



DSI-NRF
Centre of Excellence
in Food Security

2022

DSI-NRF Centre of Excellence
in Food Security (CoE-FS)

ANNUAL PROGRESS REPORT



ANNUAL PROGRESS REPORT (APR 2022)

DSI-NRF Centre of Excellence
in Food Security (CoE-FS)

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Acronyms / abbreviations

AAMP	Agriculture and Agro-processing Master Plan	FDA	United States Food and Drug Administration
ARC	Agricultural Research Council	FLRF	Family Larsson-Rosenquist Foundation
ARUA	African Research Universities Alliance	FOPL	Front-of-Package Labels
ASSAf	Academy of Science of South Africa	FOSC	ERA-Net Cofund on Food Systems and Climate
ASSURE	Agent-based modelling of Social Segregation and URban Expansion	FSNet-Africa	Food Systems Research Network for Africa
BDU	Bahir Dar University	GCRF	Global Challenges Research Fund
BMI	Body mass index	GFS	Global Food Security Conference
BVM	Breed Valley Municipality	GHS	General Household Survey
CA	Collaborating Agreement	GovInn	Governance Innovation
CaBFoodS-Africa	Capacity Building in Food Security for Africa	GSA	Grain South Africa
CDM	Child-Directed Marketing	HACCP	Hazard Analysis and Critical Control Point
CHEC	Cape Higher Education Consortium	HICD	Human and Institutional Capacity Development
CIRAD	Centre de coopération Internationale en Recherche Agronomique pour le Développement / French Agricultural Research Centre for International Development	HMT	Heat Moisture Treatment
CoE-FS	DSI-NRF Centre of Excellence in Food Security	HPH	High-Pressure Homogenisation
CoP	Community of Practice	HPL	Health Promotion Levy
CRAM-MATCH	Coronavirus Rapid Mobile Survey of Maternal and Child Health	HSRC	Human Sciences Research Council
CSG	Child Support Grant	ICP-OES	Inductively Coupled Plasma Optical Emission
CVD	Cardiovascular disease	IDS	Institute of Development Studies, University of Sussex
DAFF	Department of Agriculture, Forestry and Fisheries	IR HMT	Infrared Heat Moisture Treatment
DALRRD	Department of Agriculture, Land Reform and Rural Development	ISD	Institute for Social Development, University of the Western Cape
DHS	Demographic and Health Surveys	KAP	Knowledge, attitudes and practices
DoH	National Department of Health	KPA	Key Performance Area
DRDAR	Eastern Cape Department of Rural Development and Agrarian Reform	KSQ	Key Sustainability Questions
DSI	Department of Science and Innovation	KU Leuven	Katholieke Universiteit Leuven
DUT	Durban University of Technology	LEAP-Agri	Long-term Europe-Africa Research and Innovation Partnership on Food and Nutrition Security and Sustainable Agriculture
DVC	Deputy Vice-Chancellor / Deputy Principal	MAK	Makerere University
ECD	Early Childhood Development	MANCO	Management Committee
EDP	Western Cape Economic Development Partnership	MoU	Memorandum of Understanding
EGI	Estimated Glycaemic Index	MU	University of Missouri
ERA-Net	European Research Area Network	NCD	Non-communicable disease
EU	European Union	NDIS	National Dietary Intake Study
FAO	Food and Agriculture Organization of the United Nations	NIDS-CRAM	National Income Dynamics Study - Coronavirus Rapid Mobile Survey
		NRF	National Research Foundation
		NWU	North-West University
		OFSP	Orange-Fleshed Sweet Potato

PI	Principal Investigators	Tgel	Gel point temperature
PL	Project Leaders	TPP	Transformative Partnership Platform
PSA	Potatoes South Africa	TUT	Tshwane University of Technology
PARI	Public Affairs Research Institute	UCT	University of Cape Town
ROFE	Researching the Obesogenic Food Environment	UD	University of Delaware
ROT	Crop rotation	UFH	University of Fort Hare
SACSoWACH	South African Civil Society for Women's Adolescent's and Children's Health	UG	University of Ghana
SADC	Southern African Development Community	UH	University of Helsinki
SAFCEI	Southern African Faith Communities' Environment Institute	UJ	University of Johannesburg
SAFL	Southern Africa Food Lab	UKRI	UK Research and Innovation
SALGA	South African Local Government Association	UKZN	University of KwaZulu-Natal
SAMRC	South African Medical Research Council	UL	University of Limpopo
SARCHI	South African Research Chairs Initiative	UMD	University of Maryland
SAUFFT	South African Urban Food and Farming Trust	UNAS	Uganda National Academy of Sciences
SCFA	Short-Chain Fatty Acid	UNDESA	United Nations Department of Economic and Social Affairs
SCICOM	Scientific Sub-Committee	UNESCO	United Nations Educational, Scientific and Cultural Organization
SLA	Service Level Agreement	UNISA	University of South Africa
SLF	Sustainable Livelihoods Foundation	UP	University of Pretoria
SMME	Small, Medium and Micro enterprises	UPF	Ultra-processed food
SONA	State of the Nation Address	USDA	United States Department of Agriculture
SQC	Sensory quality control	UWC	University of the Western Cape
SSB	Sugar-Sweetened Beverages	VU Amsterdam	Vrije Universiteit Amsterdam
Stats SA	Statistics South Africa	WCG	Western Cape Government
STEERCOM	Steering Committee	WFP	Women on Farms Project
STEM	Science, Technology, Engineering and Mathematics	WHO	World Health Organisation
SU	Stellenbosch University	Wits	University of the Witwatersrand
TAFS	Transitions to Agroecological Food Systems	WP	Work Package
TARDI	Tsolo Agriculture and Rural Development Institute	WRC	Water Research Commission
		WWF	World Wide Fund for Nature
		ZEF	Center for Development Research, University of Bonn

INTRODUCTION

The DSI-NRF Centre of Excellence in Food Security (CoE-FS) was established in 2014. It is hosted by the University of the Western Cape (UWC) and co-hosted by the University of Pretoria (UP). The CoE-FS's vision is to be a global leader in research, capacity building, knowledge brokerage and service provision in food security and nutrition in Africa. This is to be achieved through collaborations with outstanding institutions and scholars.

The CoE-FS operates as a virtual centre, bringing together the expertise of South African and international institutions across various disciplines.

We receive an annual core grant from the National Research Foundation (NRF), and have successfully bid for additional research grants to increase our output and reach.

Our mission is to undertake research, capacity building and dissemination regarding how a sustainable food system can be achieved, in order to realise food security for poor, vulnerable and marginal populations. Our driving value proposition is that food and nutritional security are imperative for human survival with dignity, and must take into account economic vitality, social justice, and human and environmental health.

Our goals are to:

UNDERSTAND FOOD SYSTEMS

To build a comprehensive understanding of the changing national and global food system and how this affects the sustainability, availability, access, utilisation and attributes of food in South Africa.

IDENTIFY THE 'FOOD INSECURE'

To identify the 'food insecure' in South Africa, where they are located, and what their choices are, and their strategies and opportunities when seeking food security, health and well-being; and to understand how these change in response to the changing food system.

ENABLE ACCESS TO FOOD

To develop and promote policies, technologies, interventions and products that enable access to affordable and nutritious food in ecological, economic, social and politically sustainable ways.

GROW RESEARCH CAPACITY

To grow capacity in South Africa to undertake this research through training, grants and bursaries.



We have pursued these goals through:

- **Transdisciplinary modes of inquiry:** This mode of knowledge production and cooperation offers innovative methodologies for high-impact science through understanding and acting on complex societal problems. The design of our research programmes is informed by direct engagement with actors in the food system, in addition to more conventional approaches to scholarly endeavour;
- **A partnership approach in the organisation of our research activities:** This has required building purposive strategic relationships for the co-design and co-ownership of research problems, methodologies and solutions, by the host institutions and our collaborators;
- **A transformative agenda in terms of the South African and African food security situation:** We provide leadership, evidence for decision-making, and informed debate and critique of policies and programmes aimed at addressing food insecurity through a comprehensive and systems approach to development that recognises the underlying causes of food insecurity, including poverty, patriarchy, unemployment and inequality;
- **Research excellence:** We see this as both increasing our output of rigorous fundamental and applied research, and increasing our impact as determined by citations, peer review, research ratings, alternative metrics (altmetrics) and evidence of the use of research papers and products; and
- **Active engagement in knowledge brokerage and stakeholder engagement to contribute to policy development.**

The CoE-FS has adopted a comprehensive 'farm to fork' approach to the food system. We contend that in the African context, food security is shaped not simply by agro-ecological factors, but also by the terms on which producers, processors, distributors and consumers participate in the food system. Understanding this environment requires enquiries grounded in agronomy, political economy, health sciences, humanities and the legal perspective, including the right to food.

To focus our work on our comparative advantages, we prioritise research that includes:

- Multi-level governance and policy dialogues to create a sound and resilient food system at global, national and local level;

- Innovation regarding the sustainability, productivity and utilisation of indigenous African and other locally available foods that affect food security; and
- Quantity, quality, diversity and safety of diets concerning all forms of malnutrition.
- As a transdisciplinary approach is vital to deepening our knowledge of each of these areas, our research includes cross-cutting themes:
 - A humanities perspective, to explore the complex, dynamic and diverse relationships between food and human beings. Although this has become a discrete project led by UWC, UP and the University of KwaZulu-Natal (UKZN), the research undertaken in all of the CoE-FS programmes continues to be informed by a humanities perspective;
 - A food systems perspective, addressing the complexities of the production, processing, marketing, distribution and consumption of food, with consideration of the environmental impacts of the food system. Increasingly, our concern is shifting to local, spatially bound food systems, particularly those in which there are distinct urban/rural flows and dynamics; and
 - A social protection and poverty-reduction perspective, concerned with the causes and consequences of – and solutions to – multiple deprivations.

We work as a multidisciplinary team of research leaders, project managers and students, drawn from 43 collaborating institutions in South Africa and abroad. The CoE-FS uses both deductive and inductive reasoning to better understand the changing nature of the food environments of vulnerable consumers and food producers – their responses, food security strategies and choices, in the context of a growing health and environmental crisis. Since inception, we have collaborated with 10 out of South Africa's 26 universities, seven of which are HDIs.

Furthermore, the CoE-FS continues to seek innovative ways to apply its research at the local level, as well as ways to engage with policymakers, practitioners, other academics and the general public. While pursuing its mission and vision, the CoE-FS makes every effort to contribute to government initiatives and deliver on international development food security priorities.

In 2022, our research activities included:

South Africa/United Kingdom

KINGDOM BILATERAL RESEARCH CHAIR IN SOCIAL PROTECTION FOR FOOD SECURITY

(SARCHI) (held by Professor Stephen Devereux)

A UNESCO

CHAIR IN SCIENCE AND EDUCATION FOR AFRICAN FOOD SYSTEMS

(held by Professor Julian May)

Projects funded by the

LONG-TERM EUROPE AFRICA RESEARCH AND INNOVATION PARTNERSHIP

on Food and Nutrition Security and Sustainable Agriculture (LEAP-Agri), and the Family Larsson-Rosenquist Foundation (FLRF)

ADDITIONAL MOUS

exist between UP and the following institutions linked to the CoE-FS: Wageningen University & Research, the Netherlands; Cornell University, US; the University of Leeds, UK; and the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN).

DIRECTORS' REPORT

It has been almost a decade since the DSI-NRF Centre of Excellence in Food Security (CoE-FS) was launched, with the vision to become a global leader in research, capacity building, knowledge brokerage and service provision in food security and nutrition in Africa.

For three consecutive years (2019-2021), the University of Pennsylvania's 'Global Go To Think Tank Index' ranked the CoE-FS in the top 100 global think tanks in food security. This has been achieved through our output, science communication and collaborations with outstanding institutions and scholars.

Since our inception, we have concluded 43 memoranda of agreement and Collaborating Agreements (CAs) with universities, research institutions, civil society organisations and public institutions. These include the Institute for Development Studies at the University of Sussex (IDS), ranked first in the field of "Development Studies" by the Times Higher Education Index; the Food and Agricultural Organization of the United Nations (FAO); the World Bank; and the French Agricultural Research Centre for International Development (CIRAD), ranked second in the world in terms of co-publications with African researchers in the field of agricultural science.

We have collaborated with 10 out of South Africa's 26 universities, seven of which are other historically disadvantaged institutions (HDIs). We have also collaborated with the Agricultural Research Council (ARC), South African Medical Research Council (SAMRC), Human Sciences Research Council (HSRC) and the Academy of Science of South Africa (ASSAf). At the same time, we work with local government and grassroots organisations including the Breede Valley and Witzenberg municipalities, the cities of Cape Town and Johannesburg, the Neighbourhood Farm, Local WILD and the Western Cape Economic Development Partnership (WCEDP).

Our Steering Committee (STEERCOM) has guided our work throughout and has involved internationally renowned scholars. These have included World Food Prize Laureate Professor Lawrence Haddad; the former chair of the High-Level Panel of Experts (HLPE) Professor Patrick Caron (now CIRAD); and Dr Mickey Chopra, the World Bank's Global Solutions Lead for Service Delivery in the Health Nutrition and Population global practice. We are delighted to welcome Professor Mary Scholes as the new Chair of our STEERCOM. Professor Scholes holds the Research Chair in Global Change and Systems Analysis at the University of the Witwatersrand (Wits) and serves on the Council of ASSAf.

The CoE-FS has operated as a virtual centre since its founding, and thus quickly adapted to the COVID-19 and post-pandemic environment. In 2022, we continued to bring together the expertise of South African and international institutions, across various disciplines. In this current three-year cycle, research and training activities take place in three long-term research programmes: (1) Governance, Policy and Power; (2) Innovation

and Technology; and (3) Health, Nutrition and Safety.

Science communication in all forms has been our priority. In 2022 we published 58 peer-reviewed journal articles, one book, six book chapters and 12 working papers/reports; graduated 33 students (this figure includes postdoctoral fellows who completed their research); and received over 200 media mentions. We also supported 127 students in 2022.

Food and nutritional security are imperative for human survival with dignity, and must take account of economic vitality, social justice, and human and environmental health. To operationalise this value, we have worked with human rights research and advocacy institutions such as the Dullah Omar Institute for Constitutional Law, Governance and Human Rights (DOI) at the University of the Western Cape (UWC), the Centre for Human Rights (CHR) at the University of Pretoria (UP), and the Children's Institute (CI) at the University of Cape Town (UCT). This work has contributed towards submissions to the South African Human Rights Commission (SAHRC) among others, including on the right to food for students at higher education institutions. In recognition of this, in 2021 the CoE-FS was invited to become one of the founding members of the international Food Equity Centre, hosted by IDS. During 2022 we participated in an international webinar on food equity, and co-presented a paper on our place-based research, together with examples of similar studies in Brazil and Ghana.

Discipline-specific research and training will remain essential

The bulk of our bursaries are awarded to South African students. However, leverage funding has enabled us to undertake research in 10 other countries on the continent, including in North Africa. The extension of our reach was consolidated with the award of the UNESCO Chair in African Food Systems in 2017, and in 2022 we participated in the 30th Anniversary of the Chairs programme in Paris and applied for the renewal of the Chair, to be jointly hosted by UWC and UP.

Our capacity to assist with policy formulation was enhanced in 2022 with the appointment of the CoE-FS director to the National Planning Commission (NPC), where he serves on a task team focusing on agriculture, land and rural development. In addition, following the successful completion of the South African Rapid Food System Assessment for the FAO in 2021, the CoE-FS was appointed as the lead on the Southern and East African Synthesis of Food Systems at the end of 2022.

Over the past decade, the CoE-FS has served to advance UP's track record in food and nutrition security, while consolidating UWC's expertise in public health, food system governance and agrarian studies. It has drawn together a research group in food plant molecular biology at UWC,

and a similar group in food safety at UP. More importantly, the CoE-FS has provided a safe space for engagement between researchers at different universities, the different government departments with which these researchers have been working, and the civil society organisations that engage with the food system as consumers and producers of food. Our science communication activities have contributed towards widening engagement with food systems, and debates over how outcomes from this system can be more sustainable, inclusive and efficient.

CoE-FS is a fit-for-purpose institution to further contribute towards the knowledge and innovation infrastructure of South Africa and the continent.

Although much has been achieved, food systems are constantly changing. Climate change, a global pandemic, food safety crises and war have added to the complexity and pace of this change. In the immediate term (three to five years), we can expect escalating food prices; outright shortages; new products, technologies and processes; new ways of transacting; and changing systems of governance and innovation.

Discipline-specific research and training will remain essential, as will the need to increase both the diversity and the output of those producing this knowledge. However, the achievement of food and nutrition security requires more than scientific enquiry. Critically, transdisciplinary approaches must be mainstreamed so that environmental, social, cultural, economic and political drivers of change can be better understood and leveraged in a manner that achieves positive outcomes.

A centre of excellence is well placed to contribute towards this. By accepting that research output is a prerequisite rather than a goal, that science communication is embedded rather than desirable, and that impact is a value and not an aspiration, the CoE-FS is a fit-for-purpose institution to further contribute towards the knowledge and innovation infrastructure of South Africa and the continent.

The ambitious model in which an HDI has led a co-hosted centre of excellence has been challenging, but has endured nonetheless. Our 2022 Lekgotla concluded that the union of the host and co-host offers strength, opportunity and diversity, and committed the CoE-FS to continuing, whatever funding opportunities may be in place. In August 2022, the vice-chancellors and deputy vice-chancellors (research and innovation) met and agreed that our collaboration will continue, irrespective of the source of funding that the CoE-FS may receive.



Professor Julian May
Director (UWC)



Professor Lise Korsten
Co-director (UP)



2022 COE-FS AT A GLANCE

Publications

77 PAPERS

IN ACCREDITED JOURNALS AND PEER-REVIEWED BOOKS

40

IN JOURNALS WITH AN IMPACT FACTOR GREATER THAN 3.0

22

AUTHORED OR CO-AUTHORED BY COE-FS STUDENTS

Students

IN 2021, THE COE-FS SUPPORTED

127 STUDENTS

59

DIRECTLY FUNDED BY BURSARIES AWARDED FROM THE NRF GRANT

37

FUNDED THROUGH LEVERAGE FUNDING

31

NON-BURSARY HOLDERS

12

POSTDOCTORAL FELLOWS IN THE COE-FS IN 2021

68%

WERE WOMEN STUDENTS (ABOVE THE TARGET OF 55%)

109/127

WERE BLACK STUDENTS

33 STUDENTS GRADUATED IN 2022

16

OF THESE RECEIVED NRF FUNDING

15

OF THESE RECEIVED LEVERAGE FUNDING

2

NON-BURSARY HOLDERS

Communication

FACEBOOK:

2 945

LIKES

?????

FOLLOWERS

TWITTER:

3 244

FOLLOWERS

MEDIA MENTIONS

240

Conferences

17

NUMBER OF LOCAL CONFERENCES ORGANISED

30

PRESENTATIONS AT LOCAL CONFERENCES

7

PRESENTATIONS AT INTERNATIONAL CONFERENCES

18

FOOD SECURITY PANELS ORGANISED AT CONFERENCES

CAAs and MoUs

43 COLLABORATING AGREEMENTS (CA) OR MEMORANDA OF UNDERSTANDING (MOU) WITH INSTITUTIONS/ENTITIES IN PLACE

Researchers

OVER 68 LEAD INVESTIGATORS/ RESEARCHERS ON THE COE-FS DATABASE

Funding

GRANTS RAISED BY THE COE-FS IN 2022:

R59.5 MILLION

R??????????????? IN DIRECT FUNDING

R??????????????? IN LEVERAGE FUNDING

Specific output targets for 2021 (all achieved)

6 MANCO MEETINGS HELD

1 MANCO PLANNING MEETING/LEKGOTLA HELD (VIRTUAL)

1 BUSINESS PLAN SUBMITTED

40 NUGGETS PER YEAR HAVE BEEN PROVIDED TO THE NRF

Research outputs

58 ARTICLES IN REFEREED/PEER-REVIEWED JOURNALS

7 BOOKS/ CHAPTERS IN BOOKS

12 WORKING PAPERS/ TECHNICAL/ POLICY REPORTS

WHO WE ARE

The CoE-FS

The leadership of the CoE FS comprises a director and co-director who are responsible for the overarching management of the CoE-FS. They are supported by the Management Committee (MANCO) comprising Principal Investigators (PIs), who lead multi-year, multi-institutional programmes of research. The PIs are expected to be scientists who craft the research agenda, mediators who bridge gaps, project leaders (PLs) who manage diverse teams, knowledge brokers and 'boundary spanners', and networkers assembling a Community of Practice (CoP) on specific topics of national importance.

Director and Co-director



Director
 Professor Julian May
 Based at UWC
 Co-PI: Programme 1: Food Systems, Governance and Policy



Co-director
 Professor Lise Korsten
 Based at UP
 Co-PI: Nutrition, Health and Safety for Food Security

Principal Investigators



Professor Bruno Losch
 (CIRAD/UWC)
 Programme 1: Food Systems, Governance and Policy; MANCO



Professor Julian May
 (UWC)
 Programme 1: Food Systems, Governance and Policy; UNESCO Chair in Science and Education for African Food Systems; MANCO



Professor Naushad Emmambux
 (UP)
 Programme 2: Innovation and Technology; MANCO



Professor Ndiko Ludidi
 (UWC)
 Programme 2: Innovation and Technology; MANCO



Professor Rina Swart
 (UWC)
 Programme 3: Nutrition, Health and Safety for Food Security; MANCO



Professor Lise Korsten
 (UP)
 Programme 3: Nutrition, Health and Safety for Food Security; MANCO

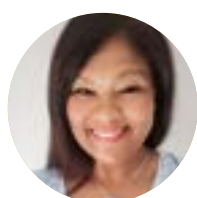


Professor Stephen Devereux
 (IDS/UWC)
 SA-UK Bilateral Research Chair in Social Protection for Food Security in South Africa; MANCO

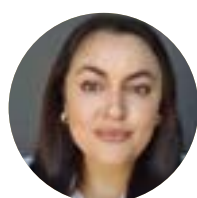
Core staff



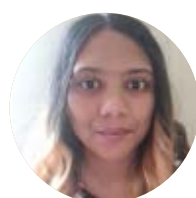
Dr Elaine Sinden
 Research manager



Elaine Petersen
 Finance manager



Carla Bernardo
 Communication and Engagement Manager



Robyn Engelbrecht
 Administrative assistant

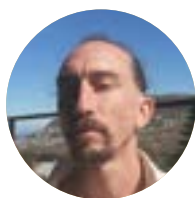


Nolutando Didiza
 Administrative assistant

MANCO



Dr Camilla Adelle



Florian Kroll



Dr Marc Wegerif



Professor Marshall Keyster



Dr Chantell Witten



Dr Willeke de Bruin



Dr Erika du Plessis



Professor Frans Swanepoel



Professor Hettie Schönfeldt



Dr Nazeeia Sayed



Professor Lindiwe Sibanda

Steering Committee

In 2022, STEERCOM consisted of members representing academia, civil society, and the public and private sector. Professor Mary Scholes was appointed in November 2022 as chairperson of STEERCOM, following a decision by the NRF that an independent chairperson be appointed.



Chairperson
Professor Mary Scholes
(University of the
Witwatersrand (Wits) – from
November 2022



Co-chairpersons
Professors Anton Stroh/
Barend Erasmus (UP) – until
October 2022



Co-chairpersons
Professors Jose Frantz/
Joliana Phillips (UWC) – until
October 2022



Director
Professor Julian May
(UWC)



Co-director
Professor Lise Korsten
(UP)



DSI
Rose Msiza
(DSI representative)



NRF
Dr Makobetsa Khati/Nathan Sassman
(NRF representatives)



Members:
Professor Patrick Caron (CIRAD);
Bongiwe Njobe (Independent consultant);
Dr Joan Matji (United Nations Children's
Fund (UNICEF) – SCICOM chairperson);
Professor Sagadevan Mundree (University
of Queensland); Professor Bocklines Bebe
(Egerton University); Dr Mickey Chopra (World
Bank); Professor Christine Foyer (University
of Birmingham)

Scientific Sub-Committee

The CoE-FS established a Scientific Sub-Committee (SCICOM) in 2021 which is responsible for reviewing its planned activities, in terms of identifying what the CoE-FS should be doing, and evaluating outputs against what has been proposed in the Business Plan. SCICOM meets bi-annually and consists of active researchers and research users.



Chairperson
Dr Joan Matji (UNICEF)

Members:
Professor Karen Hofman – Wits;
Professor Nick Vink – Stellenbosch University (SU);
Professor Joyce Tsoka-Gwegweni – University of
the Free State (UFS); Dr Arlene Alpha (CIRAD)

OUR PARTNERS

The CoE-FS has concluded formal collaborating agreements (CAs) or memoranda of understanding (MoUs) with the following 43 institutions/entities:





In 2022, the CoE-FS and partners convened numerous learning journeys, which are well suited to engage with government officials at all levels and with vulnerable stakeholders, such as informal sector traders and communities.



OVERVIEW OF ACHIEVEMENTS

Achievements related to the current stage

The tables below set out the CoE-FS's 2022's achievements against targets set for the reporting period.

Activities related to the current stage of deliverables

Output	Achieved
Participate in official events of the CoE-FS programme	☑
Continuously update the register of participants (including students) in the CoE-FS	☑
Continuously update the project register that lists all research being conducted within the CoE-FS	☑
Make available to the NRF on a quarterly basis "nuggets" of information for publication on the CoE-FS and NRF websites	☑
Maintain digital repository of completed research outputs funded by its resources, including theses, research reports, policy briefs and published papers	☑
Submit a written claim with supporting documentation to trigger transfer payments each January	☑
Submit monthly cash flow statements, within 15 days of the end of each calendar month	☑
Collect income and expenditure reports from all collaborating partners on completion of projects	☑
Collect income and expenditure reports from all collaborating partners on completion of the 2021 and 2022 projects that have received extensions	☑
Submit Annual Progress Report by no later than 30 May each year	☑
Submit an External Audit Report by no later than March each year	☑
Submit Gate Review Documentation by no later than 27 February 2023	To be done in 2023
Submit a Statement of Compliance by no later than March each year	☑

SLA 2022

Description	Output targets: 2022	Outputs: 2022
Students included in projects funded by the CoE-FS (all students)	90	127
Women students supported (all students)	50	87
Black students supported (all students)	63	109
Postdoctoral fellows (all students)	5	12
South African citizens and permanent resident students (funded by the NRF)	95%	48 ¹ (81%)
SADC countries students, and students from the rest of the world (NRF funded)	5%	19%
Women students (NRF-funded)	55%	68%
Black (African, Coloured and Indian)	90%	43 (90%)
White	10%	5 (10%)
Disability	1%	1 (2%)
Proportion of students graduating by the next Gate Review	≥ 75% of all students since inception	To be determined in 2023
Average duration of submission of master's degrees (post honours)	≥ 24 months	24 months
Average duration of submission of PhD degrees	≥ 40 months	36 months

Description	Output targets: 2022	Outputs: 2022
Average duration of submission of PhD degrees (upgraded from master's)	≥ 60 months	60 months
Number of unrated researchers who become rated, or rated researchers who retain or improve their rating	5	9 ²
Number of patents, products and artefacts	3	2
Number of articles in accredited journals, chapters in peer-reviewed books or books	55	65 ³
Number of articles with an Impact Factor greater than 3	8	40
Number of joint-venture student training initiatives	3	17
Number of local conferences organised	1	17
Number of international conferences organised	0	0
Presentations at local conferences	40	30
Presentations at international conferences	10	7
Food security panels organised at conferences	1	18
Annual social media (Facebook, etc.) views	222	3 015 ⁴
Number of face-to-face policymaker engagements	10	35
Annual website views	4500	NA ⁵
Annual media activities (radio, TV, press)	200	240
Number of citations of pooled articles/book chapters that acknowledge CoE-FS funding (Google scholar)	6-7	25
Additional funds raised	R25 million	R59.5 million

1. The total NRF-funded students is 59.
2. These researchers retained their NRF rating.
3. This number includes one book, six book chapters, and 58 accredited journals. It does not include the 12 working papers/reports.
4. As there is no metric for "views" on social media (other than video/Reels/livestream views/plays), this is engagement on Facebook.
5. Work on the CoE-FS website is ongoing, including reinstating Google Analytics. In the interim, there were 1 684 clicks on CoE-FS bitly links (shortened links, created for some of the CoE-FS website content; this does not include traffic via other social media referral or organic searches.

Transformation targets

Output	Achieved
At least five senior academics from formerly disadvantaged groups have experienced further capacity development	<input checked="" type="checkbox"/>
At least 15 emerging academics from formally disadvantaged groups have experienced capacity development	<input checked="" type="checkbox"/>

Specific output targets

Output	Achieved
Six MANCO meetings have been held	<input checked="" type="checkbox"/>
One MANCO planning meeting/Lekgotla has been held (virtual)	<input checked="" type="checkbox"/>
Annual Business Plan was submitted	<input checked="" type="checkbox"/>
40 nuggets per year have been provided to the NRF	<input checked="" type="checkbox"/>

TRANSFORMATION

Transformation is a corrective action necessary to deal with the past injustices of colonialism and apartheid. It is necessary also to create a critical diversity of perspectives that will produce new insights, a healthier education environment, promote inclusiveness within the CoE-FS, and prepare its students for a multicultural world of work. Finally, it is necessary for succession planning both for the directors and senior researchers.

With regard to its management and support structure, the CoE-FS has made good progress in placing staff from previously disadvantaged backgrounds and all of the full-time permanent staff are black women. We are also among the minority of CoEs to have a female director, and our transformation accomplishments include disability.

All students in the “Drought responses in Cereals and Legumes” project are from designated groups (Black, Coloured or Indian) and the majority of them are female. The project is multi-institutional in the sense that it includes collaborators from the ARC, MU, the University of Mauritius, the Chinese University of Hong Kong, and Walter Sisulu University (an HDI). The research team led by Professor Ludidi is formed from institutions of diverse groups and countries (Walter Sisulu University is an HDI and TARDI is a provincial institution in a poor rural setting; MU and the Chinese University of Hong Kong are world-class institutions recognised for their international academic leadership). The project is multidisciplinary, bringing together plant science, soil science, and entomology while using these diverse disciplines for social impact by collaborating directly with smallholder farmers.

Professor Ludidi’s project promotes transdisciplinary research by bridging plant science with animal science and is working towards the inclusion of indigenous knowledge systems from a social sciences point of view to address mainstreaming of indigenous grain crops in the South African food system.

The Safe Food project involved various disciplines such as microbiology, veterinary public health, social sciences, food science, epidemiology, consumer science, and bioinformatics. Also, UP’s Department of Plant and Soil Sciences, Food Safety team, Animal Sciences, Veterinary Sciences, UFH’s Animal Sciences, UD, UMD, USDA’s Agricultural Research Services, and the FDA’s Center for Food Safety and Applied Nutrition were involved in this research. Various black South African students are funded through this programme. Additionally, further African collaborators have been included and will form part of future projects. As an example of our contribution, the SFPP team includes two black women, and five African males (four Black and one Indian). Also, of the 34 students involved in this project, 26 are from previously disadvantaged groups.

In our pursuit of a more equitable, just, and sustainable society we must examine not only who gets to make decisions, but also on whose evidence these decisions are made: the question of whose knowledge is to be recognised, translated, and incorporated into action is particularly important in South Africa in the context of decolonising knowledge and our universities. The approach of knowledge co-production through CoPs workshops and co-elaborative scenarios adopted is inherently

transformative as it creates hybrid forums where groups otherwise marginalised in knowledge production (women, small farmers, informal workers, refugees) were not only considered but helped inform the overarching research agenda and had their knowledge integrated into the co-production process. We continue to focus our research on marginalised groups within the food system that, we argue, should have a more central role in food governance, namely informal food traders and civil society organisations.

The approach of knowledge co-production is also inherently transdisciplinary as it includes researchers from multiple academic disciplines (geography, sociology, political science, public health) but also participants from outside of science (various state and civil society institutions).

The approach of co-production that underpins the Local Governance project lends itself to transdisciplinary research. This can be seen in the participatory approaches used in data collection and in policy engagement.

Similarly, the leverage-funded food environment projects have collaborators in the US, Chile, Mexico, Colombia, Jamaica, Peru, and Brazil, with advisors in the UK, New Zealand, and Thailand. All collaborators meet at least twice a year for the equivalent of a three-day conference and have monthly webinars and discussion groups on thematic topics. Where possible, students are able to attend discussions. Researchers from Nutrition as well as, PhD candidates, have been invited as either collaborators or advisors on international planning committees or research projects.

Multiple institutions have been involved in the “Reclamation of heavy metal contamination of soils” project. In South Africa, Walter Sisulu University (Dr Egbichi), UP (Dr Makgopa), the National Zoological Gardens (Dr du Plessis), and UFH (Maliviwe Mpayiphele) have all contributed to the advancement of the project. All the students (Esihle Gcanga, Lee-Ann Niekerk, Fahiem Carelse, Anushka Gokul, Junaid Mia, and Dr Arun Gokul) listed in this project are from previously disadvantaged communities.

Gender impact

The CoE-FS has made a concerted effort to include women in its research teams and recipients of student bursaries. In 2022, 87 female students (of all students) were supported by the CoE-FS; and 40 (68%) female students received NRF bursaries. With respect to the CoE-FS management and administrative teams, currently, the co-director, research manager, finance manager, communications manager, and two administrative assistant positions are filled by women.

The inclusion of women is essential to the work of the CoE-FS and a few examples are as follows:

- In the project led by Professor Losch, one of the three project team members is female. In addition, several of the collaborating academics are female including Professor Jane Battersby (UCT-ACC) and Gillian Black (SLF). In addition, a significant proportion of the participants in the Food Imbizo meetings are female.

9 In 2022, the CoE-FS **SUPPORTED NINE NRF-FUNDED PROJECTS/WORK PACKAGES** (WPs) in 2022; six were administered by an HDI

5 At least **SENIOR ACADEMICS FROM FORMERLY DISADVANTAGED GROUPS** groups have experienced further capacity development

10 We have collaborated with **OUT OF SOUTH AFRICA'S 26 UNIVERSITIES,** seven of which are other historically disadvantaged institutions (HDIs)

Food and nutritional security are

IMPERATIVE FOR HUMAN SURVIVAL WITH DIGNITY,

and must take account of economic vitality, social justice, and human and environmental health. To operationalise this value, we have worked with human rights research and advocacy institutions such as:

- Dullah Omar Institute for Constitutional Law, Governance and Human Rights (DOI) at UWC
- Centre for Human Rights (CHR) at UP
- Children's Institute (CI) at UCT

We have made

SUBMISSIONS TO THE SOUTH AFRICAN HUMAN RIGHTS COMMISSION (SAHRC)

among others, including on the right to food for students at higher-education institutions

The bulk of our

BURSARIES ARE AWARDED TO SOUTH AFRICAN STUDENTS

- Zama Zulu has been a contract research assistant in the Food Safety team and contributed significantly to achieving WRC and other externally funded research project goals in the team. Training through this platform enabled her to apply and be appointed to a permanent researcher position at UP in 2021.
- Degracious Kgoale will be completing her PhD degree in 2023. Training of research assistants, postgraduate students, and the next generation of academics in the area of microbiological water analysis and related technologies, and the impact on fresh produce production will equip them with knowledge for potential future employment in the water management and maintenance and/or food safety assurance, as well as conceptualise new research associated with this field.
- Professor Korsten is a B2 NRF-rated microbiologist, and her area of specialisation is food safety. She has more than 30 years of experience as a researcher and has published more than 100 scientific papers and book chapters. She has been involved in developing the national food control authority model for the Department of Trade and Industry, and the Department of Agriculture, Forestry, and Fisheries. She has been successful in receiving grants from the fresh produce industries, the WRC, NRF, and international partners (7th Framework of the EU-Vegi trade). She will be mainly responsible for providing input into the supply chain and legislative information for verification.
- Dr Erika du Plessis is a Senior Researcher in the water and food safety research programme, Department of Plant and Soil Sciences at UP, responsible for securing external grant funding and coordination of water and food-safety-related research activities and report writing in the Department of Plant and Soil Sciences, Plant Pathology Division. She has 37 years of research experience in Microbiology and Biotechnology including the microbiological quality and safety of water and food in both formal and informal sectors, as well

as developing expression systems for overproducing enzymes of industrial/biomedical interest in microorganisms with GRASS (generally regarded as safe) status. The main focus of her recent research activities has been on the prevalence, dissemination, and characteristics of antimicrobial-resistant potential human pathogenic bacteria in the water-plant-food-public health interface. Dr du Plessis is the research coordinator and collaborator of multiple research projects funded by the WRC, Partnerships for Enhanced Engagement in Research (PEER) a USAID/DSI-funded research project, and the Gauteng Department of Agriculture (GDARD).

the impact on fresh produce production will equip them with knowledge for potential future employment

- The majority (73%) of the collaborators on research projects conducted as part of Nutrition and Health are women. The majority (77%) of CoE-FS-funded students and leverage-funded or non-bursary holders in this project are women. From one of the leverage projects, a paper on gender, food consumption and food procurement has been prepared. This publication is part of the special edition, which is under review by the Public Health Nutrition journal.
- The IYCF project team consists only of women. This project also has a strong gendered lens, as it advocates for women's rights. Women who wish to breastfeed should have the right to do so, whenever and wherever they choose, with the full support of their families, communities, employers and governments.



FINANCIALS

Funding received and spent from the NRF in the reporting period

COMMITMENT

R15 315 378.75

RELEASED

R13 895 138.76

EXPENDITURE

R11 115 573.23

The unspent balance of R2 779 565.53 is made up of R1 300 000.00 of 20% project committed funds and R600 000.00 in operational funds reserved for equipment, the annual report and updated branding. The balance is unallocated bursary funds which were a result of new bursaries being funded by the NRF's Human and Infrastructure Capacity Development directorate, and postdoctoral fellows not taking up their fellowships which were budgeted for in 2022.

The CoE-FS disbursed 80% of project expenditure at the signing of the project agreement, and the balance of the funds were released upon receiving final project reports.

Breakdown of NRF funding expenditure

Commitment	Budget	Spent	% Budget
Research	R4 776 650.00	R3 476 650.00	31.19%
Bursaries	R6 211 366.75	R3 911 561.23	40.56%
Salaries	R3 555 540.00	R3 555 540.00	23.22%
Running costs (Operational)	R201 822.00	R100 822.01	1.32%
Conferences, webinars and media	R270 000.00	R71 000.00	1.76%
Equipment	R300 000.00	R0.00	2.00%
Total income	R15 315 378.75	R11 576 283.73	100%

Direct and leverage* funds (funding received by PIs/PLs)

The CoE-FS has managed to raise a total amount of R59 471 448.55 in additional funding. This amount is made up of R31 471 448.55 in direct funding and R28 000 000.00 in leverage funding.

**Any financial contribution to the project, other than the funding received from the CoE-FS, which is auditable and managed by the PL and the collaborating institution.*

Return on investment

Since its inception in 2014, the CoE-FS has published over 370 journal articles, 54 books and book chapters, with the highest cumulative citation of 55. It has also supported more than 700 students, and more than 330 students and postdoctoral fellows completed their studies and produced over 470 conference presentations, which is viewed as a long-term economic and societal investment.

The establishment of the CoE-FS has also resulted in considerable additional funding in 2022, amounting to R59 471 448.55. However, the greatest return on investment is the networking and collaborations that have taken place within the projects supported by the CoE-FS and the findings that are emerging: the CoE-FS currently has 43 CAs in place, with more than 100 international and national collaborators since 2014.

SOCIAL IMPACT

The CoE-FS has made a concerted effort to advance social impact. Most of the activities are described in the projects and KPAs, but a few additional examples of such interactions are below:



The social impact on students' lives who earned a bursary through the CoE-FS, have graduated, and have been successfully placed within society, is infinite.

Social impact was also achieved through the involvement of civil society in the CoP meetings and through close collaboration with SALGA. Extensive consultation with Western Cape representatives of SALGA has taken place, not only by involving them in the CoP gatherings but also by convening a series of meetings with SALGA representatives. During these meetings, SALGA officials were sensitised to key issues of local food systems governance, were invited to provide feedback on draft food governance content, and consulted on the identification of small-town municipalities with whom to conduct co-elaborative scenario processes.



The research led by Dr Wegerif includes civil society, including the East and Southern African Farmers Forum, the Masifundise Artisanal Fishers Organisation (South Africa), the Association for Rural Advancement (South Africa), the Environmental and Management and Economic Development Organisation (Tanzania), and the Network for Women's Rights in Ghana. They also interacted and shared information with the South African Informal Traders Alliance and the Women in Informal Employment: Globalizing and Organizing network.



The projects led by Professor Ludidi and Professor Naushad Emmambux are working with social scientists who specialise in 'Augmentative and Alternative Communication' where the team has published a paper on food and nutrition security for people with disabilities. They are also working on two papers with a social scientist (i) relating properties of indigenous porridge for baby foods and policy impact (ii) why marama plant should be domesticated. It is also noted that traditional food crops are mainly grown by smallholder farmers. This research will have a major socioeconomic impact on rural societies through value addition. This will contribute to government efforts to end hunger, and poverty and ensure food security for vulnerable rural households. The project also aims to show proof of the nutritional and health benefits of indigenous African foods. Some prototypes also have to be used by entrepreneurs for better livelihood.



Professor Ndiko's lab has also actively engaged with smallholder farmers in August, September and October 2022 in workshops that offered training to the farmers (in the Matatiele Local Municipality) in regenerative agriculture in preparation for the 2022 summer planting season. This is at no cost to the smallholder farmers.



Community engagement activities under the project led by Professor Keyster include continuing the research activities with TARDI as well as starting a new community engagement project with a community in Matatiele. This project will explore the possibilities of converting land for subsistence farming. This project also started a new community engagement project with a community in Mthatha. He and his team are regularly involved with the community in the Westbank area of Cape Town to assist the community with farming vegetables. They also conducted an analysis of the surrounding soils in order to assess the appropriateness of the soil for vegetable farming.



An important aspect to highlight is the scientific impact reflected in the international recognition of the food safety group. Professor Korsten has been appointed as an independent expert on the Global Food Safety Initiative forum. Professor Korsten has also been appointed as an expert on the FAO and WHO Joint FAO/WHO Expert Panel on the Prevention and Control of Microbiological Hazards in Fresh Fruits and Vegetables. She also serves as a technical expert on the SABS ISO standards committees and has been invited to serve on the ministerial commission on antimicrobial resistance (AMR) contributing towards the stewardship technical working group representing environmental and plant health within AMR One Health.



Through our work on policy and governance, we have contributed towards building the capacity for policymakers and institutions at the municipal, provincial and national levels to engage with the systemic dynamics of food systems change. We thus speak directly to the need for 'improved, science-based information to direct development-oriented decision-making'. By linking food security to health, livelihoods, productivity and employment, we are supporting the different spheres of government in attaining their key social development outcomes. These include "a long and healthy life for all South Africans"; "a skilled and capable workforce to support an inclusive growth path"; and "sustainable human settlements and improved quality of household life". In this regard, we directly address the "Farmer to Phama value chain" and at least two of the four research foci of the Social Dynamics Grand Challenge: 'The dynamics of human and social behaviour' and 'Societal change and the evolution of modern society'.



Regarding the national science and technology framework, we believe that we have been able to contribute to several of the outcomes in the performance agreement between the Minister of Science and Technology and the President. Our work directly assesses outcomes working towards vibrant, equitable and sustainable rural communities with food security for all and sustainable human settlements and improved quality of household life.



Honours students from UP attended the South African Association of the Flavour & Fragrance Industry Flavour Seminar, an important platform for meeting potential employers and assisting students with Food Product Development projects.



Professor Julian May commented on the SONA 2022 and contributed to a discussion on South Africa's Cuba donation. He also presented on Governance in the Agri-Food Sector in South Africa to the CIRAD-Eduardo Mondlane University "Workshop on governance of the agri-food sector in Southern Africa: new approaches for new challenges", and is a commissioner for the National Planning Commission whose mandate is "to advise government, and indeed all of society, on the implementation of the NDP: Vision 2030".



SCIENTIFIC CONTRIBUTION

The world faces many challenges to food security including undernutrition and overconsumption, rising food prices, population growth, threats to agricultural production, etc. In addition to causing widespread human suffering, food insecurity contributes to the degradation and depletion of natural resources and economic instability.

The growing threat of, for instance, global climate change amplifies the need for food systems to better meet human needs and align with planetary sources.

- The work of Professor Ludidi and his team plays an essential role in meeting the global challenge of moving the world into a safe operating space in which agriculture can meet global food needs. A research group on the microbiology of food plants in the context of climate change has been established in the Faculty of Science following a UWC and MU Plant Science Symposium. This group have re-focused part of their work on indigenous grains and legumes, and undertaken seed collection visits in remote areas of the Northern Cape and Limpopo.
- The CoE-FS has also funded research on food authenticity using DNA metabarcoding.
- Work on public nutrition in the Faculty of Community and Health Sciences at UWC has also expanded with a growing focus on obesogenic food environments and diet-related NCDs. Studies have also been undertaken on the specific nutritional needs of highly vulnerable groups including waste-pickers, people living with HIV/AIDS and students. The Department of Dietetics and Nutrition is one of five departments in South Africa offering a degree in this field.
- The project led by Professor Keyster disseminates the ICP results to the farming community in the Eastern Cape which could aid in better soil management and planning for the 2022 growing season. This team is also working closely with GrainSA in order to reach more small-scale farmers in the broader crop-growing areas of South Africa. This project will write an information brochure to assist farmers with soil ICP data as well as pathogen incidence across field sites.
- The finding that extrusion cooking produced enhanced ferritin formation in Caco-2 cells compared to conventional cooking is an important scientific contribution. It highlights the role that modern processing technologies for the production of SMART foods, such as extrusion cooking, can play in enhancing iron bioavailability. Explaining the scientific mechanism of why fermented sorghum flour produced better quality flatbread is a good contribution towards science. This mechanism can be used to explain a lot of food and can be exploited to improve the properties of gluten-free flour for flatbread. Microwave and infrared can be used to make quick cooking legume grain with less beany or removal of beany flavour. The manufactured starch microspheres as fat-replacer have been used in

many food products and may have commercial applications.

- Professor May published and participated in multiple science communications about the CoE-FS-convened learning journeys, climate change, poverty and inequality, and child malnutrition.
- Professor May was the contributing author to *The Oxford Handbook of the South African Economy*, a book President Cyril Ramaphosa praised for its “holistic take on the economy, ranging from chapters examining South Africa’s economic history, its performance over time, and detailed analyses on various industries”. He also participated in African and French institutions’ virtual meetings on a partnership through TSARA.

The Department of Dietetics and Nutrition is one of five departments in South Africa offering a degree in this field.

Our research publications have highlighted two further noteworthy contributions to the science-policy interface concerning food issues:

1. Creative processes of storytelling can complement more conventionally “rigorous” forms of knowledge to lend greater experiential granularity, to highlight the intersection of multiple forms of oppression and deprivation, and to invoke more emotionally compelling rationales to drive policy and governance change
2. Secondly, that networks of change agents including academics, officials and civil society activists, can leverage disruptive impulses (such as the COVID-19 lockdown) to raise food issues on the policy agenda and embed policy changes that enable subsequent incremental enhancements in the democratisation and responsiveness of food systems governance.

PATENT, PRODUCTS OR INTELLECTUAL PROPERTY

- A manual on analyses of CDM on products and in media, produced by a master’s student is now being applied in projects at Wits/PRICELESS
- A manual on assessment of Anthropometry as part of a population assessment, developed for the NDIS, will be published on the CoE-FS website.



Key Performance Area 1

RESEARCH

The CoE-FS undertakes research, capacity building, multi-stakeholder dialogue and policy advocacy on how sustainable food systems can achieve food and nutrition security for all. The objective of this work is to improve people's nutritional status by linking innovative science with critical inquiry and implementation strategies.

Three areas of work are prioritised as follows:

1. Multi-level governance and policy dialogues to create a sound and resilient food system at global, national and local levels
2. Innovation for the sustainability, productivity and utilisation of indigenous African and other locally available foods that affect food security
3. Quantity, quality, diversity and safety of diets in relation to all forms of malnutrition.

Cross-cutting themes are a humanities perspective, to explore the complex, dynamic and diverse relationships between food and human beings; a food systems perspective; addressing the complexities of the production, processing, marketing, distribution and consumption of food, with consideration of the environmental impacts of the food system; and a social-protection and poverty-reduction perspective, concerned with the causes and consequences of (and solutions to) multiple deprivations.

The six areas of research adopted and endorsed by the STEERCOM in 2015, and approved by the NRF in 2016, remain the focus of our work in 2022; but have been realigned – as a consequence of the outcomes of the May 2019 Lekgotla – mainly to improve the integration of the CoE-FS's research, but also to take into consideration the CoE-FS mid-term review.

The three research questions that inform the scope of work for CoE-FS research activities for the second planning cycle (2020-2024) remain unchanged. These are:

1. How is the global and national food system changing, and how does this affect the sustainability, availability and attributes of food as well as access to food?
2. Who are the 'food insecure', where are they located, what are their choices, strategies and opportunities when seeking food security, health and well-being, and how do these change in response to the changing food system?
3. What policies, technologies, interventions and products enable access to affordable, nutritious and safe food in ecologically, economically, socially and politically sustainable ways?



PROGRAMME 1

**FOOD SYSTEMS,
GOVERNANCE
AND POLICY**



This programme is led by Professor Bruno Losch and Professor Julian May (CIRAD/UWC).

Africa's food system is undergoing rapid restructuring, with implications for food and nutrition security being both direct (via impacts on the nature and availability of food) and indirect (via the implications for livelihoods, employment and economic activity).

Programme 1 focuses on the ability of Africa and South Africa's institutions in government and civil society to engage effectively with these dynamics in the food system. Issues of coordination have repeatedly been identified as barriers to the implementation of policies concerned with food and nutrition security, while the 'public good' nature of food security results in collective action problems. The programme seeks to understand the institutional arrangements required to make food security governable, and the ability of policy frameworks to link questions of food and nutrition security to broader development priorities.

The objectives of the programme in 2022 were unchanged, continuing to:

- Strengthen a local governance approach for food and nutrition security, while taking account of strategies being implemented at higher levels
- Improve the precision with which local government can intervene in the food system, both spatially and in terms of target groups and sectors
- Develop strategies for selecting successful local governance food security approaches for adoption, for transference to provincial, national and regional implementation through knowledge brokerage
- Engage with national and regional policymakers through the implementation process of the integrated National Food and Nutrition Security Plan 2017-2022, the National Development Plan, the Comprehensive African Agricultural Development Programme and the draft Agriculture and Agro-Processing Master Plan
- Use a 'food systems' and 'place based' approach to contribute to the dialogue on what form of food system best meets the triple burden of malnutrition for poor people in Southern African cities and towns, in such a way that it benefits all stakeholders in the food system.

Local food governance

This project involves Dr Camilla Adelle (UP) and Florian Kroll (UWC).

In 2022, the CoPs in Gauteng and the Western Cape merged and were rebranded as the 'Food Imbizo', reflecting the reality of what the gathering of scholars, government representatives and food practitioners became under COVID-19: an influential network that has supported the rise of other communities from within its fold. Participants continued to meet online, with six main meetings in 2022 (and a few spin-off workshops), each reaching 50 to 70 participants from across the country.

In collaboration with SAFCEI, the Food Imbizo developed policy briefs and conducted online workshops highlighting the role of faith communities in food governance.

The rebranding has been accompanied by a new Food Imbizo website.

The Food Imbizo also started to further disseminate the knowledge co-produced in its meetings through articles published in *The Conversation Africa*. The project also published two journal articles specifically highlighting the importance of food governance in the urban design, planning, and management contexts.

Our research has reflected on the experiences of our emergent CoP. Our results show the following lessons for managers and participants engaged in establishing similar 'third spaces' for knowledge co-production:

1. Make inevitable power asymmetries explicit
2. The identity of the group should not be built on a particular normative position, but emerge from discursive processes
3. Create a balance between supporting peripheral learning and maintaining the specialist, cutting-edge discussions required for co-production.

Furthermore, the most beneficial legacy of a CoP (or another kind of social learning space) may not be the outputs in terms of co-produced knowledge, but the development of a cohesive group of stakeholders with a new, shared way of knowing. This shared way of knowing and reflexivity or 'meta-learning' (i.e. learning to learn) is a key governance capability for dealing with complex and ambiguous social problems. In this way, CoPs can foster social learning not only for the co-production of knowledge for solving wicked policy problems, but also to help transform learning and ways of knowing necessary for the emergence of novel governance arrangements.

National food governance – Towards national knowledge brokerage

This project involves Dr Camilla Adelle (UP), Florian Kroll (UWC), Professor Lise Korsten (UP), Dr Marc Wegerif (UP), Professor Julian May (UWC) and Professor Bruno Losch (UWC/CIRAD).

Through developing knowledge brokerage platforms, the project aims to increase the visibility and societal impact of CoE-FS research, as well as produce new, socially robust knowledge on how to better govern South Africa's food system.

The main activities of this project in 2022 were to:

- Engage with national policy through dialogue, policy analysis and systematic review
- Engage with the food and nutrition implications of 'hot topics' that arise, such as land reform, food safety governance and COVID-19 mitigation strategies

- Engage with international experiences of policies for food and nutrition security that explore national experiences of food policy dialogues.

With initial support from WCG and SALGA, food policy debates have already been developed at local level, with Witzenberg Municipality and the City of Cape Town (CoCT). These debates have also been initiated in Gauteng and with the City of Johannesburg (CoJ).

The project also engaged in a systematic literature review. Investigating the South African food insecurity paradox (persisting insecurity in spite of a wealth of food policies, research programmes, and developed social welfare instruments), the review of 1994 to 2020 publications highlights the central role of national government in food system governance, and the limited contribution of other actors, characterised by major asymmetries.

Maximising access to a balanced, safe and healthy diet for the poorest urban residents

This research is led by Dr Marc Wegerif (UP).

Research continues on the informal food sector, due to the lack of knowledge about the sector and its key role in creating livelihoods and serving low-income communities. The focus remains on fresh produce, essential for balanced diets, and the importance of fresh produce to emerging black farmers. Informal trade does not operate in isolation but is closely linked to the formal sector, with mutual trade and exchanges taking place between them. This unique landscape forms an interesting but complex backdrop to what requires context-specific interventions to address its most pressing concerns.

Findings thus far include:

- Street traders perform a key function in making food accessible to low-income communities through their pricing and location.
- Street traders are a key market for emerging black farmers, but there is a lack of sufficient data on pricing, costs and other factors that determine the viability of trader/farmer links and guaranteed food accessibility
- Street traders are often negatively impacted by regulations and their enforcement. More work is needed to understand what is reasonable and needed regulation, and what can be eased to enable the food system.

In 2022, six #FoodTalks seminars (later, online webinars) were organised with a range of speakers and participants from academia, government and civil society. They covered these topics:

- School food, equity and social justice

- COVID-19 impact on food systems
- Endogenous paths to a resilient food system
- Student hunger and achieving the right to food for all: what role for universities?
- Land and food
- Creating a more equitable, just and democratic food system in South Africa.

Work on mapping urban food systems revealed the importance of the informal fresh produce sector – in particular, street traders and ‘bakkie’ traders – for fresh produce markets and therefore farmers, as well as for making fresh produce more accessible to low-income consumers.

Discussions have been held with the National Agricultural Marketing Council (NAMC) and the Agricultural Produce Agents Council (APAC). These focused on the future of fresh produce markets; in particular, the municipal fresh produce markets, given the challenge of losing market share and a lack of transformation in what remains a divided agriculture and food sector. Presentations of research findings have also been made to a NAMC-organised webinar, and to the City Economic Development Managers Forum.

Research and a publication on the National School Nutrition Programme revealed a strong programme, feeding over nine million children a day; but also that more could be done to ensure food safety and use this large-scale state procurement to leverage greater agricultural sector development and transformation.

A place-based approach in selected municipalities

This research is led by Professor Julian May (UWC) and includes Professor Bruno Losch (UWC/CIRAD), Professor Peter Verburg (VU-A), Dr Jacqueline Davis (VU-A), Dr Michelle Eichinger (VU-A), Ashely Haywood (UWC), Professor Jane Battersby (UCT), Professor Scott Drimie (SU/SAFL).

The project applies methods that draw on the territorial approach to development. This recognises that people don't live in sectors; they live in places, where the potential, constraints, and plausible future of that place matter.

It builds on collaborations engaged in 2018/19 with SALGA and local municipalities in the Cape Winelands District of the Western Cape, the LEAP-Agri-funded projects currently being implemented by the CoE-FS, and ongoing work in the Johannesburg and Cape Town metropolises. Food4Cities collected spatially referenced data from households and enterprises in Worcester, a secondary town in the BVM, during November 2019. These data have been used to develop a predictive model using Bayesian inference methodologies. NOURICITY has collected data on foodsheds in Mount Frere, a secondary town located in the Alfred Nzo District of the Eastern Cape, and Langa, in the Cape Town metro. The CoE-FS project ‘Balanced and Healthy Diets for the Urban Poor’ collected data in Johannesburg metro; this is reported elsewhere.

The project also builds on previous research undertaken by the CoE-FS in Umzimvubu Local Municipality as part of the PURE Project, funded from 2014 to 2018. In 2021, new collaborations were initiated in the Matatiel Local Municipality, reported on under ‘Climate-Smart Regenerative Agriculture’ in Programme 2.

The research undertaken and the highlights in 2022 are:

- **Spatial mapping of food system actors located in the BVM using Google Earth:** This includes identifiable producers, agri-processors, upstream suppliers, downstream services, financiers and fintech,

intermediaries, retailers and food services. A preliminary mapping was completed in January 2022, and it is updated on an ongoing basis.

- **Stakeholder engagements and qualitative data collection:** Three learning journeys were funded from Food4Cities, which the current UrbanFosc overlaps: (1) in December 2021, in the Zwelethemba settlement in the BVM; (2) in April 2022, in the Durban Rd/Parkersdam area of the Worcester CBD; and (3) in Zwelethemba and the north of Mandela Square, an informal settlement. Two learning journeys have been funded by UrbanFosc, both of which took place in October 2022: in the BVM municipal offices and in other national, provincial and trans-agent government offices located in the BVM, and in the Mtswazi Street/Kolo Street area in Zwelethemba. A fifth learning journey is planned for March 2023, in Touwsrivier. In addition to these journeys, meetings have been held with the BVM municipal manager, the director of strategic services and the director of the Integrated Development Planning division. It is likely that one more learning journey will be held in the second half of 2023, where preliminary results from UrbanFosc will be discussed. This is currently planned for September 2023 and would be located either in the agro-industrial park in Worcester or in Avian Park, a low-income neighbourhood.

One PhD candidate was supported by Food4Cities and continues to be funded by the NRF for 2023. Ashley Haywood has been involved in all of the learning journeys and continues to collect data for his study of food systems analysis on the BVM Integrated Development Plan (IDP). Two new PhD candidates have joined the research team, although neither hold bursaries from the NRF. Zona Ndonga is preparing her proposal, which will investigate the impact of BVM bylaws on informal-sector food vendors. Jani Truter is a sandwich PhD candidate at UWC and KU Leuven, and is preparing her proposal on urban design for informal sector food vending, asymmetries.

PROGRAMME 2

**INNOVATION AND
TECHNOLOGY**



The PIs for this programme are Professor Naushad Emmambux (UP) and Professor Ndiko Ludidi (UWC).

The focus of this programme is to investigate the organisational and technological innovation of food systems in terms of the food production and processing required to maintain and improve livelihoods through enterprise development for food security. Enterprises include all sizes of farm and non-farm enterprises, although the focus is on small and medium-sized activities rather than on subsistence or micro-enterprises.

The problem is complex and requires a transdisciplinary approach, with a strong science focus. The technological transformation for enterprise development should impact positively on environmental, economic, social and nutritional health.

Research undertaken in this programme in 2022 and its highlights are summarised under the following three projects.

SMART Food Processing

This project is led by Professor Emmambux (UP). The team includes Professor Gyebi Duodu (UP), Dr Nwabisa Mehlomakulu (UP), Dr Danie Jordaan (UP), Professor Elna Buys (UP), Dr Maboko Mphosi (UL), Professor Riëtte de Kock (UP), Professor Shakila Dada (UP), Dr Pheseyha Dlamini (UL), and Professor Eric Amonsou (DUT).

The primary question of the project is "What technological innovation is required for food and nutrition security in the processing of indigenous and local foods?" This research project works hand-in-hand with the "Climate-Smart Regenerative Agriculture" project.

The objectives of this project in 2022 were:

- The creation and processing of SMART foods and food ingredients from indigenous and local plants that have been enriched to combat malnutrition and diet-related non-communicable diseases (NCDs)
- Necessary tools in terms of appropriate food-processing technologies for entrepreneurs to produce affordable, safe, convenient, consumer-driven, nutritious foods and food ingredients
- Value addition to waste from the food-processing industry for sustainable food production.

The research undertaken and the highlights for 2022 were:

Technological innovation to reduce energy density of foods: Maize and teff starch microspheres were prepared and analysed as fat replacers in food systems, e.g. for mayonnaise. They were tested as fat replacers at 25% and 50% in soup, shortcrust pastry, cheesecake, pannacotta and ice cream; successfully on the whole but with varying acceptability. More needs to be done in terms of texture and flavour.

Low-GI foods and food ingredients: Several indigenous and locally available grains and flours were used for reducing the estimated GI (EGI) by starch modification using green chemistry. Maize meal modified with fatty acid and heat moisture treatment showed a reduction in digestibility and the formation of resistant starch showing prebiotic effects. Microwave and infrared treatment of various sorghum flours reduced EGI in some and digestibility in others. We are also producing the first report on the use of cowpea protein isolate to produce ternary structures.

Functionality and nutrition of indigenous/local pulses: A response surface methodology design was used to successfully optimise the extraction conditions of Bambara protein to enable its complexation with gum Arabic at pH below the isoelectric point of globular proteins. Two new students have started working on modification of marama protein for (i) bread making and (ii) nanofibre by electrospinning.

Technology, sensory data and quality of quick-cooking and ready-to-eat foods:

- Sorghum pasta was manufactured by extrusion technology, showing some promising properties in terms of cooking loss and cooking quality
- Decorticated sorghum was also extruded with and without the addition of fibre to produce expanded snacks
- Two sensory and consumer studies documents were produced by researchers from UP and the University of Helsinki, based on experiments: 1) an updated and more suitable alternative scale instrument to measure food neophobia in people, and 2) a validated questionnaire to measure the knowledge, attitudes and practices (KAP) of employees in the food industry, valuable for understanding

the neophobia associated with indigenous foods

- A validated questionnaire was developed for assessing sensory quality control (SQC) related KAP in the food industry. The SQC-KAP questionnaire can be used to quickly assess the SQC KAP of food employees toward sensory services and identify SQC training needs.

Health benefits of indigenous and local foods:

Studies have been conducted on the iron bio-accessibility of extruded instant sorghum porridges fortified with baobab fruit pulp and moringa leaf, indicating enhanced iron uptake and bio-accessibility. Bioactive compounds (organic acids, phenolic acids, flavonols and a glucosinolate) were identified in Carica papaya peel crude extracts.

Enriched foods by fermentation:

- Fermented sorghum had an increase in free amino nitrogen, and demonstrated better baking properties when used for gluten-free flatbread
- Bacteriocins with potential food-preservative properties were isolated from the Bacillus species from fermentation
- Our work on the effect of souring using spontaneous fermentation and citric acid acidification indicated potential health-promoting properties of soured sorghum porridges by offering protection against diet-related NCDs
- Microbes from fermentation have been used to successfully increase vitamins and pro-vitamins in energy-dense foods.

Food biopolymer/food by-product characterisation and application:

- High-purity cellulose was successfully extracted from cowpea side stream (by chemical methods and using fewer environmentally degrading chemicals), as were biodegradable plastics with appropriate tensile and barrier properties
- A selenium/potato starch nano-film with the potential for food packaging was developed by casting method
- Research was conducted on indigenous South African plant species as sources of natural pigments for food colourants, applied successfully in acidic pH, high-sugar and high-protein food systems
- The effect of sun drying, solar cabinet drying and blanching prior to sun drying or solar cabinet drying on the drying time and moisture diffusivity of edible crickets was investigated.

Training and community-based work:

- During November 2021 and February 2022, 14 SMMEs in the Capricorn, Vhembe and Sekhukhune districts in Limpopo were trained on microbial food contamination regarding Hazard Analysis and Critical Control Point (HACCP) and ISO 22000.
- During March 2021 and June 2022, 10 SMMEs (one a cooperative of seven members, all trained) in the Capricorn, Vhembe and Sekhukhune districts in Limpopo were trained on chemical contamination food regarding HACCP and ISO 22000.

Techno-economic feasibility of manufactured food: Various products are being evaluated together with a European Union-sponsored project, InnoFoodAfrica.

Communication for low-literacy consumers: Questionnaires for sensory and consumer studies were translated and adapted for use by food scientists. Research will continue in 2023.

Innovation for environmental change-resilient agriculture drought responses in cereals and legumes

Professor Ludidi (UWC) is leading this project. Other team members include Professor Robert Sharp (MU), Professor Scott Peck (MU), Professor Hon-Ming Lam (Chinese University of Hong Kong), Professor Mounawer Badri (Centre of Biotechnology of Borj Cédria, Tunisia), Professor Nandipha Ndudane (Tsolo Agricultural and Rural Development Institute (TARDI)), Professor Joyce Govinden-Soulange (University of Mauritius), Professor Kohtaro Iseki (Japan International Research Centre for Agricultural Sciences), Professor Ueli Grossniklaus (University of Zurich, Switzerland), Professor Marshall Keyster (UWC), and Professor Emmambux (UP).

This project aims to prevent the negative impact of drought and heat stress on food and nutrition security while improving soil health and reducing excessive use of limited water resources. This will be done by using technological innovations that improve soil health and support regenerative agriculture, while increasing the biodiversity of insects and the soil microbiome to the benefit of crop production.

The research undertaken and the highlights for 2022 are:

Regenerative agriculture ensures continuous minimum mechanical soil disturbance, permanent organic soil cover, and diversification of cultivated crop species. Furthermore, regenerative agriculture enhances biodiversity and natural biological processes above and below the ground. Regenerative agriculture is a requirement for sustainable agricultural production intensification, which increases options for integration of crop production with livestock production, since crops and pastures can be integrated into regenerative agriculture to serve as a feed source for livestock production.

A shift towards regenerative agriculture will lead to large savings in machinery and energy use, reduction in carbon emissions, a rise in soil organic matter content and biotic activity, increased biodiversity above and below ground, increased diversity of crops produced (and thus the diversity of food consumed), less erosion, increased crop water availability (and thus resilience to drought), and reduced impact of climate change on food security. The inclusion of African indigenous crops in African food systems not only allows for diversified diets using environmentally resilient crops but also aids in ensuring that these crops regain their utilisation (and thus their value) as mainstream crops.

The diversity of crops grown under regenerative agriculture also contributes to the sustainable production of livestock feed/forage.

Because of the need to produce crops that can withstand the impacts of climate change and the need to reduce the contribution of agriculture to global warming, the project will:

1. identify maize, soybean, and sorghum varieties with less sensitivity to the simultaneous occurrence of drought and heat stress
2. develop new soybean cultivars with enhanced tolerance to drought because of the extreme importance of soybean to the livestock production industry and the frequent incidents of drought in Sub-Saharan Africa
3. use regenerative agriculture to preserve the health status of soil in which these crops can be grown, and promote biodiversity that impacts crop yield positively
4. reduce the impact of ruminant farming on greenhouse emissions by designing appropriate ruminant diets which enhance average daily gain, in terms of weight, in livestock (cattle, sheep and goats).

Work was conducted on *Medicago truncatula* and *Medicago sativa* in relation to their interaction with soil-borne endophytic bacteria, drought and pathogenic fungi. The work has led to identification of genetic determinants of drought- and black stem rot disease-resistant genes in alfalfa. The work on soybean and maize has identified genes that confer drought and heat-stress tolerance in soybean and in maize. We have developed a drought- and heat-stress-tolerant cultivar of sorghum, which we must subject to field trials in 2023 to ascertain its drought and heat-stress tolerance.

The work on marama bean has shown that marama growing in north-western Limpopo (near Lephalale) is more drought-tolerant than marama growing in eastern Limpopo (near Tzaneen), which we ascribe to differences in rainfall levels in the two climatic regions. We have also identified insect pests that are potential threats to marama, increasing susceptibility to fungal diseases. We are identifying the fungi and developing biocontrol strategies for managing the infections. The major challenge was access to land on which regenerative agriculture practices could be explored, but this directed us to smallholder farmers in the Eastern Cape (parts of the Alfred Nzo District (Matatiele and Bizana) and the OR Tambo District (Mthatha and Port St. Johns)) where we could access land for this purpose.

We have started to investigate genetic determinants of stress tolerance in indigenous crops such as sorghum, pearl millet and finger millet, to use these genetic determinants for improvement of mainstream crops such as maize or cowpea, Bambara nuts, tuber cowpea, marama bean, soybean and common bean.

Reclamation of heavy metal contamination of soils

Professor Keyster (UWC) is leading this research with the support of Professor Ludidi (UWC).

The purpose of the project was to analyse soil for nutrient status, physical properties, chemical properties, biological properties, and microbial diversity before and during cultivation of crops, to assess soil health. The soil was also analysed for microbial diversity, to identify plant growth-promoting bacteria. Previous work identified endophytic bacteria that promote nutrient uptake from the soil to plants, while preventing heavy metal accumulation in the plant; these endophytic bacteria will be introduced to test plots in order to monitor their effect on crop yield and crop nutrient profile (for maize, soybean and common bean).

The research undertaken and the highlights for 2022 are as follows:

Soil analysis: Preliminary analysis showed that there are variations in nutrient amounts throughout the study sites. Some sites are mostly phosphorus- and potassium-deficient, but also overabundant in iron. Some sites are deficient in Iron and have an overabundance of macronutrients.

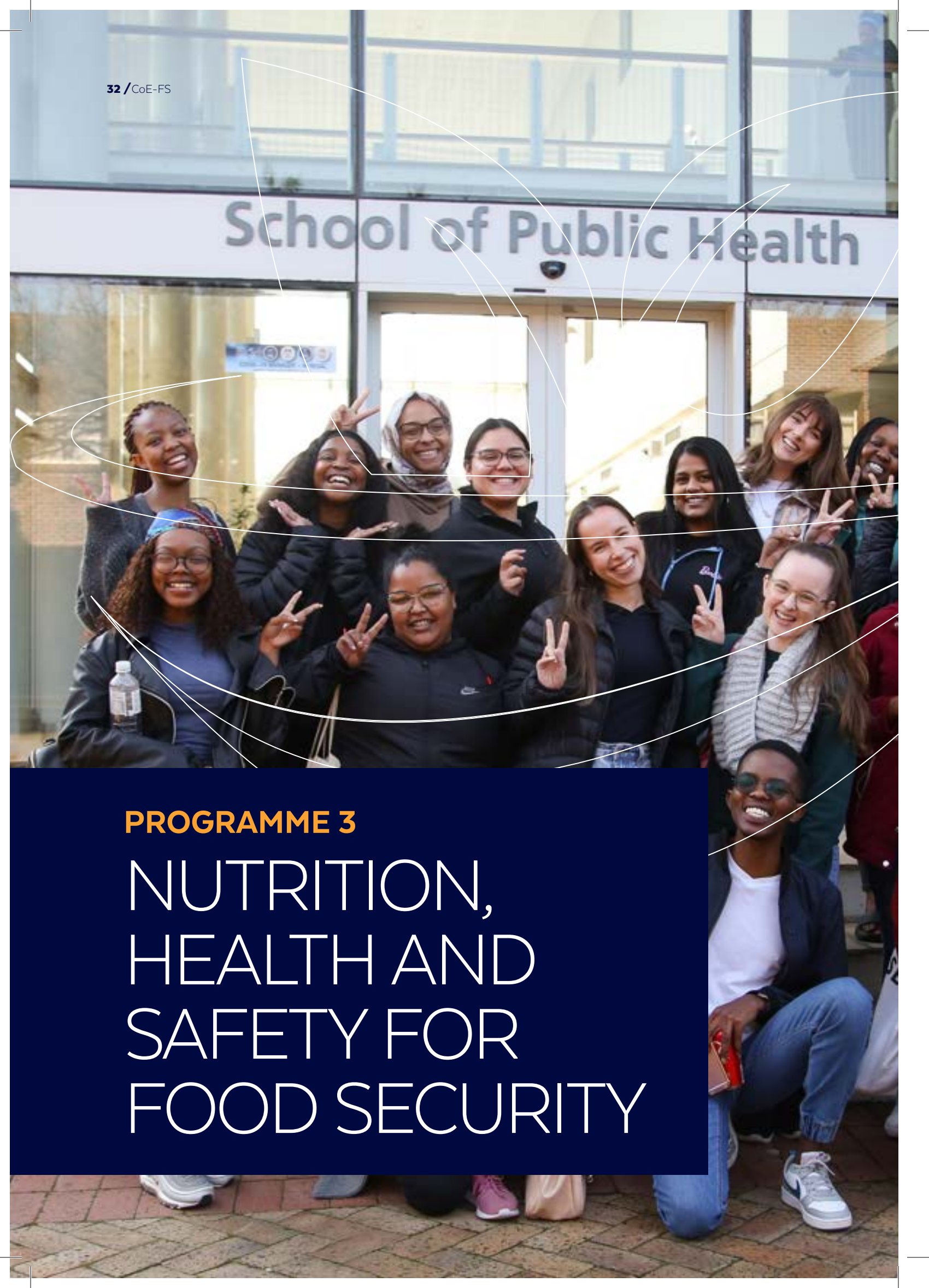
Microbial diversity of soil and plants: Various extreme weeds were identified and GPS-tagged on sites around UWC, the broader Cape Town area and coastal areas. Endophytic bacteria will be extracted from the weeds and pure cultures will be obtained.

Plant growth under endophyte inoculation: All bacterial candidates will be used in plant growth experiments conducted in both field and greenhouse contexts.

School of Public Health

PROGRAMME 3

NUTRITION, HEALTH AND SAFETY FOR FOOD SECURITY



The PIs for this programme are Professor Rina Swart (UWC) and Professor Lise Korsten (UP).

Significant sectors of South African society continue to experience high levels of chronic undernutrition, as well as nutritional deficiencies. At the same time, obesity among adults and children is a growing public health problem in the country, and is accelerating the burden of food-related NCDs in both poor and middle-class populations.

Since the inception of the CoE-FS, a key question has been “What is on the plate of South African consumers?”. Within the reconfigured CoE-FS 2020-2024, this question will remain central to the work of the Nutrition, Health and Safety for Food Security programme. The spectrum of work to be explored in the 2020-2024 cycle includes a continuation of the

exploration of food consumption patterns (paying special attention to particularly vulnerable groups, where possible), the safety of the food on the plate, and possible effects (on nutrition and health) of appropriate, affordable and accessible interventions to improve the amount and quality of food on the plate; as well as the interaction between and impact of changing food systems in the country on the content of the plate, and subsequent consequences for the nutrition and health of the population.

Projects in the programme can be loosely categorised into three themes: (1) nutrition and health; (2) safe food; and (3) an integrated food environment systems theme.

Research undertaken and achievements made under this programme are highlighted in the projects that follow.

Safe food

This project is led by Professor Korsten (UP). Other team members include Dr Stacey Duvenhage (University of Greenwich, UK), Dr Chris Marufu (UP), Dr Ishmael Jaja (UFH), Professor Kalmia Kniel (UD), Professor Shirley Micallef (UMD), Dr Manan Sharma (USDA’s Agricultural Research Services).

In addition to assessing the level of risk to the community, an essential part of the food safety and security paradigm is the prevention of communicable and NCDs, as well as assuring nutrition security. Therefore,

an integrated approach is taken, which includes risk analysis, reduction and mitigation through innovation, education and communication, as well as assessing the effect of naturally occurring micro-organisms in the prevention of disease, in the hope of reducing risk within vulnerable communities to lessen the double burden of food insecurity and communicable disease.

The research and highlights for 2022 are organised under the following sequence of WPs:

Work package	Status	Notes
All-inclusive One Health risk analysis for community health	Pathogens identified in previous studies by the research team, and globally, include Salmonella spp. and E. coli as major pathogens prevalent in the environment and the informal food system.	The food safety One Health approach incorporates the three main interlinking facets of animal, plant and human health with the cross-cutting facets of water and environment. This approach is critical to addressing the control of zoonosis and of antibiotic resistance.
Risk assessment studies	In progress: Research titled ‘Qualitative and quantitative microbiological risk assessment of dark leafy green vegetables commonly consumed in South Africa to build expertise regarding hazard assessment and exposure assessment which are critical elements in developing and implementing risk mitigation strategies’.	This research builds on information generated from research results in the informal supply chains, as well as data regarding the microbiological quality and safety of fresh vegetables consumed as part of school feeding programmes.
Potential human pathogenic bacteria (including E. coli and Salmonella spp.)	In progress: ‘Impact of water pollution on the microbiological safety and biome of fresh produce from farming to retail (predominantly informal) for fresh vegetables and development of a fit-for-purpose water microbiological quality guideline for smallholder farmers and retailers to evaluate microbiological risk reduction strategies/technology to ensure food safety in the supply chains’.	
Cryptosporidium detection	In progress: ‘Molecular detection of Cryptosporidium in the water-soil-plant nexus within selected South African small-scale vegetable farms’	There is limited knowledge on the occurrence of Cryptosporidium in water, soil and fresh produce in South Africa, and previous studies have only reported on contaminated water sources. Water, soil and fresh produce samples have been collected from four smallholder farms selected in collaboration with Ali Mkgato from the Gauteng DALRRD. Inoculation studies and optimising extraction methods for isolating Cryptosporidium DNA are in progress.
Risk reduction through innovation	In progress: “The efficacy of Moringa oleifera zero-valent iron sand filtration on the reduction of Escherichia coli in borehole water for the irrigation of spinach”.	Initial results showed improvement in the microbiological quality of the irrigation water by using a Zero-Valent Iron-sand mixture in one of the columns, and ground moringa seeds mixed with sand, mixed in a second column.
Risk mitigation, communication and education	Risk communication was undertaken with various stakeholders, which included two PhD candidates. Food safety training in the current South African school curriculum was also included in the summary.	
Assessing the microbiota of fruit and vegetables and how that affects the gut microflora of selected communities	Ethical clearance was obtained, and the research is progressing well.	This research aims to investigate the microbiome-based transmission of pathogens from fresh and dry indigenous produce such as morogo, nyii and marula collected from Gauteng and Mpumalanga. It also aims to unravel the complex microbiomes that are present on fresh and dried indigenous produce that is traded in the formal and informal sectors, by following the food system from the point of collection to the plate, and by assessing the microbial shifts.

Nutrition and health

This project is led by Professor Swart (UWC).

Three areas were explored in 2022:

- 'Food consumption, gut microbiome and chronic disease' will explore the relation between the composition of the gut microbiome and lifetime cardiovascular disease (CVD) risk profiles among a sub-sample of participants in the PURE study, with a particular focus on obesity, Type 2 diabetes mellitus and colon cancer
- 'Food consumption patterns' will contribute students to a leverage-funded national food consumption study, which will assess the nutritional status and dietary intake of different age and gender groups in South Africa. This WP explores the drivers of food choice through qualitative methods, complementary to the National Dietary Intake Study (NDIS)
- 'Maternal health and nutritional status of mothers' will fund a new postdoc in the exploration of maternal nutritional status and birth outcomes in a study on 'Cardiovascular, haemostatic and micronutrient status of pregnant women in urban food environments'.

The research and highlights for 2022 are organised under the following WPs:

Food consumption, gut microbiome and chronic disease in disadvantaged urban and rural communities: This project explores the relationship between the composition of the gut-microbiome and lifetime CVD risk profiles among a sub-sample of participants in the PURE study, with a particular focus on obesity, Type 2 diabetes mellitus and colon cancer. The CoE-FS funding is only for the assessment of dietary intake, while the microbiome analyses and endoscopies are covered (as leverage funding) by the African Microbiome Institute at SU. The criterion for inclusion is that participants must have a BMI > 35 with a diagnosis of diabetes Type 2. The intervention component will include a complete feeding intervention to provide at least 40-50g of fibre per day, in a diet consisting of whole foods most commonly consumed by traditional rural Africans in South Africa. In 2022, Professor O'Keefe received an NRF grant for the intervention study. The proposal of a master's student received ethics approval and she is currently compiling an amended food composition database which contains polyphenol content of food, to explore possible associations between the polyphenol content of the diets and the gut microbiota (specifically Bifidobacterium and Lactobacillus) of participants in the pilot study.

Food consumption patterns: This WP primarily funds students on a leverage-funded NDIS which will assess the nutritional status and dietary intake of different age and gender groups in South Africa. Due to COVID-19 and low vaccination rates, fieldwork for the NDIS could not commence. During 2020, a desktop review (including two systematic reviews and analyses of data from household survey reports covering the period 1997-2020) was completed by three groups of researchers. Some of the key findings of this project are as follows:

- The majority of the population procure most of their food from commercial enterprises (SMMEs). The gains in reduction of hunger since 2002 have in all likelihood been erased by the socioeconomic effects of the COVID-19 pandemic control measures. Dietary diversity is low, and heavily reliant on energy-dense foods that are not necessarily nutrient-dense. Intake of fruit and vegetables is particularly low. Intake of food sources of calcium is very low.
- The intake of commercially manufactured, ultra-processed foods that are high in added sugar, salt and saturated fat is growing exponentially across all income groups. The high intake of ultra-processed foods (UPFs) such as sugar-sweetened beverages (SSBs) and salty snacks among young adults who were born into an obesogenic food environment suggests the need for far-reaching and impactful strategies to improve the healthiness of their diets.

The desktop review has been converted to an e-book, which will be available online, and six papers to be published in a special edition of the PHN journal.

Training of fieldworkers subsequently took place in January and February 2022. Fieldwork for the NDIS was completed between February and September 2022 by 12 teams of seven fieldworkers each.

Postdoc Dr Nazeeia Sayed acted as assistant to the PI during the planning and management of the NDIS. Another postdoc, Dr Siculo Siro, acted as coordinator for the North-West and is currently assisting with quality assurance of dietary intake data. Dr Jaah Mkupete, a newly appointed postdoc, has been instrumental in the data cleaning process.

Maternal health and nutritional status of mothers

This research is led by Professor Swart (UWC).

This project funds a postdoc towards the exploration of maternal and child nutrition aspects of the Food Consumption survey.

While no data from the NDIS was available for analysis, the postdoc played an instrumental role in the development of the instruments for the Food Consumption survey and the logistics planning for the survey. An alternative data source was identified, and two papers were prepared from this data. Both papers are currently under review and have had comments from reviewers addressed.

The study, called the Coronavirus Rapid Mobile Survey of Maternal and Child Health (CRAM-MATCH) formed part of the National Income Dynamics Study - Coronavirus Rapid Mobile Survey (NIDS-CRAM) data collection, and used MomConnect to obtain information on hunger, breastfeeding and the mental health of pregnant women, and women with young infants during June and July 2020. Some of the key findings of this project are:

- High breastfeeding initiation rates were confirmed (94% in study participants). Although exclusive breastfeeding could not be determined, we assessed the prevalence of children being predominantly breastfed.
- Eighteen percent of participants (18.3%) reported hunger; 10% reported children in the household also going hungry. The odds of hungry mothers breastfeeding were significantly lower (OR = 0.66; p = 0.045). A positive correlation was found between not breastfeeding and not going to the health clinic.
- Both child and adult hunger were significantly associated with an increased likelihood of depression, with postpartum women at greater risk of depression than pregnant women. In September 2022, data collection for the 'Cardiovascular, haemostatic and micronutrient status of pregnant women in Johannesburg' (CHAMP study) commenced at the Discoverers Community Health Centre in Roodepoort, Johannesburg. Postdoctoral fellow Dr Olive Khaliq assisted with fieldworker documentation for appointment, procurement procedures for consumables and training of fieldworkers at the end of 2021. However, she resigned at the end of 2021. A new postdoc (Dr Xolisa Nxele) was appointed but is currently on maternity leave.



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RESEARCH
CHAIRS

Research chairs

SA-UK Bilateral Research Chair in Social Protection for Food Security in South Africa

This project is led by Professor Stephen Devereux (UWC).

The first five-year cycle of this bilateral SARChI concluded on 31 May 2022; therefore, new research activities were initiated in 2022. In July 2022, the NRF awarded the chair a six-month bridging grant while they considered a proposal for a second five-year cycle, to allow Prof Devereux to continue supervising master's and PhD students, and conclude the writing up of ongoing projects.

This SARChI has two overarching research objectives:

1. To contribute to knowledge about the drivers of food insecurity in South Africa, which remain at unacceptably high levels for an upper-middle-income country
2. To inform improved social protection policies and programmes, in support of efforts to reduce food insecurity for poor and vulnerable South African citizens and residents. Social protection refers to state interventions – such as social grants, school feeding, public works, graduation programmes and Basic Income Support – that provide assistance to poor and vulnerable people.

The strategy was to initiate research on several topics directly relevant to food security and social protection, mainly in South Africa but also (with co-funding) in other countries, and to generate high-level academic outputs (journal articles, chapters, books) and lessons that can be communicated to policymakers through academic and policy engagement (online articles, media appearances and participation in South African government processes).

Academic outputs include 19 peer-reviewed journal articles, 14 book chapters, six conferences or workshops organised, 32 presentations at international conferences including four keynote addresses, numerous blogs, seminars, webinars and project workshops, and 33 TV or radio interviews. The majority of these outputs are directly attributable to the SARChI, but all were made possible by the time provided by the award of this Bilateral Research Chair for academic writing and public engagement. Public engagement and policy advocacy are important components of the SARChI chairholder's work, and essential for achieving societal impacts from academic research. Prof Devereux was appointed to two South African government advisory panels, in 2017 (Food and Nutrition Security) and in 2021 (Basic Income Support). In 2019, the CoE-FS communications manager estimated that his media appearances in South Africa since 2016 had reached more than 12 million viewers, listeners and readers.

The Chair had, from 2016 to 2022, the following workstreams:

1. Social grants
2. School feeding programmes
3. Public works programmes
4. Economic and social rights
5. Farmworkers in South Africa
6. Graduation model programmes
7. Social protection policy process
8. COVID-19
9. Basic income support
10. Resilience and food security

Highlights and outputs per workstream, for the first term of the Chair, include:

- A review of literature and quantitative analysis of secondary data of the NIDS dataset in 2016-17, in collaboration with a visiting researcher hosted at UWC by the Chair, explaining the paradox that child malnutrition rates in South Africa are unchanged since the 1990s despite a massive expansion in the Child Support Grant. Findings were presented in seminars at ISD in Cape Town and at IDS in Brighton.

- In 2017, Prof Devereux chaired a commission at government's Food and Nutrition Security Indaba, which reviewed and revised the social protection chapter of the National Plan for Food and Nutrition Security.
- The Chair established a national School Feeding Working Group in 2016 and chaired four working group seminars at UWC under the CoE-FS.
- Prof Devereux conceived, organised and was director of South Africa's first National School Feeding Workshop, where he delivered the keynote address.
- Prof Devereux was an advisor for a Max Planck Institute project titled 'The ILO Recommendation on Social Protection Floors' in 2016. His SARChI co-sponsored a workshop on this topic at the University of Johannesburg, where he presented a paper titled Social Protection Floors and the Right to Food, published as a book chapter in 2017.
- Prof Devereux delivered the keynote address, 'The Right to Social Protection in Africa', at the conference 'Law for Development' in Berlin, that was published in the journal Law in Africa in 2017.
- The Chair collaborated with WFP, a feminist NGO, on a research project that analysed violations of labour rights of farmworkers in the Western Cape and Northern Cape. The research report was presented to a South African parliament portfolio committee meeting and was well received.
- The Chair also designed and managed a research study into food insecurity among farmworkers in the Northern Cape.
- Prof Devereux presented a paper on the Northern Cape research study at the 4th International Conference on Global Food Security in 2020, and an article in the journal Nutrients (impact factor = 4.17), co-authored with a UWC researcher he mentored.
- Prof Devereux led a series of research studies of graduation model programmes in Burundi, Rwanda and Bangladesh, with funding from other sources, to generate evidence that could be synthesised and adapted to the South African context.
- In 2019, Prof Devereux was awarded a Mercator Fellowship by the SOCIUM Research Centre on Inequality and Social Policy, at the University of Bremen, Germany, and a contract with Palgrave Macmillan for a book provisionally titled Policy Pollinators: The role of transnational agents in propagating social protection in Africa.
- Prof Devereux conducted a two-round panel survey on COVID-19 impacts on farmworkers in the Northern Cape.
- The Chair was invited by the African Union to contribute a chapter on social protection to Africa's COVID-19 Recovery Strategy.
- In 2021, Prof Devereux was appointed to an expert panel by the DSD to investigate 'The Appropriateness and Feasibility of a System of Basic Income Support for South Africa' for the Cabinet. He co-authored the expert panel report and participated in several dissemination activities. This work provided empirical support for the government's decision to extend the COVID-19 Social Relief of Distress Grant until March 2023, after which it could become a permanent Basic Income Support.
- Prof Devereux and a colleague from the International Centre for Tropical Agriculture secured a contract from Palgrave Macmillan for a co-edited book on Resilience and Food Security in a Food Systems Context. Contributors include world-leading experts from Cornell University, Johns Hopkins University, the University of London, CIRAD and the International Food Policy Research Institute, as well as South Africans from UWC, UCT and the CoE-FS. The book synthesises cutting-edge research and thinking on resilience, food systems and food security.

The Chair was extended for another five-year cycle from 2022.

Research chairs

UNESCO Chair in Science and Education for African Food Systems

The UNESCO Chair in Science and Education for African Food Systems, held by the CoE-FS director Professor Julian May, was established at UWC by UNESCO on 12 December 2017. The Chair was launched in December 2017 at the third Global Food Security (GFS) Conference, in Cape Town. During 2018 funding was raised for an inception meeting, held in April 2019 in Tunisia. This was attended by 15 representatives from founding universities located in eight countries. An agreement on the goals, objectives and action plan for the first cycle of the Chair was reached. The final objectives are:

- To support transdisciplinary modes of inquiry to better inform the analysis of food security and nutrition in Africa
- To promote and facilitate Africa-wide partnerships for research, innovation and training activities
- To foster a transformative agenda for African scholarship on the food system through research, training and engagement, by providing opportunities, leadership, evidence for decision-making and informed debate, and critique of policies and programmes aimed at addressing food insecurity.

These align with the UNESCO priorities of gender equality and Africa. Gender is central to the production, processing and utilisation of food in Africa, which is shaped by relationships of patriarchy that impact issues as divergent as access to land, uptake of technology and 'maternal buffering', whereby women give up food to ensure that their children receive nutrition. Scholarship in the field is itself gendered. African women remain under-represented in the Science, Technology, Engineering and Mathematics (STEM) fields of enquiry that are central to the analysis of food systems. Activities undertaken by the Chair focus on the eradication of poverty, as manifested by hunger, malnutrition and food insecurity. Emphasis is placed on the situation of children, and, in 2020, the Chair was involved in the publication of a significant report on child nutrition in South Africa, the Child Gauge. Sustainable development is a priority, with activities directed towards climate change, soil and plant health, and the sustainability of the African food system. Finally, intercultural dialogue is central, in terms of both the activities in all regions in Africa and the spread across the natural and social sciences and the humanities. The COVID-19 pandemic exposed the vulnerabilities and inequities of both the global and the African food systems. It also disrupted the plans prepared in Tunisia. While the first and last of these objectives were achieved, the GFS was postponed and then run as a smaller, virtual event,

while the restrictions on international travel hindered networking activities. Nonetheless, the Chair has made progress toward its goal to increase and promote the contribution of the African academic community to building sustainable food systems.

Firstly, the Chair was able to facilitate three successful proposals concerning the African food system. In 2018 and 2020, the Chair worked with universities in Europe responding to joint Europe-Africa Research and Innovation funding calls to partner with universities in Africa. Through LEAP-Agri H2020 and the ERA-Net Cofund on Food Systems and Climate (FOSC), consortia were established that included the Universities of Bonn, Ghana, KU Leuven, Makerere, Moi, Pretoria, VU-A, Western Cape, and CIRAD. Projects in Ghana, Uganda and South Africa have been completed, and a project concerning climate change in Algeria, Kenya and South Africa was launched in 2022. These resulted in student mobility from South Africa, Ghana and Kenya to Europe in the period prior to COVID-19, which will continue now that global travel is possible again. Each project also generated scholarly publications and included a component focused on knowledge brokerage and engagement with policymakers.

Secondly, in 2021 the Chair prepared an African Food Systems conceptual framework developed with the African Research Universities Alliance (ARUA) Centre of Excellence in Sustainable Food Systems at UP and its collaborators, the universities of Ghana and Nairobi. This framework is being used by their Food Systems Network (FSNET) project. More than half of these researchers are women, drawn from countries throughout the continent. Before the global lockdown, the Chair gave presentations on this conceptual framework and planned activities at Erasmus University, VU-A, KU Leuven, and the universities of Bonn, Ghana and Pretoria. Virtual presentations have been given in Cairo, Nairobi and Paris. Finally, the chairholder was appointed as a visiting fellow in the Centre for the Advancement of Scholarship at UP. In this capacity, two international events were held in 2022 to celebrate World Food Day: one was held at the 2022 Norman E. Borlaug International Dialogue: World Food Prize meeting, and the other was the publication of a special edition of Sustainability. An application for the extension of the Chair was made in 2022, with the Chair being successfully extended for a further X years.



need image

LEVERAGE
PROJECTS

Leverage projects

Front-of-package labels (FOPL) on food products to inform regarding high levels of nutrients of concern for NCDs

This research is led by Professor Swart (UWC).

This project began in 2018, and several CoE-FS-funded students are using data from the project for their research. Leverage funding is from Bloomberg Philanthropies. The project collects data on the nutrient composition of all packaged foods in South Africa (SA), and has also developed and tested a warning label as a possible FOPL for packaged foods high in nutrients of concern (such as sugar, sodium, and saturated fat) in SA. **Some of the key findings from this project are:**

- Almost all participants from all socioeconomic backgrounds had positive feelings towards warning labels, reporting that warning labels concisely and understandably educated them about the nutritional composition of foods.
- Some participants anticipated that warning labels would reduce their purchases of unhealthy foods.
- Participants found the warning labels to be attention grabbing, and stated that their preferred most effective label featured a black triangle on a white background (a 'holding strap'), the words 'high in' and 'warning' in bold and uppercase text, an exclamation mark, and an icon depicting the excessive nutrient.
- In SA, policies that mandate warning labels may improve consumer understanding of nutrition information and assist consumers in determining the nutritional quality of packaged foods and drinks.
- The newly developed warning label consistently and statistically significantly outperformed the other FOPLs (Guideline Daily Amount (GDA) and multiple traffic light) in terms of assisting participants to identify products high in nutrients of concern (sugar, sodium and saturated fat) as well as to identify the unhealthiest of the food products.
- The warning label as FOPL will complement existing health-promotion and obesity-prevention strategies such as HPL and restrictions on marketing to children.
- 80% of packaged foods and 60% of packaged drinks in the sample were ultra-processed.
- An assessment of sugar in foods found the amounts of sugar they contained to "far exceed" recommendations by the WHO, and beverages were a big contributor to this result.
- The mean total sugar content was significantly higher in breakfast cereals with CDM compared to those without CDM.
- This group assisted the NDoH (Food Control) with the preparation of the draft regulation, as well as with the Socio-Economic Impact Assessment System report to the Department of Monitoring and Evaluation within the Presidency.

Leverage projects

Impact evaluation of the Health Promotion Levy (HPL)

This research is led by Professor Swart (UWC).

This project received leverage funding from Bloomberg Philanthropies. Data was collected regarding the dietary intake of young adults (aged 18-39 years) in a low-income community in South Africa immediately prior to the implementation of the HPL on 1 April 2018, and one year later. This resulted in two project-specific publications, as well as two congress presentations: one in South Africa and the other in the US. A third paper is under review. Information from this project also contributed to several other publications.

Some of the key findings of this project are:

- One year after the tax was implemented, taxed beverage energy intake had declined by 24% due to behavioural change, and by an additional 8% due to reformulation compared to baseline.
- A media analysis found industry expressed no support for the HPL, whereas academics, government and other sources mainly expressed support. Health reasons were the most common justifications for support, and economic harms were the most common justifications for opposition.
- Statements opining that sugar intake is not related to obesity, that the HPL will not reduce SSB intake, and that the HPL will cause industry or economic harm were all disproportionately frequent from industry sources.
- The tax effect on SSB intake was modified by SSB knowledge and intention to reduce SSB intake, with higher levels of each associated with lower SSB intake.
- After implementation of the HPL, the sugar content of beverage purchases fell by 4.9g/capita/day overall, a 32% decrease. Taken in isolation, consumer switching and volume changes together led to a reduction equivalent to 71% of the total change, while reformulation accounted for a decrease equal to 34% of that change. Middle-LSM households experienced larger reductions than high-LSM households, due to larger changes on the consumer side. For both LSM groups, reformulation-led reductions mostly occurred after implementation, and most changes came from taxable beverage purchases. As sugary drink tax designs evolve with broader implementation globally, understanding both supply- and demand-side factors will help researchers to better assess the population and equity potential of these policies.



Leverage projects

Infant and Young Child Feeding Advocacy (IYCF) Project

The project is led by Dr Chantell Witten (UWC), supported by Dr Nazeeia Sayed (UWC).

This project aims to create an environment in which women's breastfeeding choices are not unduly influenced by the marketing of infant formula. The project is aligned with and in support of the strategic initiative of the WHO to work with countries (including South Africa) to strengthen legislation with respect to implementing the 'International Code of Marketing of Breast-milk Substitutes', and monitoring and enforcing the 'Regulations Relating to Foodstuff for Infant and Young Child Feeding in South Africa' (R. 991). This is an 18-month project funded by the FLRF. The project uses a multisectoral engagement process to develop an advocacy strategy to counteract the marketing of infant formula in South Africa. It is designed to follow and test a prescribed process previously used for policy development in Ghana, and falls within the domain of operational research.

A project kick-off meeting was held on 3 May 2022. A Technical Working Group was established, with monthly meetings; an IYCF STEERCOM was established, with monthly meetings; the ethics application for research

study was submitted; and a media analysis to inform the target market research has started.

This project has been invited to share project progress at several forums, including engagements with the CoE-HUMAN, SU's Department of Global Health, The Health Living Alliance, the Food Justice Coalition and Black Sash. The project hosted two symposia sessions, at The Global Health Networks Conference in Cape Town on 22 November 2022, and the Child Health Priorities Conference on 24 November 2022.

The project has been cited in several Daily Maverick articles that specifically addressed industry influence and interference in public health discourse. The project has been recognised by the NDoH as an undertaking that will positively influence the breastfeeding landscape in South Africa, and the IYCF participated in the CoE-FS and NRF co-hosted webinar 'Strengthening resilience in nutrition and food security on the African continent'.

Research under this project will continue in 2023, and further research outputs will be provided in the 2023 APR.

Leverage projects

Partnerships for healthy diets and nutrition in urban African food systems – evidence and strategies (NOURICITY)

This is a collaborative agreement between the project lead, ZEF, and the CoE-FS. The other PIs are at Wageningen University, UG and MAK, Uganda. The core team is Dr Nicolas Gerber (PL, team coordinator, ZEF); Professor Julian May (PL, UWC); Professor Felix Asante (PL, UG); Professor Vincent Linderhof (Wageningen University); and Dr Coretta Jonah (UWC) (2018-2019).

The research project investigates three factors influencing urban food systems. These are:

1. Urban food sources, characteristics (including food safety) and rural-urban linkages as 'systemic' drivers of food choices and nutrition
2. People's access to nutrition-related knowledge (formal and informal, indigenous and Western), income, food tastes, habits and culture, as 'individual' drivers of food choices
3. How systemic and individual drivers combine to determine people's food consumption and nutrition status.

This project aims to improve urban nutrition in Africa by bridging some of the knowledge gaps on urban malnutrition and its systemic (in our case, mostly retail-level) and individual (household-level) drivers, as well as on the impacts of policies and their spheres of action and mandates. Bringing together stakeholders in urban food systems to disentangle their roles, responsibilities and possibilities to support improved urban nutrition, the project strives to deliver a partnership concept for improved policy interventions for urban nutrition in the three main study cities: Accra, Cape Town and Kampala. The partnership concepts are key contributions to the foreseen impact, i.e. improved urban nutrition in Africa.

The highlights and achievements of this project include:

Stakeholder engagement: In Ghana, four stakeholder workshops were held: three highlighted the main issues at the retail sector level, discussed them with public authorities, and mapped policy and public interventions around urban nutrition and food safety/quality, especially highlighting the applicability of the institutions' mandates; the fourth was a partnership workshop. In Kampala, two workshops were conducted. At the first stakeholder workshop with people from Kanyanya, a 'CoP' group was initiated in the parish on 'Improving nutrition quality and reducing food unsafety'. On the second day, high-level stakeholders discussed food-security challenges, the main challenge being the knowledge of the people of Kanyanya regarding healthy food and healthy diets. In the

second workshop (February 2020), potential strategic interventions were discussed for healthier food and diets. Participants were higher-level stakeholders and selected representatives from Kanyanya parish.

Capacity building: 'Working' workshops for stakeholders took place in 2021 and 2022, capitalising on the first workshops, strong media attention to food safety and nutrition in 2019 (e.g. in Ghana), and COVID-19. On the research side, colleagues from South Africa (Dr Coretta Jonah and Winnie Sambu) stayed at the coordinator's institute in Germany for a month in September 2019, developing their research plans with German colleagues and with the Ghanaian partner, who also visited ZEF for a month and in 2021 for a week. The ZEF doctoral researcher is also Ghanaian. Another doctoral colleague in South Africa benefited from a scholarship delivered by the German coordinator to complete her thesis on the project. The academic impact has been the sharing of research methodologies and study protocols across the consortium. For example, the research team in Pretoria has shared food-safety lab protocols with research institutes in Accra; the teams in Cape Town have shared methodologies for urban food-systems mapping with consortium members at the Universities of Ghana and Bonn.

The success of the stakeholder engagement process in Accra relied heavily on the connection of the Ghanaian partner with research facilitators in the communities around the open markets, and with policymakers and the ministerial level. Crucially, seizing on local media buzz and national-level discussions on food safety and hygiene (linked to the country's open markets) has worked to guarantee the support and participation of the stakeholders, despite the long break in field activities due to the pandemic. This participation led to a stronger focus on the food-safety issue in the retail space throughout the research activities.

In Uganda, there are small initiatives (pilots) to improve food and nutrition security, but most relate to traditional settings (urban agriculture via sack gardening, keeping traditional diets with traditional preparations). In South Africa, the NOURICITY partner and its associates in the field of food security were well positioned long before the project and just continued throughout, embedded in the consultation activities and exchange with (notably) the Cape Town and Western Cape town and district authorities, and community associations, in Langa in particular.

Leverage projects

Researching obesogenic food environments in South Africa and Ghana

This research was led by Professor Swart (UWC).

This project used a three-phase mixed-methods approach to trace the links between foodways, local food retail environments, key value chains, and the policy and regulatory environment in South Africa and Ghana.

Some of the key findings of the project are as follows:

- A small but significant associations between gender and the frequency of consumption of different foods. Households where men were responsible for food purchases tended to consume higher levels of meat, fast food, salty snacks and ready-to-eat meals, which have all been associated with increased risk for NCDs. Households where women oversaw food purchasing and preparation tended to consume more sugar and home-baked bread.
- Customised data analysis frameworks identified fish as the most commonly consumed protective food in Ghana; in South Africa it was fruit, with higher consumption among non-deprived (76.5%) compared to deprived households (50.1%).
- Sugar was the most frequently consumed obesogenic food in both countries.
- In South Africa, formal retailers were key sources of most obesogenic and protective foods.
- In both Ghana and South Africa there is an increasing 'concentration' of producers, importers and/or distributors into a few large companies.
- Nutrition-related concerns are largely inconsequential within the food system; and where they feature, they are focused on the desire to drive sales, including of higher-profit-yielding products.
- Food safety considerations overshadow nutrition, including with regard to the scanty forms of state-based governance in existence.
- Food vendors on ground level were generally indifferent to the perceived contribution of their cooking and handling practices to the risk of obesity (malnutrition).
- Small-scale actors in the supply chain (a particular feature more relevant in Ghana than in South Africa) have limited capacity in terms of asset base.
- Poor infrastructure and lack of access to refrigeration drive post-harvest losses, and make fruits and vegetables less readily available and more expensive.
- Information and power asymmetries lead to a weaker negotiating/bargaining position for primary producers than for traders (wholesalers and retailers), and drive decline in local markets. This is the case specifically for chicken in Ghana.
- Nutrition was a stated policy priority in both Ghana and South Africa; however, policy responsibility was located within the health sector, and the integration of nutrition into food-system sectors (including agriculture, trade and industry) remained challenging.
- This study identified opportunities for reconceptualising 'nutrition' policy outside of the narrow health and food sectors, including through emphasis on externalities associated with malnutrition; and in Ghana, through investment in traditional minimally processed foods.

Leverage projects

Exploring food system transformations in rapidly changing African cities (Food4Cities)

This is a collaborative agreement between the project lead, VU-A and UWC. The other collaborators and PIs are at KU Leuven and MAK. The core team consists of Professor Peter Verburg (PL, team coordinator) (VU-A); Professor Anton van Rompaey (PL, Kampala) (KU Leuven); Professor Shuaib Lwasa (MAK); Dr Jacqueline Davis (VU-A) (2018-2020); Dr Nyasha Magadzire (UWC) (2019-2020); Lisa-Marie Hemerijckx (KU Leuven); Professor Julian May (PL, Worcester) (UWC); and Raymond Esau (BVM).

Food4Cities developed representations of food systems and urban growth of rapidly developing African cities through multidisciplinary methods that identified trade-offs and synergies between food systems, urbanisation and other development goals. Focusing on Worcester in South Africa, and Kampala, Uganda, this project aimed to analyse and map the urban food system and its relationship with food security. **The project comprises the following four WPs:**

1. Knowledge co-production and participatory planning
 2. Characterise the food system
 3. Model food systems dynamics and explore alternative futures
 4. Collaboratively plan for the future
- Highlights for 2022 include:**
- In Worcester, through household surveys, the team was able to map hot spots of food insecurity, ECD centres and the movement of food in and out of the Worcester area; the data was integrated in consistent models.
 - Another innovative outcome has been the development of a Massive Open Online Course (MOOC), in partnership with KU Leuven. It is hosted on an edX platform and be accessible to all stakeholders and the public.
 - Four meetings and three in-person stakeholder workshops were held with officials and councillors from the BVM and the Cape Winelands District; five meetings and two in-person stakeholder workshops were held with officials from the WCG, under the auspices of their Nourish2Flourish Strategy.
 - A meeting was held with the NPC, and there was participation in four online stakeholder engagements with the DALRRD, at which results from Food4Cities were presented. Meetings were also held with Uganda National Farmers Federation, Kampala Capital City Authority (KCCA) and at the Ministry of Agriculture, Animal Industry and Fisheries.
 - The results and findings from Food4Cities have been communicated and shared on various forums, informing use of the IDP, the FAO Rapid Food System Assessment, an online food forum and in Kampala, a food consumption and selling database. They have been mentioned on radio and in published articles.
 - The team also prepared policy briefs, had six peer-reviewed papers published and presented their findings at several conferences and seminars.

Key Performance Area 2

EDUCATION AND TRAINING

In 2022, the CoE-FS supported, in total, 127 students (NRF-, leverage-funded and non-bursary holders). A total of 33 bursary holders graduated, or completed their studies. That is 16 NRF-funded students and 15 leveraged-funded students, and two non-bursary holders.

Synthesis of training

NRF bursary holders

This table presents the spread of NRF bursary holders.

Category	Total
Honours students	0
Master's students	14
Doctoral candidates	21
Postdoctoral fellows	8
Total postgraduate students	43
Total RSA master's and doctoral students	32
Total students from African countries (master's and doctoral)	6
Total foreign (not from Africa) master's and doctoral students	0
Female master's and doctoral students (RSA)	26
Black master's and doctoral students (RSA)	22
Honours/BTech graduations	1
Master's graduations	10
Doctoral graduations	3
Postdoctoral fellows	2

NRF bursary holders across collaborating institutions

2022 Institution	Level				Total
	Doctoral	Honours / BTech	Master's – Research-based	Postdoc	
SU	-	-	-	-	-
UCT	-	-	-	-	-
SAMRC	-	-	-	-	-
UP	7	0	6	3	16
UFH	-	-	-	-	-
UL	-	-	-	-	-
UWC	14	0	8	5	31
Wits	-	-	-	-	-
Total	21	0	14	8	43

Leverage-funded bursary holders

Category	Total
Honours students	1
Master's students	6
Doctoral candidates	13
Postdoctoral fellows	2
Total	22

Non-bursary holders supported

Students who were supported by the CoE -FS but who did not receive bursaries.

Category	Total
Honours students	6
Master's students	11
Doctoral candidates	12
Postdoctoral fellows	0
Total	29

NRF degrees conferred

Degree	Total
Honours	1
Master's	10
Doctoral	3
Postdoctoral	2
Total	16

Leverage-funded degrees conferred

Degree	Total
Honours	5
Master's	7
Doctoral	3
Total	15

Non-bursary holder degrees conferred

Degree	Total
Master's	2
Total	2

Key Performance Area 3

INFORMATION BROKERAGE AND RELATED ACTIVITIES

The CoE-FS met and exceeded its information brokerage targets as per the SLA 2018-2023 and has done so annually. Below are some of the highlights of the CoE-FS's performance, and the visibility achieved through our various channels in 2022:

- Partnering with the NRF for a special "Science for Society" Africa month lecture
- Extensive coverage of the IYCF
- Collaborative communication and engagement around the learnings journeys in Worcester and Langa, with the WCEDP, and the World Food Programme's (WFP) regional director joining one of the days.
- Gastronomies, a creative and collaborative science communication exhibition, showcased ahead of World Food Day by Professor Korsten's team
- The reintroduction of the 'glossy' version of the Annual Progress Report
- Attendance, participation and coverage of the 2022 Norman E. Borlaug International Dialogue – World Food Prize Foundation, and a visit to the University of Missouri, Columbia.

Communications and engagement in numbers

Platform/product	2021	2022
Internal nuggets (target is 40)	44	53
External nuggets/media mentions	74	240
YouTube views	1 887	2 331
YouTube watch time	61.7 hours	63.1 hours
Facebook group	799	819
Facebook page (likes)	2 694	2 945
Facebook page (followers)	/	3 244
Twitter followers	2 604	2 753
Instagram	/	116

By far, the most successful internal nuggets have been the press releases and articles for the launch of the IYCF Advocacy project and for PhD candidate Catherine Pereira-Kotze's first journal article on maternity protection.

Another internal nugget that received notable traction is "How Russia's invasion of Ukraine impacts global food security", an article based on Professor Devereux's input at a related panel discussion, which was then picked up by the Inter Press Service, a wire service for news from the Global South, and teleSUR, the "Latin socialist answer to CNN".

According to AVE, the top three CoE-FS stories for 2022 (for which we have data) are:

- "12% of working women in South Africa are domestic workers – yet they don't receive proper maternity leave or pay", written by Catherine Pereira-Kotze with the assistance of the CoE-FS communications manager | AVE: R721 416.10
- "Worcester project teaches how to future-proof food" published across Business Day's editions, online and in the Daily Dispatch. AVE:

- R538 874.48. Researcher: Julian May
- World Breastfeeding Week (combined articles/media mentions/broadcasts). AVE: R527 450.15. Researchers: Chantell Witten, Catherine Pereira-Kotze, Julian May, Nazeeia Sayed.

Other CoE-FS content that received notable news coverage in 2022 includes:

- Professor Swart's input on the poor regulation of child-directed food advertising for Daily Maverick's Food Justice project
- Co-director Professor Korsten's work on microscopic organisms found on raw fruit (for example)
- Dr Sayed's well-timed tips for healthy eating during Ramadan
- Ongoing and extensive coverage of the learning journeys in Worcester and Langa
- Food Imbizo events on the right to food and World Breastfeeding Week
- Professor Keyster's research on plant tolerance to toxins.

Events

Events such as conferences, seminars and launches are an opportune way in which to connect researchers with relevant stakeholders, including the broader public and media. In 2022, the CoE-FS staged or participated in events, including:

- Co-organising and hosting a special Africa month lecture with the NRF, the “NRF Science for Society Lecture invitation - Topic: Strengthening resilience in nutrition and food security on the African continent”
- The multi-day, multistakeholder learning journeys in Worcester and Langa
- A notable moment in a Worcester learning journey was the inclusion of the WFP regional director Dr Menghestab Haile, which was facilitated by the communications manager
- Another innovative science communication event was the World Food Day event, led by Professor Korsten and senior postdoctoral fellow Dr Willeke de Bruin. Professor Korsten’s research group at the Department of Plant and Soil Sciences collaborated with the UP Drama Department on applied research communication pieces, known as Gastronomies
- The participation and attendance of the CoE-FS in the 2022 Norman E. Borlaug International Dialogue - World Food Prize Foundation in October 2022
- Invited to exhibit at the first World Science Forum in South Africa, with extensive media coverage and foot traffic.



Key Performance Area 4

NETWORKING

Since its inception, the CoE-FS has established various national and international collaborations and/or partnerships as a result of research activity and/or affiliations. Collaboration is fundamental to the work of a virtual centre such as the CoE-FS. Connecting with diverse stakeholders in this regard is critical to our success and relevance. In addition to the formal agreements that the CoE-FS has reached with 43 collaborating institutions, it has nurtured research and networking collaborations with scholars and institutions across South Africa and internationally. A few networking examples are as follows:

- **Programme 1:** Researchers from several different institutions are involved, including UCT, UWC, CPU, and SU
- **Programme 1:** Collaboration with a network of global researchers has led to the publication of a paper in a special issue of the Journal of Evidence and Policy
- **Programme 1:** The collaboration with SAFCEI has raised the profile of food governance in the faith community's domain, contributing towards greater societal mobilisation around this issue
- **Programme 1:** Researchers have also collaborated with the Centre for Food Policy at City University London to conduct research and present findings; this has increased the visibility of the CoE-FS and shared insights and learnings from these dialogue processes
- **Programme 1:** The developing collaboration with the 'Food Governance and Policy Reform' project, the SAFL and the FAO resulted in more visible engagement at national and international levels
- The project led by **Dr Wegerif** continued the implementation of the three-country study of the impacts of COVID-19 on food systems. This involves work in South Africa, Ghana and Tanzania. It is a partnership with UWC, Ardh University in Tanzania, and UG, as well as civil society partners in each country
- **Prof May** attended the 30th anniversary meeting of the UNESCO Chairs programme in Paris and attended side sessions on the Priority Africa programme of UNESCO, and a working group meeting to establish a network of UNESCO Chairs working on food systems analysis
- **Prof May** also submitted the application for the renewal of the UNESCO Chair for 2022-2026, which was successful
- In October 2022, **Prof May** gave a side-session presentation at the "2022 Norman E. Borlaug International Dialogue - World Food Prize Foundation" meeting in Des Moines, Iowa. This was part of the, FSNet-Africa breakout session.
- Also in October, **Prof May** prepared the programme and gave a presentation at the FSNet-Africa World Food Day dinner at UP.
- **Prof May** gave a presentation at the Committee of World Food Security 50 Side Event 29 on "Diversified food production and diet: The challenges of transition to more sustainable agrifood systems" which was co-hosted by the EU, FAO, CoE-FS and the SDG 2 Advocacy Hub
- **Prof May** was one of the speakers for the Business Day Dialogues on "The role of ethical leadership in addressing child hunger", along with Anglican Archbishop Thabo Makgoba, Dr Andrew Boraine, Dr Witten and Omri van Zul (Agri-SA)
- **Prof May** participated in the Food Equity Centre's International Symposium, and contributed towards a paper on place-based approaches to food equity analysis
- **Prof May** collaborated with Dr Kate Trout, a researcher from MU to implement a study of ECDs, which was conducted in Worcester
- **Prof May** co-presented a session at a symposium convened by the Western Cape Department of Agriculture on "Agriculture is pushing forward: Advancing the role of extension and advisory services towards inclusive and resilience food system". This was attended by all extension officers working in the province.
- **Programme 2:** Prof Emmambux and Prof Ludidi are leading the South African part of the project "Food and Livelihood Resilience from Neglected Plant Species in Western and Southern Africa"
- **Programme 2:** Collaboration with Purdue University (USA), University of Eldoret (Kenya), and ITA Food Technology Institute in a USAID project is continuing under the SMART foods project
- **Programme 2:** The project, "Sustainable Reduction of Post-harvest Losses in Feed the Future Countries through Technologies and Innovations that link Farmers to Markets: Focus on Kenya and Senegal" is in the Food Processing Innovation Lab. This project is based on the concept of food-to-food fortification for enhanced nutritional characteristics of cereal-based foods which is also a core concept of the CoE-FS's SMART food project. The project has opened various avenues for SMART foods and food ingredients with extra funding and analytical resources
- **Programme 2:** InnoFoodAfrica has a multidisciplinary team to tackle food and nutrition security. The PI of the SMART Foods project is also leading the food ingredient and product innovation WP for InnoFoodAfrica
- **Prof Emmambux** has joined a consortium that applied for a project entitled "SunGari: A modern solar cooking solution for African staples". The consortium consists of colleagues from Greenwich University (UK), UL, the University of Kassel (Germany), and the University of Lomé (Togo)
- **Prof Emmambux** also formed part of the proposal "LIMAQUA: African interdisciplinary laboratory in sustainable, nutrition-sensitive marine aquaculture" together with several local and international partners
- The project led by **Professor Ludidi** consists of collaborators from the ARC, MU, the University of Mauritius, the Chinese University of Hong Kong and Walter Sisulu University
- National collaborations under the project led by **Professor Keyster** include Walter Sisulu University (Dr Ifeanyi Egbichi), UP (Dr Eugene Makgoba), the National Zoological Gardens (Dr du Plessis), and UFH (Maliviwe Mpayipheli). This project also collaborated with MU (Professor David Mendoza-Cozatl and Professor Antje Heese), the University of Mauritius (Navindra Boodia), the Chinese University of Hong Kong (Dr Hon-Ming Lam), and the National Botanical Research Institute (Dr Chandra Sekhar Mohanty).
- **Programme 3:** The Food Safety project is collaborating with Prof Stefan Schmidt (UKZN) and Prof Gunnar Sigge (UWC). The group of researchers in this project includes researchers from UP's Department of Plant and Soil Sciences, Department of Veterinary Sciences, Department of Food Science and Department of Consumer Sciences; and the Department of Animal Science at UFH

- **Programme 3:** Collaboration with the Department of Rural Development and Agrarian Reform enables researchers in the project to use the modern state-of-the-art veterinary laboratories in the Eastern Cape. The department also provides retrospective data on a microbial survey of meat from abattoirs in the province. All researchers collaborating on this project share the UP-NRF RISP-funded MALDI-TOF for rapid confirmation of pathogens.
- **Programme 3:** UP's Food Safety team has established collaboration with the National Institute of Communicable Disease's Sequencing Core Facility to begin exploring the genome of selected isolates through the supply chains
- **Programme 3:** Collaboration has been established with Prof Gabriella Berg (University of Graz, Austria) who is a human gut and postharvest microbiome specialist
- **Programme 3:** A collaboration between the USDA Center for Food Safety and Applied Nutrition and the CoE-FS Food Safety team, through the Genome Traker, has been created in order to conduct further characterisation isolates in the CoE-FS Virtual Microbial Database. Researchers include Dr Marc Allard, Dr Yi Chen and Dr Dumitru Macarisin. Moreover, a collaboration with Dr Victor Ntuli (University of Lesotho) has been established in order to harness his expertise in risk assessment
- **Programme 3:** The NDIS is a significant national collaborative effort with a total of 43 academics and students from 11 HEIs (of which six are HDIs). The group has been meeting monthly and dedicated working groups have contributed to the development of the instruments of the survey, and the training material for the survey and will similarly contribute to the research output. The primary research output is the report for the NDoH
- **Programme 3:** The continued work on monitoring of nutritional content of packaged food supply in South Africa – part of the FOPL leverage-funded work and source of research topics for several CoE-FS-funded masters students – has led to engagements with UNICEF to assist with similar support in Zimbabwe; MoUs are currently being developed. A PhD candidate, Persuade Makore Kudenga, from Zimbabwe will use some of the Zimbabwe data in her research
- All leverage-funded projects under the leadership of Professor Swart are international collaborative projects
- **Professor Swart:** Although the NDIS does not have international collaborators or funders, the instruments were developed in consultation with international collaborators and there are opportunities for papers doing country comparisons where instruments provide sufficient overlap
- **Professor Swart:** Collaboration with international collaborator Anne Hereforth of the Global Dietary Quality group continued
- **Professor Swart** assisted as a country consultant and translated the Global Dietary Quality's Diet Quality Questionnaire (DQQ) into Afrikaans. The translations into the African languages which were prepared for the NDIS will also be shared with the global DQQ project, to be available to any researcher who may wish to use it
- **Professor Devereux** is a founding member of the Food Equity Centre, a global network of researchers hosted by IDS, Sussex, with partners in the UK, Brazil, Thailand, and the CoE-FS
- **Professor Devereux:** In September 2022, a symposium was held that will generate academic publications in 2023, followed by collaborative research proposals into the "normalisation" of hunger, food justice, and violations of the right to food, in South Africa and other countries
- During August 2022, the German Africa Centre for Development Research hosted the CoE-FS in Bochum for a preparatory meeting with Hohenheim University to discuss collaboration in an African-German Centre for Sustainable and Resilient Food Systems and Applied Agricultural and Food Data Science. This was followed up with meetings in Amsterdam with VU-A
- In September 2022, the CoE-FS hosted a visit to UWC by the German Federal Ministry of Agriculture, the German Academic Exchange Service and the German Foreign Office. This was the second interaction that has taken place with the group (following the above). The meeting was attended by UWC's VC Professor Tyrone Pretorius and DVC: R&I Professor Jose Frantz.

Photo credit: FSNet-Africa



Key Performance Area 5

SERVICE RENDERING

All the PIs are involved in service rendering, which includes input into policy debates, keynote presentations, and facilitating workshops

- The Food Imbizo has continued to offer policymakers and other stakeholders access to current research findings informing policy deliberations
- Members of Programme 1 continued to offer informal advice to provincial and local authorities on food system governance matters. They were invited to participate in regular gatherings of the CoCT Food Security Working Group; participated in monthly meetings of the Food Forum coordinated by the WCEDP; actively participated in the advisory committee of the 2022 Food Dialogues; developed two policy briefs in collaboration with SAFCEI; and contributed to a critical review of the draft CoJ Food Resilience Policy
- The SMART food project has various partners locally, including the University of Johannesburg, UL, and DUT
- Prof Emmambux engaged with the food industry in terms of communication and frequent virtual meetings. The team has a good relationship with Tiger Brands, Pepsico, and RCL Foods in South Africa; RISE Sweden, and Puratos Belgium at the international level. Sensory evaluation services (descriptive sensory evaluation and consumer testing of food products) are rendered to industry partners.
- Prof Ludidi's lab has actively engaged with smallholder farmers during workshops with farmers in Ward 22 of the Matatiele Local Municipality, where Prof Ludidi and his team trained the farmers in regenerative agriculture in preparation for the 2022 summer planting season
- As part of the WRC deliverables by Prof Korsten and her team, a policy brief, "Fit-for-purpose irrigation water guidance document to ensure the microbiological quality and safety of fresh vegetables from farm to retail in the formal and the informal sector". This document was prepared as a Ministerial Policy Brief by the WRC in 2022
- UP's Food Safety team is working with the National Institute of Communicable Disease's Sequencing Core Facility to begin exploring the genome of selected isolates through the supply chains
- Prof Keyster and his team are working closely with GrainSA in order to reach more small-scale farmers in the broader crop-growing areas of South Africa. They are writing information brochures to assist farmers with soil quality data as well as the results of scoring pathogen incidence across field sites
- The NDIS is conducted as a tender from the NDoH
- The NDoH's Department of Food Control indicated their intention to include this warning label in revised regulations on food labelling and marketing to children. The revised R146 of 2010 is currently with the legal advisors of the NDoH before being published in the Government Gazette for public comment. The FOPL team assisted the NDoH's Food Control to prepare the SEIAS report for the DPME - one of the requirements before the promulgation of any regulation Makoma Bopape (UL and member of FOPL and HPL leverage-funded projects) serves on the task team that is preparing the Obesity Prevention strategy 2022-2030 for the NDoH
- Members of the FOPL team are also currently serving as advisors on the planning committees for the development of nutrient profiling and FOPL in China and Ghana
- Knowledge generated regarding critical issues such as the increased use and impact of sanitisers on human and environmental health through the CoE-FS Food Safety project will impact society, industries, and policy in the longer term. Establishing the Food Science Platform for South Africa and sharing information about food safety critical matters as an open resource to academia, government, etc., will allow the development and implementation of knowledge-based solutions
- Prof May is the guest editor for a special issue of Sustainability on agroecological transitions. The first paper was published at the end of 2022. The remainder of the edition will be published during 2023. The co-editors are Dr Melody Mentz-Coetzee (UP) and Prof Claire Quinn at the University of Leeds
- Prof May also serves on the FSNet-Africa Academic Leadership team. FSNet-Africa is a capacity building programme run by the ARUA Centre of Excellence in Sustainable Food Systems at UP. Prof May designed the Conceptual Framework used by FSNet to develop their training programme, and has participated as a guest lecturer and speaker
- Prof May was appointed to the NPC in December 2021 and he will serve until 2027. He serves on both the Economics and Quality of Life Workstreams, chairs a Task Team on Economic Modelling for Redistribution, and participates on Task Teams on ECD and on Agriculture and Rural Development
- Prof May's term as the Chair of the Dullah Omar Institute Board of Trustees and MANCO came to an end in 2022 when he stepped down from this position
- Prof May also serves on the scientific sub-committee of the CoE-HUMAN. His term as the chair of the ASSAf Standing Committee on the Science for the Reduction of Poverty and Inequality came to an end in 2022. He has since been elected onto the ASSAf Council where he serves on the Audit and Rick Sub-committee
- In 2022, ASSAf nominated Prof May to serve on the Inter Academy Partnership Programmatic Committee on Policy Advice
- Prof May serves on the ARUA-SFS Steering Committee hosted by UP and chairs the Advisory Board Meeting of the Food and Nutrition Security Survey undertaken by the HSRC for DALRRD
- Prof May has also been appointed as a visiting research fellow in the Centre for the Advancement of Scholarship at UP from 2022 until 2023
- Prof May attended the Agricultural Salon in Paris and spoke at a workshop organised by CIRAD to launch the TSARA initiative. TSARA is initiated by two French research institutes - CIRAD and INRAE - and developed jointly with around 20 African partners (universities and research institutes). It aims to strengthen cooperation in order to promote sustainable agriculture, food systems and agricultural, pastoral and forestry landscapes.

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CHALLENGES AND WAY FORWARD

Challenges and constraints

Although most restrictions on travel, the working environment and research were eased early in 2022, the legacy of the global COVID-19 pandemic continued to present the CoE-FS and our students with challenges in 2022. In particular, the sequencing of our projects was impacted, whereby student mobilities budgeted for in 2019 could not take place, while stakeholder engagements with decision-makers had been postponed.

In the case of our two LEAP-Agri projects, we were able to complete engagement via learning journeys undertaken with the assistance of the EDP and the SAFL. In both cases, we were able to present and discuss our research findings with a diverse group of respondents in Langa, Worcester and Zwelethemba. However, resources set aside by our EU partners were unspent and were returned to their funders.

UP returned to full campus attendance in 2022, while UWC only opted to open the campus in the second half of 2022. We hope that the disruptions to our postgraduate feeder programmes that were experienced in 2021 will now be resolved and that more students will apply for NRF bursaries within the stipulated timeframe. In this regard, the decision by the NRF to introduce some flexibility in the application cut-off for postgraduate degrees is warmly welcome and this should assist in bringing undecided/hesitant students into the various postgraduate degrees that we support.

The CoE-FS elected to continue to work virtually throughout 2022 although, in the last quarter, we ensured an office presence during the week. The CoE-FS will likely operate as a blended model in 2023 given that our activities stretch across multiple institutions in South Africa. Our CoPs have benefitted from this model and our reach has been extended well beyond our expectations.

Social science research has returned largely to pre-COVID-19 methodologies, and face-to-face interviews were permitted during most of 2022. However, we have noticed an increase in usage of online interviews, virtual focus group discussions, the use of online apps such as MURAL, and internet-based projects involving the use of social media and systematic reviews. Ethics review processes for such studies continue to evolve given the change in the risk profile for such research. Related to this, and to the sharing of information in general, the POPI Act has raised challenges in terms of the use of cloud-based computing, data storage

procedures and obtaining consent. Both universities have dedicated staff who have assisted when necessary.

As mentioned in the 2020 and 2021 APRs, the CoE-FS has faced pressure from stakeholders in the food system to assist directly with interventions and to take activist positions. While we have provided regular science communication, we have stepped back from an activist role, and have preferred to provide evidence that we believe to be robust. In some cases, such as with the rise in child malnutrition, this has involved identifying policy failure, and in other cases, such as with the NDIS survey, this has involved providing assistance to government.

We were unable and sometimes unwilling to engage with all of the requests that were submitted to us. In some cases, we lacked the expertise and used our CoP networks to refer the request. In other instances, we felt that the available science did not support the request being made, and we were unwilling to be drawn into a lobbyist position. Nonetheless, we continue to support campaigns to increase the Child Support Grant, promote EBF, increase the taxation of sugary beverages, and have also contributed towards debates on a universal income grant and regulation of the food industry.

As always, we were active in the publication of articles in non-academic media sources, as well as participating in radio and television discussions.

In the area of our science communication, a challenge has been that explicit links to the CoE-FS are often missed by journalists or not mentioned by the researcher involved in the interview/news item. This continues also to be the case with work published in academic journals which has benefitted from leverage funding via the CoE-FS. Further measures need to be put in place to ensure the CoE-FS is appropriately credited. This requires an understanding and ongoing engagement between researchers and the communications manager to make one another aware of any media activity, ideally prior to or as it happens.

Despite these challenges, we achieved some critical milestones in 2022, most notably the meeting of the vice-chancellors of UP and UWC and their decision to continue the CoE-FS irrespective of the source of funding. Prior to this, at the annual Lekgotla, the MANCO of the CoE-FS had already agreed that the collaborations built by the CoE-FS would continue.



Way forward

The CoE-FS is a part of the wider South African research and innovation ecosystem and is also embedded in the specific research and innovation systems of the host universities and, to some extent, our collaborating institutions. It is one of many research and training institutions concerned with food and nutrition security in South Africa. These include university faculties of agriculture, public health, economics and science; research councils such as the ARC, HSRC and SAMRC; as well as food policy think tanks such as the Bureau for Food and Agricultural Policy (BFAP) and industry organisations such as GrainSA.

The resources available to the CoE-FS are considerably less than most of these institutions, and 40% of our budget is directed towards meeting the critical demand for postgraduate bursaries. However, what distinguishes a centre of excellence from these more specialised organisations is the ability to initiate enquiries that span multiple disciplines, and that focus on identifying the root causes of impediments and propose solutions. Most importantly, a CoE serves as a catalyst to bring about change by transferring models that have been developed to others in the research ecosystem, who further build the knowledge base and grow capacity. We have achieved this through directed, long-running programmes of

work that attract a wide range of stakeholders and collaborators. As an example, our research on breeding climate-smart plants has been linked to the processing of these plants into food that is nourishing and safe, as well as the identification of beneficiaries who would benefit from access and use of such food, and finally, through our place-based projects, we can identify the policies and sphere of government that can best achieve such improvements. In this way, we strive to produce models that can be transferred to different contexts, and which enable other role-players in the agri-food ecosystem to achieve positive change.

This approach will continue to inform the CoE-FS as we plan for our future beyond 2024.

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The text-only version of the *CoE-FS Annual Progress Report 2022*, from which this publication is derived, was compiled by Julian May, Lise Korsten, Elaine Sinden, Elaine Petersen, and Carla Bernardo.

For this publication:

Editors: Carla Bernardo, Dave Buchanan

Layout and design: Nado Graphics

Printing: Nado Graphics

Cover photo: Ashraf Hendricks

With thanks to our funders and host institutions, without whose support our work would not be possible



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