop

3 | MULTIPLY SKILLS

4,500+

Public health professionals trained through peer-led knowledge transfer

4 | SYSTEM-WIDE IMPACT

Stronger

surveillance • outbreak response • evidence-informed decisions

KNOWLEDGE IS DISSEMINATED THROUGH LOCAL AND REGIONAL NETWORKS

BURUNDI — DR CONGO — KENYA — RWANDA — TANZANIA — UGANDA

Fellows return to their institutions • train peers • share practical skills • sustain regional learning

Model inspired by Sharma & Datta (2012) Decentralized Information Dissemination model

Work package architecture: 16 WPs in 9 delivery blocks

The split supports reporting-period logic, payment timing and clearer responsibility.

WP1–WP3

Scientific leadership

Lead: CU

WP4–WP7

Training

Lead: DTU / UR

WP8–WP10

Field + data

Lead: KEMRI / DTU

WP11–WP14

Collaboration + retention

Lead: RBC / KEMRI

WP13–WP16

Communication + management

Lead: CU / EDCTP Assoc

Training pathway: two tracks, one capacity engine

OCTOPUS combines degree training with semester modelling training and cascade dissemination.

Master's academic training

WP4: curricula validation, selection and onboarding.

WP5: core coursework, supervision, assessment and transition to field research.

Semester modelling training

WP6: curriculum, recruitment and initial delivery.

WP7: advanced modelling, simulations, toolkits and reusable outputs.

Decentralised dissemination

Fellows and trainees become multipliers through structured workshops, seminars and materials aimed at reaching thousands of professionals.

Training quality safeguards

Validated curricula, mentoring package, progress reports, technical support and quality assurance help protect learning quality.

Fellowship lifecycle

Call	Selection	Onboarding	Coursework	Placement	Outputs	Completion
M1–M6	M2–M6	M4–M8	M10–M24	M18–M36	M25–M42	M46

- Universities: selection, registration, tuition activation, teaching, assessment and academic supervision.
- Public health institutions: placements, host-site readiness, mentoring, data access and uptake of outputs.
- Technical partners: modelling, data workflows, analytics platform, dashboards and documentation.
- Coordinator and scientific leadership: governance, quality, reporting and evidence tracking.

Field attachments: from training to experience

WP8 prepares the ground; WP9 turns placements into usable public health outputs.

WP8: readiness

- Placement plans
- Supervision structures
- Ethics/ site access
- Data-sharing
- Deployment arrangements

WP9: delivery

- Supervised placements
- Applied research
- Dashboards
- Forecasts
- Geospatial visualization
- Policy briefs
- Manuscripts

Expected outputs

- Applied outputs package
- Policy brief package
- Manuscript and research output package
- Supervision and placement performance evidence

Data and analytics infrastructure

Reusable data workflows and technical assets to convert learning into institutional capability.

- Data harmonisation, interoperability and access workflows
- Validated analytical pipelines and technical documentation
- Training datasets, user onboarding and technical support
- FAIR-aligned data management and routine-use readiness
- Dashboards, code repositories, open anonymised datasets and platform

Institutional collaboration and workforce retention

WP11 Collaboration

- Cooperation frameworks,
- Data-sharing arrangements
- Faculty exchange
- Communities of practice
- Regional networking events
- Long-term partnership mechanisms

WP12 Retention

- Mentoring
- Career development
- Workforce integration pathways
- Retention study
- Policy-facing outputs
- Alumni/professional hub

Sustainability starts during implementation - not an end-of-project activity.

Beatrice W. Muchiri

Academic Officer | Research Group for Genomic Epidemiology, DTU

Research and programme coordinator with experience across Africa, Europe and the United States.

PhD in Psychology

University of South Africa

Relevant Experience

- International project & partner coordination
- Training, capacity building & learner support
- Research administration, reporting, monitoring & evaluation
- Data analytics in social epidemiology
- User-centred design and digital learning

Beatrice Support for OCTOPUS

Helping connect people, training, data and partner institutions to strengthen outbreak preparedness and public health analytics across Sub-Saharan Africa.

TRAINING & FELLOWS

- Coordinate curriculum validation, learning activities, workshops and programme support;
-Fellows and trainees onboarding, engagement and follow-up.

PARTNERSHIPS

- Facilitate communication and collaboration across the international consortium and its **academic** and **public-health** partners.
- Research on workforce retention

DATA & REPORTING

Support structured documentation, centralised data and analytical outputs, progress tracking and reporting to the EU.

CAPACITY BUILDING

Help translate technical outputs into accessible training materials and support continuous improvement of learning programmes.

EXPERIENCE UNISA • Institute for Statistics & Data Science • DTU | TOOLS Python • R • Power BI • Moodle • Figma | LANGUAGES English • Swahili • Danish • Kikuyu

Triple-Duty Indigenous Synbiotics to Sustainably Alleviate Health and Nutrition Challenges for African Perinatal Women and Children Under-Five", ("TRIPLE-SYNBIO")

DFC Funded Ca. DKK 10,000,000

MINISTRY OF FOREIGN AFFAIRS OF DENMARK

Danida Fellowship Centre

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Theresa Awotundun

Olanrewaju Fayemi

Mary Omolola Omosebi

Fehintoluwa Joy Femi-Olabisi

THE PROBLEM

Interconnected crises of malnutrition, infectious diseases, and antimicrobial resistance threaten the health and future of women and children in Sub-Saharan Africa.

TRIPLE BURDEN OF MALNUTRITION

- Undernutrition (stunting, wasting, underweight)
- Micronutrient deficiencies (iron, zinc, vitamin A, B12, folate)
- Overnutrition and rising obesity

Greatest impact on children under five and perinatal women

HIGH BURDEN OF DIARRHEAL DISEASES

- Leading cause of illness and deaths in children under five
- Impairs nutrient absorption and growth
- Recurrent infections trap families in a cycle of poverty

Weakens immunity and undermines child development

RISING ANTIMICROBIAL RESISTANCE (AMR)

- Overuse and misuse of antibiotics in humans, animals and agriculture
- Fewer effective treatments for common infections
- Increased health costs and mortality

AMR threatens to reverse health gains and endanger future generations

ROOT CAUSES & SYSTEMIC CHALLENGES

- Limited access to nutritious, affordable and safe foods
- Poor sanitation, clean water and hygiene
- Low awareness and fragmented interventions
- Climate change and food insecurity

Sustaining the cycle of poor health, poverty and inequality

WHY IT MATTERS

- Stalls economic growth and human potential
- Strains health systems and resources
- Increases vulnerability to future epidemics and shocks

Urgent need for native, sustainable and scalable solutions for Africa

THE OPPORTUNITY

Indigenous fermented foods and microbes are a rich, under-utilized resource. Our research leverages local biodiversity to develop safe, effective and affordable synbiotic solutions that improve nutrition, strengthen gut health and combat AMR.

PROBIOTICS + PREBIOTICS + BACTERIOCINS = HEALTHIER COMMUNITIES

AFRICAN INNOVATION | FUNCTIONAL FOOD OPPORTUNITY

From indigenous foods to a growing synbiotic market

1. BUILD ON LOW-COST, CULTURALLY RELEVANT CARRIERS

Use familiar African food matrices to deliver probiotics (PBs) + prebiotics as synbiotics.



SORGHUM



MAIZE



MILLET



CASSAVA



INDIGENOUS VEGETABLES

PB PROBIOTICS + PRE PREBIOTICS = SYNBIOTICS

Locally adapted • affordable • familiar food formats

2. ENTER A RAPIDLY GROWING GLOBAL MARKET

Global functional food market value (USD)



3. CREATE LOCAL VALUE

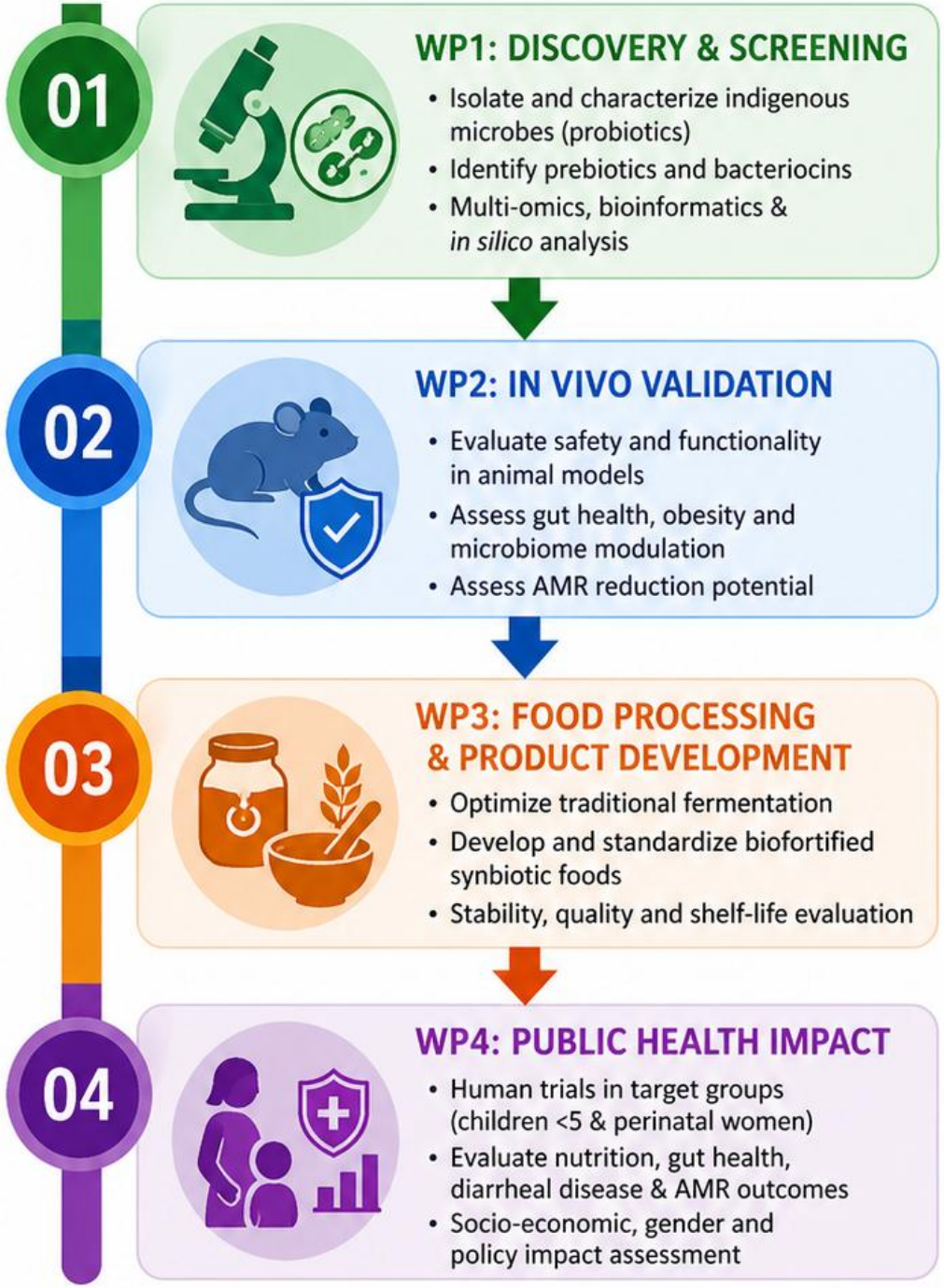
- **SME growth**
  Local production and product development
- **Lower healthcare costs**
  Potential savings through better health
- **Economic opportunities**
  Jobs, enterprise and value creation in SSA

OVERALL GOAL

Develop and validate indigenous synbiotics to sustainably improve nutrition, reduce diarrheal diseases and combat AMR in Sub-Saharan Africa.

IMPROVED GUT HEALTH & IMMUNITY	REDUCED DIARRHEAL DISEASE	REDUCED AMR & ANTIBIOTIC USE	ENHANCED MICRONUTRIENT STATUS & GROWTH	METABOLIC HEALTH & OVERNUTRITION
Strengthen gut health and immune function across vulnerable groups.	Lower incidence and severity of diarrheal diseases in children and communities.	Reduce antimicrobial resistance and reliance on antibiotics in humans, animals and agriculture.	Improve micronutrient status, support healthy growth and development, especially in children and perinatal women.	Develop indigenous synbiotics to support healthy weight, improve metabolic health and reduce obesity-related risks.
-Discover indigenous probiotic Strains from African fermented Foods; characterise gut-health, antimicrobial and immune effects - Rational microbiome design: combine selected strains with prebiotics to develop synbiotics	-Screen strains and synbiotics against diarrheal pathogens. -Validate pathogen inhibitioc in vitro, in vivo and in target population nutritional trials	-Genome-mine and characterise bacteriocins from indigenous microbes for targeted activity. -Tract gut AMR genes and antimicrobial use in intervention studies.	-B-group vitamins: folate (B9), riboflavin (B2) and cobalamin (B12). - Essential amino acids. -Rational microbiome design: adaptive evolution & protocooperation for high performing strains.	-Screen anti-adipogenic strains and metabolic-health effects. -Test in cell/gut models and validate weight and metabolic biomarkers in vivo.

Approach: from discovery to impact



CAPACITY & NETWORK STRENGTHENING

Building the people, platforms and partnerships

6
PhD candidates

4
MSc candidates

2
Postdoctoral fellows

6
Research assistants

01

ADVANCED RESEARCH CAPACITY

- Genomics expertise
- Gut-models for microbiome research

02

RESEARCH NETWORKS

- North–South collaboration
- South–South collaboration

2031

EXPECTED OUTCOMES

A portfolio of scientific outputs, shared resources and market-ready innovations

BY 2031, THE PROJECT WILL DELIVER

D

5+

VALIDATED SYNBIOTIC FOOD PRODUCTS

Product innovation

D

NOVEL

BACTERIOCINS TARGETING AFRICAN PATHOGENS

Scientific discovery

P

NATIONAL

MICROBIAL REPOSITORIES

Future research input

S

OPEN-ACCESS

MULTI-OMICS DATASETS

Shared research resources

T

SME-READY

FUNCTIONAL FOODS FOR SCALE-UP

Translation and uptake

DISCOVER → PRESERVE → SHARE → TRANSLATE INTO PRACTICE

Expected project outcomes by 2031