EMPOWERING YOUTH FOR A SUSTAINABLE, HEALTHY FUTURE

A COLLABORATIVE PROJECT

unicef
for every child

UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

FUTURE AFRICA

CONTENTS

MESSAGE FROM
THE UNIVERSITY OF PRETORIA

AS A LEADING ACADEMIC INSTITUTION IN AFRICA, THE UNIVERSITY OF PRETORIA (UP) IS COMMITTED TO FINDING SOLUTIONS TO THE CHALLENGES THAT THREATEN THE SUSTAINABLE DEVELOPMENT OF OUR CONTINENT AND ITS PEOPLE. IT IS WITH GREAT APPRECIATION THAT THE UNIVERSITY RECOGNISES THE SUPPORT OF THE UNITED NATIONS CHILDREN'S FUND (UNICEF) TOWARDS OUR FEATURED PROJECTS – EMPOWERING YOUTH FOR A SUSTAINABLE, HEALTHY FUTURE. THIS PUBLICATION SHOWCASES THE SUCCESS OF THESE PROJECTS, FACILITATED THROUGH FUTURE AFRICA.

The partnership between Future Africa and Unicef sought to empower youth through education and community engagement. It was launched with the Youth Empowerment and Health/Economic Responses to COVID-19 (YEaH) programme in August 2020, followed by a second programme, Women Scientists and Historically Disadvantaged Institutions (YWS & HDI) in April 2021.

The first programme was conceived following the realisation that COVID-19 would have a considerable impact on the youth, with possible future risks for the next generation. It therefore focused on scaling up various sustainable skill- and capacity-building activities to respond to the pandemic with a focus on the youth. The second programme extended the focus of the partnership to include the promotion of young women scientists' engagement with relevant responses to the pandemic, and engagement with historically disadvantaged institutions.

The engagement with individuals, communities and researchers during the programme was extremely positive, and the impact and feedback from the implementing partners were overwhelmingly unexpected in terms of the enthusiasm and generosity of all stakeholders.

This programme not only succeeded in building an academic community, but made a substantial, sustainable impact on the lives of many.

The University of Pretoria is one of the largest research universities in South Africa. It boasts a dynamic community of staff and students who come from diverse backgrounds and cultures, showcasing South African and global societies.

The University was born from a vision to create a space for quality education and new ideas to flourish. Over the course of its existence, and through different phases of political power and social change, it has been resilient in its commitment to academic quality. This has allowed it to establish a presence among the top universities worldwide.

Its vision has always been to look forward, provide the best possible education for its students, and encourage them to go on to do great things. It is continuously transforming the corporate and research landscape through innovative thinking and the high calibre of its graduates.

VISION

To be a leading research-intensive university in Africa, recognised internationally for its quality, relevance and impact, as well as for developing people, creating knowledge and making a difference locally and globally.

MISSION

In pursuing recognition and excellence in its core functions of research, teaching and learning, and integrating engagement with society and communities into these, the University of Pretoria will use quality, relevance, diversity and sustainability as its navigational markers.

The University of Pretoria is built on a foundation of excellence and change. Its strength lies in working together to transform the futures of our country, continent and the world.

KEY STRATEGIC GOALS

- Enhance access and successful student learning
- Strengthen the University's research and international profile
- Foster and sustain a transformed, inclusive and equitable university community
- Optimise resources and enhance institutional sustainability
- Strengthen the University's social consciousness and its impact on society

ACADEMIC OFFERING

The University of Pretoria offers academic and research programmes in nine faculties and one business school:

- Faculty of Education
- Faculty of Economic and Management Sciences
- Faculty of Engineering, Built Environment and Information Technology
- Faculty of Health Sciences
- Faculty of Humanities
- Faculty of Law
- Faculty of Natural and Agricultural Sciences
- Faculty of Theology and Religion
- Faculty of Veterinary Science
- Gordon Institute of Business Science (GIBS)

The University produces a high number of research outputs locally, as recorded by the Department of Higher Education and Training. It will continue to improve on the quality of its research. It is one of the biggest contributors of qualified professionals and research students in the country. As a result, it is already known internationally as a research-intensive university.

Prominent research focus areas include agriculture and sustainable food systems, climate change and the environment, economic development and sustainable futures, energy, heritage studies, inequalities, social justice and human rights, One Health, smart infrastructure and innovation, and water.

The University of Pretoria is recognised for transdisciplinary research and partnerships. It addresses the world's challenges through collaboration, transdisciplinary approaches and exciting new platforms to co-create knowledge that translates into solutions. One such platform is Future Africa, the first of its kind on the continent to function as a space for transdisciplinary research.

FUTURE AFRICA

THE UNIVERSITY OF PRETORIA TACKLES ISSUES OF CRITICAL RELEVANCE TO AFRICA WITH RESEARCHERS FROM MULTIPLE DISCIPLINES ACROSS ALL THE UNIVERSITY'S FACULTIES. THESE ISSUES INCLUDE EVERYTHING FROM SUSTAINABLE DEVELOPMENT AND GOOD GOVERNANCE, CITIZEN PARTICIPATION AND HUMAN RIGHTS, TO ADVANCING INNOVATION FOR THE BIORESOURCE ECONOMY. FUTURE AFRICA CONTRIBUTES TO ADDRESSING COMPLEX CHALLENGES THAT FACE AFRICA AND THE WORLD. IT IS COMMITTED TO CREATING THE NEXT GENERATION OF RESEARCHERS AND RESEARCH LEADERS REQUIRED TO ENSURE RESEARCH SUSTAINABILITY AND CONTINUITY.

Future Africa also develops innovative transdisciplinary skills transfer programmes to address Africa's growth and development challenges. This major investment from the University provides advanced facilities and capacity for developing problem-oriented, interconnected, pan-African research networks for innovation. The University's capacity includes a large number of National Research Foundation (NRF)-rated researchers, who are internationally recognised in their disciplinary field, across nine faculties. These researchers can contribute to the implementation of programmes, while being appropriately paired as research mentors.

Many complex challenges face Africa and the global community. We know that traditional linear and singular approaches to science are no longer appropriate, and that searching for solutions will require the scientific community to operate in fundamentally new ways. It also requires transformation-minded researchers and science leaders to drive equitable and sustainable development.

IN A NUTSHELL, FUTURE AFRICA:

- Takes a future-oriented perspective on skills
- Promotes development for a new generation of science leaders in Africa
- Actively builds networks between leaders of science across Africa and the rest of the world
- Develops interdisciplinary and multinational research teams who, together with societal structures, can engage in impactful research to find solutions to complex problems
- Places equity and sustainability at the centre of its research and engagement related to African challenges

The work at Future Africa is anchored by its commitment to the African continent, the belief that knowledge generation will be the foundation of development, and the recognition that this cannot be done in isolation. To have substantive impact on the pressing issues facing society, Future Africa's value proposition is to strengthen networks, and mobilise human capital and talent to generate integrated knowledge that matters for Africa.

In 2020, the world came to a standstill, grappling with the challenge of effectively navigating the face of the COVID-19 pandemic. Responding to this global crisis, UNICEF-South Africa forged a partnership with the University of Pretoria. Together, we were able to launch the Youth Empowerment and Health/Economic Responses to COVID-19 (YEaH) programme in August 2020.

Building on this initiative's success, a second programme, Women Scientists and Historically Disadvantaged Universities (YWS&HDU), was introduced in April 2021.

These collaborative efforts were aimed at empowering youth through education and community engagement, addressing the multifaceted impacts of the pandemic on health, economy, and education.

By investing in the next cohort of researchers, we ensure knowledge and evidence generation to promote evidence-based (g)local solutions for all the partners working towards the realisation of sustainable development.

– United Nations Children's Fund (Unicef)

OVERVIEW OF THE **FUTURE AFRICA-UNICEF PROGRAMME**

FUTURE AFRICA AND THE UNITED NATIONS CHILDREN'S FUND (UNICEF) EMBARKED ON A PARTNERSHIP TO FOCUS ON SUSTAINABLE INITIATIVES THAT EMPOWER YOUTH THROUGH EDUCATION AND COMMUNITY ENGAGEMENT. THIS PARTNERSHIP WAS LAUNCHED WITH THE YOUTH EMPOWERMENT AND HEALTH/ECONOMIC RESPONSES TO COVID-19 (YEAH) PROGRAMME IN AUGUST 2020. IT WAS FOLLOWED BY A SECOND PROGRAMME, WOMEN SCIENTISTS AND HISTORICALLY DISADVANTAGED INSTITUTIONS (YWS & HDI) IN APRIL 2021.

These two programmes, which form the focus of this publication, were considered two separate phases of the partnership. This is because there was a degree of overlap between the two programmes, and some projects continued the work conducted in the first programme, or Phase I of the partnership (YEaH), in Phase II (YWS & HDI).

The initial programme was conceived based on the realisation that COVID-19 would have a considerable impact on the youth, with possible future risks for the next generation. The pandemic brought with it serious impacts and likely future risks for the next generation in terms of reduced employment opportunities, exposure to health threats, and social consequences that could not be addressed without harnessing the diversity and energy of higher education and its extensive collaboration with stakeholders. Phase I therefore focused on scaling up various sustainable skill- and capacity-building activities to respond to the pandemic with a focus on the youth.

Phase II extended YEaH's focus on COVID-19 to include the promotion of young women scientists' engagement with relevant responses to the pandemic, and engagement with historically disadvantaged institutions. Future Africa pursued the outcomes of these activities, focusing simultaneously on "impact for youth" in vulnerable communities. It built on the existing platform created by Phase I, and expanded on the results obtained in all the research projects.

The topics addressed as part of the Future Africa-Unicef partnership echo United Nations resolution A/RES/64/13, which recognises Nelson Mandela's dedication to the service of humanity, including the rights of children as leaders of the future. Projects were therefore also aimed at encouraging sustainable community engagement, unlocking access to broader communities and promoting cross-pollination.

The expansion of the initial YEaH programme to the second phase (through the YWS & HDI programme) was encouraging, not just in terms of its priority areas (previously marginalised communities, women and youth), but also in terms of its scope. Evolving from local to regional, and – ultimately – global platforms, YEaH could therefore continue to empower the youth during the second phase of the partnership.

Since YEaH was a robust advocate for the promotion of inclusivity, it did not exclude collaboration with stakeholders who do not have access to tertiary education based on their means or perceived lack of abilities. The results of this first phase of the partnership showed that progress and success cannot be measured by quantitative targets alone, and that it is the qualitative, emotive, human and innovative practices that add colour and dimension to any project. Therefore, by including the perspectives of scholars representing historically disadvantaged institutions, and fostering collaboration with women researchers, platforms for inclusive dialogue could be expanded.

Seven of the University's faculties and research centres were involved in this collaborative venture. Eight clusters were identified within these faculties and research centres, with more than 100 scientists from various disciplines actively engaged in reaching individuals from all sectors of society, and diverse socio-economic contexts.

7 UP FACULTIES AND CENTRES

8 RESEARCH CLUSTERS

100+ SCIENTISTS

> Although COVID-19 had reshaped the landscape, rules of engagement and research modalities, it also provided novel opportunities for raising awareness. According to Rachel Fischer, Future Africa's programme coordinator at the time, "the pandemic blurred the differentiation between teaching and learning spaces (virtual and offline) and places (home and work), allowing education to be more accessible than ever before".

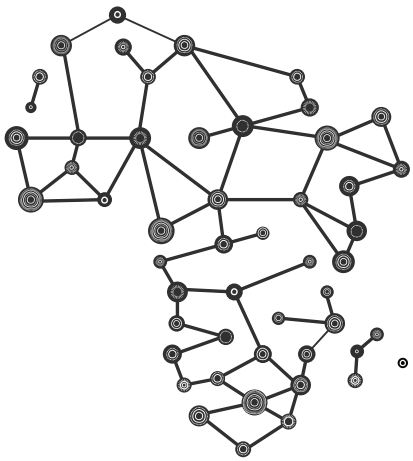
Participating staff members responded to the challenge posed by the pandemic by adjusting their methodologies, which ranged from offline, in-person partnerships to online, virtual collaborative projects. The initial target of Phase I was to reach 2 100 individuals.

By the end of June 2021, researchers had engaged directly and indirectly with more than **8 000** individuals due to the transition from offline to online engagements. This number continued to increase after the conclusion of Phase I due to website visits, material downloaded and views of recordings. The One Health for Change project, for example, had **62 000** views of its online videos by July 2021.

The objective of supporting and contributing to young women scientists at universities had a target of 42, while the project reached **689** young women. On the other hand, the objective of the Historically Disadvantaged Universities Development Programme (HDU-DP) to initiate and develop collaboration had a target of 114, while the project reached **622** individuals.

The role of **Future Africa** was essentially to link the activities of the different faculties, research centres and other role players by facilitating, supporting and mobilising initiatives.

As a transdisciplinary research institute, Future Africa promotes a systems approach to stakeholder engagement, crossing boundaries that encapsulate inclusivity, participation and multistakeholder collaboration.



"The new generation of science leaders and future researchers can no longer afford to function in traditional academic practices."
– Rachel Fischer

The themes that were covered in the two phases of the partnership were as follows:

- Mentoring, ethics and science communication
- Women research mentorship
- Transdisciplinarity
- One Health for Change
- Food nutrition job opportunities, and agriculture enterprises skills training
- Start-up management and entrepreneurship
- Augmentative and alternative communication
- Arts for Health

While some of the themes were cross-cutting, others developed into important flagship programmes, such as One Health for Change. There was also a strong alignment of these themes to Future Africa's research themes:

- **Connected Africa:** Connecting the people of Africa through shared diverse histories, knowledge systems and cultures to shape opportunities offered by technology for new ways of living and communicating

- **Sustainable food science:** Realising diversity, justice and technology to transform African production systems for equitable and sustainable opportunities
- **Health:** Unlocking novel capacities to ensure the right to health and wellbeing by addressing the priority challenges for all people in Africa
- **Future education:** Empowering people through access to transformative education opportunities for the 21st century and beyond
- **Equity in a global Africa:** Creating and navigating pathways to a just world through research-led policy, governance and social innovation
- **Sustainability science:** Future Africa needs to have acumen to develop research and new knowledge on the interactions between ecological and social systems, and how these interactions affect and apply to the challenge of sustainable development

As part of Phase I, Future Africa hosted a Youth Forum, which took place on 10 June 2021, in observance of Youth Month and Youth Day on 16 June. The Youth Forum transcended the parameters of YEaH to include Unicef's other youth-inclusive projects, as well as collaborative engagements related to Unicef's Generation Unlimited (GenU) programme.

It also participated in the Galien Forum Africa 2020, hosted by the Galien Foundation, which took place in Dakar, Senegal, on 10 and 11 December 2020. The theme of this scientific forum was "COVID-19 responses from Africa". It brought together top scientists in health and pharmaceutical sciences from around the world. Phase II included a Transdisciplinary Symposium, with the theme "Transdisciplinarity through the lens of the youth", hosted at Future Africa on 21 April 2022. It provided an overview of the research that formed part of the Unicef partnership, particularly transdisciplinary research and collaboration related to young women in science, and food security, health and the environment.

Several reflections on the success of this programme came to light during interviews with the implementing partners of the seven clusters that formed part of Phase I. These included appreciation for the following:

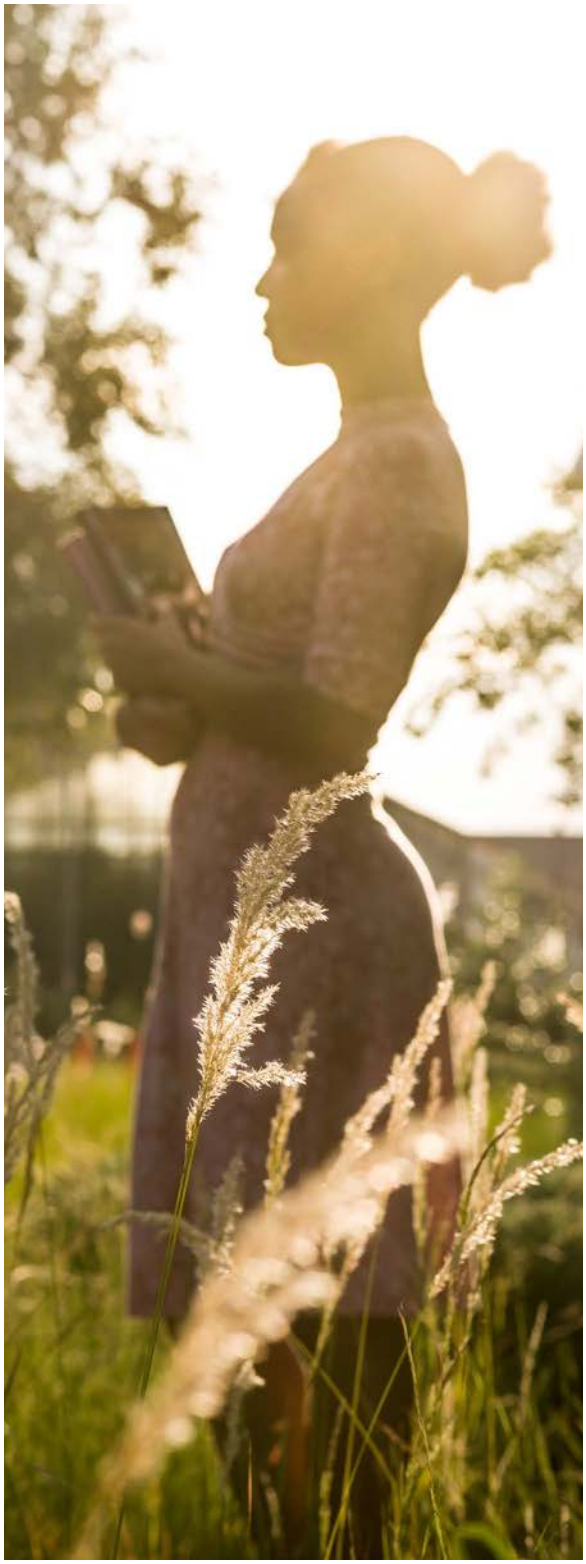
- The funding of this collaborative research by Unicef, as well as Future Africa's coordination of the various clusters and resulting projects
- The transdisciplinary nature of this work – across all disciplines and faculties – which should continue to ensure and promote inclusivity
- The equity of human rights, recognition of the social sciences and inclusion of the humanities

Suggestions included the need for a scientific committee to oversee the overall project management. The observation was also made that research papers and other knowledge products, such as project briefs, policies and toolkits, should continue to flow from these projects.

According to **Prof Wanda Markotter**, Future Africa Research Chair in People, Health and Places (One Health) and the Project Lead, the engagement with individuals, communities and researchers was extremely positive, and the impact and feedback from the implementing partners were overwhelmingly unexpected in terms of the enthusiasm and generosity of all stakeholders. "During the exit interviews, researchers emotionally shared their experiences, and some even reported on their own spin-off projects due to the Unicef initiative. In short, this programme not only built an academic community, but simultaneously made a substantial impact on the lives of many."

The outputs of Phase I can be summarised as follows:

- Students benefitting from entrepreneurship learning, start-up management skills training on natural resources, food and nutrition security and sustainable development opportunities:
  243 against a target of 150 — TARGET EXCEEDED
- Students inducted in the Naspers Labs, and TechnoGirl students inducted at Mamelodi Campus:
  128 against a target of 100 — TARGET EXCEEDED
- Students participating in at least five workshops on the role of natural resources and agriculture in sustainable opportunity creation (for example, in the food industry and agricultural skills):
  507 against a target of 400 — TARGET EXCEEDED
- Students in exchange programmes with other countries on science, technology, engineering and mathematics (STEM) (five selected countries in other regions):
  20 against a target of 20 — TARGET ACHIEVED
- Students enrolled in STEM mentorship and PhD programmes at the Future Africa Campus:
  50 against a target of 50 — TARGET ACHIEVED
- Students enrolled for and having completed an internship programme at UP's professional schools:
  525 against a target of 100 — TARGET EXCEEDED
- Students in job shadowing (co-learning) events with at least five private enterprises:
  340 against a target of 50 — TARGET EXCEEDED
- Young people receiving training on One Health and young academics using One Health approaches:
  2 000 against a target of 100 — TARGET EXCEEDED
- Students trained on transdisciplinary One Health approaches to address the emerging health crisis, its impacts and future solutions:
  938 against a target of 100 — TARGET EXCEEDED
- Students benefitting from social and analytical skills on the social dimensions of the health crisis (HIV, COVID-19, malaria, etc.):
  3 348 against a target of 1 000 — TARGET EXCEEDED
- Students who were able to use the Javett Arts Centre as a creative space for augmentative and alternative communication:
  286 against a target of 100 — TARGET EXCEEDED



The successful implementation of Phase I led to Phase II of the Unicef-sponsored programme, with its focus on women in research and support to historically disadvantaged institutions. "In effect, Phase II served as an extension of Phase I," explains Prof Markotter. "The under-representation of women, beyond the issue of gender equality, is reflected in the failure of human resources development and career path management," she says. "Encouraging girls and women to get involved in advancing actionable science and engaging with communities is imperative for improved social development."

Prof Markotter emphasises that giving women equal opportunities to pursue and thrive in professional careers helps narrow the gender gap, enhancing women's economic security and ensuring a diverse and talented female workforce. It also prevents biases in these fields, and in the products and services they produce.

The rationale behind the upscaling of the programme in Phase II lies in the fact that South Africa has among the highest youth unemployment rates globally, with 58% of 15- to 24-year-olds without jobs. In the first quarter of 2020, there were 20.4 million young people aged 15 to 34. These young people accounted for 63.3% of the total number of unemployed persons in South Africa. The unemployment rate within this group was 43.2% in the first quarter of 2020. Youth aged between 15 and 24 years are the most vulnerable in the South African labour market as the unemployment rate among this age group was 59.0% in the first quarter of 2020.

Education in South Africa and around the world is recognised as being a key instrument in human capital development. Although the youth in the labour market are vulnerable, those with a tertiary education have a better chance of being employed.

The persistently high youth unemployment rate has long been one of the most pressing socio-economic problems in South Africa. Funding remains an issue for providing these opportunities, as well as pushing science and technology as a way to drive economic growth and job creation. In 2017, Cyril Ramaphosa – then Deputy President – was quoted as saying:

"We have a responsibility to develop a community of young people that believes there is a future for science in South Africa and the continent."

The main activities of Phase II were twofold: Engaging with women in education and promoting careers that will enable them to obtain the skills to thrive and become leaders in science and technology; and strengthening the capacity of selected institutions to deliver gender-responsive education through teacher training, educational content and pedagogy.

Historically disadvantaged institutions (HDIs) is a collective term that refers to universities established during apartheid, which were located in the former homelands of South Africa. In the realm of the United Nations' Sustainable Development Goals (SDGs), there is a concept stating that "no one should be left behind". Included in this concept should be that "no education institution should be left behind". In the view of Prof Markotter, this requires levelling up capacity to train the young generation to give all African youth the same opportunities for quality education.

South Africa's public higher education system comprises an array of different universities, ranging from highly developed, well-resourced universities to those that are underdeveloped, and constantly face research and education capacity and performance challenges. This prong of Phase II thus sought collaboration with several HDIs in South Africa and other universities across Africa to reduce not only the national gap in education and research, but also the pan-African gap.

The outputs of Phase II can be summarised as follows:

- Number of young female PhD candidates and mentors that are supported and developed through a mentorship programme:
  41 against a target of 20 TARGET EXCEEDED
- Number of young women involved in training programmes developed to contribute to the capacity of select institutions:
  526 against a target of 20 TARGET EXCEEDED
- Number of implemented community engagement projects towards vulnerable communities:
  122 against a target of 7 TARGET EXCEEDED
- Number of researchers supported from HDIs on doctoral and postdoctoral programmes:
  24 against a target of 12 TARGET EXCEEDED
- Number of early career researchers appointed from HDIs to contribute to the research and development capacity of the HDI:
  9 against a target of 2 TARGET EXCEEDED
- Number of workshop participants receiving educational training material at identified universities in Africa:
  589 against a target of 100 TARGET EXCEEDED

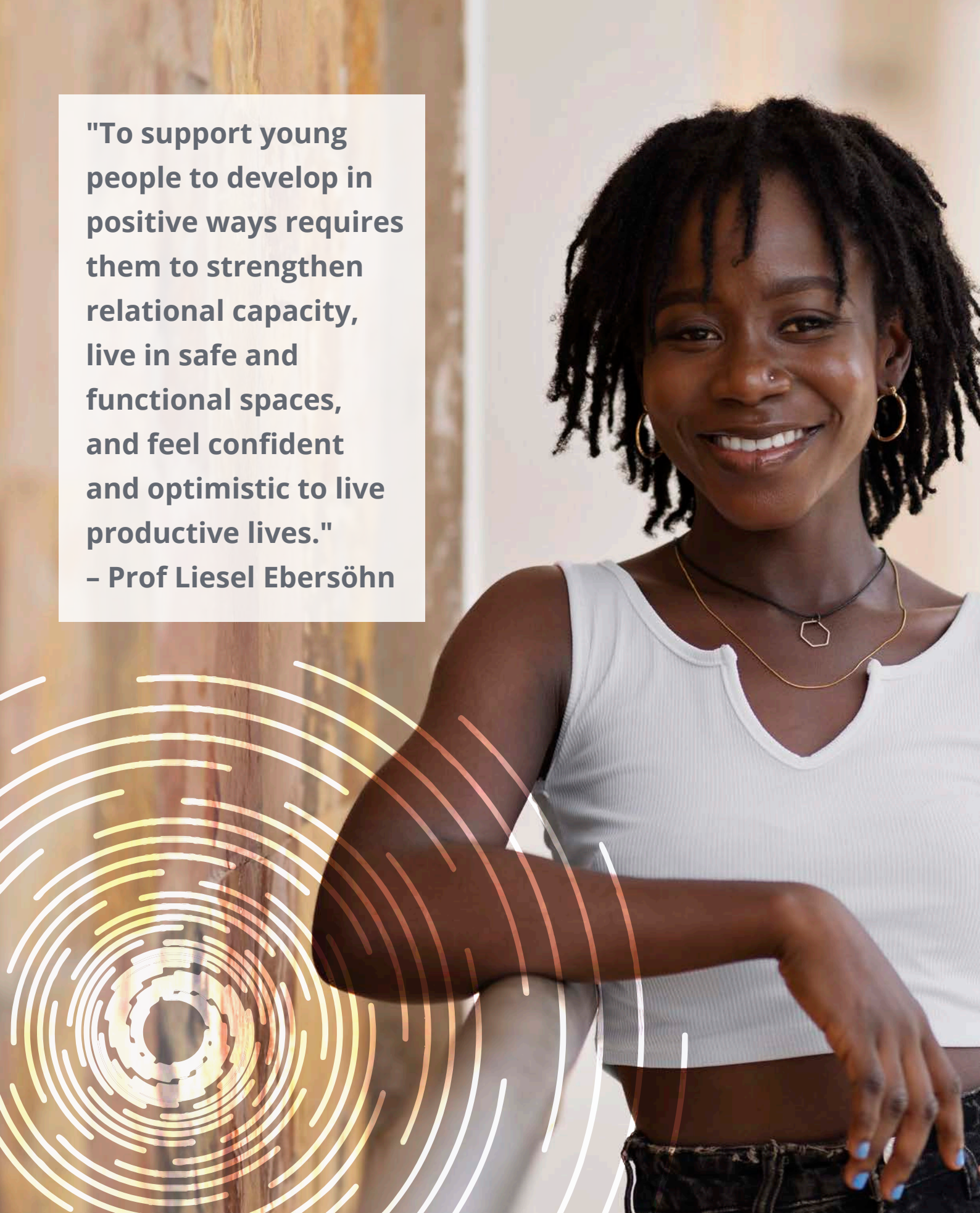
Although all the targets of Phase II were met, the implementing partners have made several suggestions to ensure the sustainability of the programme outcomes:

- Community engagement should continue to be a priority.
- The projects and research outcomes should open up to achieve broader community impact and promote cross-pollination.
- The projects and research should not be limited to science, technology, engineering and mathematics, but should engage with other disciplines as well.
- Relationships already exist between the various clusters and their teams. It is therefore of utmost importance to continue this collaboration in a relational manner.
- Existing projects should be utilised to promote scaling and growth.

The engagement with individuals, communities and researchers during the two phases of the partnership was extremely positive. “The impact and feedback we received was overwhelmingly unexpected in terms of the enthusiasm and generosity of all stakeholders,” remarked Prof Markotter. During the exit interviews, staff emotionally shared their experiences, and others reported on their own spin-off projects due to the Future Africa-Unicef initiative. “This partnership not only built an academic community, but made a substantial impact on the lives of many.”

Recommendations for future collaborators and contributors are to include the Faculty of Humanities and the Faculty of Education, who will package, integrate and represent research gleaned from the vast variety of current and future Unicef-funded projects. Collaboration with these faculties, with access to primary, secondary, tertiary and informal education and community platforms, will elevate the programme to unprecedented levels. Collaboration can also be extended to the faculties of Theology and Religion, Law, and Engineering, Built Environment and Information Technology. In essence, literacy and education are the ultimate keys to knowledge creation, which transforms any society into a knowledge society.

Such a full-scale effort will manifest across all sectors of society via the public education sector. It will also translate to the strengthening of government entities, private sector organisations and civil society representatives.



"To support young people to develop in positive ways requires them to strengthen relational capacity, live in safe and functional spaces, and feel confident and optimistic to live productive lives."
– Prof Liesel Ebersöhn

EDITORIAL

YOUTH EMPOWERMENT: SYSTEMIC FLOCKING ENABLES YOUNG PEOPLE

Prof Liesel Ebersöhn

HOW CAN YOUNG PEOPLE BE SUPPORTED TO FEEL HAPPY AND GOOD ABOUT THEMSELVES SO THAT THEY CAN ADAPT POSITIVELY TO THE CHALLENGES THAT CONFRONT THEM? EVIDENCE FROM STUDIES CONDUCTED IN THE UNIVERSITY OF PRETORIA'S CENTRE FOR THE STUDY OF RESILIENCE (CSR) (BANDEIRA, 2022; EBERSÖHN, 2019; MAMPANE, OMIDIRE, & EBERSÖHN, 2021) SHOWS THAT THE ANSWER TO ADAPTABILITY DOES NOT LIE SOLELY WITH YOUNG PEOPLE. NOR CAN SILOED ACTIONS BY FAMILIES, COMMUNITIES OR GOVERNMENTS BE MEANINGFUL. TO SUPPORT YOUNG PEOPLE SO THAT THEY CAN ENJOY HIGHER LEVELS OF RESILIENCE AND SELF-ESTEEM, AND LOWER LEVELS OF DEPRESSION, SYSTEMS NEED TO FLOCK TOGETHER TO SHARE THE AVAILABLE RESOURCES IN COORDINATED WAYS TO PROVIDE YOUNG PEOPLE WITH SAFETY, CARE AND SUPPORT.

A comparative survey CSR-study, in partnership with the Regional Psychosocial Support Initiative (REPPSI) (Bandeira, 2022), on adolescent mental health and resilience shows how 3 312 young people (1 818 female and 1 494 male) in nine sub-Saharan African countries (Angola, Eswatini, Kenya, Lesotho, Mozambique, Namibia, South Africa, Uganda and Zambia) report on depression, self-esteem and resilience.

Young people in these countries indicate lower levels of depression when they are in school, feel safe (at home, in school and in their communities), are treated fairly in communities and have people around them who like to spend time with them. A family life that supports lower levels of depression in young people is one where they can talk to their families, where their caregivers know a lot about them, where they like how their family celebrates events, and where they have an opportunity to look after someone who is sick at home.

Not only did these factors support lower levels of self-reported depression among young people. The presence of these factors also indicated higher levels of self-esteem – especially where young people also had opportunities to look after younger children at home, when they were able to get along with people around them, and when they had opportunities to show others that they were growing up and could do things for themselves.

Within this population, young people with a higher resilience (as measured by self-reported access to resources across systems) additionally had better food security (fewer days hungry), had electricity at home and lost fewer caregivers – be it one or both parents or significant other people in their lives.

From structural equation modelling, it is apparent that it is especially the home lives of young people that gives them strength. When young people feel safe at home, they have lower levels of depression and higher self-esteem – all of which is strengthened when young people also experience high caregiver resilience (access to resources from a parent or carer).

Young people who feel that they have caregiver support generally have fewer days where they feel hungry. They also experience less depression, and show higher personal resilience (higher access to personal traits and competencies).

In addition, a study with young people from all South Africa's provinces co-generated insights on a systemic support framework to strengthen youth resilience. From this study, it was apparent that young people were especially concerned about managing their wellbeing, given high levels of unemployment and limited job opportunities. Young people expressed a desire for opportunity structures that could support them with employability.

The implication of care and support structures that enable young people to thrive reflects the significance of flocking. Flocking, posited in the relationship-resourced resilience theory (Ebersöhn, 2019), is an Afrocentric pathway to support collective wellbeing in times of collective distress. Flocking means that available resources are mobilised for social support to buffer against challenges and promote positive development outcomes: unpredicted given the significance of a challenge. Systemic flocking would imply that multiple systems (individual, family, school, community and society) need to coordinate practices that support young people to thrive.

Systemic flocking for social support can focus on strengthening the capacity of young people in terms of relationship-building, safety, employability and functional spaces.

WHICH SYSTEMIC PRACTICES FOR SOCIAL SUPPORT CAN STRENGTHEN YOUNG PEOPLE?

Given the centrality of meaningful relationships in their home, school and community lives, on a personal level, young people need access to training opportunities to acquire socio-emotional competencies. They need to know how to establish and maintain relationships in order to provide and receive social support. Advocacy programmes are needed (in collaboration with schools, faith-based organisations and clinics) to share family practices that support young people.

Such campaigns could share information or provide activities for families, caregivers and young people on how to establish and maintain caring and supportive home practices. Family-life examples include daily and weekly routines to talk with young people, showing an interest in knowing them, appreciating their roles at home (maybe looking after younger children or sick people), supporting their school attendance, and holding celebrations to show joy and pride in their milestones as young people emancipate and are able to do more by themselves. At community level, young people and other decision makers could join together to imagine and create safe and caring spaces (time spent in available places) for young people to get together and spend time with one another to strengthen relationships.

WHO IS ACCOUNTABLE FOR THE SAFETY OF YOUNG PEOPLE?

Accessing established community forums or institutions (faith-based organisations, schools and clinics) may be one way in which to lobby communities to think of practices that they can establish to support young people to feel positive about themselves. To support young people on an individual level, it may be valuable for schools or community organisations to create opportunities to train young people in self-defence, thus promoting feelings of higher personal safety, and buffering against extreme levels of societal crime and violence.

Systemic flocking is needed to provide structures that enable youth employability. At its most basic, employability starts with school attendance, achievement

and progress. Families, schools and community members are all central to encouraging and validating young people to be in school. Community-based career centres, collaborating with schools and local government officials, may be considered a mechanism to provide training on job-seeking skills, and entrepreneurial and/or income-generation skills in the small and medium enterprise sector, as well as to host career fairs and information sessions. Small businesses may collaborate with schools and faith-based organisations to think of opportunities that include young people in learnerships and apprenticeships.

All these support strategies are based on preconditions of young people living, laughing, learning, dreaming and working in functional spaces. Besides thinking at government level, in families, schools, clinics and hospitals, libraries and places of worship every day, citizens need to be deliberate in thinking how they can flock together to make sure that young people do not go hungry, have access to safe housing, clean water and stable electricity, transport to schools and clinics, as well as opportunities for accessible and affordable connectivity.

To support young people to develop in positive ways requires them to strengthen relational capacity, live in safe and functional spaces, and feel confident and optimistic to live productive lives (economically and socially). Young people are valuable partners to include in plans to reimagine, create and maintain the necessary systemic flocking practices that support them to thrive.

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"Effective mentoring provides a pipeline of young researchers that will enable them to develop and contribute to economic growth and innovation."
– Prof Lise Korsten

EDITORIAL
EMPOWERING WOMEN SCIENTISTS THROUGH RESEARCH MENTORSHIP

Prof Lise Korsten

MENTORING ADEQUATE NUMBERS OF THE NEXT GENERATION OF FEMALE SCIENTISTS IS AN ESSENTIAL STRATEGIC TARGET TO SET FOR ANY COUNTRY TO ENSURE SUSTAINABILITY WITHIN THE ACADEMIC ECOSYSTEM.

Effective mentoring provides a pipeline of young researchers that will enable them to develop and contribute to economic growth and innovation. However, many challenges and obstacles still exist, particularly for young female academics in certain fields of science, technology, engineering, and mathematics (STEM). For instance, in sub-Saharan Africa, between 18 and 31% of science researchers (compared to 49% in Southeast Europe) are female (Foresight Africa, 2022). This represents a significant gap in representation, and highlights the need for increased support and mentorship for female scientists.

Without a significant investment in education, infrastructure and human capacity, Africa will not be able to achieve the African Union's goals in its Agenda 2063. It is therefore important for governments and industry to invest in fast-tracking female science careers and increase the number of mentoring programmes.

To develop an effective mentoring strategy, it is important to understand the pipeline. According to UNESCO (2021), 54% of students who obtain a bachelor's degree in science today are female. This pipeline is not continued into the normal development phases of academia.

Only 19% of professors in science in Africa are women. This highlights the need for increased support and mentorship at all levels of academia. These findings were based on gender distribution data that 776 universities contributed to Times Higher Education in its 2021 world university rankings exercise, as well as bibliometric data from 2015 to 2019. Furthermore, of the total number of universities providing gender information, only 49 were African (University World News, 2022).

In South Africa, for instance, black female professors constitute less than 17% of the total academic workforce. Furthermore, across the 26 universities in South Africa, only five have a female principal and vice-chancellor (19%). Globally, less than 4% of Nobel Prizes for science have ever been awarded to women (Unesco, 2015). Between 2005 and 2020, the participation and productivity of women, especially black women, have increased; particularly in the disciplines of agriculture and engineering (Mouton et al., 2022).

In this context, mentoring becomes even more important, and requires a broad participatory approach. By investing in young minds, and providing a clear supportive framework, established female scientists can be empowered to become leaders in their own rights.

Sharing stories of overcoming generation-specific stereotypes and challenges will provide mentorship and guidance that can inspire and support the next generation of female scientists.

An effective mentorship programme is thus based on five essential key points:

- Taking ownership of the mentorship programme
- Investing personal time and stories in the mentorship journey
- Making time to discuss the future the mentee wants and co-creating opportunities to achieve this
- Planning the pathway and identifying realistic goals to achieve a top science rating and a strong international and local network of collaborators and students
- Remaining focused on the task at hand and never forgetting one's roots and the dignity of the journey

There are many career paths available for female scientists in Africa, including academic research, industry, government and entrepreneurship. Each path offers unique challenges and opportunities, and mentors need to provide guidance and support as young scientists navigate their options. In addition, many international organisations and initiatives are focused on supporting female scientists in Africa, such as the United Nations Educational, Scientific and Cultural Organisation (UNESCO), the L'Oréal Foundation African Women in Science and Engineering (AWSE) programme and the programme of the African Academy of Sciences (AAS).

One of the key imperatives of the post-1994 science and higher education system in South Africa has been the transformation of the human resource base of knowledge production. This can be achieved through interventions that will lead to a research system that is more inclusive of female and black scientists and academics.

Several interventions have been created, such as the Thuthuka and Women-in-Science funding instruments of the National Research Foundation (NRF), the University Capacity Development Plan of the Department of Higher Education and Training (DHET) and the New Generation of Academics Programme (nGAP).

Other initiatives include those of the Academy of Science of South Africa (ASSAf) and the National Science and Technology Forum, which focus on creating and stimulating the interest and participation of female students and scholars in knowledge production. By connecting with these networks, female scientists can access resources and achieve their goals.

Mentoring the next generation of scientists is not without its challenges, particularly when it comes to addressing issues of representation and equity. However, there are also many opportunities to make a difference and support the growth and development of the next generation. By providing effective mentorship, guidance and resources, mentors can help young scientists overcome obstacles and achieve their goals. In doing so, they can contribute to the growth and development of scientific research in Africa and beyond.

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EVENTS

GALIEN AFRICA FORUM PROVIDES AN OPPORTUNITY TO SHOWCASE OUTPUTS

THE INITIAL OUTPUTS OF THE FIRST PROGRAMME THAT FORMED PART OF THE FUTURE AFRICA-UNICEF PARTNERSHIP, YOUTH EMPOWERMENT AND HEALTH/ECONOMIC RESPONSES TO COVID-19 (YEaH), FEATURED IN THE PROGRAMME OF THE GALIEN AFRICA FORUM, WHICH WAS HELD IN DAKAR, SENEGAL ON 10 DECEMBER 2020. THIS INITIATIVE OF THE GALIEN FOUNDATION RECOGNISES AND AWARDS EXCELLENCE IN MEDICAL AND PHARMACEUTICAL INNOVATION THAT HAS THE POWER TO BRING ABOUT TRANSFORMATIVE CHANGES.

Future Africa's participation took the form of a pre-recorded presentation of the activities of several of the YEaH clusters. Titled "Transdisciplinarity to advance the COVID-19 response", the 20-minute video was followed by a live question-and-answer session. The recording of the presentations took place during Future Africa Day on 18 November 2020, which was hosted specifically to develop the presentation for the Galien Africa Forum.

The presentation covered various dimensions of youth empowerment and health, and economic responses to the pandemic. It focused on four core interconnected activities:

- Empowering students with entrepreneurial skills
- Internships and job-shadowing with private enterprises
- The COVID-19 Science for Society Programme
- Social skills for resilient communities

These themes linked the YEaH research projects and harnessed lessons learnt from the COVID-19 pandemic, while proposing a safety net for improved decision making.

Introducing the projects that formed part of Future Africa's presentation, Prof Wanda Markotter, project manager, remarked: "COVID-19 will probably not be the last pandemic. If we do not build resource capacity, we are going to be in even more trouble. And if we do not build a youth that thinks transdisciplinarily, we are also going to be in trouble."

Future Africa's presentation provided a snapshot of the work being done as part of the Unicef-funded programme, and included feedback on the following cluster activities:

- Start-up management skills for youth entrepreneurship development
- Food and nutrition job opportunities, and agriculture enterprises skills training
- Transdisciplinary training and the 1HOPE initiative
- Student support and cross-cutting skills, including mentoring, ethics and science communication
- Augmentative and alternative communication during a health crisis
- The social dimensions of the health crisis

During the panel discussion, Prof Liesel Ebersöhn, Director of the Centre for the Study of Resilience, explained that transdisciplinarity was "the most natural way of being" that is unlearnt when people go to university.

She drew a parallel between behavioural change with HIV/Aids and the pandemic: “What changed behaviour about HIV/Aids was social cohesion: not the fear of the illness, but the fear of the effects of the illness.” She remarked that it is not fear of infection that stops people from forming mass gatherings to socialise, but rather the fear of further restrictions that prevent them from engaging in life as usual, in leisure activities, and in generating an income.

The message that came across during Future Africa’s participation in the Forum was that working collaboratively and across disciplines is the only way to beat the pandemics and crises of the future.

YOUTH FORUM REFLECTS ON REIMAGINING EDUCATION FOR THE FUTURE

THE PROJECTS THAT FORMED PART OF THE FUTURE AFRICA-UNICEF PROJECT FOCUSING ON YOUTH EMPOWERMENT AND HEALTH/ECONOMIC RESPONSES TO COVID-19 (YEaH) HAD THE OPPORTUNITY TO REPORT ON THE PROGRESS THAT HAD BEEN MADE IN UPSCALING VARIOUS CAPACITY-BUILDING INITIATIVES WITH A FOCUS ON THE YOUTH AT THE YOUTH FORUM. THIS EVENT WAS HELD AT FUTURE AFRICA ON 10 JUNE 2021, AND COINCIDED WITH THE OBSERVANCE OF YOUTH DAY ON 16 JUNE, AS WELL AS YOUTH MONTH, IN WHICH THE YOUTH FORMS THE FOCUS OF SEVERAL NATIONAL INITIATIVES FOR THE WHOLE MONTH OF JUNE EACH YEAR.

The aim of the event was for the youth to drive engagements in various identified priority areas. It was held under the theme: “Reimagine education tomorrow – our time, our turn, our future”. The underlying message was that the pandemic had come with serious impacts and likely future risks for the next generation in terms of reduced opportunities for employment, exposure to health risks and social consequences that cannot be addressed without harnessing the diversity and energy of the youth. The forum attracted 100 participants, and the YouTube video of the event recorded 458 views.

Given humanity’s interconnected and social realities, it is important to pay attention to the youth and their nuanced and invaluable approaches to helping solve the ills of the world. Four of the project clusters considered the value and necessity of collaborative, transdisciplinary work and community participation, guided by the voices of the youth, during the forum.

Date: **10 June 2021**
Time: **10:00-13:00**
Place: **Future Africa, University of Pretoria**

The forum was opened by Prof Cheikh Mbow, Director of Future Africa at the time. He mentioned that higher education in Africa should play a strong role in the demographic divide, as Africa today is young, with more than 60% of the population below 25 years of age. He added that the trust that is needed in society in general cannot be achieved without a framework for youth to engage with each other, and learn new techniques under the right mentorship and with the necessary support.

The first address was delivered by Prof Stephanie Burton, the University of Pretoria's former Vice-Principal: Research and Postgraduate Education, and strategic research advisor at Future Africa. The topic of her presentation was: "Future Africa: Spotlighting research". She emphasised the need for the youth to discover what they hope to achieve in life, and to continue to ask pointed questions on how to get there.

This was followed by the perspective of Unicef in an address by Dr Wycliffe Otieno, Unicef's Chief of Education and Adolescent Development. His presentation was titled: "Situating the context from a global and local perspective". He suggested that young people who embrace self-drive, innovation and proactive thinking can significantly address the social ills prevalent in their communities. He pointed out that Unicef's appeal to young people is to see the various challenges they may face as opportunities to hone their skills, change their destinies, become assets to their communities, and be game changers in their societies.

This was followed by a series of engagement sessions, during which the facilitators led the programme's panel discussions on topics related to the work of four of the project's clusters:

- Start-up management skills for youth entrepreneurship development
- One Health
- Augmentative communication during a health crisis
- The social dimensions of the health crisis

The presenters of the panel discussion were all youth participants in the activities of these clusters, who could share their concerns and hopes for the future, and reflect on their experiences during the YEaH project.

TRANSDISCIPLINARITY THROUGH THE LENS OF THE YOUTH

THE FUTURE AFRICA-UNICEF WOMEN SCIENTISTS AND HISTORICALLY DISADVANTAGED INSTITUTIONS DEVELOPMENT PROGRAMME (YWS & HDI) WAS CONCLUDED WITH A TRANSDISCIPLINARITY SYMPOSIUM, WHERE PARTICIPANTS IN THE ACTIVITIES OF THE VARIOUS CLUSTERS HAD THE OPPORTUNITY TO REPORT ON THE PROGRESS THAT HAD BEEN MADE IN THEIR VARIOUS CAPACITY-BUILDING INITIATIVES. THE SYMPOSIUM WAS HELD AT FUTURE AFRICA ON 21 APRIL 2022, WITH THE THEME: "TRANSDISCIPLINARITY THROUGH THE LENS OF THE YOUTH".

It focused on youth participants, who delivered presentations on aspects of transdisciplinarity, community engagement and sustainability in their projects. The presentations were focused on informing a broader audience, which would encompass all principal investigators, participants and relevant stakeholders of the programme, and initiate a discussion on developing a roadmap of how to sustain and expand the Unicef project, specifically identifying future thematic focus areas, collaborations and partnerships.

The expected outcomes of the symposium were as follows:

- Establish transdisciplinary conversation and knowledge sharing between thematic areas
- Establish a networking platform for future transdisciplinary projects
- Gather feedback and create a roadmap for the continuation of projects
- Develop publications linked to the symposium to showcase outputs in collaboration with The Conversation

Dr Neeraj Mistry, Deputy Director of the Future Africa Institute, welcomed delegates to the symposium, which would illustrate the wide range of interventions that were undertaken, and the many collaborators that had participated in the individual activities. This was followed by an introduction to the Future Africa-Unicef programme by Prof Wanda Markotter, Future Africa's Research Chair for People, Health and Places, and Ms Muriel Mafico, Deputy Respresentative of Unicef in South Africa.

Prof Markotter provided the delegates with an overview of the partnership between the University of Pretoria and Unicef, which had started in August 2020 with the first phase of the programme: Youth Empowerment and Health/Economic Responses to COVID-19 (YEaH). The initial target had been to reach 2 100 individuals, but it ended up engaging directly and indirectly (in-person and online) with more than 8 315 people. This was scaled up in July 2021 with the second phase: Women Scientists and Historically Disadvantaged Institutions. This symposium would reflect on the successes of the projects that made up these two programmes, as well as the challenges experienced with a view to future collaboration. "The projects and research outcomes that have been achieved should open up towards achieving broader community impact and promote cross-pollination," she remarked.

Ms Mafico expressed her appreciation for the work that had been done during the course of the partnership under the stewardship of Future Africa and the University of Pretoria. "Our greatest challenge is to address the global problems of unemployment, poverty and sustainability. These are issues that require transdisciplinary solutions: it is only through collaboration across disciplines that we will succeed in addressing these developmental challenges."

The symposium was divided into four sessions:

- Young women in science
- Transdisciplinary research and collaboration
- Food security, health and the environment
- The Unicef roadmap

Presentations reporting back on the programme's activities relating to young women in science included the following:

- Zoonotic disease biosurveillance in Southern Africa – from discovery to capacity building (Dr Marike Geldenhuys-Venter)
- A scoping review of supply chain management systems for point-of-care diagnostic services: Optimising COVID-19 testing capacity in resource-limited settings (Ms Kuhlula Maluleke)
- Mentorship: The gift that keeps on giving (Ms Thobeka Dlangalala)
- The undergraduate student's perspective (Ms Emily MacGregor)
- Mapping the path towards leadership: Leading an externally funded evidence synthesis project (Ms Kabelo Kgarosi)

Prof Liesel Ebersöhn introduced the session on transdisciplinary research and collaboration by presenting a video on building transdisciplinary research capacity in Africa. It illustrated how a webinar series had been co-generated with early-career researchers and doctoral scholars.

This was followed by four presentations related to the session's theme:

- Talking dirty: Sensitising abattoir workers to the risks of the microscopic world (Ms Desiree Mazwi)
- A case for transdisciplinarity: Anthrax under the lens (Mr Sunday Ochai and Dr Ayesha Hassim)
- Lessons learnt from the Peer Mentorship Programme 2021 (Dr Pavitra Pillay)
- Longitudinal viral prevalence in Molossid bats in different land use systems (Mr Lungelo Ndzinisa)

Presentations reporting back on the programme's activities relating to food security, health and the environment included the following:

- Quality and safety of South African hand sanitisers during the COVID-19 pandemic (Dr Willeke de Bruin)
- Fruits and vegetables (or foods) adopted to climate change towards improving food security for children within the first 1 000 days – a scoping study in marginal communities (Dr Carmen Muller)
- Endocrine-disruptive activity and occurrence of pharmaceuticals and viral content in selected water sources in Melusi, Pretoria (Ms Miane Swanepoel)
- Understanding mosquito-borne vector epidemiology towards One Health in the malaria-endemic Vhembe District, Limpopo Province (Ms Monique Shanahan)
- Creating a supportive environment to support breastfeeding (Ms Marion Beeforth)
- Breaking the cycle of poverty: Empowering vulnerable women with food cultivation and life skills at Imvelo Food Garden (Dr Sunette Laurie)
- The narratives of people who use or have used drugs and people who were homeless on their daily experiences and realities navigating their lives in challenging settings in Tshwane (Dr Michelle Janse van Rensburg and Helga Lister)
- Occurrence of Fasciola species in slaughter cattle in the Eastern Cape Province, South Africa, and comparison of different detection methods (Dr Charles Byaruhanga)
- A transdisciplinary approach to an intelligent tutoring system for an augmentative communication module: Feasibility for implementation (Dr Kirsty Bastable)
- The landscape of Arts for Health practices with children and youth in South Africa (Ms Sunelle Fouché)

During the final session, Prof Markotter facilitated a discussion on creating a roadmap for the continuation of projects. "Due to the progress in project activities, and inspired by the breadth of engagement and quality of collaboration, Future Africa seeks to prioritise the partnership with Unicef through its participation in future projects," she concluded.

"The projects and research outcomes that have been achieved should open up towards achieving broader community impact and promote cross-pollination" – Prof Wanda Markotter

OVERARCHING THEME: **MENTORING, ETHICS AND SCIENCE COMMUNICATION**

ONE OF THE IMPORTANT FOCUS AREAS OF THE FUTURE AFRICA-UNICEF PARTNERSHIP WAS THE CAPACITY BUILDING AND TRAINING OF EARLY-CAREER RESEARCHERS AND STUDENTS. THIS WAS AN OVERARCHING FEATURE THAT WAS INCLUDED IN THE ACTIVITIES OF ALL THE CLUSTERS DURING THE FIRST PHASE OF THE PROGRAMME (YEaH). THE STUDENT SUPPORT ACTIVITIES THAT FORMED PART OF THE PROGRAMME ALL REQUIRED ELEMENTS OF MENTORING, ETHICS AND COMMUNICATION.

These elements of the programme were presented and managed by Prof Stephanie Burton and Dr Leti Kleyn, who ensured that a coordinated approach to the programme's mentoring, ethics and communication activities were included in all the cluster activities. The Youth Forum, which was hosted on 10 June 2021, provided the opportunity for young people who had been involved in various cluster activities to reflect on how the programme had impacted their lives and the lives of others.

The overarching mentoring, ethics and communication activities continued during the second phase of the programme, where the activities of all the clusters focused on ensuring the planned outcomes relating to supporting young women scientists at universities, and the development of historically disadvantaged institutions. These activities formed a supplementary cluster, and continued to provide supporting workshops on mentoring, ethics and science communication.

PROFILE OF FACILITATORS

Prof Stephanie Burton
Prof Burton is a former Vice-Principal: Research and Postgraduate Education at the University of Pretoria and a professor at Future Africa. She is an internationally acclaimed researcher, who has been a B-rated scientist with the National Research Foundation (NRF) in the discipline of Biochemistry. She is involved in several leadership roles in higher education, including as Vice-President of the Academy of Science of South Africa (ASSAf). She was instrumental in setting up the African Research Universities Alliance (ARUA), a network of 16 leading African universities.

Dr Leti Kleyn
Dr Kleyn is the Digital Platform Manager of the Future Africa Research Institute, as well as the Information Hub of the Forestry and Agricultural Biotechnology Institute (FABI). Her research interests include freedom of information, institutional repositories, copyright, literature, community engagement and marginalisation.

EMPOWERING YOUTH TO RESPOND TO THE COVID-19 PANDEMIC

In addition to hosting the Youth Forum, the outputs of this cluster included student support, a mentoring programme, science communication training and ethics training.

Student support

The Alliance for African Partnership (AAP) and the University of Pretoria developed a concept note merging ideas around youth empowerment that puts universities at the centre of skills development and job creation on the continent. The partners also had a series of discussions with the African Development Bank to share their thinking around the proposed youth empowerment programme and obtain feedback on the concept note.

The feedback received from the Development Bank noted that there are knowledge gaps in the design and implementation of entrepreneurship training programmes, as well as in the overall support environment for entrepreneurship development in African countries. Understanding this knowledge gap is key to understanding why efforts to promote entrepreneurship development on the continent fail to succeed.

With input from the Development Bank, the partner institutions resolved to initiate a scoping study in Botswana, Kenya, Malawi, Nigeria, South Africa, Tanzania and Nigeria. These were the countries that were expected to participate in a programme to address the knowledge gap.

The results of the scoping exercise would help the partner institutions conceptualise and design a programme on youth empowerment, with a focus on building the capacities of institutions of higher learning to deliver innovative and effective entrepreneurship development programmes.

Mentoring programme

The purpose of a mentorship programme is to provide mentees with support through interaction with more experienced mentors. This support comes in the form of interactions between individual mentor-mentee or mentor-mentees in small groups, and through informal discussion and meetings.

The mentoring programme had two main purposes:

- Mentors could offer practical advice and guidance, based on their experience, on various aspects of the programme, with the aim of supporting mentees and enabling them to achieve their objectives more rapidly and without drawbacks due to inexperience or uncertainty as to what was required of a mentee in the training programme. This guidance could include aspects such as assistance with technical aspects (know-how) of the training, course content, sources of information and time management.
- Mentors could assist trainees to gain confidence by being available to offer encouragement and emotional support.

Each cluster in the programme was therefore required to include a coordinated mentorship programme and to identify and recruit established academics in the field who can act as mentors.

Three mentorship workshops were held:

- **A broad overview and introduction to mentorships.** This workshop was held on 25 November 2021 and was attended by mentors, supervisors, postdoctoral fellows and students.
- **Mentorship: How it works and how it helps.** This workshop was held on 26 November 2021 and was attended by students.

- **Offering successful mentorship.** This workshop was held on 1 December 2021 and was attended by mentors and supervisors.

Science communication training

The aim of the science communication training was to enable participants of the YEaH programme to disseminate and explain their research. The training programme would focus particularly on emerging researchers, and participants working in transdisciplinary teams to develop science communication skills.

Integrating science communication training into the programme's overall transdisciplinary research activities would promote skills and enhance the students' capacity to engage, share and effectively communicate in a clear and engaging way. This would lead to an improved understanding of their research by multiple audiences, the media, government officials and other people outside the researchers' specific scientific disciplines.

The training was provided in collaboration with the University of Pretoria's Department of Institutional Advancement, The Conversation Africa and professional science journalists. It was organised as a coordinated programme that was run across each individual programme.

The Start-up Management Skills and Entrepreneurship programme held two workshops:

- The first workshop, which was held on 1 March 2021, included a panel discussion, followed by a question-and-answer session on how to speak and write about a specific topic when communicating with the broader public about topics that are relevant to the group.
- The second workshop, which was held on 11 March 2021, focused on social media messaging and current topics. Trainees were required to compose social media messages about their own projects.

Three general science communication workshops were also held:

- The first workshop, held on 10 March 2021, included a panel discussion, followed by a question-and-answer session on how to speak and write about a specific topic when communicating with the broader public about topics that are relevant to the group.
- The second workshop, held on 15 March 2021, focused on science writing for the public. Some science journalists were asked to present their approaches.
- The third workshop, held on 24 March 2021, focused on social media messaging and current topics. Trainees were required to compose social media messages about their own projects.

General communication related to the visibility of the YEaH programme also formed part of this cluster's activities. It included journalists and science communicators, in collaboration with the University's Department of Institutional Advancement and faculty communication specialists, who supported the work of the clusters. They served as communicators of the research conducted in the programme, and disseminated research findings to the target audience.

The proposed communication programme contributed to the visibility of the YEaH programme by preparing information and making it as useful and accessible to the public as possible. The communication about the programme extended beyond traditional journalism to support the researchers and trainees using different approaches to ensure that accurate research information, facts, figures and direct communication were disseminated from the scientists via interviews, opinion pieces, podcasts, blogs and posts on social media.

Ethics training

The purpose of the programme's ethics training was to ensure that trainees become aware of the need for ethical practices in research and science broadly, and become conversant with the necessary practical aspects of ethical research. Although media ethics was incorporated into the science communication workshops, two general ethics workshops were held:

- A workshop on ethics in the broader sense was held on 30 November 2021. It was attended by staff members, postdoctoral fellows and students.
- An introduction to research ethics workshop was held on 31 May 2021.

Furthermore, an Ethics Seminar was presented through the Centre for Ethics and Philosophy of Health Sciences. Information sessions also took place to ensure that trainees were informed of the requirements regarding ethical approval prior to initiating a research project. This related to both research data management, and the confidentiality of data in terms of the Protection of Personal Information Act.

OVERARCHING THEME: **TRANSDISCIPLINARITY**

THE FUTURE AFRICA-UNICEF PARTNERSHIP'S FOCUS ON YOUTH EMPOWERMENT AND HEALTH, AND ECONOMIC RESPONSES TO COVID-19 INCLUDED A SERIES OF TRANSDISCIPLINARY TRAINING WORKSHOPS, DEVELOPED AND PRESENTED AS A SERIES OF WEBINARS BY THE CENTRE FOR THE STUDY OF RESILIENCE (CSR), IN COLLABORATION WITH THE INTERNATIONAL ONE HEALTH FOR ONE PLANET EDUCATION (1HOPE) INITIATIVE.

Increasingly recognised nationally and globally by organisations and commissions, and coupled with COVID-19, it is becoming clear that the One Health approach has stimulated modern societies to rapidly adopt measures to save lives, protect livelihoods and safeguard nature to reduce the risk of future pandemics (strengthening resilience, preparedness and precautions).

The webinars focused on strengthening transdisciplinary research training capacity development for doctoral and early-career scholars in Africa by leveraging a One Health and Wellbeing lens. They incorporated the concept of a collaborative, multisectoral and transdisciplinary approach, working at the local, regional, national and global levels with the goal of achieving optimal health and wellbeing outcomes. This constituted a recognition of the interconnection between people, animals, plants and their shared environment, which was especially evident in the time of COVID-19's global challenges.

CENTRE FOR THE STUDY OF RESILIENCE

Housed in the University of Pretoria's Faculty of Education, the Centre for the Study of Resilience is a knowledge-generation platform that was established to make a meaningful contribution to resilience-enabling conditions that are responsive to chronic and cumulative adversity, something that is characteristic of a Global South, African space. It has a two-pronged research niche: to investigate resilience as a complex transdisciplinary phenomenon, and to use systematic scientific evidence to centralise Global South knowledge on adversity and adaptation into existing global discourses of resilience.

ONE HEALTH FOR ONE PLANET EDUCATION (1HOPE)

The 1HOPE initiative of the One Health Commission seeks to educate the next generation of global citizens about the criticality of ensuring the sustainability of the planet and all its species. This was made especially poignant by the global COVID-19 upheaval. It envisions a world where people of all ages, and in civil and government organisations apply a One Health and Wellbeing approach – recognising and respecting the interconnections and interdependencies among humans, animals, plants and their shared environment. Its main aim is to build and support global capacity for understanding and valuing the One Health and Wellbeing approach as the foundation for achieving the United Nations' Sustainable Development Goals.

THE TEAM

The team behind the Unicef-funded initiative to provide transdisciplinary training for research scholars comprised Prof Liesel Ebersöhn, Dr George Luedekke, Stephan Dippenaar and Liz-Marie Basson.

Prof Liesel Ebersöhn

Prof Ebersöhn is Director of the Centre for the Study of Resilience and is a professor in the Department of Educational Psychology in the University of Pretoria's Faculty of Education. She is considered a leading authority on resilience and interventions to promote resilience in high-risk school environments. Her research is positioned in those contexts that are typical of an emerging economy in a transforming country. She combines emancipatory and intervention methodologies to investigate pathways to resilience as human-ecological and cultural adaptive responses to chronic and cumulative adversity. Her recognised scientific contributions include a generative theory (relationship-resourced resilience), which describes an emic system to counter chronic adversity, as well as "flocking", a word she coined to depict a collectivist indigenous psychology pathway to resilience.

Dr George Lueddeke

Dr Lueddeke is an education advisor in higher, medical and One Health education, and the global lead of the international One Health for One Planet Education (1HOPE) initiative, in association with national, regional and global organisations. As a former senior lecturer in Medical Education in the University of Southampton's Faculty of Medicine, and consultant education advisor with the London KSS Postgraduate Deanery, he was extensively involve in building capacity in undergraduate and postgraduate education and research, as well as interprofessional learning and quality assurance. In collaboration with Future Africa and the Centre for the Study of Resilience at the University of Pretoria, he has been engaged in progressing transdisciplinary research.

Stephan Dippenaar

Stephan Dippenaar is a PhD candidate and Secretariat at the Centre for the Study of Resilience. He is a registered educational psychologist at Prospectus Novus Special School (a resource centre for the Department of Education in the Tshwane North district). He previously worked for the World Educational Research Association as part of the Secretariat team. He is providing training and developing short course modules, specifically relating to the implementation of the differentiated curriculum, autism spectrum disorder and learning difficulties to resource-constrained schools in an attempt to combat the current educational challenges experienced in the country. His current research focuses on resilience, educators and wellbeing. He believes that it is not about the resources one has, but rather how resourceful one can be.

Liz-Marie Basson

Liz-Marie Basson provides research support at the Centre for the Study of Resilience. She is a registered research psychologist, PhD candidate and an early-career researcher. Her research focuses on vulnerable societies, specifically children within rural areas in the Global South. Her work emphasises resilience, learning, health and wellbeing. She believes in expanding on existing evidence-based knowledge through the use of systematic reviews. Her interest lies in indigenous and cross-cultural psychology, as well as the decolonisation of psychology.

EMPOWERING YOUTH TO RESPOND TO THE COVID-19 PANDEMIC

To achieve transdisciplinary research capacity building, three online transdisciplinary research workshops were held in November and December 2020, and in January 2021. The workshops were presented in collaboration with the 1HOPE initiative with the aim of building collaborative transdisciplinary research capacity for early-career researchers and doctoral candidates through a One Health and Wellbeing lens, particularly female candidates.

The webinar series had the following goals:

- Create a platform to meet and engage with a cross-section of multidisciplinary experts linked with national, regional and global networks
- Raise awareness of the urgent need to shift from disciplinary silos to address complex, socially relevant issues, such as COVID-19, climate change and food security, by transcending and integrating disciplinary paradigms and engaging in participatory research
- Identify the transdisciplinary knowledge and research skills needed to co-produce relevant outcomes for society
- Reconcile transdisciplinary research, teaching and learning, and scholarship

The 1HOPE webinar series focused primarily on training and developing resource capacity in early-career scholars and doctoral students to drive multidisciplinary and transdisciplinary projects. These four-hour webinars were free of charge, and were attended by postgraduate students from different universities, as well as doctoral candidates and early-career scholars, and experts from various disciplines who could contribute to the body of transdisciplinary knowledge globally. Open learning resources that were developed through the workshops were made available on the CSR's webpage.

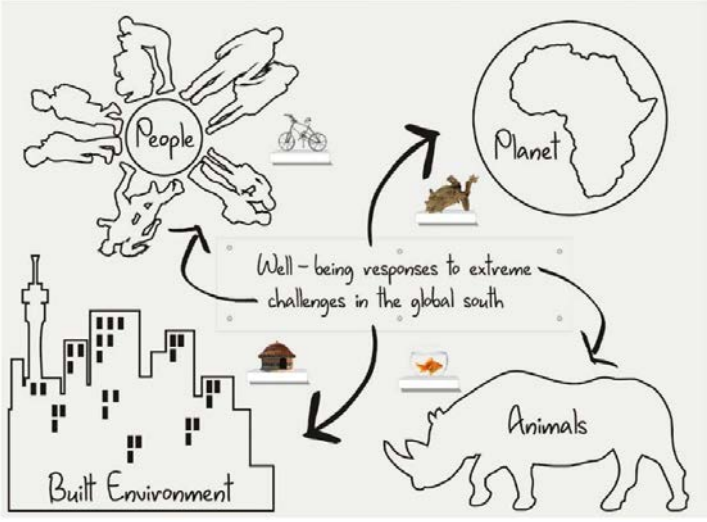
The development of the educational material and planning of the workshops took place by collaborating with stakeholders from 1HOPE and the World Education Research Association (WERA). The educational material was prepared for the sharing of open resources. Following the recruitment and coordination of speakers, the webinars could be widely advertised among postgraduate students and early-career researchers.

The webinar series hoped to achieve the following:

- Meet and engage with a cross-section of multidisciplinary experts linked with national, regional and global networks
- Raise awareness of the urgent need to shift from disciplinary silos to address complex socially relevant issues, such as COVID-19, climate change and food security, by transcending and integrating disciplinary paradigms and engaging in participatory research
- Identify the transdisciplinary knowledge and research skills needed to co-produce relevant outcomes for society
- Reconcile transdisciplinary research, teaching and learning, and scholarship

It was organised around six key themes related to transdisciplinary research:

- Global and African socio-economic challenges
- The role of the university of the 21st century
- The international 1HOPE initiative
- Global and local transdisciplinary research and development initiatives
- Methods and epistemology in addressing complex and contested transdisciplinary problems
- Career development opportunities in a COVID-19 world



Transdisciplinary research from a One Health perspective

The first webinar was held on 11 November 2020 and attracted 138 delegates from 38 cities across the world. It included a broad introduction to the webinar series by Prof Cheikh Mbow, Director of Future Africa at the time. He explained transdisciplinary research from a Unicef-One Health-Future Africa perspective.

This was followed by a presentation by Dr George Lueddeke, Chair of 1HOPE in the United Kingdom, who discussed transdisciplinarity in terms of reimagining the university of the 21st century. Prof Bassirou Bonfoh of Afrique One-ASPIRE, the Swiss Centre for Scientific Research in the Ivory Coast, discussed enhancing transdisciplinary research capacity in Africa.

The webinar was concluded with an interactive discussion on the 1HOPE working groups in Africa. This was led by Dr Wilfred A Abia (Primary and Secondary Education in Cameroon). Panellists included Dr Phaedra Henley (Director of the Centre for One Health at the University of Global Health Equity (UGHE) in Rwanda), Dr Ursin Bayisenge (One Health research associate and junior faculty lecturer at the Centre for One Health in Rwanda's UGHE) and Dr Ayinka-Asahkee Brown (Governance of Policy and Advocacy in Jamaica).

Building transdisciplinary networks

The second webinar was held on 2 December 2020 and attracted 111 delegates from 29 cities across the world. It engaged with panels that were specifically transdisciplinary in nature. Speakers from various global institutions shared their knowledge and expertise.

The first session – One Health transdisciplinary networks – was chaired by Prof Wondwossen Gebreyes (Executive Director of the Global One Health initiative at the Ohio State University, USA). The panel comprised the following speakers:

- Barbara Martin (Executive Director of the World Association of Veterinary Laboratory Technicians – Global Laboratory Leadership Program, USA)
- Dr Vipat Kuruchittham (Executive Director of the Southeast Asia One Health University Network, Thailand)
- Dr Irene Naigaga (Regional Programme Manager and Agnes Yawe Partnerships, Africa One Health University Network, Uganda)
- Dr Ayodele Odusola (Resident Representative of the United Nations Development Programme)

This session was concluded with two panel discussions on transdisciplinarity and the social sciences. The first one was chaired by Dr George Lueddeke (Chair of 1HOPE in the United Kingdom) and included the following participants:

- Ediola Pashollari (Secretary-General of the World Assembly of Youth, Malaysia)
- Prof Shakila Dada (Director of the Centre for Augmentative and Alternative Communication at the University of Pretoria)
- Prof Rohini Roopnarine (Professor at St George's University in Grenada, West Indies)
- Aisha Nankanja (a sociologist from Uganda)

The second panel discussion was chaired by Prof Liesel Ebersöhn (Director of the Centre for the Study of Resilience at the University of Pretoria). It comprised the following speakers:

- Prof Chrisna du Plessis (Chair of the Department of Architecture at the University of Pretoria)
- Dr Olutayo Babalobi (consultant, lecturer and researcher at the University of Ibadan, Nigeria)

- Prof Funke Omidire (senior lecturer and researcher in the Department of Educational Psychology at the University of Pretoria)
- Prof Maretha Visser (counselling psychologist at the University of Pretoria)

The webinar was concluded with a contentious discussion on The Earth Charter Pillars by Alicia Jiménez (Director of Programmes at the Earth Charter International, Costa Rica), followed by a discussion on The Lancet One Health Commission by Dr John Amuasi (Co-Chair of The Lancet One Health Commission and Executive Director of the African Research Network for Neglected Tropical Diseases, Ghana).

Strengthening transdisciplinary research

The third webinar was held on 27 January 2021 and attracted 138 delegates from 27 cities across the world. It embraced what is being done by doctoral and early-career scholars. The webinar comprised two panel discussions, where these scholars shared their thoughts, knowledge and expertise on being next-generation scholars, and what they think is required for us to move forward as scientists. Both panels were chaired by Prof Liesel Ebersöhn (Director of the Centre for the Study of Resilience, University of Pretoria) and Dr George Lueddeke (Chair of 1HOPE in the United Kingdom). The panels comprised the following panellists:

- Adele May (Centre for Augmentative and Alternative Communication at the University of Pretoria)
- Samantha Mukonjia (International Student One Health Alliance)
- Dr Adriano Mendez (Centre for Viral Zoonoses at the University of Pretoria)
- Dr Willeke de Bruin (Centre of Excellence in Food Security at the University of Pretoria)
- Robyn Moore (Centre for Augmentative and Alternative Communication at the University of Pretoria)
- Dauda Onawola (International Student One Health Alliance)
- Dr Assefa Woldegerima (Centre for Viral Zoonoses at the University of Pretoria)
- Dr Lizyben Chidamba (Centre of Excellence in Food Security at the University of Pretoria)

The following key participants posed suggestions on how the development of transdisciplinary research might be strengthened in research or education settings:

- Loandi Richter (Centre of Excellence in Food Security at the University of Pretoria)
- Tiffany Naidoo (School of Health Systems and Public Health at the University of Pretoria)
- Marinda Mortlock-De Vries (Centre for Viral Zoonoses at the University of Pretoria)
- Thabang Msimango (Centre of Excellence in Food Security at the University of Pretoria)
- Chiedza Mandimika (School of Health Systems and Public Health at the University of Pretoria)
- Marike Geldenhuys-Venter (Centre for Viral Zoonoses at the University of Pretoria)
- Ulonka Barnard (Centre for Viral Zoonoses at the University of Pretoria)

Following the two panel discussions, the webinar engaged in a consensus consultation on transdisciplinarity with Prof Belinda Reyers (a senior advisor at the University of Pretoria who is affiliated with the Stockholm Resilience Centre) and Prof Liesel Ebersöhn. This session was chaired by Dr George Lueddeke.

The final item on the programme was an interactive discussion on developing a career in One Health, chaired by Prof Liesel Ebersöhn. It involved the knowledge, experience and expertise of Prof Renzo Guinto (New Generation One Health Advisor at The Lancet One Health Commission) and Dr Deborah Thomson (Founder and President of One Health Lessons).

The webinar series was concluded with a brief closing, chaired by Prof Ebersöhn and Dr Lueddeke.

According to Prof Ebersöhn, the webinar series is a stepping stone and pilot for what may happen in the future to strengthen transdisciplinary research capacity. “Initially, we attempted to gather doctoral and early-career scholars in person, but due to the COVID-19 pandemic, alternatives, such as a hybrid model, were considered. However, this did not work and we had to settle for a virtual webinar series”.

Prof Ebersöhn believes that some valuable lessons were learnt in the planning, development and presentation of the webinars. “It is advisable to include future doctoral students and early-career scholars in the planning phase

of a webinar. Unfortunately, this was not possible in this case due to the short turnaround time of the funding period." The involvement of global research stakeholders such as 1HOPE and WERA was crucial to ensuring the success of the webinars, particularly in terms of knowledge and resource sharing, as well as their access to wider networks.

EMPOWERING WOMEN SCIENTISTS AND HISTORICALLY DISADVANTAGED INSTITUTIONS

Following the successful conclusion of the first phase of the partnership with Unicef, the Centre for the Study of Resilience upscaled its collaboration with its global partners, 1HOPE and WERA, to expand its support specifically to women scientists and historically disadvantaged institutions. This upscaling was focused on online research capacity development. It was an intervention research initiative using participatory reflection and action principles.

This programme had two outputs:

- Increase the number of young women involved in training programmes developed to contribute to the capacity at identified African universities
- Increase community engagement projects targeted at vulnerable communities

Development of online transdisciplinary training material

This project was guided by the following research question: What matters for the transdisciplinary research capacity development of young women researchers in Africa to generate evidence-based responses to global challenges?

Its aims were as follows:

- Train young women researchers in Africa by developing capacity to generate transdisciplinary evidence that is responsive to global challenges
- Culminate in an evidence-based online training module to build transdisciplinary research capacity with young women researchers in Africa.

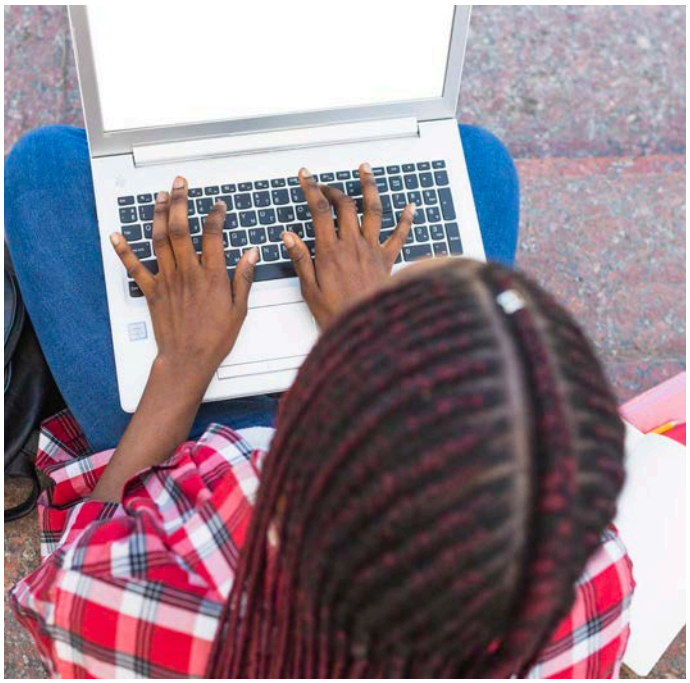
The existing networks of the CSR and the University of Pretoria were utilised to recruit young women researchers in Africa to participate in the training. Transdisciplinary researchers from the University's networks were invited to moderate online sessions with the young scholars, and recruit attendees and expert transdisciplinary moderators.

Through a participatory reflection and action methodology, evidence-based online training material was co-constructed with young female scientists (especially targeting Africa), focusing on transdisciplinary capacity development. Intervention developers were co-opted within and outside UP to use the training framework to develop a transdisciplinary training or intervention module for online delivery. This was presented in the form of five three-hour online transdisciplinary training sessions.

The first webinar was held on 1 September 2021 and attracted 68 participants. It aimed to generate pre-intervention data by asking attendees to answer the core research question. The session was audio-recorded, transcribed and analysed to generate a training framework of transdisciplinary training needs for young female researchers in Africa. Delegates received an overview of transdisciplinary training. They then had the opportunity to consider four questions:

- What would you like to learn about transdisciplinary teaching?
- Why do you think transdisciplinary research is so important now?
- Which global challenges would you like to study as a future transdisciplinary researcher? Can you think of any examples from your own life where transdisciplinary research can make a difference?
- How can one motivate researchers, students and stakeholders to be involved in transdisciplinary studies?

The second webinar, held on 13 October 2021, attracted 24 young female researchers, while the third webinar, held on 27 October 2021, attracted 48 young female researchers. These female researchers had been recruited in Africa. The content of these webinars was based on content co-generated with webinar participants. The transdisciplinary capacity development content was therefore evidence-based and customised to target early-career scholars and doctoral candidates, especially women.



The webinar of 13 October addressed the following themes:

- An introduction to transdisciplinary research, which comprised three presentations:
  - Clarifying transdisciplinary research (presented by Prof Liesel Ebersöhn)
  - The purpose of transdisciplinary research (presented by Dr George Lueddeke)
  - Transdisciplinary teamwork (presented by Prof Liesel Ebersöhn and Dr Eugene Machimana)
- Transdisciplinary research: Science that matters, which comprised two presentations:
  - Pathways to impact (presented by Dr Eugene Machimana)
  - Transdisciplinary science communication (a panel discussion chaired by Dr Mokgaetji Soma)

The webinar of 27 October comprised two panel discussions:

- Transdisciplinary networks and training: Africa, chaired by Dr George Lueddeke. Panellists included Dr Truphena Mukuna, Executive Director of the Organization for Social Science Research in Eastern and Southern Africa, Addis Ababa, Ethiopia; Prof Tally Palmer, Director of the Institute for Water Research and African Research Universities Alliance (ARUA) Water Centre of Excellence, Rhodes University, South Africa; Prof Eleni Akillu, Senior Researcher and Research Group Leader of the Division of Clinical Pharmacology, Karolinska Institutet, Stockholm, Sweden; and Dr Tobias Buser, Executive Secretary for the Global Alliance for Inter- and Transdisciplinarity, Switzerland.
- Transdisciplinary networks and training: Worldwide, chaired by Prof Liesel Ebersöhn. Panellists included Dr Priyanka Jamwal, Fellow and Centre for Environment and Development at Ashoka Trust for Research in Ecology and the Environment, India; Prof Ulli Vilsmaier, Leuphana University Lüneburg, initiator of the Responsive Research Collective, and co-founder of the Global Alliance for Inter- and Transdisciplinarity; Dr Catherine Ward, South African Research Chair in Marine Ecology and Fisheries, University of Cape Town, South Africa; Prof Jacob Zinsstag-Klopferstein, Department of Epidemiology and Public Health Swiss Tropical and Public Health Institute, Basel, Switzerland, and President of the International Association of Ecology and Health; and Dr Priyanka Jamwal, Fellow and Centre for Environment and Development at Ashoka Trust for Research in Ecology and the Environment, India.

A fourth webinar was held on 24 November 2021, which attracted 20 participants. It took the form of the online presentation of the research proposals of female early-career and doctoral researchers worldwide to a panel of peer and expert reviewers, who provided feedback on their drafted proposals. The topics presented focused on transdisciplinary solutions to global challenges.

The programme included two breakout groups: one chaired by Prof Liesel Ebersöhn and Dr Eugene Machimana, and the other by Dr George Leuddeke and Dr Mokgaetji Somo.

The first breakout group comprised the following participants:

- Ms Arinola Olaonipekun, Department of Consumer and Food Sciences, University of Pretoria
- Ms Bukola Amao-Taiwo, Department of Educational Management, University of Lagos
- Dr Clement Ayarebilla Ali, Institute of Educational Research and Innovation Studies, University of Education, Winneba, Ghana
- Dr Michelle Janse van Rensburg, Community-oriented Primary Care Research Unit, University of Pretoria

- Dr Daphna Arbell Kehola, Adult Education Programmes, Expressive Arts Therapy and Yoga Therapy
- Ms Florence Wamahiga Githuthu, Counselling Psychologist, Tangaza University College
- Dr Handré Janse van Rensburg, Department of New Testament and Related Literature
- Ms Michugina Svetlana, Institute of Foreign Languages, Moscow City University

The second breakout group comprised the following participants:

- Mr Amir Hossain, Department of English, International Business Administration and Information Systems University, Bangladesh
- Dr Leti Kleyn, Future Africa Institute, University of Pretoria
- Dr Maitumeleng Nthontho, Department of Education Management and Policy Studies
- Dr Paulette Ekejiuba, University of Benin, Nigeria
- Dr Ebo Amuah, College of Education Studies, University of Cape Coast, Ghana
- Ms Elena Gui, Universidad Casa Grande, Ecuador
- Dr Joynce Shirinde, School of Health Systems and Public Health, University of Pretoria

OUTLOOK

Feedback on the project was used to refine the online transdisciplinary training that was presented as an evidence-based intervention to strengthen transdisciplinary research capacity.

Reflecting on this phase of the partnership, Prof Ebersöhn confirmed that "leveraging existing global networks from transdisciplinary scholars allowed us to reach a greater audience throughout Africa." These networks proved valuable for a time-sensitive, quality and representative webinar series: both to include presenters and to recruit a target audience of early-career scholars globally. The availability of experts to review concept notes added great value to the current work of the young female scientists who participated in the workshops.

The programme directors have been approached by a UK-based academic publisher, Emerald Publishing, to consider proposing a volume on transdisciplinary research capacity development with early-career female scholars in Africa. The proposed volume will draw on the content of this webinar series.

Support for community engagement within vulnerable communities

Workshops were also implemented to support community engagement and training. Three experienced research assistants were appointed to develop and deliver training material at local communities over a period of five months. Another four team members were actively involved in the webinar series.

As part of the webinar series, 20 early-career scholars developed, presented and received expert and peer review on small-scale transdisciplinary research projects. The group of beneficiaries can build on the feedback to refine their proposed ideas. In addition, due to participation in the webinar series, participants now have access to a worldwide network of peers and experts in the field of transdisciplinary research.

WEBINAR PARTICIPATION

PHASE 1: EMPOWERING YOUTH TO RESPOND TO THE COVID-19 PANDEMIC

11 NOV 2020	138 DELEGATES	38 CITIES
2 DEC 2020	111 DELEGATES	29 CITIES
27 JAN 2020	138 DELEGATES	27 CITIES

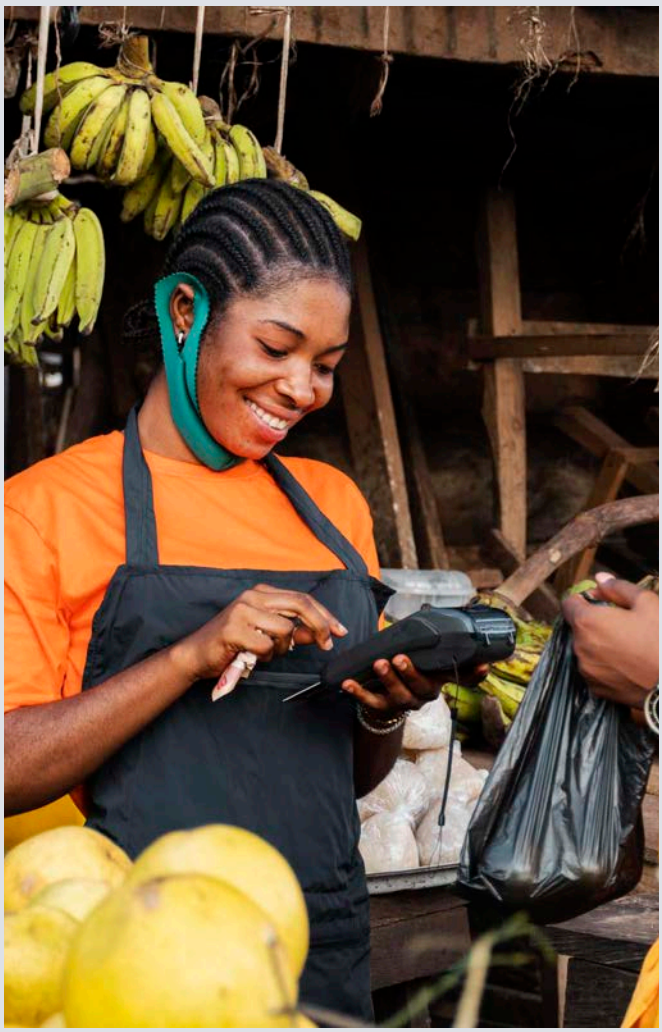
PHASE 2: EMPOWERING WOMEN SCIENTISTS AND HISTORICALLY DISADVANTAGED INSTITUTIONS

1 SEPT 2021	68 WEBINAR PARTICIPANTS	13 OCT 2021	24 YOUNG FEMALE RESEARCHERS
27 OCT 2021	48 YOUNG FEMALE RESEARCHERS	24 NOV 2021	20 WEBINAR PARTICIPANTS

“Leveraging existing global networks from transdisciplinary scholars allowed us to reach a greater audience throughout Africa.”
– Prof Liesel Ebersöhn

THEME 1
START-UP MANAGEMENT AND ENTREPRENEURSHIP SKILLS

BY EMPOWERING THE YOUTH, WOMEN AND HISTORICALLY DISADVANTAGED COMMUNITIES WITH START-UP MANAGEMENT AND ENTREPRENEURSHIP SKILLS, THE UNICEF-FUNDED TEAM IN THE UNIVERSITY OF PRETORIA'S DEPARTMENT OF BUSINESS MANAGEMENT IS NOT ONLY ENSURING BENEFICIARIES AND THEIR FAMILIES DECENT WORK AND CONTRIBUTING TO THE COUNTRY'S ECONOMIC GROWTH IN ACCORDANCE WITH THE UNITED NATIONS' SUSTAINABLE DEVELOPMENT GOAL (SDG) 8, BUT IS ALSO WORKING ON ERADICATING POVERTY (SDG 1), ACHIEVING ZERO HUNGER (SDG 2), PROMOTING GOOD HEALTH AND WELLBEING (SDG 3), AND PROVIDING QUALITY EDUCATION (SDG 4).



DEPARTMENT OF BUSINESS MANAGEMENT

The University of Pretoria's Department of Business Management, headed by Prof Alex Antonites, offers diverse and comprehensive training and research within the broader academic domain of business management studies. Its value proposition includes education and research in the integrated subfields of entrepreneurship, management and strategy, international management, supply chain management, responsible leadership, and turnaround and rescue.

The Department endeavours to apply the key principles of innovation management, which results in a number of market-leading, technology-driven service options, ranging from internal operational efficiency to catalysing enhanced teaching and learning.

Launch of the Mamelodi Business Hub

In addition to its undergraduate and postgraduate educational offering, it is a leader in enabling entrepreneurship in South Africa. It offers two levels of business incubation: the University of Pretoria Business Incubator (UPBI) and the Mamelodi Business Hub (MBH). While the UPBI equips aspiring young entrepreneurs with the tools, skills and connections they need to turn their dreams into a tangible reality, the MBH has the primary aim of enhancing the development of entrepreneurs in the local community of Mamelodi.

UNIVERSITY OF PRETORIA BUSINESS INCUBATOR

The University of Pretoria Business Incubator is a rapid business incubator based at the University of Pretoria that helps aspiring young entrepreneurs build the companies that will shape the future. Students apply to become part of the incubator by presenting their business ideas. They are then invited for an interview. Once accepted, incubatees are eligible to attend a series of talks hosted by a select group of speakers. They can then pitch their start-ups to a panel of judges. The most outstanding business ideas are selected to be personally managed by an incubator manager. The incubatees are mentored, receive guidance and support, and are introduced to investors who can assist them with establishing their businesses.

MAMELODI BUSINESS HUB

The Mamelodi Business Hub offers young people in Mamelodi and the City of Tshwane the opportunity to realise their entrepreneurial ambitions. It endeavours to become a key catalyst in township revival and enhancement. It not only focuses on entrepreneurial development, but also on making a significant social impact through its focused service offerings and transdisciplinary programmes to an array of communities in the region. It emphasises the development of women's leadership skills, co-creating innovative products and services for young entrepreneurs, and merging the needs of Mamelodi's micro-business environment with the skills of the University's undergraduate and postgraduate students through community engagement. It was established in collaboration with Unicef's Generation Unlimited initiative.

THE TEAM

The team behind the Unicef-funded initiative to empower the youth, as well as women and historically disadvantaged institutions, with start-up management and entrepreneurship skills, comprised Prof Alex Antonites, Dr Dawie Bornman and Dr Muriel Serfontein-Jordaan from the University's Department of Business Management.

Prof Alex Antonites

Prof Antonites is the Head of Department of the University of Pretoria's Department of Business Management in the Faculty of Economic and Management Sciences. He also lectures and supervises research at the University's Gordon Institute of Business Science (GIBS). He established the UP Business Incubator, which is currently developing a number of innovative new start-up companies. He heads the Mamelodi Business Hub and is a non-executive director of TuksNovation, the University's technology business incubator, which provides specialised product and business development support to start-up companies. He strives to implement the principles of an entrepreneurial university by leading the Entrepreneurship section of the University's Work-readiness and Entrepreneurship Programme, which has already supported 5 200 potential student entrepreneurs. He steered the South African Small, Medium and Micro Enterprises (SMME) Support Portal, which offered specialised support to entrepreneurs during the COVID-19 pandemic. His entrepreneurial creativity and innovation has led many organisations to the next level of performance.

Dr Dawie Bornman

Dr Bornman is a senior lecturer, postgraduate supervisor and researcher in the University of Pretoria's Department of Business Management. He focuses on entrepreneurial creativity, business management innovation and leadership communication, and has presented his research at numerous international conferences, seminars and workshops. He received a EUROSA Grant, funded by the European Union as part of the Erasmus Mundus Scheme, which enabled him to study and work at the University of Leipzig in Germany. He acts as a guest lecturer at various international universities, including the Vorarlberg University of Applied Sciences in Austria and the Karel de Grote University College in Belgium. He is passionate about the youth and SMME development projects. He is also involved in developing talent in the South African entertainment industry. His consultation activities in this industry are focused on building a stronger creative sector in South Africa.

Dr Muriel Serfontein-Jordaan

Dr Serfontein-Jordaan is a lecturer in the University of Pretoria's Department of Business Management. Her field of specialisation is strategic management and strategic communication management. She has been involved in the development of various business management courses and programmes at different levels, as well as their facilitation. This has ranged from independent training programmes to tertiary postgraduate programmes. Her experience in the tertiary education landscape has made her acutely aware of the social realities of South Africa. This has strengthened her belief in equality and the development of the people of the country through education in the broadest sense. This experience has not only shaped her perspective, but also her teaching philosophy.

EMPOWERING THE YOUTH WITH START-UP MANAGEMENT AND ENTREPRENEURSHIP SKILLS

The initiative that was developed to empower the youth to respond to the challenges brought about by the COVID-19 pandemic took the form of an online youth entrepreneurship development course, Starting MY Business. The course was advertised broadly among students from the University of Pretoria. Applications were not only received from students in business-related studies, but included a range of fields, even from as far afield as agriculture and veterinary science.

According to Dr Bornman, who led this cluster, the selection process entailed ensuring that the participants would have the time available in their schedules to complete the course in terms of their current workload, and that they had access to the internet or a device with which they could access the online lectures and course material. “Participants with limited data were not excluded from the course. We found a way of ensuring that they were also able to take part in the programme if they showed potential,” he said.

The course focused on enhancing and understanding several aspects of entrepreneurship, including entrepreneurial awareness, orientation, intent and action. It was designed as a unique hybrid course, presented through Enterprises University of Pretoria (Enterprises UP), the University’s vehicle for providing short courses and lifelong learning opportunities to industry. It covered a portion of the relevant first-year content of undergraduate Entrepreneurship and Business Management modules, but with case studies that were relevant to the South African context.

Dr Serfontein-Jordaan, a co-presenter of the course, explained how the course worked. “There were practical online workshop days that ran concurrently with academic online units. Each workshop day consisted of a combination of online live conversations, theoretical discussions and practical activities that assisted each delegate to understand who they were as an entrepreneur, as well as the context of entrepreneurship and its role in the broader national and international business environment.”

The course focused on the following discussion points and critical areas: creativity, design thinking, innovation, competitive business models and business plans, market feasibility and identifying opportunities, the day-to-day management of an entrepreneurial venture, strategic communication, entrepreneurial marketing, and sustainability in the new digital age of the COVID-19 ecosystem. In addition, the presenters offered live entrepreneurship development support in the form of “e-assist” sessions to address any questions and refine business plans and models that formed part of delegates’ final assessment project. After passing all the required outcomes, the delegates received a certificate of completion.

“The teaching and learning approach is practical, opportunity-driven and flexible,” explained Dr Bornman. “Not only does it focus on managing a delegate's own learning time, but also on applying the theoretical and practical start-up management and entrepreneurial knowledge gained in an outcome-driven process based on their own effort.”

The training was presented by experienced lecturers with international exposure in entrepreneurship. They could assist with delegates’ specific questions on an ongoing basis to establish a unique learning experience that could enable participants to start their own performance-orientated businesses. The learning experience was technology-driven and offered the opportunity to engage with other delegates during the course, as well as afterwards through networking.

“The course focused on more than just understanding and developing a sustainable entrepreneurial idea or venture,” remarked Dr Bornman, “but concentrated on improving the quality of life of individuals, communities and the broader society”.

Project activities

The project was launched with the recruitment and selection of potential delegates, who were registered students at the University of Pretoria. The project team followed a cost-free approach by announcing the course on social media and on the University's learning management system, ClickUP, to which all registered students have access. Above all expectations, the team received 243 applications. "Our only concern at that stage," remarked Dr Bornman, "was that we would only be able to select a small portion of the total response population, while there was such an overwhelming interest in the offering."

This concern was addressed following the successful completion of the first intake of delegates when additional funding from Unicef made it possible to present another two iterations of the course. In this way, 85 applicants could benefit from the training: 40 delegates in the first course (22 October to 30 November 2020), 20 delegates in the second course (24 March to 23 April 2021) and 25 delegates in the third course (12 to 27 May 2021). The delegates were aged between 18 and 34 years, and the majority (57%) were female. All population groups of South Africa took part in the training.

Each course comprised nine units:

Unit 0:	**Is this course for you?**
Unit 1:	**Entrepronology – the story of entrepreneurs**
Unit 2:	**Where do ideas come from and what happens then?**
Unit 3:	**Building a business model**
Unit 4:	**The language of money**
Unit 5:	**Get real – YOUR business model**
Unit 6:	**Building a business plan**
Unit 7:	**Get funded – a business plan at work**
Unit 8:	**Make it legal (How? How much? By when? By whom?)**
Unit 9:	**Your network**

With each version of the course, the team members learnt from the experiences of the delegates, and were able to amend the course to address challenges that were identified. For the first intake, the content was delivered in the form of six workshops presented on scheduled days from 09:00 in the morning until 17:00 in the afternoon for two consecutive days every second week over six weeks.

The delegates also had to complete the online course content, which ran parallel with the workshops. Some of the delegates experienced challenges attending a full-day course as they were writing tests or examinations. Live online support was introduced in the form of e-assist sessions, which were scheduled for six to nine hours in the week following the fortnightly two-day workshop sessions, and via email. There was thus weekly interaction between the presenters and the delegates.

Following the first intake, the presenters revised and restructured the course based on the shortcomings that were identified. The course content was condensed into two workshops, presented a week apart, with the full course completed within five weeks. Delegates could do the work at their own pace, using the content discussed in the workshops to complete the online units and workshop activities. The e-assist sessions were again utilised to assist delegates who were unable to attend the online workshops due to tests and examinations.

An additional five practical self-paced workshops were introduced, which focused on the following topics:

- Who you are as an entrepreneur, and entrepreneurship
- Creativity and design thinking
- The business model
- The business plan
- Communication and marketing

Positive feedback was received from the delegates:

"Due to COVID-19, the online platform is understandable, otherwise a live workshop would have been even more enjoyable."

"Theory is great, but practicality is what gets you there. I like that there are practical examples, and explanations and guides. Keep them coming!"

"The course coordinators have been very accommodating and there is very helpful information. The activities were also enjoyable because they caused me to think about the feasibility of my idea and compare it with other thriving businesses."

"I loved the online workshops, the presenters made it extremely fun and interesting. I learnt a lot, and I loved learning and broadening my knowledge and way of thinking."

"When I normally attend a class online, it is not always enjoyable, but this course was excellent! Great practical examples, great tips, great presentations, and the templates helped a lot with the assessment."

"More people need to attend this course, it changed my view not only of entrepreneurship, but also of my future."

"Thanks, Unicef and UP for the fun course. I learnt more than I expected. This was an enriching time in my life."

"My experience was very positive, and Dr Muriel and Dr Dawie made me want to work hard at pursuing my passion."

The presenters themselves also experienced the course as making a positive impact on the youth. "We are grateful to Unicef for giving us this opportunity to play a small part in making a change in the delegates' lives by sharing our knowledge and equipping them with the skills they need to start their own businesses," remarked Prof Antonites.

Some of the delegates have already started to apply what they have learnt by starting their own entrepreneurial ventures in rural areas or within their immediate communities. "This illustrates that the information transferred to the delegates was understood, and assisted them to not only focus on enhancing their own knowledge base, but also to uplift and build their communities in an effort to lessen the South African youth unemployment rate," commented Prof Antonites.

Reflecting on the project's activities, Prof Antonites, Dr Bornman and Dr Serfontein-Jordaan conclude that it is important for the Department to stay in contact with the course delegates beyond the conclusion of the project to determine whether they encounter any other issues as they move into the entrepreneurial ecosystem. "Encouraging these delegates will assist in building a network of like-minded individuals who can learn from each other and sustain their endeavours through mutual support," concludes Dr Bornman.

Applying the lessons learnt

During the Youth Forum that was held on 10 June 2021, some of the participants reflected on the value of the project's activities. During a panel discussion facilitated by Francois Gilles de Pelichy, an entrepreneur and assistant lecturer in the University of Pretoria's Department of Political Sciences, the participants agreed that they had benefitted from the course, both personally and professionally.

Mpumelelo Mkhize found the most useful lessons he learnt on the programme to be the mindset an entrepreneur should have, as starting one's own business requires a lot of dedication and sacrifice. He was motivated to start his own business as he saw the need to create employment in the country.

Education student Maymoena Khamisi emerged from the programme with a more clearly defined vision of success: "Success is a journey of countless small steps. It is a constant process of growth. If you want to be successful, you must continue to hold yourself to a higher standard, and believe in yourself." Before enrolling in the course, she had developed an online modest wear store. "I wanted to gain the skills I needed to help me succeed in running a business, and to educate myself more on the things I did not know," she explained. After completing the course, she started developing another online store, specialising in baby products, but is concentrating on her studies for now.

Through the programme, Omphile Sheila Sekwele gained a greater awareness of her own interests, and whether she can be an entrepreneur. As an Industrial Sociology and Labour Studies student, she had enrolled in a start-up competition and had drawn up a business plan before enrolling in the course. "I was interested in learning more about business management and improving my skills and knowledge about how to start and grow a business," she explained. The idea she would like to develop once she has obtained the necessary funding for her start-up business is a self-defence device that includes pepper spray and a panic

button, connected to a mobile app that is GPS-enabled to track the user's location. She considers networking to be the most important skill she learnt on the course: knowing the right people and building relationships with them to receive the support one needs to grow a business.

Social Work student Tebogo Sebesho has ambitions to become a social entrepreneur. Prior to enrolling for the course, he had been involved in a cleaning company. "I applied for the course because I wanted to gain information and knowledge about running a business, writing a business proposal and learning about different business models," he explained. "I also wanted to learn how to attract investors and obtain small enterprise funding from state entities." After completing the course, he established a clothing company, Leetco Clothingware, a small local business that specialises in designing local street clothing and narrating township stories through apparel wear. He endeavours to inspire young people in the townships and create job opportunities so that they can rewrite the narrative of the country's townships. He believes that encouraging stories about the townships, featuring positive role models, are the driving force behind township communities through which young people can defy the odds and build a new reality for themselves. The positive impact that the course had on him is therefore cascading down to the community, motivating and inspiring other young people as well.

Sikhulile Nguse is an Informatics student who is passionate about solving youth unemployment through entrepreneurship. He therefore embarked on the course to learn what it takes to become an entrepreneur. The case studies that were dealt with in the course provided him with food for thought. He also benefitted from the thought-provoking and challenging questions that were asked in the course.

EMPOWERING WOMEN SCIENTISTS AND HISTORICALLY DISADVANTAGED INSTITUTIONS

Upon conclusion of the first phase of the partnership with Unicef, the Department of Business Management embarked on upscaling its start-up management and entrepreneurship training activities, and identified three young female PhD candidates at a historically disadvantaged institution, who could qualify for a bursary opportunity.

Entrepreneurship development training

The University of Limpopo in Polokwane was identified as a historically disadvantaged institution that could benefit from the expertise of the University of Pretoria's business management specialists. After signing a Memorandum of Interest with the University of Limpopo, the Department of Business Management developed an entrepreneurship development training programme, similar to the course presented at the University of Pretoria in the first phase of the partnership.

The target of this online intervention among students of the University of Limpopo was 60 delegates. Despite the fact that 113 applications were received, only about two-thirds of the total response population could be accommodated. Seventy delegates were therefore selected to attend the training programme. They were divided into two groups of 35 delegates each. The majority of the delegates (63%) were female. The delegates were all previously disadvantaged individuals who came from the rural residential area in Limpopo.

Introductory sessions were presented to both groups on 17 November 2021, in which the delegates received their first online units and participated in their first activity workshop. Some delegates experienced difficulties attending the sessions due to a lack of internet access or because they were writing examinations. Support was provided on an individual basis in the form of e-assist sessions over the following two days.

The first workshop, which focused on business model development, was presented on 24 November 2021. It took the form of an online live-streamed event. This was followed by two online activity workshops, presented on 24 and 26 November, respectively. The delegates could complete these at their own pace. The first four units of the online course content, which ran parallel with the workshops, had to be completed by 30 November.
The second workshop, which focused on business plan development, was presented on 1 December 2021. It was also an online live-streamed event. This was followed by the next two online activity workshops, presented on 1 and 3 December, respectively. The delegates could also complete these at their own pace. The next five units of the online course content had to be completed by 12 December.

The final online activity workshop, which the delegates could complete at their own pace as well, was made available on 7 December 2021. Their final assessment project was due on 14 December. Some individuals had difficulty submitting their final assessment project within the given time frame and before the deadline. This was dealt with on an individual basis, and provision was made to extend the deadline to 31 January 2022.

The topics that were covered during the various online activities included the following:

- Workshop 1: Business model development
- Workshop 2: Business plan development
- Online Activity Workshop 1: Who you are as an entrepreneur, and entrepreneurship
- Online Activity Workshop 2: Creativity and design thinking
- Online Activity Workshop 3: Business model development
- Online Activity Workshop 4: Business plan development
- Online Activity Workshop 5: New developments, the way forward and future consultation

The course content was the same as that presented during the first phase of the programme for empowering the youth with start-up management and entrepreneurship skills.

Upon conclusion of the first round of training, additional funding was granted to train an additional group of delegates. Applications were received from 53 interested students, but only 17 of them could be accommodated. This training course was amended to provide students with an even more basic understanding of the concepts, as many students in the first two groups indicated that they had found the content challenging and overwhelming. Some of the activities and workshops were therefore reduced. This training commenced on 19 April 2022, with the final assessment project due on 23 May 2022.

Positive feedback was received from the delegates:

"I loved the online workshops, and the presenters made it extremely fun and interesting. I'm learning a lot, and I love learning and broadening my knowledge and way of thinking."

"I enjoyed the course and thank you for accepting me to take it … I had to read a lot to understand because I had never studied business before, but now I know much more."

"Thank you to the training teachers for making it easy to understand and learn, and thank you, Unicef!"

"It was challenging to manage all my responsibilities while doing this programme. Luckily Dr Dawie taught me how to manage my time and Dr Muriel taught me how to give my best. The presenters motivated me to work harder."

"COVID-19 made it difficult because everything was online, but I still liked the course a lot because I could work at my own pace. A live workshop would be great, but online is also good!"

"My knowledge of starting a business is now much better and I like the examples and videos that taught me things by explaining them in the way one would do them in the real world. Please let me know when there is more training from the University of Pretoria."

"The lecturers were very accommodating and helped me gain confidence, plus they showed me how I can use the internet for research and to find information."

Reflecting on the conclusion of the online entrepreneurship development training in Polokwane, it became clear that there was a dire need for more training in terms of the level of understanding and commitment of the students regarding start-up management and entrepreneurship. In essence, the content that was covered in the course either had to be less time-consuming for delegates (a very basic introductory course) or more in-depth (an advanced course, building on the intellectual capacity and practical expansion ideation of delegates). It was disappointing that not all the individuals who were interested in attending the course could be accommodated and awarded training opportunities.

The training that was presented consisted of a combination of easily understandable aspects, alongside more complex aspects within the fields of start-up management and entrepreneurship. Some delegates needed to first acquire the foundational background in these fields, while others were either looking to enhance their current understanding or expand on more complex, in-depth practical knowledge applications.

As this phase of the partnership focused on historically disadvantaged institutions, it was evident that some of the delegates from the targeted partner university (the University of Limpopo) did not grasp some of the concepts on which the training was based. This indicated that a very basic foundational understanding first had to be established. There were instances where the delegates first had to consult with the course presenters to make sense of basic concepts related to start-up management and entrepreneurship before they could submit their work for assessment. Although time-consuming, these consultation sessions enabled the facilitators to realise that certain terms, concepts and ideas were on a much higher level of understanding than initially anticipated. However, these consultation sessions were dealt with on an individual basis, and enabled the delegates to continue with the training and stay motivated.

On the other hand, however, some delegates were further along their entrepreneurial journeys, and required more advanced assistance regarding human resources management, leadership, marketing, communication, ethics, finances, networking and digitalisation. These cases were also dealt with on an individual basis.

Some of the delegates relaunched their business ventures to incorporate their newfound insights into entrepreneurship and general business management. These delegates could, in future, be utilised as role models, motivators and mentors, who could assist delegates who might be struggling to understand the relevance of certain concepts or practical applications of entrepreneurship.

Support for female doctoral candidates

Three PhD bursaries were established to support female doctoral candidates that qualified based on certain criteria. These were individuals who were completing their PhD in the Department of Business Management, and who had already successfully completed the first year of their doctoral studies. These bursaries were designed to enable the candidates to complete their research proposals. At the stage of awarding the bursaries, they had to be busy with their research methodology.

During the evaluation of the bursary applications, it was noted that, although there were criteria in terms of applying for the bursaries, many of the students who submitted applications did not meet the requirements. This highlights the fact that there is a general need among PhD candidates in terms of support and mentorship that is not currently being met. Dr Bornman proposed the development and implementation of a training course or mentorship programme for PhD candidates. This could also serve to ensure that students who are registered for their PhD studies, or who receive a bursary for their PhD, remain on course by means of guidance throughout their studies. This could also ensure their future employability.

ACKNOWLEDGEMENT

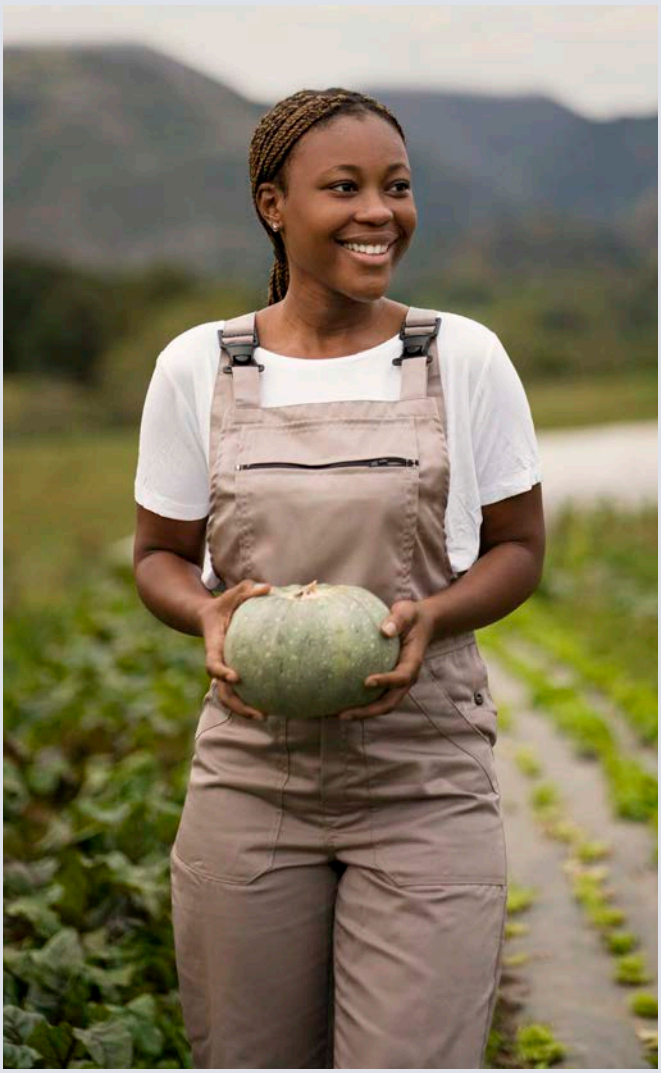
The cluster members would like to thank all the role players from Unicef, Future Africa, the University of Pretoria, the University of Limpopo and Enterprises UP for their continued support, encouragement, advice and guidance in making this project a success.

"We feel strongly about the impact this project has made and trust that its further expansion will enrich the youth and general economic landscape of our country." Prof Antonites concluded that "for future projects, we will have to link the practical training courses with research to increase the visibility of this initiative beyond just practical implementation." In this way, the key stakeholders can gain wider exposure in terms of academia.

THEME 2

FOOD AND NUTRITION JOB OPPORTUNITIES, AND AGRICULTURE ENTERPRISES SKILLS TRAINING

IN PARTNERSHIP WITH UNICEF AND FUTURE AFRICA, THE FORESTRY AND AGRICULTURAL BIOTECHNOLOGY INSTITUTE (FABI) OF THE UNIVERSITY OF PRETORIA (UP), THROUGH THE INNOVATION AFRICA @UP PLATFORM, UNDERTOOK THE ADVANCEMENT OF FOOD SECURITY AND FARMER ECONOMIC DEVELOPMENT THROUGH TAILOR-MADE, RELEVANT DIGITAL DIAGNOSTIC SUPPORT TOOLS.



INNOVATION AFRICA @UP

Innovation Africa @UP is a research investment platform at the University of Pretoria that hosts and develops government-industry-university research entities to address national and pan-African needs for sustainable development and economic growth. FABI, the University's Engineering 4.0 facility and Future Africa, together with various other research programmes and facilities at UP, provide a powerful foundation for this platform.

FORESTRY AND AGRICULTURAL BIOTECHNOLOGY INSTITUTE

FABI is a postgraduate research institute in the University of Pretoria's Faculty of Natural and Agricultural Sciences. It was established in 1997 based on the recognition that the future of forestry and agriculture in South Africa will strongly depend on the incorporation of new and emerging technologies into these industries. Major opportunities for these industries have emerged in recent times, including biotechnology and bioinformatics applications.

FABI is an anchor institute within the Innovation Africa @UP platform. The institute's flagship research groups include the Department of Science and Innovation (DSI)-National Research Foundation (NRF) Centre of Excellence in Plant Health Biotechnology (CPHB) and the Tree Protection Cooperative Programme (TPCP).

An important resource for commercial and small-scale farmers is the FABI Diagnostic Clinic. This is where the information obtained from using a plant health digital tool is interpreted to improve food security and support small-scale farmers in rural areas.

CENTRE OF EXCELLENCE IN PLANT HEALTH BIOTECHNOLOGY

The CPHB promotes the health of plants and trees. Research conducted under the auspices of this centre addresses some of the burning national challenges, particularly in terms of food security, the sustainable use of natural resources, and economic growth, while building human capacity in these important areas. The centre utilises world-class scientific research and biotechnology to promote the long-term health and sustainable use of socio-economically important plants, including trees, and facilitate inclusive postgraduate education.

In doing so, it contributes to the protection of food and plant resources in South Africa (and Africa to some extent), as well as developing human capacity in this important field.

FABI DIAGNOSTIC CLINIC

The FABI Diagnostic Clinic provides a free disease diagnostic service to its members and partners. In this way, plant diseases and pest problems can be readily identified, and solutions to these problems sought. Information accumulated through this service is added to the FABI database on diseases and ensures a long-term record of trends associated with pest and pathogen outbreaks. In addition, selected isolates and specimens of important disease agents are stored using state-of-the-art technologies. These cultures and specimens are a critical resource for plant health research in the country.

THE TEAM

The team behind the Unicef-funded initiative to empower the youth with food and nutrition job opportunities, and agriculture enterprises skills training, was led by Prof Bernard Slippers and Dr Osmond Mlonyeni of FABI.

Prof Bernard Slippers

Prof Slippers is the Founding Director of Future Africa and the Innovation Africa @UP initiative. He is the Director of FABI and the Tree Protection Cooperative Programme at the University of Pretoria. He is a professor in the Department of Biochemistry, Genetics and Microbiology. His research focus is on the ecology, evolution and management of insects and fungi that affect tree health. He uses genetic, genomic and chemical tools to characterise patterns of diversity and the global spread of invasive tree pests and pathogens, as well as their population dynamics, communication systems, mating strategies and community structures.

Dr Osmond Mlonyeni

Dr Mlonyeni is project manager of the Innovation Africa @UP initiative. He was formerly responsible for partnerships and programmes for innovation at Future Africa. He is in possession of a PhD in Genetics and was a Postdoctoral Fellow at FABI. During this period, his research formed part of a broader project to understand diversity in the Sirex-Amylostereum-Deladenus symbioses. This system serves as a model to understand the potential role of diversity in invasive pests and biological control systems.

EMPOWERING THE YOUTH WITH FOOD AND NUTRITION JOB OPPORTUNITIES, AND AGRICULTURE ENTERPRISES SKILLS TRAINING

In rural South Africa, agricultural commodities from farmers are still disproportionately influenced by traditional or informal agricultural farming methods. The crops of small-scale farmers are particularly vulnerable to plant pests and diseases, which result in significant yield losses. Limited specialist support exists to help reduce yield losses caused by pests and pathogens.

The FABI team engaged with industry, business and the non-governmental organisation (NGO) sector to provide specialist agricultural support and training to these farmers and various agriculture-based stakeholders. It also established these farmers' competence to identify plant diseases through the use of digital tools. This support ranged from providing exposure, knowledge and training on pest and pathogen diagnostics, to surveillance and access to information and communication technology (ICT) tools.

Through FABI's research partners in industry, small-scale farmers and extension officers were included in the training that was developed to use a diagnostic tool to enhance food security and increase the productivity and competitiveness of South Africa's small-scale farmers. These research partners, which included Grain SA, Cropwatch Africa and Social Coding SA, played an important role in bringing digital technology to small-scale grain farmers across South Africa. "We hoped to drive plant health management technology use and adoption in the forestry and agriculture industry that is inclusive and underpinned by high-quality specialist research support," said Dr Osmond Mlonyeni, project manager.

The downstream benefit of this project was that it would enable small-scale farmers and their associated networks to collect informative data that can be used to develop sustainable agricultural businesses, improve yield and catalyse advanced training and impact-focused research. At the same time, the information that was obtained could be added to the FABI database, thereby benefitting both commercial and small-scale farmers by identifying trends associated with pest and pathogen outbreaks.

This project's benefits included, but were not limited to the following:

- The improvement of datasets for the development of pre-diagnosis tools through artificial intelligence
- The surveillance of plant pests and diseases, and the strengthening of national biosecurity systems
- Disease identification using photo imagery and machine learning.

The overall aim of this intervention was to develop stakeholder competence in the use of plant health digital tools. The broader focus was the empowerment of the youth and women in various aspects of the project.

Project activities

One of the main focal points of this project's activities was to develop a locally relevant online platform and plant health application (app) interface linked to FABI's Diagnostic Clinic. This would provide diverse stakeholders access to specialist research support to address plant health challenges by leveraging transdisciplinary research-society-industry networks.

The project included extensive stakeholder collaboration with FABI's research partners, the small-scale farmers in Grain SA's database, which included the farming community in Elukwatini, Mpumalanga that also served as a pilot study. The farmers in the Elukwatini community were provided with transdisciplinary training on the use of the online platform, and on plant health. This was aimed at ensuring ongoing collaboration.

An introductory meeting with the farmers took place on 24 March 2021. The purpose was to introduce the project and conduct a survey to ascertain the basic knowledge of plant health management, assess the needs, how crop diseases are managed, determine access and inclination to technology, as well as the necessary logistic support required to connect to FABI's Diagnostic Clinic. To ensure that the digital tools being developed were useful and accessible, a training workshop was conducted with the farmers.

A constructive outcome from the Elukwatini workshop was the suggestion to include government extension officers in the use of the tool. This would increase its effectiveness, as well as its ability to be scaled up. It would also give the digital tool a wider reach, and facilitate collaboration with government stakeholders.

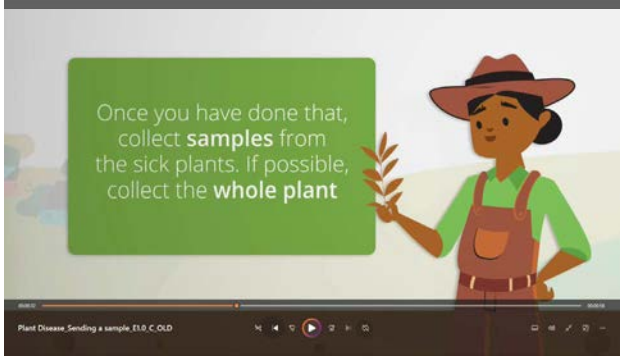
Online platform and app interface development
The results of the survey with the Elukwatini farmers provided insights that would guide the planned in-person training of small-scale farmers and extension officers in the use of plant health digital tools. This also contributed to refining the development of the Plant Health Diagnostic Clinic App and its subsequent training material.

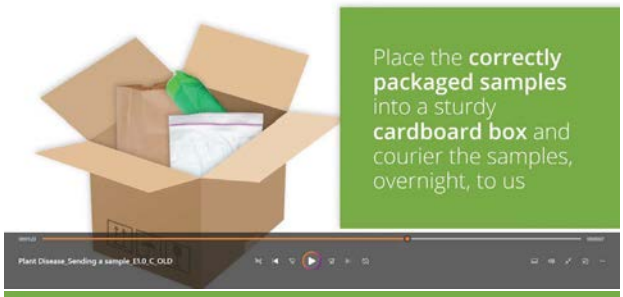
According to Dr Mlonyeni, the successful development and roll-out of the app depended on a couple of things. “First of all, we need to get the tool right. To do so we needed to engage in co-creation with the users of the app. Finally, we needed to determine the minimum viable technology that would be required for the app’s effective implementation.”

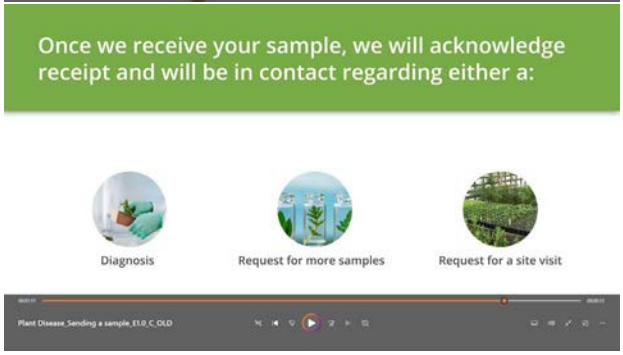
To test the app, small-scale farmers and extension officers in Elukwatini put it to use to identify any faults, and whether any adaptations were required. The developers also needed to determine whether the app was inclusive and user-friendly for people of wide-ranging literacy levels and limited plant health knowledge. Options were explored to incorporate capabilities that would minimise language as a barrier. A second survey was conducted after the testing of the app. The feedback was utilised to bring about improvements to the app that would assist when a wide-scale roll-out is undertaken.

The digital infrastructure that was developed to support the app included certain functionalities, such as being desktop- and mobile-friendly, and containing user management systems that could improve data capture through geolocation and the accurate capturing of symptoms and images. It also included industry-specific and organisation-focused features that would ensure the security of information. It furthermore contained features such as database management, database uploading and sharing ability, and database storage capabilities. Additional features are being developed on an ongoing basis for incorporation into a following iteration of the tool.

According to Jerry Mthomobothi, provincial development coordinator of Grain SA, “this initiative will help our farmers a lot because they will be in a position to know what problems their crops have, why they have those problems, the extent of the damage, and what the remedy will be when they get the results back.” He believes that if farmers can find solutions to crop problems early enough, they will be able to increase their yields and produce products of a good quality.







Stakeholder engagement

Extensive stakeholder engagement, including engagement with the Elukwatini farmers, formed an important part of the project. According to Dr Mlonyeni, the most important insight from the engagement with the pilot community was the realisation that co-creation with small-scale farmers is essential to develop relevant technology-inspired solutions to meet their needs. "We were able to incorporate the information gained through the interactions with the farmers, as well as the results of the survey, to develop a training programme on plant health digital tools that would capacitate small-scale farmers and extension officers across the country."

A positive outcome of the stakeholder engagement was the knowledge that small-scale farmers have access to technology devices like smartphones and computers, the internet, email and WhatsApp. They also have a fair understanding of how to use these technologies – all of which are important factors in the use of the Plant Health Diagnostic Clinic App. "On the whole, the farmers' response was very positive," said Dr Mlonyeni. "There was scope to improve their understanding of plant health management, and they displayed an openness to use technology."

This fact-finding mission enabled the team to recognise a need to provide quality training for optimum technology adoption. Network connectivity was also recognised as a challenge. The subsequent training workshop for the small-scale farmers was initiated in June 2021. "In addition to improving their computer skills, we also provided them with knowledge and training on pest and pathogen diagnostics," said Dr Mlonyeni.

The farmers were shown how to use ICT tools, particularly those that were necessary for the use of the app. "This included showing them how to use the Plant Health Diagnostic Clinic App, from registering users to tracking samples and accessing a final diagnostic report." The training contained practical illustrations on how to identify sick plants, collect samples and package them to be couriered to FABI for diagnosis.

Collecting a large database of information is essential for future research into pests and pathogens found in agricultural lands. Data from other agricultural surveillance tools, such as that of Cropwatch Africa, can also be included. Such evidence-based data is important to support policy development in the national sphere of government. Sufficient data can also build the capacity of artificial intelligence prediction and machine learning, which will further enhance the tool.

By analysing the results that are added to the Diagnostic Clinic's database through the use of the app, the project team will be able to perform post-training analysis. In the further roll-out of the tool, FABI's collaboration with its research partners will be expanded to provide specialist plant health services and training to small-scale farmers across the entire country.

The development of training material

Following the development of the app, the project team developed a training programme on the use of plant health digital tools to capacitate small-scale farmers and extension officers across the country. It incorporated the information gained from the interactions with the farmers, as well as the results of the surveys conducted before and after the testing of the app by the pilot community.

The feedback of the pilot community revealed information that could be used to improve training on the tool. The project team realised that it was vital to communicate the use of the tool and its importance in different South African languages if the technology was to be widely adopted.

A set of three plant health infographics was developed to help decode plant health diagnostics for the target audience:

- Why is plant health important?
- Why are my plants sick?
- Send a sample to the FABI Diagnostic Clinic

These infographics were translated into four South African languages to ensure a wider reach: isiXhosa, isiZulu, Setswana and Afrikaans. Together with the original English version, the infographics were therefore available in five South African languages, and could form part of the training material that was being developed.

For even better engagement, videographics of the infographics were developed in the aforementioned South African languages. This material would be used for the proposed wide-scale training and to build awareness of the Plant Health Diagnostic Clinic App. Primarily, this material is distributed to FABI's research partners, which includes different agriculture and forestry stakeholders.

This information dissemination campaign had various spin-offs. An article that was published on the University's website led to wide exposure on various social media platforms. An audience of more than 8 000 was reached with this publicity. Wider exposure took the form of a presentation at the Galien Africa Forum, as well as at the science communication workshop and panel discussion that formed part of the Unicef-Future Africa partnership.

The impact of COVID-19

With the advent of the COVID-19 pandemic, the project team had to be agile and adapt its initial plans for in-person training workshops. These workshops for small-scale farmers had initially been planned to address challenges in African agriculture, and to introduce farmers to the app and its benefits to improve their productivity by being able to identify plant diseases. For health and safety reasons, however, the initial workshop was cancelled, and other means of communicating the message were conceived.

The infographics that had been developed for the training were animated and converted into videographics that could be shared via low-bandwidth digital platforms. Story boards were developed for each of the videographics in the five different South African languages. Finally, social media platforms were utilised to share the purpose of the plant health digital tools.

The critical message that needed to be communicated was that plant health management is critical, that technology use and adoption can be inclusive and can be an enabler, and that FABI provides high-quality specialist research support related to plant health.

Participation in an internship programme

The FABI Centre of Excellence in Plant Health Biotechnology internship programme also participated in this project. The eight interns (seven female and one male) conceptualised, developed the content and outline of the plant health infographics and some also provided voice-overs for the videographics.

Scaling of the tool

FABI rolled out the Plant Health Diagnostic Clinic App in the Eastern Cape in August 2022. This entailed introducing it to extension officers in the province, as well as to senior scientific agricultural advisors. For the training workshop at the Döhne Agricultural Development Institute in Stutterheim, these officers came from the five regions of the province. For Ukhanyo Farmer Development, which services approximately 2 600 farmers, the training workshop of the extension officers was done in Mthatha. By using the app, this farming community will have a valuable tool that helps to identify plant diseases to aid productivity and yield improvement.

Explaining the use of the tool, Dr Mlonyeni says that the value proposition of the Diagnostic Clinic is that it provides research-based knowledge that will contribute to bio-security measures that the farmer can take. Farmers also have immediate access to the results of the diagnosis.

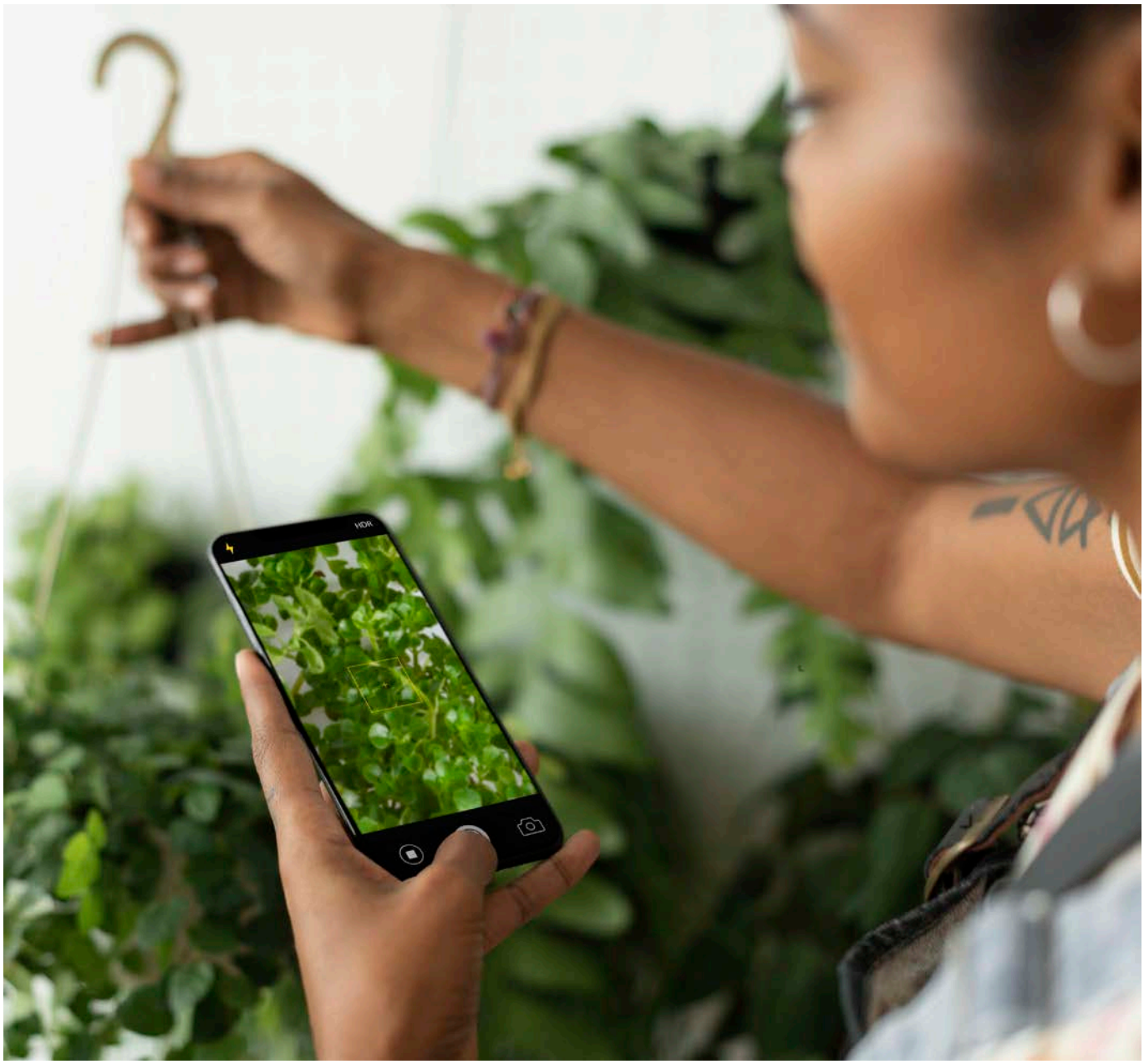
Dr Mlonyeni further explains that the information obtained through the use of the tool will provide FABI's partners with new knowledge of pathogens that have not yet been identified or are not known to occur in a particular region. "Organisations get quality, first-hand information that is well researched and is characterised by academic rigour."

Discussing the selection of the Eastern Cape for the first roll-out of the tool, Dr Mlonyeni says that this is the region in the country with great potential, as it enables community engagement, it is a vast area, many farmers are located in remote areas where digital connectivity is sometimes a problem, and production capacity holds much promise. "For the tool's adoption to be effective, it needs to be of ongoing practical use, and not a once-off application," he says. The further roll-out of the tool will be determined by examining which regions will benefit most from its use, and where the utilisation of the app will be most effective.

Dr Mlonyeni emphasises the need to continuously engage with the same community and with the Department of Agriculture, Land Reform and Rural Development to improve the digital tool and its results. “We will also engage with the other provinces.” A step-wise strategic engagement such as this will build upon what is already in place, and what can be further developed to achieve skills development that can lead to food and nutrition job opportunities in the agricultural sector.

OUTLOOK

Reflecting on the project’s outcomes, Prof Bernard Slippers, team leader, remarked that the partnership with Unicef has given momentum and leverage to UP’s reimagined social contract with society, empowering both students and the farming community. “Investment in research excellence is the catalyst that drives innovation for societal impact,” he concluded.



THEME 3
ONE HEALTH FOR CHANGE

COVID-19 HAS STIMULATED MODERN SOCIETIES TO RAPIDLY ADOPT MEASURES TO SAVE LIVES, PROTECT LIVELIHOODS AND SAFEGUARD NATURE TO REDUCE THE RISK OF FUTURE PANDEMICS. THE BIGGEST CHALLENGE IN THIS REGARD IS TO BALANCE THE SENSE OF URGENCY WITH LONG-TERM SOLUTIONS TO PREPARE SOCIETY FOR FUTURE CRISES. SUCH CRISES INCLUDE, BUT ARE NOT LIMITED TO, VIRAL AND OTHER ZOONOTIC AND INFECTIOUS DISEASES, THE ENVIRONMENT, CLIMATE CHANGE, ECONOMICS, ANTHROPOLOGY, VETERINARY SCIENCE, ENTOMOLOGY, ENGINEERING, MATHEMATICAL MODELLING, LAW, ECOSYSTEM HEALTH, HEALTH SYSTEMS AND PUBLIC HEALTH, ANIMAL BIOLOGY, PLANT HEALTH, FOOD SECURITY AND NUTRITION, AND GEOGRAPHY, GEOINFORMATICS AND METEOROLOGY.

As part of the Youth Empowerment and Health/Economic Responses to COVID-19 (YEaH) programme, the One Health for Change cluster established a University of Pretoria (UP) One Health workforce. Several transdisciplinary short-term research projects were awarded to academics in the University's One Health for Change network. These projects were utilised as mentorship opportunities to strengthen the capacity of young scientists, and to engage with local communities on topics related to One Health.

Following the success of these short-term research projects in building the capacity of young academics, the topics were re-evaluated for their potential to be upscaled to focus on empowering women scientists and historically disadvantaged institutions in the second phase of the partnership, particularly for encouraging transdisciplinary research. The mentorship that was initiated in the first phase was thus continued during the subsequent phase of the programme.

ONE HEALTH

One Health is a collaborative, multisectoral, transdisciplinary approach, working at the local, regional, national and global levels, with the goal of achieving optimal health outcomes. It recognises the interconnection between people, animals, plants and their shared environment, while addressing the collective need for clean water, energy and air, and safe and nutritious food, taking action on climate, and contributing to sustainable development.

UP ONE HEALTH FOR CHANGE

The University of Pretoria is exceptionally well positioned to make a difference to society through a transdisciplinary One Health approach. Such an approach focuses on the interfaces between humans, animals and their various environments to prepare for the next pandemic. It involves various faculties and departments, including several disciplines: virology, zoonotic and infectious diseases, the environment (water), climate change, economics, anthropology, veterinary science, entomology, engineering, mathematical modelling, law (human rights), ecosystem health, health systems and public health, animal biology, plant health, food security and nutrition, and geography, geoinformatics and meteorology.

Understanding the complex connections between the natural environment, animals and people requires a transdisciplinary One Health approach. Collaboration between multiple stakeholders from a research background and community-based organisations is a key aspect of One Health research.

PARTICIPATING RESEARCH ENTITIES

The following research entities at UP participate in the activities of the UP One Health Workforce, One Health for Change:

Centre for Viral Zoonoses

This is a research centre of excellence in viral zoonotic diseases in South Africa and the broader African continent, together with global partners. It combines the research strengths of established research groups in, among others, the Faculty of Health Sciences, the Faculty of Natural and Agricultural Sciences, and the Faculty of Veterinary Science. This includes research groups working in the disciplines of arbovirology, viral zoonotic diseases associated with bats and other small mammals, rabies and rabies-related lyssaviruses, wildlife ecology, viral pathology, medical entomology and ecology.

www.up.ac.za/centre-for-viral-zoonoses/

Institute for Cellular and Molecular Medicine

This institute engages in transdisciplinary, translational research and innovation pertaining to the communicable and non-communicable disease burden in South Africa, the genetics of disease, cellular and molecular therapy products, the generation of intellectual property with the potential to be commercialised (bio-entrepreneurship), and the legislation and regulation of advanced therapies.

www.up.ac.za/institute-for-cellular-and-molecular-medicine

Institute for Sustainable Malaria Control

This institute is pioneering transdisciplinary research on innovative, safer and more sustainable malaria control methods. Research is done in three clusters. The Parasite Control Cluster studies the biology of the malaria parasite and the discovery of biochemical mechanisms that can be used to block transmission. The Vector Control Cluster studies safer physical methods of mosquito control and integrated vector management. The Human Health Cluster studies human and environmental health, especially the potential health effects associated with currently used insecticides for malaria vector control.

www.up.ac.za/up-institute-for-sustainable-malaria-control

ARUA Centre of Excellence in Sustainable Food Systems

This centre aims to create an engaging global network of talented researchers through which it can harness partnerships in research and innovation to drive agricultural and food system transformation to ensure sustainable food security and nutrition in Africa. Its aim is not to duplicate efforts that endeavour to find solutions to the food security and nutritional challenges in Africa, but to create a critical mass of talented researchers who can work synergistically to maximise complementarity.

www.up.ac.za/arua-centre-of-excellence-in-sustainable-food-systems

Community-orientated Primary Care Unit

This unit is located in the Department of Family Medicine and aims to explore and innovate the practices and processes of information and communication technology (ICT)-enabled community-orientated primary care. Its research activities focus on innovative and sustainable contributions to re-engineer primary health care so as to change health outcomes for ordinary people in a meaningful way, and to significantly contribute to health care capacity development.

www.up.ac.za/up-copc-research-unit

Environmental Chemical Pollution and Health Research Unit

This unit is a partnership between the School of Health Systems and Public Health, and Andrology in the School of Medicine's Department of Urology within the Faculty of Health Sciences. Its main focus is on the impact of endocrine-disrupting chemicals on the environment, and on human and animal health in both rural and urban areas.

www.up.ac.za/environmental-chemical-pollution-and-health-research-unit

THE ONE HEALTH PROJECT TEAM

The Unicef-funded initiative to empower the youth to deal with the health challenges associated with COVID-19, and to empower women and historically disadvantaged institutions through a One Health approach was led by Prof Wanda Markotter, Prof Tiaan de Jager and Prof Stephanie Burton.

Project leaders

Prof Wanda Markotter
Prof Markotter is Research Chair at Future Africa for People, Health and Places (One Health). She is also Director of the Centre for Viral Zoonoses in the Faculty of Health Sciences, and the Department of Science and Innovation (DSI)-National Research Foundation (NRF) South African Research Chair in Animal Infectious Diseases (Zoonoses). She has vast experience in One Health as a virologist focusing on interdisciplinary research into the disease ecology of zoonotic pathogens in bats.

Prof Tiaan de Jager
Prof De Jager is Dean of the Faculty of Health Sciences. He is also Director of the UP Institute for Sustainable Malaria Control, and a professor in Environmental Health in the School of Health Systems and Public Health. His primary research focus is on male reproductive health, specifically related to environmental health and toxicology, including epigenetics. He is keenly involved in public health and water quality research, with a special interest in malaria.

Prof Stephanie Burton
Prof Burton is a former Vice-Principal: Research and Postgraduate Education at UP and a professor at Future Africa. She is an internationally acclaimed researcher, who has been a B-rated scientist with the NRF in the discipline of Biochemistry. She is involved in several leadership roles in higher education, including as Vice-President of the Academy of Science of South Africa (ASSAf). She was instrumental in setting up the African Research Universities Alliance (ARUA), a network of 16 leading African universities.

Principal investigators of short-term research projects

Several research projects were initiated as part of the One Health for Change cluster. These were led by researchers from the Faculty of Health Sciences (Prof Janet Mans, Dr Ellenore Meyer, Dr Michelle Janse van Rensburg, Helga Lister and Dr Sean Patrick), the Faculty of Natural and Agricultural Sciences (Dr Bernard Coetzee, Prof Lise Korsten and Prof Hettie Schönfeldt) and the Faculty of Veterinary Science (Prof Henriette van Heerden, Dr Musafiri Karama and Dr Chris Marufu), with involvement of several other faculties and external collaborators.

ONEHEALTH

Dr Bernard Coetzee

Dr Coetzee is a global change researcher who focuses on how humans are altering the natural environment, how that changes biodiversity, and what that means for our wellbeing. He has a conservation science and policy background, particularly in applying systematic conservation planning, with a special interest in birds, climate change, biogeography and landscape conservation. He obtained his undergraduate, honours and master's degrees in Zoology from the University of Pretoria, and completed his PhD at the University of Stellenbosch.

Dr Michelle Janse van Rensburg

Dr Janse van Rensburg is an occupational therapist with a master's degree in Public Health, a PhD in Family Medicine and a postgraduate diploma in Health Professions Education and Leadership. She is a senior researcher at the Community-oriented Primary Care (COPC) Research Unit and is involved in the training of community health workers, understanding the functioning of substance users in a harm-reduction programme, and developing pathways out of homelessness in the inner city of Tshwane. She is committed to working with people who use drugs and those who are homeless as they share their stories as actions for advocacy, creating awareness and overcoming stigma.

Dr Musafiri Karama

Dr Karama is a veterinarian with a specialisation in veterinary public health. He obtained his PhD in Veterinary Microbiology from the University of Guelph in Ontario, Canada. For the last 25 years, he has been lecturing in veterinary public health and infectious diseases at various universities in South Africa, the USA and the Caribbean. His research interests are the molecular epidemiology of foodborne pathogens and their bacteriophages along the food chain, with particular emphasis on Shiga toxin-producing *Escherichia coli* isolates recovered from animals and humans.

Prof Lise Korsten

Prof Korsten is a co-director of the DSI-NRF Centre of Excellence (CoE) in Food Security. She is responsible for the Food Safety Programme and interacts with other researchers in various institutes. She is an editor of the journal *Food Security* (Springer) and Chair of the International Society for Plant Pathology Task Force on Global Food Security. She has addressed Parliament on food safety control and has developed a national framework for government to develop a food control authority. She is active within the broader One Health initiative, focusing specifically on plant health and food safety.

Helga Lister

Lister coordinates the Occupational Therapy Service-learning Community Fieldwork module, as well as various community engagement activities in the Department of Occupational Therapy. She was awarded the School of Health Care Sciences Community Engagement merit award in 2020. She strives towards sustainable interprofessional and interdisciplinary community-engaged teaching, learning and research, together with community members as equal stakeholders in the partnership. She recently completed her PhD in food security among disabled, HIV-positive women.

Prof Janet Mans

Prof Mans is an associate professor in the Department of Medical Virology, and co-leads the Enteric Virus and Environmental Virology Research Group. She has a master's degree in Biochemistry from the University of Pretoria. She joined the Immunology Laboratory of the National Institute of Allergy and Infectious Diseases in the USA as a predoctoral fellow in 2004 and obtained her PhD from the University of the Witwatersrand in 2008. She established norovirus research at UP and her research combines norovirus surveillance in the clinical setting and the environment to understand the molecular epidemiology and diversity of these viruses in South Africa. Since the COVID-19 pandemic, she has been involved in the environmental surveillance of SARS-CoV-2.

Dr Chris Marufu

Dr Marufu is a veterinary parasitologist who obtained his BVSc degree from the University of Zimbabwe in 2006, an MSc degree *cum laude* from the University of Fort Hare in 2009 and a PhD from the University of KwaZulu-Natal in 2014. He was appointed as a senior lecturer in Veterinary Parasitology at the University of Pretoria in 2019. His research focuses on sustainable solutions to animal health challenges caused by parasites in different animal production systems, thus improving food security. He has a Y2 rating from the NRF, and is a highly cited researcher with a Scopus h-index of 11.

Dr Ellenore Meyer

Dr Meyer is a medical doctor and health manager with a PhD in holistic health and integrating spiritual care into patients' management, a master's degree in bio-ethics and health law, and a diploma in health systems management and executive leadership. She is a social justice ambassador with over 10 years' experience in health and social development. She manages interdisciplinary community development and health service delivery in informal settlements at the University of Pretoria's Community-oriented Primary Care Research Unit.

Dr Sean Patrick

Dr Patrick is a senior lecturer in the School of Health Systems and Public Health and a scientist in the Environmental Chemical Pollution and Health (ECPH) Research Unit. He is also a member of the UP Institute for Sustainable Malaria Control. His PhD research focused on the effects of in-utero, lactational and direct exposure to selected endocrine-disrupting chemicals. Since transdisciplinary approaches are required to deal with complex environmental-social issues that have an influence on existing and emerging diseases, his work focuses on SDG 3 (targets 3.3 and 3.9), SDG 4 (using education as a tool to promote healthy lifestyle and reduce harmful exposures through community interventions) and SDG 6 (target 6.2).

Prof Hettie Schönfeldt

Prof Schönfeldt is co-director of the African Research Universities Alliance (ARUA) Centre of Excellence for Sustainable Food Systems, led by the University of Pretoria. She is a B-rated scientist and South African Research Chairs Initiative (SARChI) Chair in Nutrition and Food Security. She serves as scientific advisor on the Task Force of AfroFoods, an African network that forms part of the International Network of Food Data Systems (INFOODS). She was chief rapporteur of the Food and Agriculture Organisation (FAO)/World Health Organisation (WHO) Expert Consultation on Protein Requirements for Human Health.

Prof Henriette van Heerden

Prof Van Heerden obtained her PhD at the University of Pretoria, after which she joined the Onderstepoort Veterinary Institute and worked on the Heartwater Programme. This programme completed the sequencing of the entire 1.51 Mb genome of *Ehrlichia ruminantium*. She started her academic career in the Department of Biochemistry at the University of Johannesburg in 2003. She joined the Department of Veterinary Tropical Diseases in 2008. Her research projects aim to improve the understanding, detection and control of brucellosis and anthrax in wildlife and livestock.

EMPOWERING YOUTH TO RESPOND TO THE COVID-19 PANDEMIC

The overarching long-term objective of UP's One Health for Change Workforce in the first phase of the Future Africa-Unicef partnership was to bring together various research teams at the University of Pretoria across disciplines and in multiple countries who are involved in relevant science activities that can be connected to address complex COVID-19 research questions in the short term, but with broader applications over a longer term.

The programme's short-term objectives were focused around UP's strengths and existing initiatives, linking these with existing national, regional and international initiatives. These objectives were met through the implementation of several activities.

Linking the UP One Health Workforce with relevant networks

An online cluster workshop was held in which researchers from UP discussed the programme's proposed activities, involvement and actions. A UP database of expertise and projects in One Health was created with information on 250 individuals representing South Africa, other African countries and international partners. It included representation from government and higher education institutions.

Existing networks with which the One Health for Change could collaborate included the Africa One Health University Network (AFROHUN), the South African One Health Forum, the Africa One Health Network (AFOHNET) and the United States Agency for International Development (USAID)'s Next Generation One Health Workforce (OHW-NG).

Development of a web-based UP One Health online platform

A dedicated website was developed for the UP One Health for Change (UP-OHC) research focus area. As a platform for disseminating information and educational material about the One Health approach, it provided the opportunity for interested individuals and organisations to join the network, while giving members of the network the chance to connect with potential collaborators on multidisciplinary research, share community outreach efforts linked to One Health projects, and gain access to skills development and training.

The platform served as an important source of educational material for outreach purposes. Information fact sheets were developed on Rift Valley Fever, anthrax, bovine tuberculosis, brucellosis, cysticercosis, leptospirosis and rabies. This material was later translated into isiXhosa and Sepedi to raise awareness of zoonotic and infectious diseases in rural communities. This was disseminated to at least 5 000 community members.

This education material was also used during community outreach events that took place to promote One Health awareness with a focus on COVID-19. This included an essay competition for school learners on the impacts of COVID-19 in their daily lives. At least 20 UP students were mentored to participate in these outreach activities, together with 30 postgraduate students and 30 staff members. These activities included the following:

- A visit to Kgadimo High School in the village of Ga-Mafefe in Limpopo by members of the One Health network on 10 November 2020.
- The presentation of a talk to members of the Zoo Club, a youth eco-club based in Pretoria, by Tedson Nkoana, one of the network's researchers, at the National Zoological Gardens in Pretoria on 28 November 2020, and the distribution of posters to club members to raise awareness about the spread of infectious diseases.
- The presentation of an Africa Vaccination Week event at Ikusasa Comprehensive School in Tembisa, Ekurhuleni, by mentees and students in the Centre for Viral Zoonoses on 22 April 2021 to create awareness of infectious diseases and the value of immunisation.
- The presentation of two education events by staff and students of the Centre for Viral Zoonoses at Letloltlo Secondary School in Mabopane on 14 May 2021, and Soshanguve Secondary School on 22 May 2021 to raise awareness of bats, and how to live safely with this small mammal.

Public awareness of the cluster's activities was achieved through social media, as well as the preparation of the following news articles published on the One Health for Change website:

- "Zoonotic diseases and the value of natural history voucher specimens and collaborative research"
- "Promoting people-centred engagement through story-telling"
- "Africa Vaccination Week: UP One Health for Change creates awareness about vaccine importance"

Another awareness-raising activity was the production of a video to promote malaria awareness. It featured Dr Megan Riddin of the Institute for Sustainable Malaria Control, who answered questions on this life-threatening disease to foster a better understanding of its prevalence and control. This was published on the One Health for Change website to coincide with Malaria Day, which takes place on 25 April each year.

Supporting multidisciplinary short-term research projects

Several small research projects were initiated as part of the Future Africa-Unicef partnership. The goal was to develop capacity by empowering future academics through a transdisciplinary approach that encompasses the disciplines and skills needed to build knowledge that matters to society and decision makers. In addition, a seedbed of preliminary data and actions was developed that could lead to new projects in the future. These projects included collaborative and inclusive research across various disciplines that addressed community needs. They were short-term mentorship-driven projects that specifically developed human resource capacity in transdisciplinary One Health research within and beyond UP, and included national, regional and international collaborations.

Projects addressed challenges and risks in society, including human health systems, zoonotic disease, food security, education and socio-economic problems. The UP One Health Workforce that had been established will in future create links with other national, regional and international networks. The focus was on societies or communities. In addition to outreach activities to schools, the general public and professionals, the UP-OHC network members were involved in "research that matters". Its aim was to develop sustainable solutions and mitigation strategies that would prove to be practical for the southern African region and beyond.

Based on exploratory research that had been conducted, research proposals were invited for topics that would address the elements of a One Health approach. The criteria for the acceptance of a project for the first phase of the Future Africa-Unicef programme were that they should include young scientists; they should be transdisciplinary; and they should include a community outreach element.

Thirteen projects were awarded in the first phase of the project. This included the participation of 75 people, six faculties at the University of Pretoria, and seven other academic or research institutions. This contributed to the promotion of transdisciplinary and collaborative research, both within the University, and through national, regional and international collaboration. The research topics were classified according to four broad themes: animal health, zoonotic and vector-borne diseases, community health and food systems.

EMPOWERING WOMEN SCIENTISTS AND HISTORICALLY DISADVANTAGED INSTITUTIONS

During the second phase of the Future Africa-Unicef partnership, academics in the UP One Health for Change network continued to support a series of multidisciplinary short-term research projects.

These short-term projects included young scientists at PhD and postdoctoral level, African women scientists, historically disadvantaged institutions and researchers in other countries. They were mentored by senior academics in the various faculties and departments in the One Health for Change network to ensure that their research was collaborative and transdisciplinary in nature, and that it included a community outreach element. The main aims of the One Health for Change cluster's activities in this second phase of the partnership were therefore the mentorship of the young scientists by senior academics, and building capacity in UP's transdisciplinary research domain.

Ten of the short-term research projects that had been accepted for inclusion in the cluster's research programme during the first phase of the partnership had the potential to contribute to capacity building focused on young women scientists and historically disadvantaged

institutions, and could be upscaled. They also included a community outreach element, and could provide the foundation for mentorship.

These projects included the involvement of 75 people, three countries (Botswana, Eswatini and South Africa) and nine institutions (including the University of Fort Hare, North West University, Rhodes University, the University of the Witwatersrand, the University of Zululand and the University of the Western Cape). They also included the involvement of six faculties and 24 departments at the University of Pretoria. As a result, bursaries could be awarded to 13 UP students (nine of whom were African women), two international African students, and two members of other higher education institutions in South Africa.

The classification of research topics according to the **four broad themes** that formed part of a One Health approach was also applied in the second phase, as these projects could be upscaled to empower women scientists and historically disadvantaged institutions.

1. ANIMAL HEALTH

DETECTION OF INFECTIOUS DISEASES IN LIVESTOCK AT ABATTOIRS

This research project, led by Prof Henriette van Heerden in the Department of Veterinary Tropical Diseases, was a collaboration between the University of Pretoria and the University of Fort Hare.

The funding was used to address the following objectives:

- Determine the seroprevalence of pathogens in slaughter animals in abattoirs in the Eastern Cape
- Detect vector-borne diseases such as *Theileria*, *Babesia*, *Ehrlichia* and *Anaplasma* in slaughter animals in abattoirs in the Eastern Cape through polymerase chain reaction (PCR) and using the reverse line bot method
- Develop educational material for use in community engagement and knowledge transfer activities to stakeholders in the Eastern Cape

The project entailed collecting samples at three abattoirs in the Eastern Cape to determine the seroprevalence

of zoonotic diseases such as brucellosis, leptospirosis and Q-fever. This data could also be made available for future research projects. Using samples collected from the slaughtered animals, vector-borne diseases were detected using a molecular technique established in UP's Department of Veterinary Tropical Diseases.

Educational material was developed to raise awareness about zoonotic and infectious diseases. This was used in a community engagement project to educate abattoir workers and animal owners about infectious diseases. It included information on standard operating procedures, as well as supplementary information about infectious diseases.

Two postdoctoral fellows were involved in the project. Francis Kolo was mentored in sample collection and community engagement, while Ayesha Hassim was mentored in developing the educational material that was used to educate the abattoir workers and animal owners.

Upscaling the project

In the second phase, objectives were specific to the empowerment of women scientists and historically disadvantaged institutions, and were as follows:

- Detect infectious diseases in livestock at abattoirs in the Eastern Cape
- Determine the knowledge, attitudes and practices of abattoir workers in the Eastern Cape related to zoonotic diseases and the use of personal protective equipment (PPE)

- Improve the developed education material for occupational health training, community engagement and knowledge transfer activities to stakeholders in the Eastern Cape

Two additional objectives were supported by other sources of funding:

- Determine the seroprevalence of pathogens in slaughter animals in abattoirs in the Eastern Cape
- Detect and characterise *Brucella* and *Coxiella burnetii* in slaughtered animals in the Eastern Cape using molecular methods

The project team included members of the Department of Veterinary Tropical Diseases in the University of Pretoria's Faculty of Veterinary Science, as well as a researcher from the University of Fort Hare's Department of Livestock and Pasture Science.

Outputs of the project included the following:

- The collection of samples at three abattoirs in the Eastern Cape to determine the seroprevalence of zoonotic diseases. This enabled various MSc and PhD students to conduct postgraduate studies at both UP and the University of Fort Hare.
- Assessing the knowledge, attitudes and practices of abattoir workers in the Eastern Cape towards micro-organisms and the use of PPE.
- The presentation of the project's findings at the Future Africa-Unicef Transdisciplinary Symposium on 20 April 2022 by postdoctoral fellow Ayesha Hassim and PhD candidates Sunday Ochai and Desiree Mazwi.
- The presentation of the results of the knowledge, attitudes and practices analyses at the annual conference of the Southern African Society for Veterinary Epidemiology and Preventive Medicine (SASVEPM) on 7 August 2022.
- The presentation of a community outreach and education event for abattoir workers by postdoctoral fellow Francis Kolo and PhD candidate Desiree Mazwi in November 2021 to share information on the knowledge, attitudes and practices of abattoir workers towards zoonotic diseases.
- Beneficiaries of the programme included a female PhD candidate and a male postgraduate fellow, as well as a female MSc student and an African male early-career mentor at the University of Fort Hare. Three young women were furthermore involved in training programmes that had been developed to contribute to building capacity at select institutions.

The research group visited an abattoir in the rural farming area in the Eastern Cape, as well as abattoirs in East London, Queenstown and Port Elizabeth to collect samples, and determine the knowledge, attitudes and practices of 80 abattoir workers. The educational material that had been developed in the first phase of the project was translated into isiXhosa and distributed to workers.

PREVALENCE AND VIRULENCE CHARACTERISATION AND ANTIMICROBIAL RESISTANCE PROFILING OF SHIGA TOXIN-PRODUCING *ESCHERICHIA COLI* ISOLATES CARRIED BY GOATS ON COMMUNAL FARMS IN GAUTENG

This research project, led by Dr Musafiri Karama in the Department of Paraclinical Sciences, aimed to determine the prevalence and characterise Shiga toxin-producing *Escherichia coli* (STEC) from goats in South Africa through serotyping, virulotyping and antimicrobial resistance profiling, mainly through the use of molecular techniques. This project will ultimately provide the surveillance data needed to increase awareness on the role played by goats in the epidemiology of STEC in South Africa. Food safety and public health organisations could use the findings of this study to formulate policies geared towards mitigating STEC foodborne diseases in humans.

There are approximately 800 million goats worldwide, including 5.6 million in South Africa. Goats are farmed primarily for meat, and to a lesser extent for milk. However, meat and milk from goats have received little attention in terms of food safety. Current data shows that goat food products can be a source of major foodborne diseases, including STEC and salmonella.

Shiga toxin-producing *E. coli* is a zoonotic foodborne pathogen associated with mild to severe bloody diarrhoeal and fatal human diseases such as haemolytic uremic syndrome (HUS) and kidney failure. Cattle are the primary reservoir for STEC, but goats and other ruminants can also be a source of STEC, and can cause foodborne diseases in humans.

However, current reports on the role of STEC from goats and in goat food products, such as meat and milk, in human disease in South Africa are non-existent.

The objectives of the research were as follows:

- Determine the prevalence of STEC isolates
- Serotype and virulotype STEC isolates
- Determine antibiotic resistance profiles of STEC
- Determine genotypic relationships among STEC

Rectal faecal samples were collected from 300 goats grazing on communal land in the Rust de Winter area in Gauteng during community outreach vaccination and deworming campaigns. These samples were screened, and the STEC isolates evaluated at the molecular level to extract virulence genes. This will determine to what extent goats may be a source of pathogenic STEC isolates for humans, specifically goat farmers and their families. The preliminary results on a small number of STEC isolates showed that goats can be a potential source of virulent STEC that are pathogenic for humans.

Upscaling the project

This project was continued in the second phase, with a particular focus on completing the outstanding PCR STEC somatic and flagellar antigen serotyping. The characterisation studies (virulotyping) would be completed during the second phase of the project. This would enable the researchers to assess the role that goats grazing on communal farms may play as a source of virulent and antimicrobial-resistant Shiga toxin-producing *E. coli* (STEC) isolates potentially pathogenic to humans through comparative studies, including that of goat and human STEC isolates.

The detection of STEC was carried out by culturing the faecal samples that had been collected from the grazing sites, and screening them for the presence of Shiga toxins. Some 600 STEC isolates were sent to the Reference Laboratory for *Escherichia coli* (LREC) at the University of Santiago de Compostella in Spain for identification, serotyping and virulence characterisation. This was followed by the profiling of STEC antimicrobial resistance at the University of Pretoria.

It is hoped that this study will contribute to and enhance foodborne disease surveillance in South Africa and contribute data that may be used to support public health and food safety systems policies based on scientific awareness. Furthermore, data from this study will be used as a basis for community outreach programmes to raise awareness on foodborne disease, food safety and public health among the rural communities in the study area. These are the main farmers and consumers of goat meat in South Africa.

Upon conclusion of the fieldwork and analysis of the isolates, the researchers conducted community engagement and education sessions on food safety and foodborne diseases. Two feedback sessions were organised in Rust de Winter in collaboration with the Gauteng Department of Agriculture and Rural Development to educate farmers, mothers at a local clinic and pupils at a local primary school about food safety and zoonotic foodborne diseases. Videos and illustrated pamphlets were used for these exercises.

MOLECULAR PREVALENCE OF BOVINE FASCIOLOSIS IN SLAUGHTER CATTLE, RISK FACTORS FOR HUMAN FASCIOLIASIS AND AWARENESS TRAINING IN THE EASTERN CAPE

This research project, led by Dr Chris Marufu in the Department of Veterinary Tropical Diseases, is a collaboration between the University of Pretoria and the University of Fort Hare. It sought to determine the molecular prevalence of fasciolosis in cattle slaughtered at abattoirs. This would assist in determining the associated risk factors for human fasciolosis, and create an awareness of fasciolosis among cattle farmers in the Eastern Cape.

This research applied a transdisciplinary One Health approach to investigate the neglected zoonotic disease fasciolosis. Contributing disciplines included animal health (meat inspectors and field veterinarians), human health (farmers, medical personnel and vegetable sellers) and environmental health (environmental workers, crop personnel and food handlers). This study was a continuation of research performed by Ishamael Jaja from the University of Fort Hare, who conducted abattoir-based studies in the Eastern Cape in 2017, and published his findings on the prevalence of fasciolosis in cattle using morphological tests.

Fasciolosis is an infectious disease caused by parasites of the *Fasciola* species. These are flat worms, referred to as liver flukes, that are found in the bile ducts and liver of infected people and animals such as sheep and cattle. Its development involves various factors in the environment, such as water and the aquatic vegetation fed on by cattle, or even ingested by humans.

During the current study, epidemiological studies on bovine fasciolosis shifted towards utilising molecular approaches to determine the *Fasciola* species that is infecting cattle. It focused on the participation of farmers in a survey to identify the risk factors of human fascioliasis. This enabled information transfer from researchers to farmers on the risk and transmission of the disease to humans. The study will ultimately lead to a better understanding of the epidemiology of bovine fasciolosis, and set the tone for the formulation of preventative and control strategies for fasciolosis in cattle and people in the Eastern Cape.

Upscaling the project

In the second phase, a transdisciplinary investigative approach was taken to study bovine fasciolosis in cattle and the zoonotic implications for people in the Eastern Cape.

The upscaled project had two objectives:

- Compare the detection of *Fasciola* species in cattle by post-mortem liver examination to antibody enzyme-linked immunosorbent assay (Ab-ELISA), sedimentation and real-time polymerase chain reaction (rt-PCR)
- Create an awareness of fasciolosis among farmers and farm workers in the Tsitsikamma dairy-farming region of the Eastern Cape.

The project team included members from the University of Pretoria's Department of Veterinary Tropical Diseases, as well as the University of Fort Hare's Department of Livestock and Pasture Science.

Outputs of the project included the following:

- The publication of an article in *Parasitology Research*, an international peer-reviewed journal.
- The preparation of a manuscript comparing four methods to detect *Fasciola* species in slaughter cattle in the Eastern Cape.
- The acceptance of two abstracts for presentation at the International Conference on Parasites of Wildlife, held in the Kruger National Park, South Africa, in September 2022.
- The submission of the thesis of PhD student Zuko Mpisana from the University of Fort Hare in August 2022.
- The presentation of two information dissemination sessions to create awareness among cattle farming communities. On 6 May 2022, 14 farm workers learnt more about the transmission of zoonotic diseases, and on 7 May 2022, 15 farm workers learnt more about the transmission and control of bovine fasciolosis. A hundred posters on bovine fasciolosis were developed and distributed at both the University of Pretoria and the University of Fort Hare.
- Beneficiaries of the programme included a doctoral student and two postdoctoral fellows from the University of Fort Hare – a historically disadvantaged institution. The programme also enabled two early-career researchers to contribute to research and capacity development at the University of Fort Hare.

The research involved in this project has fostered transdisciplinarity, which will continue in future research. There was also evidence of enhanced collaboration with public health experts in the state veterinary services and those at the University of Pretoria, as well as meat inspectors and abattoir workers. This has led to a better understanding of zoonotic diseases in the farming communities of the Eastern Cape, and the identification of research and training needs.

For the first time, researchers were able to establish PCR-based methods for the detection and characterisation of zoonotic helminth infections in the University of Pretoria's Department of Veterinary Tropical Diseases. This will support future research and student training.

There was strong collaboration with the University of Fort Hare, and academic ties were forged. One lecturer, Ishmael Jaja, was assimilated into the project's transdisciplinary team, and given the opportunity to

co-supervise a PhD student, Zuko Mpisana. He was also involved in the implementation of the project, as well as its community outreach activities. The PhD student, who was registered at the University of Fort Hare, was funded by the project, and was involved in data collection, management and analysis, laboratory analyses and writing up the results of the project.

2. ZOONOTIC AND VECTOR-BORNE DISEASES

MOSQUITO-BORNE VECTOR EPIDEMIOLOGY AND ONE HEALTH IN THE VHEMBE DISTRICT

This research project, led by Prof Tiaan de Jager, Director of the Institute for Sustainable Malaria Control, sought to apply a One Health approach to determine the effects of mosquito-borne parasites and viruses at six sites in the Vhembe District in Limpopo, an area with a high malaria burden in this endemic malaria region in the Limpopo River Basin.

This district has the highest average malaria incidence-to-population ratio in the country. The effect of the global COVID-19 pandemic is thought to have resulted in a significant increase in the burden of other infectious disease due to the redirection of health service provision and control resources.

Mosquitoes result in significant global mortality every year. In South Africa, malaria is considered the most important mosquito-borne disease. Understanding these and other zoonotic diseases is critical to human, animal and environmental health.

In the Vhembe District, little is known about vector epidemiology, the differential diagnosis of febrile patients, animal health and environmental health. Zoonotic arboviruses and vectors are continually documented in the province, raising concern about One Health when it comes to mosquito-borne diseases.

This project had the following objectives:

- Understand mosquito vector epidemiology in the Vhembe District
- Identify primary and secondary mosquito vectors of malaria and arboviruses by assessing the

community composition, and conduct parasite and viral screening
- Investigate the effect of the health crisis on mosquito-borne disease
- Investigate the abiotic and biotic determinants of transmission and persistence to develop mechanistic simulation prediction models
- Mentor students to build capacity in medical entomology

It made use of transdisciplinary research approaches, with the inclusion of ecology, entomology, climatology, public health, parasitology and virology, to obtain essential data on mosquito-borne disease entomology and One Health during the COVID-19 health crisis.

As such, it collaborated with researchers in the University of Pretoria's Faculty of Health Sciences, Faculty of Natural and Agricultural Sciences and Faculty of Veterinary Science. Collaboration also took place with scientists at the National Institute for Communicable Diseases (NICD) and the South African Weather Service (SAWS). Collaborators in this project included Dr Megan Ridden and Dr Taneshka Kruger (School of Health Systems and Public Health), Dr Abiodun Adeola (SAWS) and Prof Basil Brooke (NICD).

Mosquitoes were collected across six sites using CO_2-baited traps and larval sampling. Species were identified through morphological and molecular methods. Female anopheles individuals furthermore underwent enzyme-linked immunosorbent assay (ELISA) circumsporozoite detection and arboviral assessment.

COVID-19 intervention impacts were determined through historical and real-time disease and vector occurrence data. Climate and environmental data obtained from the SAWS and the National Aeronautics and Space Administration (NASA) was utilised to identify factors that determine the transmission and persistence of mosquito-borne disease for the development of mechanistic simulation prediction models, early-warning systems and climate change scenarios.

The outcomes of the research would contribute to malaria control efforts and programmes by gathering essential data on mosquito-borne disease entomology and One Health during the COVID-19 health crisis.

This served to influence and inform future disease control and management policy in South Africa and internationally. Such knowledge provides guidance on targeted and successful control methods, and aids in public and animal health management. It also empowers communities, particularly in the event of a health crisis like the COVID-19 pandemic, by strengthening their health crisis preparedness.

During the course of the project, four students were mentored in field collection methods, morphological identification, geographic information systems (GIS), database management and laboratory methods. This provided them with vital experience in transdisciplinary research, which not only served to build capacity for UP, but also to address the global deficit in medical entomology skills.

Engagement with the community took place by meeting with local residents to obtain information on mosquito-borne disease prevalence and control, and to establish relationships for research and outreach.

Upscaling the project

This research continued during the second phase. The Limpopo Province experienced the highest annual malaria incidence in 2017, with 18 991 cases. This was more than 10 000 cases more than the other provinces, despite the implementation of control programmes and planned elimination strategies.

Within this province, the Vhembe District on the north-eastern border was documented in recent investigations as having the highest malaria case incidence per population ratio in the province between 2015 and 2017, particularly across six sites, with a clear indication of disease burden.

In addition, the confirmation of the presence of multiple known mosquito arboviral vectors, and the continual detection of neglected, mosquito-borne zoonotic diseases, including Wesselsbron, Shuni, West Nile, Chikungunya and others in the province, is of great concern to public, animal and environmental health.

As malaria is considered the most important mosquito-borne disease in South Africa, there is potential to overlook the differential diagnosis of human febrile

cases, and further misdiagnosed or ignored livestock and wildlife disease mortality.

The aim of this project was therefore to supplement the baseline vector data collected in 2020 to contribute to the current understanding of the mosquito vector epidemiology in the Vhembe District. It aimed to understand primary and secondary mosquito vectors of malaria in a region with an apparent lack of primary vector presence, and investigate flaviviral vector involvement through an assessment of community composition, and flaviviral screening.

This research continued to follow the One Health approach to determine the effects of mosquito-borne parasites and viruses on the community, animals and the environment.

In addition, climatic and environmental factors that contribute to the transmission and persistence of mosquito-borne disease were investigated, in isolation and combination, for incorporation into the future development of mechanistic simulation malaria prediction models for the study region.

The project had the following objectives:

- Mentor students in field collection methods, the morphological and molecular identification of fundamental mosquito species and parasite screening methods, and the benefits of transdisciplinary research, to address the global medical entomologist deficit
- Continue the spatial analysis and mapping of mosquito vector breeding sites across the study area
- Perform the molecular identification of members of morphologically indistinct species of mosquito groups and complexes
- Identify primary, secondary and novel malaria vectors through ELISA sporozoite detection in all anopheline females in a region with an apparent lack of recognised primary vector presence
- Perform the further identification of potential zoonotic flaviviral vectors through the arboviral screening of all mosquito genera females
- Conduct an in-depth investigation of annual climatic and environmental factors, in isolation and combination, that contribute to disease persistence and transmission through the incorporation of vector epidemiology and historical malaria case incidence data

The project team included members from the University of Pretoria's School of Health Systems and Public Health, as well as a researcher from the SAWS's Climate Change and Variability Division, and a researcher from the NICD's Vector Control Reference Laboratory.

Outputs of this research included the collection of about 4 450 mosquitoes over two collection events across six sentinel sites in Limpopo. The purpose of this activity was to build on surveillance and outputs obtained in 2020. An abundance of Anopheles genera individuals was identified in the region, in addition to high numbers of Culex and Mansonia individuals. About 2 860 anopheline individuals were identified, making up a minimum of 16 species.

Species collected once again emphasised a rarity of primary vectors in the region, but higher numbers of secondary vectors not yet implicated in South Africa. Circumsporozoite detection is ongoing, but has not yet implicated species.

The remaining estimated 1 500 included 20 culicine species within the Culex, Aedes, Mansonia, Coquillettidia and Uranotaenia genera. Species collected included the known flaviviral vectors *Culex univittatus, C. pipiens sl, C. antennatus, C. neavei* and *Aedes aegypti.* Almost 130 pools (830 individuals) screened identified eight positive insect-specific virus (ISV) pools.

Although ISVs do not infect vertebrate cells, the discovery that they may either enhance or suppress the replication of medically important flaviviruses in co-infected mosquito cells has emphasised the importance of further research on such ISVs.

Climate and environmental factors identified as malaria burden drivers included minimum temperature, precipitation and significant tropical cyclone events over the Mozambican channel.

Five individual and ensembles of Global Climate Models of the Fifth Phase of the Coupled Model Inter-comparison Project (CMIP5), downscaled in the Coordinated Regional Climate Downscaling Experiment (CORDEX) by the Rossby Centre regional model (RCA4), were completed to generate future projections of various malaria transmission characteristics. These included prevalence, incidence and vector population under the effects of climate change. A further 12 weather systems were deployed inside and outside homes across the surveillance sites to obtain continual fine-scale climate data.

All anopheline data collected was included in the South African malaria vector surveillance report for January to December 2021. This is a public health surveillance bulletin published by the NICD, released in 2022.

Breeding site mapping was once again performed across all sites, allowing for the identification of a number of malaria and arboviral vector breeding sites.

This data contributed to the South African District Health Information Software (DHIS) database, an open-source software platform for the reporting, analysis and dissemination of data for all health programmes. It is being implemented across all malaria-endemic provinces in South Africa. In addition, data is shared with the Limpopo Malaria Provincial Control Programme for the purpose of continued surveillance and assistance towards control programme decision making, particularly vector control implementation, including larval source management.

Two community engagement events were held per surveillance site throughout the course of the research. The engagement involved meeting with village leaders to discuss challenges experienced, and current and future mosquito-borne disease research in the region. This was subsequently communicated to the community members. The research culminated in the preparation of three manuscripts for submission to the journals *Viruses, Parasites and Vectors* and *PLOS One/Climate Dynamic*.

Community outreach activities included 12 community meetings with the chiefs, headmen and village leaders of the six sentinel sites (two per site) to discuss challenges experienced and the current and future mosquito-borne disease research in the region. The village leaders would then disseminate information to all community members within their domain.

Two young students (one from University of Pretoria and one from the University of Fort Hare) were mentored in aspects of medical entomology, parasitology, climatology, geographical modelling, community engagement and transdisciplinary research. Two female researchers from the SAWS were also trained in the development of linear mixed models towards climatological modelling and determining the effects of climate change.

The project furthermore contributed to the capacity building of women researchers in fields such as medical entomology, where there is a deficit. The project team involved predominantly female collaborators, while the lead on the entomological and arboviral aspects was also female.

SARS-COV-2 WATER-BASED EPIDEMIOLOGY IN GAUTENG

This research project, led by Prof Janet Mans of the Department of Medical Virology, was a collaborative project between the University of Pretoria, Waterlab and the Council for Scientific and Industrial Research (CSIR). It sought to assess whether SARS-CoV-2 can be detected consistently over time in river water to monitor the presence and concentration trends of the virus and to characterise the spike protein in selected samples so as to assess strain diversity in the environment. The monitoring of river water could provide an early warning of a rise in cases in communities without formal sewage systems, where run-off contaminates rivers.

It had the following objectives:

- Collect water samples from three rivers in Gauteng weekly for three months
- Recover SARS-CoV-2 from river water using skimmed milk flocculation and screen recovered concentrates for SARS-CoV-2 using a commercial multiplex real-time PCR assay
- Analyse virus trends using Ct value as an indicator of concentration
- Analyse the diversity of the spike protein sequence in selected samples with a high viral load

SARS-CoV-2 causes gastrointestinal symptoms in 5 to 20% of infections, and is shed in stool in about 30 to 60% of infected individuals. SARS-CoV-2 is detectable in wastewater, but infectivity in raw or treated wastewater has not been shown. Surveillance of SARS-CoV-2 in waste or surface water systems may provide early warning of the spread of the virus in the community. In Europe, Australia and the USA, virus levels increased in wastewater one week prior to increased detection with clinical screening. South Africa has poorly functioning wastewater treatment plants in many areas, and many communities lack sewage networks. The monitoring of river water for SARS-CoV-2 and changes in its concentration may provide an early warning of increased circulation of the virus in the community. Frequent sampling and real-time analysis are required to generate useful data that could guide public health policies and interventions.

The environmental surveillance for SARS-CoV-2 formed part of a proof-of-concept study funded by the Water Research Commission (WRC) between June and August 2020. SARS-CoV-2 was consistently detected in sewage influent at various treatment works in Gauteng, the Western Cape and KwaZulu-Natal. SARS-CoV-2 was also detected in highly polluted surface water from rivers in the vicinity of informal settlements. A comparison between PEG/NaCI precipitation and skimmed milk flocculation in the preceding WRC proof-of-concept study indicated comparable virus recovery with both methods. Since skimmed milk flocculation is a cheaper and less time-consuming method, it was implemented in this study for SARS-CoV-2 recovery.

River sampling was conducted in collaboration with Waterlab and Rand Water on a weekly basis from the end of September 2020. The Jukskei River, Rietspruit and Klip River were sampled weekly (2 ℓ per site) from 28 September 2020. If the river-based surveillance approach proves to be successful, it can be expanded to other areas and provinces to assist in the control of the COVID-19 pandemic.

IDENTIFICATION OF ZOONOTIC DISEASE HOTSPOTS IN SOUTH AFRICA: A RISK MAP ASSESSMENT

This research project, led by Prof Wanda Markotter of the Department of Medical Virology, sought to create a South African risk map of zoonotic disease emergence using publicly available data of factors that could serve as predictors for zoonotic disease emergence based on a mathematical modelling approach.

Zoonotic diseases are those that can be transmitted from animals to people, either through direct contact or by first infecting another animal. The number of newly emerging zoonotic agents has increased drastically in recent years. Events with sustained person-to-person transmission result in large outbreaks. A global analysis of disease outbreaks showed that various anthropological, environmental and behavioural factors can predict the emergence of zoonotic diseases. Examining these factors in South Africa can assist in determining which factors significantly influence zoonotic disease outbreaks in the local environment.

This research had the following objectives:

- Construct a database of spatial predictors as underlying mechanisms for the emergence of zoonotic disease
- Construct a database of emerging infectious diseases
- Conduct mathematical modelling and generate a risk map of South Africa
- Facilitate discussion among young academics
- Engage in community education on risk factors for disease emergence

The transdisciplinary collaborations and application of the One Health approach that this research required entailed the integration of expertise from a number of sectors, including medical virology, mathematics, geography, geoinformatics and meteorology, ecological health, health systems and public health, and veterinary science.

A risk map can identify populations or regions at higher risk of zoonotic disease outbreaks. Improved bio-surveillance can be performed in these high-risk regions. The ultimate goal is to reduce opportunities for disease spillover. Educational activities in these communities are paramount to inform local communities and the government of identified high-risk predictors of zoonotic disease emergence. This includes the loss of natural habitats, land use changes, biodiversity loss, population density and population growth, and climate change.

A strong component of the study is the training of young, emerging researchers to provide the next generation of scientists with the skills to conduct interdisciplinary research in the fight against emerging zoonoses.

Outcomes of the research project therefore included elements of community education, knowledge transfer and capacity building, and the mentoring of young academics in mathematical modelling and the critical analysis of predictive data.

Zoonotic diseases have a significant impact on global health. Through proper bio-surveillance and understanding of the drivers of the disease, prevention strategies can be employed to reduce the frequency of zoonotic disease outbreaks.

Upscaling the project

The research was expanded in the second phase to include zoonotic pathogen surveillance among bat populations in Botswana and Eswatini.

This project focused on strengthening local capacity and skills development towards zoonotic disease surveillance by training students from Botswana and Eswatini in sampling from high-risk wildlife species, specifically bats, and performing surveillance for potential zoonotic agents.

The project conferred laboratory training and skills transfer in molecular biology to two students from Botswana and Eswatini with respect to the detection of coronaviruses and paramyxoviruses, enabling them to perform independent research in their home countries.

The objectives included the following:

- Provide training in methods of virological specimen collection for fieldwork
- Provide training in extraction methods, molecular methods and the in-house assays available for nucleic acid detection and data analysis
- Provide training on molecular species identification through barcoding from extracted DNA
- Assist in training for data analysis and interpretation by performing statistical analyses on excretion significance over time, investigating the effects of body mass index, and interpreting the results in relation to the meaningful biological life stages of the host species

The project team included members from the University of Pretoria's Department of Medical Virology, the University of Eswatini's Department of Biological Sciences,

and the Botswana International University of Science and Technology's Department of Biological Sciences and Biotechnology.

Researchers from the University of Pretoria travelled to Eswatini to provide training to two MSc students, who joined the project after the initial proposal was submitted. They had enrolled at the University of Eswatini to study techniques associated with bat capture and identification, and sample collection for virological testing. This included the collection of blood, taking swabs and inserting pit tags to record the recaptured bats.

This was done to ensure that the students would be able to perform independent sample collection for testing at a later date. According to Prof Markotter, the research lead, the students adapted quickly and learnt all the necessary techniques. They performed monthly surveillance from two identified roost sites at a human interface between December 2021 and July 2022. The collected samples were sent to the University of Pretoria in April 2022. Both students also received training on molecular techniques, specifically in respect to the testing of samples for the presence of bat coronaviruses and paramyxoviruses.

In Botswana, samples to be used for the research project of master's student Nametso Dibuseng had previously been collected by her research team in Botswana and sent to the University of Pretoria in July 2021. The team in South Africa began extractions of her samples so that she could come and test the nucleic acids for coronaviruses and paramyxoviruses after learning the required molecular techniques. Ms Dibuseng is a young female researcher performing novel research in Botswana, and has the potential to develop a strong research career at the Botswana International University of Science and Technology.

All the students involved in the project delivered a presentation of their work at an international workshop, "One Health coronavirus biosurveillance towards prevention, preparedness and response". It involved representatives from the Southern African Development Community (SADC) countries, as well as collaborating partners from the EcoHealth Alliance in the USA and the Biotechnology and Biological Sciences Research Council in the UK.

The students took part in group discussions on the status of biosurveillance within their country in respect to bat-associated viral surveillance. The workshop and training raised the students' awareness of activities (including funding) in their local settings that could be used to promote the surveillance for zoonotic agents of disease. This enabled them to continue to develop careers in research.

According to Prof Markotter, the project was largely focused on improving capacity in neighbouring countries like Eswatini and Botswana. "We have thus begun training and educating three students from institutions in these countries, and although the Unicef-funded project is at a close, we will continue to mentor these students and be available to them as resources to aid them in the completion of their degrees."

Community outreach was facilitated on a small scale by the students in their local environments through discussions with inhabitants of regions included in the surveillance sites on the importance of peaceful co-habitation with wildlife such as bats, and the risk exposure to the excrement of these hosts may pose.

Two of the students who received training were women interested in pursuing careers in research, who were enrolled in their master's studies. Both have expressed a strong desire to continue with their PhD degrees. Both these students, together with a male master's student from Botswana, were mentored by two female postdoctoral fellows from the University of Pretoria and supervised by Prof Markotter.

LOCAL SCALE ARTIFICIAL LIGHT USE AS PREDICTOR OF VECTOR-BORNE DISEASE RISK

This research project, led by Dr Bernard Coetzee of the Department of Zoology and Entomology in the Faculty of Natural and Agricultural Sciences, sought to investigate the use of artificial light at night to alter disease vector biology, particularly that of mosquitoes, which carry some of the world's worst diseases.

Light is a fundamental cue that regulates a host of biological responses. This research study investigated the interaction between artificial light and disease vectors in an attempt to determine whether artificial light can serve as a predictor of vector-borne disease risk. Understanding how artificial light may modulate mosquito-borne disease risk may also assist in employing and redesigning light regimes that do not increase, and may even mitigate, already significant disease burdens, especially in the developing world.

The project served to combine multiple strategies from various scientific disciplines to create a holistic approach to assessing human and environmental health. By conducting ground surveys with the assistance of geographic positioning systems (GPS), and calibrating remote-sensed products, tools from geography were used to map artificial light use. By assessing temperature and humidity, tools from entomology were used to better understand mosquito biology. Ultimately, by assessing the consequences of light on human health and the interaction of light with disease vectors, the study could follow a One Health approach.

The project had the following aims:

- Understand how exemplar rural African households are adopting artificial lighting technologies in their homes
- Map how artificial light is distributed at the local scale
- Create disease risk maps of human health risks from disease vectors based on artificial light use

During this project, holistic and integrated, spatially explicit maps were constructed of artificial light use at the local and rural scale. This proved to be ecologically relevant for the vector species' biology. According to Dr Coetzee, it is only once we appreciate the trade-offs in development expansion across Africa that we can better plan for, manage and mitigate the potentially negative impacts of artificial light. "Then we can promote the use of affordable and energy-efficient artificial lighting technologies at the household scale that do not increase human health risks or compromise the attainment of the Sustainable Development Goals."

The project included collaboration with members of the UP Institute for Sustainable Malaria Control and the Centre for Environmental Studies.

Outputs of the project included the following:

- The creation of a local-scale artificial light use map of Tshianzwane Village in Limpopo
- The comparison and contrasting of satellite images with local-scale mapping
- The collection of basic energy and artificial light use data
- The collection of local-scale temperature and humidity data using small devices that allow the measurement of key environmentally relevant variables at organismally relevant scales
- The collection of spectral readings of major light types to determine whether light-emitting diode (LED) lights attract fewer insects than conventional lights

The project also gave rise to the development of a peer-reviewed article on the impacts of artificial light at night in Africa for publication in *South African Journal of Science*.

3. COMMUNITY HEALTH

CREATING A SUPPORTIVE ENVIRONMENT FOR MOTHER-TO-INFANT BREASTFEEDING

This research project, led by Dr Ellenore Meyer in the Department of Family Medicine, is a transdisciplinary collaboration focused on creating a supportive environment for optimal breastfeeding. It made use of action research to develop and test educational material in different languages that communicate the public health message in a context that is relevant to vulnerable communities. It aimed to engage communities in creating a supportive environment for mothers to promote exclusive breastfeeding for six months, and continued breastfeeding for two years and beyond with appropriate complementary food.

To create a supportive breastfeeding environment in which mothers and their children can thrive, the research had the following objectives:

- Identify barriers for optimal breastfeeding in communities through individual and small group engagement
- Develop infant and young child feeding educational material with key young infant feeding messages
- Educate mothers and other community members on the importance and benefits of breastfeeding
- Test the developed material among the segments of target groups, including pregnant women, young mothers, fathers and caregivers, and early learning centres

Exclusive breastfeeding is an internationally recognised cost-effective public health measure that has a significant impact on infant morbidity and mortality. Given the limited health-care resources in South Africa, finding effective breastfeeding promotion and support interventions that are easily replicable in various settings have become a priority.

The COVID-19 crisis magnified the inequity that exists in our society, and increased the risk of malnutrition. In many communities globally, the pandemic led to a health, nutrition and socio-economic crisis. In Pretoria, the communities in which the Community-oriented Primary Care (COPC) Unit operates – Daspoort, Zama-Zama, Melusi, Woodland Village and Cemetery View – were not spared the impact.

Together with partner organisations, the University's COPC Unit assisted communities with COVID-19 preventative strategies, and supported the socio-emotional needs of these communities. However, it became evident that more sustainable interventions were needed to ensure optimal infant and young child feeding. A better understanding of the norms that affect breastfeeding in formal and informal settlements were needed to address low exclusive and continued breastfeeding rates.

This transdisciplinary project had a strong element of community involvement. It included hundreds of women living and working in four informal settlements in Gauteng.

Pregnant women, community health workers, medical professionals and breastfeeding experts collaborated with the aim of developing new educational material that could address primary care needs in the era of COVID-19 to complement and strengthen existing programmes and policies so as to create a supportive breastfeeding environment for the health and wellbeing of mothers and their children.

The envisioned impact of the project was to create an environment that would normalise breastfeeding as optimal nutrition for all babies, save lives and reduce the environmental footprint.

Upscaling the project

This research project was continued in the second phase. It had the following objectives:

- Review the literature on infant feeding in informal settlements and different communities (primarily in South Africa) and investigate barriers and challenges to breastfeeding
- Investigate possible strategies to enhance and create a more supportive breastfeeding environment, and engage communities with breastfeeding logos to open dialogue around breastfeeding
- Use the action research framework to develop and test an information, education and communication intervention to advocate and create a supportive environment for breastfeeding.
- Explore the knowledge, attitudes and needs of mothers, caregivers, community health workers and early learning centres on messages communicated regarding exclusive breastfeeding and continued breastfeeding
- Test and develop information, educational and communication material for use in primary care and vulnerable communities based on the inputs from mothers, community health workers and early learning centres, caregivers and fathers (focused on exclusive breastfeeding and continued breastfeeding)
- Provide community engagement opportunities for fourth-year health sciences students to promote, protect and support breastfeeding
- Provide some financial support for the information, education and communication material students develop to print for use in the communities
- Engage with community members around challenges of their environment
- Discuss possible skills and knowledge opportunities using the developed story boards, sewing workshops and student interventions

The project team included members from the COPC Unit in the Department of Family Medicine, the Research Centre for Maternal, Foetal, Newborn and Child Health

Care Strategies in the Department of Paediatrics, the Department of Human Nutrition, the Centre of Excellence in Sustainable Food Systems, the Tshwane District Clinical Specialist Team of the South African Medical Research Council, as well as maternal and child care non-profit organisations with a breastfeeding support focus.

Outputs of the project included the following:

- Qualitative research with focus groups who tested the logo and story board
- Community engagement with four communities in the form of breastfeeding role-play and the presentation of a breastfeeding day
- The development of training material in the form of a breast milk expression instructional video
- The development of educational material in the form of a complementary feeding booklet and posters developed by fourth-year Dietetics and Physiotherapy students

Breaking the cycle of poverty

A spin-off project was also developed to empower vulnerable women with food cultivation and life skills. Called "Breaking the cycle of poverty", this intervention targeted 25 vulnerable women, expanding on existing knowledge with a focus on economic independence, food security, and personal health and hygiene.

Topics that were covered as part of a focused skills and educational intervention included the cultivation of vegetables and production of eggs for use or resale, how to design a budget and formulate a life plan, education on contraception and HIV/Aids, family planning and reporting abuse.

The aim of the project was to promote female urban farming (food production) and transfer critical health and social skills for health and improved livelihoods to the urban residents of an informal settlement in Pretoria. This would support and enable their independence, as well as their ability to make informed decisions about their own health and nutrition.

This project followed an action research framework to develop and test food production (farming and animal protein) using an educational kit that included entrepreneurship, food production skills (cultivation and preparation) and maternal and child care skills to advocate and create a supportive environment for vulnerable women.

The objectives of this project included the following:

- Explore the knowledge, attitudes and needs of mothers, caregivers and community health workers to establish food gardens and egg production facilities (a hen house) in the informal settlement

- Test and develop information, educational and communication material for use in primary care and vulnerable communities based on inputs from experts on health, nutrition and urban farming

The egg production project ran over four months, and included the construction of a hen house and the hands-on training of women in egg production. The vegetable production project resulted in the establishment of a demonstration garden and the training of 25 women in space-efficient vegetable production and harvesting to improve nutrition. They learnt to set up bag and tower gardens for the production of leafy vegetables, container gardens for the production of vegetables such as tomatoes and carrots, and open-field vegetable gardens for the planting of orange-fleshed sweet potato. They were furthermore taught to cultivate oyster mushrooms using bags in-house, and to plant moringa trees.

The women participants were invited to attend regular food production and processing sessions, where the vegetables that were grown were utilised in recipes developed by the Dietetics team, incorporating local products, as well as the eggs that had been produced.

The project brought together qualified professionals and experts in primary health care, dietetics and nutrition, food cultivation and animal husbandry. The combination of these disciplines in targeted health and nutritional skills transfer workshops had a major impact on the vulnerable women living in the informal settlement.

UNDERSTANDING KNOWLEDGE, ATTITUDES AND PRACTICES IN RESPONSE TO THE COVID-19 PANDEMIC

This research project, led by Dr Sean Patrick of the School of Health Systems and Public Health, sought to ascertain whether people's adherence to COVID-19 control measures was affected by their knowledge, attitudes and practices towards COVID-19. As such, it aimed to understand the actions taken by community members and young adults in response to the COVID-19 pandemic.

It had the following objectives:

- Determine the knowledge, attitudes and practices of community members and young adults in response to the COVID-19 pandemic
- Determine the factors identified in the knowledge, attitudes and practices survey that may be associated with poor adherence to the current COVID-19 regulations
- Propose a knowledge dissemination strategy that promotes young adult-driven responses to the COVID-19 and future outbreaks

A transdisciplinary approach is essential to achieve the objectives of this study. Collaborators in this study included Dr Joyce Shirinde (School of Health Systems and Public Health), Dr Jan Hugo (Department of Architecture), Prof Jannie Hugo (Department of Family Medicine) and Prof Wanda Markotter (Centre for Viral Zoonoses).

To curb the spread of the pandemic, countries imposed drastic lockdown measures, restricting their residents' movement, and embarking on health-promotion messages to prevent the spread of the disease. However, the effectiveness of these mitigation measures depended to a great extent on the cooperation and compliance of all members of society. In addition to the impact of the lockdown restrictions and COVID-19 regulations, and concern about the spread of zoonotic diseases, the transmission of the disease also had an impact on the built environment.

The research included a knowledge, attitudes and practices survey as a quantitative method to provide access to both quantitative and qualitative information. Questions related to knowledge entailed what people know about zoonoses, human-animal interactions, and the spatial and environmental conditions (including pollution) that create unfavourable health conditions. Questions related to people's attitudes included those towards social distancing, living spaces and interactions with animals. Questions about practices concerned the adoption of the new guidelines and impacts on people's daily lives, the use of chemicals to clean surfaces, and strategies used to achieve social distancing.

The mentoring activities of the study leader included teaching his students the essentials of questionnaire design and distribution, training them in data analysis and statistical methods, and developing their scientific writing skills. Two student projects emanated from this research, with students graduating with a Master of Public Health degree in 2022.

The project had several important outcomes. Understanding knowledge, attitudes and practices in adapting to these challenging times provided insight into how best to support a resilient generation in times of crisis, and to create opportunities for engagement and upliftment.

The results of the research can be used to inform governmental outbreak response measures, including policies, interventions and communication. It can also support the implementation of specific programmatic interventions and policies, in addition to the messaging that is necessary to encourage the uptake of disease prevention and control measures.

Finally, it served to support the strengthening of health systems as South Africa and other countries are striving to achieve the global goal of universal health coverage.

Upscaling the project

During the second phase, Dr Patrick expanded the research he had conducted in Phase I to examine the impact of diseases caused by environmental chemical pollution on the built environment.

In the process, he sought to create opportunities to build compelling interactions between the different disciplines that contribute to sustainable transdisciplinary research environments. The project team included members from the School of Health Systems and Public Health, the Department of Architecture and the Department of Chemical Engineering at the University of Pretoria. It provided support to three master's students: one in Architecture, one in Environmental Health and one in Public Health. Each student submitted a manuscript for publication in an academic journal.

With the increasing risks associated with climate change, the current burden of disease, the increase in aquatic pollution and the current fragile social, political and financial conditions, vulnerable communities with poor living conditions and housing are most at risk. "We know and understand the dynamic interplay that exists between people and places," says Dr Patrick, "and the importance of context when it comes to efforts that promote the health and wellbeing of individuals".

He explains that two specific risks are critical when working in vulnerable informal communities. Firstly, water insecurity is increasingly driven by climate change, leading to both limited access and poor water quality. As a result, the presence of endocrine-disrupting chemicals (EDCs) in water is of significance when evaluating water quality and safety, and has an impact on water management strategies in areas with limited access to clean water for irrigation and sanitation. Secondly, the noted increases in temperature, the impacts of urban heat islands, and the occurrence of heat waves are exacerbated by climate change. The limited capacity of informal and poor-quality housing to lower residents' exposure to heat stress and enable them to manage high indoor temperatures during hot spells is an ever-growing concern in informal settlements in southern Africa.

There is a paucity of information on the social impacts and unequal outcomes of climate change adaptation policies, with discussions often being discipline-specific and removed

from the ground-level reality of the context. Thus, a comprehensive understanding of the environmental and social determinants of health, coupled with behaviour, can provide a more holistic approach to suggesting a practical strategy to promote health and wellbeing in informal communities, while working towards developing safe and sustainable health-promoting living spaces. To address this problem, the research team investigated the interaction between living spaces, environmental pollution and disease dynamics in a vulnerable population with the aim of developing a strategy to improve health and wellbeing.

The project had the following objectives:

- Map water sources and hazard points, and conduct a detailed observational analysis of the target homes to improve the fine-grained mapping and data of the informal built environment
- Determine the inhabitants' knowledge, attitudes and practices towards environmental pollution, human health and living spaces
- Screen for aquatic environmental contaminants in water sources
- Determine structural and environmental interactions using indoor and outdoor air-quality monitors and temperature loggers

The research team undertook an integrated assessment of the internal and external exposures that affect the resilience of residents in the Melusi informal settlement in the west of Pretoria. They made use of a complex climate change risk assessment framework to examine the resilience of a community to adverse changes or effects.

The framework included both exposure and adaptive capacity. A series of *in-vitro* bioassays and a network of external monitoring sensors were used to measure the temperature, humidity and heat index of the environment both inside and outside informal dwellings, as well as respondents' exposure to chemicals. This was followed by a series of questionnaires related to the environmental and social determinants of health.

The respondents' exposure levels were considered on three scales: the neighbourhood, household and individual scale. Assessments included analysing the physical and environmental data (including the built environment), socio-cultural factors (including behaviour and knowledge systems) and empirical environmental and toxin exposure data.

Upon conclusion of the project, a knowledge dissemination workshop was held to share the preliminary findings of the research with community members.

This research will ultimately provide a rich basis on which to develop a community resilience plan that is responsive and appropriate to the needs, risks and capacity available in the community. It will be a practical guide, grounded in environmental justice principles, to assist communities to set priorities and allocate resources to reduce their risk and improve their resilience.

CONVEYING COMMUNITY NEEDS THROUGH STORYTELLING

This research project, led by Dr Michelle Janse van Rensburg of the Community-oriented Primary Care (COPC) Research Unit, and Helga Lister of the Department of Occupational Therapy, developed a pilot project to encourage the sharing of narratives by community members involved in various UP student-led projects on their daily experiences and realities in navigating their lives in vulnerable communities in the City of Tshwane. The aim of the project was to promote people-centred social development policies by conveying the community's needs through storytelling.

Existing health and social development policies build on important available quantitative data from research studies and health statistics to respond to the needs of vulnerable communities. As the realities on the ground may be very different, qualitative data, such as that obtained anecdotally, is often neglected.

The research team recognised that much work has already been done in responding to the needs of vulnerable communities in Daspoort, Mamelodi and the Inner City. During the COVID-19 national lockdown, this included community engagement interventions in the lives of street-based people (especially those living in shelters), clients of the University of Pretoria's Community-oriented Substance Abuse Programme (COSUP) and clients attending clinics offered by various health sciences disciplines.

However, the voices of beneficiaries or community members often remain unheard or are filtered through academic lenses. Since oral histories are an important component of traditional African cultures, the use of storytelling is a long-established and powerful tool to engage audiences from various sectors.

By making use of innovative tools to convey the first-hand experiences of community members, decision makers may be able to influence and adjust national policies to ensure that they are truly person-centred. These policies include the Department of Health's National Health Insurance strategy, primary health care, the national policy on substance use and harm reduction, education policies and those responding to health care workers.

The research questions that this study aimed to answer were as follows:

- What are the lived experiences of community members involved in various UP student-led initiatives in vulnerable communities in the City of Tshwane?
- How have UP student-led initiatives contributed to the household wellbeing of community members in vulnerable communities in the City of Tshwane?

This research built on existing community relationships and focused on identified areas that could benefit from intervention, thus enhancing the wellbeing of community members. The concern of the lead researchers was that reporting and advocacy lies in the hands of the organisers, managers and academics involved in community initiatives. Although citizens' voices are taken into account, there is a lack of first-hand information being shared directly from the community members themselves.

Participants had the opportunity to tell their stories with the intention of enabling researchers to better understand their lives so as to positively influence policy and its implementation. This would contribute to appropriate interventions and raising the awareness of communities' situations. The objective was to overcome stigma and the resulting discrimination towards homeless people, people living with substance abuse disorder and persons with disabilities. The participants' stories were recorded and converted into digital stories. A following phase of the research would entail analysing these stories to make sense of them and ensure that they are incorporated into policy.

The project included collaboration with community members and the staff employed in various community programmes, and the mentoring of students from various disciplines in the University of Pretoria's Faculty of Theology and Religion, School of the Arts, School of Architecture, School of Engineering, Department of Information Science, Department of Occupational Therapy, and the community engagement structure of the Mamelodi Campus. The fundamental objective was to develop community members, and support them to use their voices and co-constructed stories in an authentic manner.

This work is rooted in transdisciplinary cooperation and collaboration. According to the lead researchers, "on our own, we only have part of the puzzle, but working together, we can achieve more, reach further and influence more deeply." Mentorship occurred in multiple avenues: community members mentoring students, students mentoring other students, and staff mentoring students. "This is a constant reminder that it is not about the 'me', but about the 'we'".

Upscaling the project

During the second phase of the programme, the two researchers continued the project that had been piloted in Phase I. This involved analysing the narratives of community members involved in various UP student-led projects on their daily experiences and realities, and navigating their lives in vulnerable communities in the City of Tshwane. The focus was specifically on youth, people who use drugs and the homeless. Analysing these narratives would enable the researchers to make sense of the participants' stories.

The University of Pretoria has long-standing engagements with various communities in the City of Tshwane, including Daspoort, Mamelodi and the Inner City. Community engagement, service delivery and research respond to identified areas that could benefit from intervention and the enhanced wellbeing of community members.

A lot of good work has already been done in several of the University's faculties and research units to respond to the needs of community members, including street-based people and those those living in shelters. These include clients of the University of Pretoria's Community-oriented Substance Use Programme (COSUP) in the Faculty of

Health Sciences. Stakeholders include local and provincial government, faith-based organisations (FBOs), non-governmental organisations (NGOs), advocacy organisations, community members and the University of Pretoria.

The project aimed to collect narratives and creative expressions of people's lived realities, and present them in the form of an e-book. It therefore endeavoured to address the following questions, which allowed the researchers to better understand the lived realities of community members in various settings:

- What are the lived experiences of community members involved in various UP student-led initiatives in vulnerable communities in the City of Tshwane?
- How best are these stories put together and presented authentically?
- What information can be gleaned from the stories to help improve services to vulnerable communities in the City of Tshwane?

Narratives and creative expressions of stories were facilitated among people who use or have used drugs. This took place at the University's COSUP sites in Mamelodi, Daspoort, Hatfield and Atteridgeville, as well as among homeless people living in shelters and transitional housing facilities in the inner city of Tshwane. The stories were collated and edited for publication (while maintaining their authenticity), thematically analysed for research purposes, and presented as acts of advocacy in various settings.

The research had the following objectives:

- Increase awareness of the lived reality of people who use drugs and people who are homeless in the City of Tshwane by sharing their stories
- Bring people who use drugs and those who are homeless into contact with decision makers by sharing their stories at the Illicit Drug Use Symposium 2021

The project team included members of UP's COPC Research Unit, the Department of Family Medicine, the Department of Occupational Therapy, the Department of Architecture, the Department of Information Science, the Centre for Faith and Community in the Faculty of Theology and Religion, and Mamelodi Campus's Community Engagement and Research Unit. Members of the project team mentored both undergraduate and postgraduate students across various disciplines.

Outputs of the project included the following:

- The delivery of a collaborative oral presentation, titled "Sharing narratives of the COSUP clients and members of the homeless community in the city of Tshwane through digital storytelling", at the Flexible Futures virtual conference on 27 and 27 August 2021.
- The delivery of a collaborative oral presentation, titled "Building connections through storytelling and bringing about change", at the Africa Interprofessional Education Network (AfrIPEN) virtual conference from 15 to 17 September 2021.
- The presentation of five health awareness events at disadvantaged schools around Pretoria (more than 500 school learners were reached).
- The presentation of four peer educator training sessions (more than 30 peer educators were reached).
- The presentation of 27 group therapy sessions in Mamelodi, Daspoort, the Inner City and Atteridgeville (more than 350 individuals were reached).
- The presentation of a Pecha Kucha workshop on 1 October and 22 October 2021 to empower peer educators to document their stories in preparation for the Illicit Drug Use Symposium on 16 and 17 November 2021 (four Pecha Kucha workshops were presented by peer educators at the symposium).
- The collection of additional stories from marginalised and stigmatised community members for publication in the e-book.
- The transcription, editing and relaying of the stories for publication in the e-book.
- The publication of two e-books in November 2021.
- The presentation of digital storytelling training from 7 to 10 March 2022.
- The distribution of information and educational training material via seven newsletters, eight on-site conferences and five online webinars. The online webinars were also attended by collaborators from other universities in Africa.
- The drafting of articles for publication in peer-reviewed, accredited academic journals.

Four female postgraduate students played an active role in the project's community engagement initiatives and research, two of whom have since graduated with their master's degree, while about 70 female fourth-year Occupational Therapy students disseminated information and conducted therapeutic interventions in the community. An early-career researcher, Judith Mahlangu, who was studying Development Studies at Northwest University at the time of the project, completed her undergraduate studies at the end of 2021. In 2022, she enrolled for a Postgraduate Diploma in Disability Studies at the University of Cape Town. She intends to pursue a master's degree at the University of Pretoria after completing her postgraduate diploma.

THE DOWNSTREAM IMPACT OF DISINFECTANTS AND SANITISERS ON THE ENVIRONMENT, FOOD AND HEALTHCARE SYSTEMS: A LEGAL AND REGULATORY FRAMEWORK

This research project, led by Prof Lise Korsten of the Centre of Excellence in Food Security, aimed to investigate the South African regulatory framework for disinfectants and hand sanitisers in South Africa to determine whether products comply with safety specifications, and whether a One Health approach is followed.

In the absence of a vaccine, the World Health Organisation (WHO) emphasised that hand hygiene is essential. One way of practicing this is by using hand sanitisers with an alcohol content of at least 70%. This study sought to determine whether such hand sanitisers are available to the South African public, and if so, what distinguishes one brand from another.

The researchers explored this conundrum from different angles. Firstly, they assessed the applicable legislation, regulations and standards associated with disinfectants and sanitisers. Secondly, they selected hand sanitiser samples from different suppliers and ranked them according to their regulatory specifications. Finally, they tested the products for their alcohol percentage and for the presence of impurities that can be harmful to human and animal health, and that can have a negative impact on the environment.

The relevance of this research is to be found in the Consumer Protection Act, which seeks to ensure that consumers are provided with adequate, evidence-based information. The researchers hope that this research will contribute to the pool of knowledge on the sustainable production, distribution and use of sanitisers and disinfectants. Collaborators included Dr Willeke de Bruin and Dr Tracy Muwanga of the Department of

Plant and Soil Sciences. It enabled further studies into the downstream impact and effect of mass-released disinfectants and sanitisers on the environment, public health and safety, and the long-term impact on microbial diversity and stability, thus providing a more effective policy governance structure for these chemicals. It also supported public awareness and training programmes towards the safe use of these chemicals.

Upscaling the project

This project was upscaled during the second phase. Phase I had focused on the downstream impact of disinfectants and hand sanitisers on the environment, food and healthcare systems. Further research could thus be conducted on the status of fake hand sanitisers and public perceptions on hand sanitisers' health implications.

The COVID-19 pandemic had emphasised the critical importance of hand hygiene as a proactive measure to prevent transmission of the coronavirus. Washing with soap and water is the WHO's recommended preventative measure as it removes a broad spectrum of micro-organisms and dirt, but where hand-washing facilities are not available, hand sanitisers serve as the most convenient and accessible alternative.

Some of these commercially available products have come under scrutiny due to unregulated and substandard formulations. In the first phase of this project, the research team completed chemical analyses and a review of the label information of 60 hand sanitisers found on South African retail shelves. This study focused on expanding the scope of the previous study to include an analysis of the androgenic activity and sensory properties of the hand sanitisers. Furthermore, a human health risk assessment was performed on the products' potential health risks.

The project team included members from the Department of Plant and Soil Sciences, and the Department of Consumer and Food Sciences in the Faculty of Natural and Agricultural Sciences, and the Department of Urology in the Faculty of Health Sciences.

The project covered three main elements:

- An assessment of the androgenic activity of hand sanitisers
- An analysis of the risks associated with estrogenic and androgenic exposure as a result of hand sanitiser use
- An investigation into the sensory properties of hand sanitisers

Sixty different hand sanitisers were analysed for androgenic activity using the recombinant yeast androgen screen (YAS) assay.

A chemical with androgenic activity mimics human androgen hormones, which are responsible for regulating the development and maintenance of male characteristics, by binding to the cell's normal androgen receptor location. Chemicals with androgenic activity can have adverse health effects in mammals, including humans, sometimes at low doses in foetal to juvenile stages, with effects detected in adults. Of the 60 samples, 22 indicated androgenic activity.

The assessment of the hand sanitisers' androgenic activity was followed by a risk analysis of hand sanitiser exposure. The findings of the previous study were used to evaluate the potential human health risks of sanitiser use based on the oestrogen- or androgenic-mimicking concentrations measured.

Use was made of the human health risk assessment approach of the United States Environmental Protection Agency and the WHO to conduct a first-level screening health risk assessment. This entailed modelling occupational exposure to hand sanitisers, as well as consumers' assumed exposure to hand sanitisers.

Exposure assessment assumptions were calculated for employees working at tills, who need to sanitise their hands up to 50 times per hour, and the average consumer, who needs to sanitise their hands every time they enter a store or travel on public transport.

Hazard quotients were calculated using both the mean and maximum concentrations detected to provide an indication of the range of potential risk.

All assumed exposures resulted in a Hazard Quotient (HQ) of less than 1 for both oestrogen and androgen activity in the worst-case occupational scenario and for the average user.

An HQ of less than 1 is considered safe for a lifetime of exposure.

It was not surprising that the occupational exposure of tellers resulted in significantly higher hazard quotients, with a ten-times higher assumed multiple exposure on a daily basis than the average consumer (yet still with an HQ of less than 1).

Although negative health risks resulting from oestrogenic and androgenic activity are not anticipated according to the modelled exposure scenarios, the skin barrier has been shown to be overcome by mixtures of chemicals, enhancing transdermal drug delivery.

Examples of chemical penetration enhancers were found in each of the 60 hand sanitisers tested. According to Prof Korsten, additional research is needed to confirm these modelled results to ensure that greater absorption of the hormone-mimicking compounds does not result in possible long-term health impacts.

The final section of the project entailed a descriptive sensory analysis of 25 of the 60 hand sanitisers in the sample. An experienced trained sensory panel, comprising 10 members from the University of Pretoria's Department of Consumer and Food Sciences, evaluated the sanitisers. The evaluation found that there were significant differences in the sensory properties of the different sanitisers. These differences could be attributed to particle presence, viscosity, colour and aroma.

Outputs of the project included the following:

- The preparation of a scientific paper on the risk analysis of hand sanitiser exposure
- The preparation of a scientific paper on the sensory analysis of hand sanitisers
- The delivery of a presentation on the findings emanating from the project at the 10th European Conference on Sensory and Consumer Research in Turku, Finland, from 13 to 16 September 2022
- The participation and mentorship of young female doctoral candidates and undergraduate students in the project

4. FOOD SYSTEMS

ALL-INCLUSIVE ONE HEALTH RISK ANALYSIS FOR COMMUNITY HEALTH

This research project, led by Prof Lise Korsten of the Centre of Excellence in Food Security, confirmed that multidrug-resistant, extended-spectrum and/or AmpC-producing *Klebsiella pneumonia* and *Escherichia coli* are prevalent in the environment (including water) and the fresh produce food system.

Determining the likely presence of pathogens provides a better understanding of the level of risk in the informal food system. Determining the virulence, antibiotic-resistant genes present, and other characteristics is essential to allow a deeper understanding of risk through next-generation risk assessment. Tools such as whole-genome sequencing have allowed researchers to exploit the tracing routes of transmission and determine contamination events that take place in the farm-to-fork continuum, as well as to understand that antibiotic resistance can be spread and transferred within the environment.

Collaborators in this project included Dr Stacey Duvenage and Dr Erika du Plessis of the Department of Plant and Soil Sciences within the Fresh Produce Safety Research Group in the Centre of Excellence in Food Security. Collaboration was also established with the core sequencing facility of the National Institute of Communicable Diseases (NICD) early in 2020, as well as with the Centre for Enteric Diseases. The sequencing of these *K. pneumonia* and *E. coli* isolates is the next step in the hazard characterisation process to determine their antibiotic resistance and virulence.

The research provided the opportunity for transdisciplinary contributions from researchers in microbiology, plant science and plant pathology, who collected and identified isolates. These researchers extracted DNA from the isolates before submitting them to the NICD, where experts in genetics and bioinformatics sequenced the strains. Collectively, all these disciplines will be responsible for analysing the whole-genome sequencing data in a relevant and accurate manner.

Working within this transdisciplinary team gave the mentees the opportunity to learn from experts outside their field of specialisation. This provided insight into the link between the environmental and botanical aspects of a holistic One Health approach, and how the individual components of One Health link to and contribute to human health. The project included community outreach and education.

During a virtual workshop held on 7 June 2021, some information on the project was shared with the public. This led to a deeper understanding of transdisciplinary research within the larger area of food safety and One Health. This project continued during the second phase of the Future Africa-Unicef partnership.

Upscaling the project

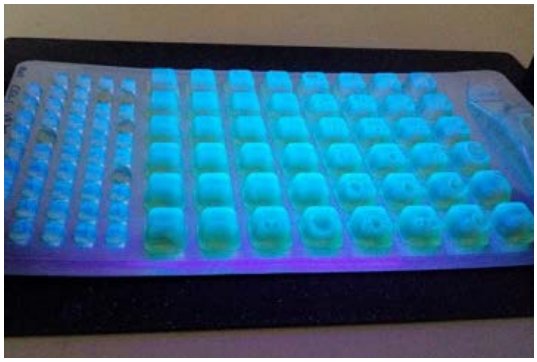
The second part of the project aimed to determine the potential link and pathogenic probability of *Salmonella, E. coli* and *K. pneumoniae* multidrug-resistant isolates obtained from the environment and irrigation water used in the production of leafy green vegetables on commercial and small-scale farms. This produce is sold formally and informally.

The whole-genome sequencing of *Salmonella* isolates was done as part of a collaborative agreement with the US Food and Drug Administration, using its core sequencing facility. The sequencing of *E. coli* and *K. pneumoniae* isolates was done in collaboration with the NICD. This information was used for hazard characterisation and data analysis. This work formed part of a PhD study on risk assessment using the generated data.

Upon completion of the sequence analysis, this research was consolidated into two articles in high-impact journals. These articles provided an overview of the characteristics of the *E. coli, Salmonella spp.* and *K. pneumonia* isolates from the fresh produce agro-ecosystem.

Outputs of the project included the following:

- The mentoring of three female PhD candidates, who completed their postgraduate studies through the project.
- The contribution of a chapter, "School food and the promotion of a more just and equitable food system in South Africa" in the book *School food, equity and social justice, critical reflections and perspectives*. Thabang Msimango, a PhD student in the project, presented the school food safety section of the book chapter to students and academics during a webinar held on 16 March 2022.
- The submission of a scientific article to *Journal of Food Safety* on the microbiological safety of fresh produce used to prepare meals in school feeding schemes.



- The presentation of three science communication workshops.
- Presentation of a session, "A scientific dialogue to inform fit-for-purpose irrigation water microbiological quality criteria and policy for fresh produce production to ensure food safety" at the Water Research Commission's webinar on 7 June 2021 to coincide with World Food Safety Day.

FOOD PRODUCTS ADOPTED TO CLIMATE CHANGE TO IMPROVE FOOD SECURITY FOR CHILDREN

This research project, led by Prof Hettie Schönfeldt, NRF-DSI SARChI Chair in Nutrition and Food Security, aimed to examine fruit, vegetables and animal products adapted to climate change in improving food security for children within their first 1 000 days.

The project resulted in transdisciplinary research, combining knowledge from different scientific disciplines, including the public and private sector, and civil society. Cross-sectoral collaboration took place with Future Africa, the University of Pretoria's Community-orientated Primary Care Unit, the Department of Family Medicine, the Department of Animal Science and the Department of Architecture. The implementation of an urban agricultural programme within an informal settlement could serve as a model for future projects.

The objectives of the study were as follows:

- Evaluate the proposed vegetables, fruit and animals in terms of their resilience and adaptability to the study
- Determine the acceptability of the proposed vegetables, fruit and animal products as complementary and weaning foods for children aged 6–12 months, 12–24 months and 24–59 months

The study site was Cemetery View, an informal settlement in the east of Pretoria with a population of approximately 3 500 people. This settlement developed organically over time, with minimal municipal input. It is located within a wetland, which has prevented the municipality from legitimising it, as was done with the neighbouring informal settlement, Plastic View. As a result of these factors, Cemetery View has had an unstable growth. Its fluctuations could be attributed to several factors, including frequent flooding, fires and a lack of municipal support. It has a transient character.

A list of foods was compiled that grow easily in Pretoria. These foods were identified with the assistance of a botanist and the Agricultural Research Council. These foods were displayed on a poster board with their common names. Participants in the study were provided with stickers according to their countries of origin, and instructed to paste the stickers on two boards – one for mothers and one for children – indicating the foods they would like to have in a food garden and consume. The majority of the participants (80%) were migrants, mostly from Zimbabwe, but also from Lesotho, Mozambique and Zambia. Only one participant was from South Africa. They therefore represented different food cultures.

The study included a cross-sectional survey with data collected using focus group discussions. The members of the focus groups had to be over 18 years of age; they had to reside in Cemetery View; and they had to be able to give informed consent. The qualitative data collected from the focus group discussions relating to the proposed fruit, vegetables and animal source foods preferred was then analysed.

The researchers anticipated that more participants would choose spinach. However, upon questioning the participants, they revealed that if they had a choice, they would not eat spinach, but due to it being readily available and easy to grow on small patches of land and in bag gardens, it is regularly consumed. Their favourite foods included avocado, banana, cabbage, carrots, guava, maize, orange-flesh sweet potato, papaya, pumpkin, tomatoes and watermelon. Statistical calculations will be performed on the data collected. Nutrient density calculations will also be done on the chosen foods, and a model constructed, plotting the nutrient density of the chosen foods as opposed to its energy content.

THEME 4
AUGMENTATIVE COMMUNICATION ON THE HEALTH CRISIS

HEALTH IS A FUNDAMENTAL RIGHT, ENSHRINED IN THE SOUTH AFRICAN CONSTITUTION. THIS EXTENDS BEYOND THE RIGHT TO BASIC HEALTH CARE, TO THE RIGHT TO EQUALITY OF OPPORTUNITY TO HEALTH CARE, PREVENTATIVE HEALTH CARE AND HEALTH CARE THAT IS ACCEPTABLE AND OF A GOOD QUALITY. DESPITE THESE RIGHTS, NOT ALL PERSONS RECEIVE EQUALITY IN HEALTH CARE. IN SOUTH AFRICA, PERSONS WHO ARE VULNERABLE, SUCH AS THOSE WITH DISABILITIES, ARE REPORTED TO EXPERIENCE INCREASED BARRIERS IN ACCESSING HEALTH CARE, AS WELL AS DISPARITIES IN THE QUALITY OF SERVICES THEY RECEIVE COMPARED TO PEOPLE WITHOUT DISABILITIES. WITHIN THE GROUP OF PERSONS WITH DISABILITIES, THOSE WITH COMMUNICATION DISABILITIES HAVE BEEN SPECIFICALLY HIGHLIGHTED AS HAVING INCREASED VULNERABILITY IN HEALTH CARE QUALITY AND SAFETY.

CENTRE FOR AUGMENTATIVE AND ALTERNATIVE COMMUNICATION

The University of Pretoria's Centre for Augmentative and Alternative Communication (CAAC) is located in the Faculty of Humanities. The Centre was established in 1990 to ensure better and more coordinated service delivery for children with severe disabilities, and little or no functional speech. It provides training and education through degree and non-degree programmes, as well as research to provide evidence-based services that are appropriate to the South African context. It also mobilises support for persons with little or no functional speech by providing credible evidence of the challenges they face.

THE TEAM

The Unicef-funded initiative to empower the youth, as well as women and historically disadvantaged institutions, with support relating to augmentative communication, was led by Prof Shakila Dada. Other members of the team were Prof Vasu Reddy, Prof Kerstin Tönsing, Dr Alecia Samuels, Dr Kirsty Bastable, Maureen Casey, Constance Ntuli, Marguerite Steppe and Dr Adele May.

Prof Shakila Dada

Prof Dada is Director of the University of Pretoria's Centre for Augmentative and Alternative Communication (CAAC). Her research seeks to systematically describe and understand the communication and participation patterns of people with complex communication needs. She focuses on the way in which graphic symbol-based augmentative and alternative communication (AAC) systems can be used to facilitate both language learning for persons who use AAC and their participation in society. She is particularly interested in the amount of intervention required to facilitate comprehension of language in these individuals, and how to train communication partners to facilitate language learning.

EMPOWERING COMMUNICATION-IMPAIRED YOUTH TO RESPOND TO THE PANDEMIC

The initiative that was developed to empower communication-impaired youth to respond to the challenges brought about by the COVID-19 pandemic entailed taking a mixed-method approach involving various stakeholders (youth with disabilities, caregivers and professionals). The stakeholders co-designed health care material relating to COVID-19 and other health-related matters for use with individuals who experience communication vulnerability in South Africa.

The project utilised elements of co-design to ensure that material was designed in collaboration with youth with disabilities and their communication partners. This material has been made available in six of the country's official languages: English, Afrikaans, Setswana, isiZulu, isiXhosa and Sepedi. The electronic resources that were developed are available on the CAAC's website and include, among others, 18 communication boards relating to the COVID 19 pandemic, such as explaining the lockdown situation or health-related matters, such as communicating to a health care practitioner about one's pain.

www.up.ac.za/centre-for-augmentative-alternative-communication

A communication board is an AAC device that displays photographs, symbols or illustrations to help people with limited language skills express themselves. The user can gesture, point to, or blink at images to communicate with others. They can be simple, handmade boards or computerised programs. They can be useful in schools, homes, health care environments or any community setting.

Communication boards help users express their immediate needs and preferences. These boards may increase autonomy by allowing users to make decisions about their own lives, as it allows them to communicate their needs to others more effectively. They also provide a way to learn and practice more advanced communication skills. Most importantly, they can keep users safe by giving them a means to tell others what is happening in their world.

The project also developed 20 visual schedules explaining, for example, how to use a communication board, wash your hands and go to the doctor. More than 70 social story videos provide information on how to maintain your mental health during lockdown, how to communicate with health care professionals, what happens when you go to hospital during COVID-19, how to tell if information is real or fake news, how to make your own hand sanitiser, how to wash your hands, what is cerebral palsy, how to keep yourself healthy, having a medical procedure, your blood drawn or an X-ray taken, and healthy eating.

The project involved the following activities:

- Conducting virtual interviews with youth with disabilities on their health care communication needs, including on COVID-19
- Producing health education materials
- The social validation of health education materials
- The translation and publication of health education materials in multiple South African languages
- Increasing the knowledge of students in early childhood intervention on the rights of youth with disabilities
- Increasing the knowledge and skills of individuals working with persons with disabilities to address health care education and communication needs

In the first phase of the project, ethical approval was granted to conduct virtual interviews with 14 youths with disabilities and eight caregivers of youths with disabilities. Online focus groups were also held with 15 health care professionals who work with these individuals. The interviews centred on determining their health education needs.

"Interviewing youth with intellectual disabilities and/or communication impairments without a face-to-face interview introduced additional challenges," explains Prof Dada. "For youth with communication disabilities, the process of answering questions can be very time consuming." Literacy is a challenge for both groups. "In this regard, the use of online surveys – with voice-overs of all the questions – was extremely useful for participants with communication impairments as they were able to answer the initial questions at their own pace, and could repeat the question if required."

The online survey was followed up with an interview on WhatsApp, including video chat, so that the researcher could see the participants. The video interviews were challenging for some of the participants due to poor data connections. For individuals with intellectual disabilities, the Zoom platform proved to be the most successful mechanism to conduct interviews as the interviewer could ask for clarification as needed, and probe certain areas further.

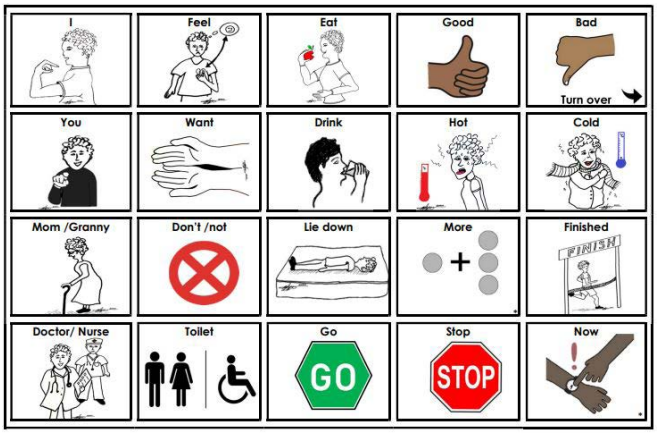
Obtaining sufficient caregiver participants for this component of the study was also very difficult. Caregivers did not always respond to requests to be interviewed or to complete an online survey. Many indicated that they were too busy. Once eight participants had been interviewed, saturation of the data became mostly evident, hence the project continued with these eight participants.

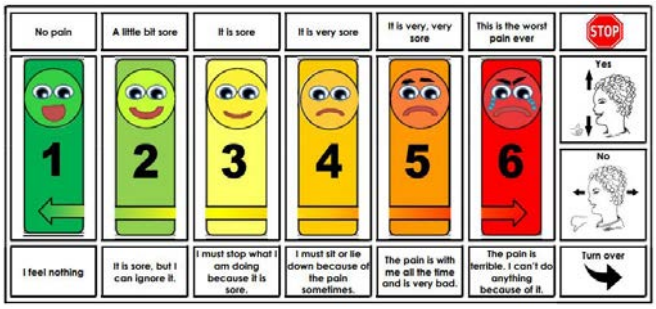
Focus groups with health care professionals such as speech therapists and occupational therapists yielded valuable information that assisted in understanding the communication challenges experienced related to accessing health information and healthcare. It also helped to refine the design requirements of the adapted health education materials.

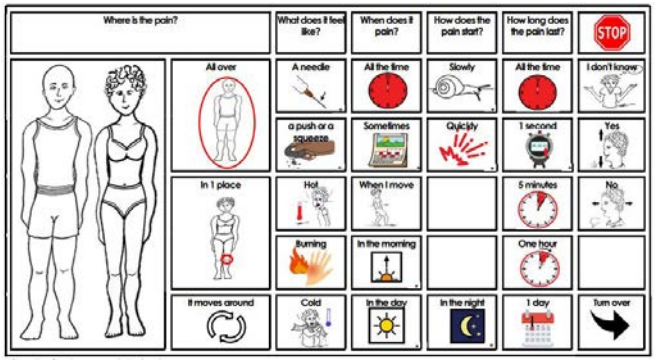
Comprehensive feedback was received, analysed and synthesised. In addition, 12 young academics participated in the project. Eleven youths with typical development were also involved in the production of the social story resources.

Based on the findings of the interviews and focus groups, health education materials were produced. The social validation of the materials was obtained by obtaining feedback from the youth, including the validation of symbols, communication boards, visual schedules and videos.

"This was an extremely rewarding process," says Prof Dada. "At times, it became apparent that the concept being presented was not known or understood by the youth with disabilities. However, these guided adaptations of the vocabulary facilitated the presentation of the concepts." A major accomplishment of the project was the involvement of young people, including those who use AAC, in the project.







The success of the project was voiced by a youth participant who reported: "We should all be so proud of what we have made." This surely provides evidence that the project has succeeded in its aim to be a co-production where researchers and participants are partners, rather than youth with disabilities only being "consultants" on the periphery.

Following the production of the health education materials, they were translated and published in multiple South African languages, including English, Afrikaans, Setswana, isiZulu, isiXhosa and Sepedi. A total of 110 health education materials were produced and published online. Since going live on 12 February 2021, the website has reached its target of 2 700 visits and downloads of resources. An additional 59.26% of the visits to the website have been new visits. Although the incorporation of the translations, particularly the voice-over translations of the video material, proved to be time consuming, the feedback received on these materials has been extremely positive.

Organisations who work with youth with a disability reported sharing the resources with their members via their social media platforms. These organisations include the International Association for the Scientific Study of Intellectual and Developmental Disabilities, the International Association of Communication Sciences and Disorders, the South African Speech Language and Hearing Association, and the Department of Education in the Eastern Cape, KwaZulu-Natal and Gauteng provinces of South Africa.

Some of the people who have downloaded the resources have also shared their experiences with the project team. One person who uses AAC said: "Now, more than ever, I really want to be heard. I am going back to hospital for a big operation, and I am armed with all my boards."

Seminars and workshops

The production of the health education materials for youth with disabilities and communication impairments was followed by a seminar with master's students on the ethics of undertaking research with these populations.

The aim of this seminar was to increase the knowledge of students in early childhood intervention on the rights of youth with disabilities when undertaking research

with them. A total of 27 master's students from the University of Pretoria and Jönköping University in Sweden participated in a three-day online academic discussion, held from 14 to 16 September 2021.

The online discussion provided an opportunity for students from different countries and cultural contexts to engage in discussions on ethical issues related to conducting research with children and youth with disabilities. The inclusion of students from different cultural and economic backgrounds provided for diverse and interesting discussions, and a better understanding of challenges encountered in various contexts.

In addition to this, a virtual workshop was hosted on 27 October 2020 for persons working with youth with disabilities on the relevance of, and mechanisms for, the co-design of health education and communication materials. The workshop aimed to increase the knowledge and skills of individuals working with persons with disabilities to address health care education and communication needs. A total of 100 delegates attended the online workshop, which presented the theory behind co-production, as well as the results of interviews undertaken with stakeholders. The workshop also introduced the initial materials produced as a result of this project.

Other dissemination events included the following:

- A virtual workshop for persons working with youth with disabilities on the design, production and co-production of health education materials in video format: 20 people attended the training, and nine health education videos were produced from this workshop.
- A final project dissemination webinar on Zoom: Approximately 75 individuals attended the webinar as groups or as individuals, both in real time or by later downloading the event.
- Youth Forum: Three youths who use AAC made a presentation at the Youth Forum hosted by Future Africa on 10 June 2021.
- Webinar of the Emirates Speech Language Organisation: 50 professionals in the United Arab Emirates (UAE) attended a webinar on the project on 24 May 2021.
- The participation of students involved in the project in discussions on the co-design of health care materials, ethics webinars and communication science engagements.

Feedback

Professionals who work with youth with disabilities provided extremely positive feedback to both the workshop on co-production and the training to make health educational video materials. From this workshop, they produced materials that were included in the project. Although this number is low, it may be attributed to the timing of the project as it overlapped with students meeting deadlines to graduate timeously. With the extension of the project in 2021, an additional 14 postgraduate students could be included.

Postgraduate students from the CAAC involved in the project at master's level also had a very positive experience of their involvement. "I believe that involving youth in research will provide youth with a voice, thus providing them with opportunity to participate in decisions that pertain to themselves and the larger community," remarked one student. Another said: "The role of the youth in future education is vital as they will indicate preference, motivation and direction of involvement and participation and thereby success."

Two PhD students involved in the project reflected positively on their experience as well:

"As an evidence-based researcher, the practical information acquired from these webinars was most pertinent – especially given the current climate of health misinformation... Overall, the three webinars were excellent opportunities that facilitated my growth as an early-career researcher."

"It was highly motivating to work on a project based on consumer-driven research priorities and to see the real-world applications of the project. On a personal level, the experiences bolstered my confidence to speak about my research and research interests and potential to collaborate with other departments or researchers outside of my field. It was also positive to have a sense of connection with other researchers and to frame my own research interests in the greater scheme of COVID-19 and related research."

For Prof Dada, a highlight of the project was the collaboration with people who use AAC and their caregivers, and the production of concrete material that can be used to make their lives easier within the health care system, and support their ability to communicate graphically.

EMPOWERING WOMEN SCIENTISTS AND HISTORICALLY DISADVANTAGED INSTITUTIONS

The University of Pretoria's CAAC is currently the only centre in Africa that does postgraduate training in AAC. There is limited knowledge regarding the implementation of this specialised field in South Africa and on the African continent. Following the co-production of health education materials research project, a second project was initiated to meet the objectives of Phase II of the Future Africa-Unicef partnership. It aimed to address the need for training in AAC across a cohort of young women researchers in South Africa and on the continent. Partners from historically disadvantaged institutions and African universities were identified for support, based on previous interactions and requests to the CAAC for AAC training.

To improve the fundamental knowledge on AAC that has been developed at the University of Pretoria over many years, a transdisciplinary approach was taken to develop an intelligent tutoring system (ITS) interface for AAC training, in collaboration with Prof Nelishia Pillay of the University's Department of Computer Science. It was envisioned that, following the development and successful roll-out of the ITS, it would be possible to share this knowledge with candidates at other universities. This training would not only cover basic knowledge, but would include training in the clinical skills related to AAC.

The aim of the project was therefore to develop four ITS AAC modules, and to evaluate their effective implementation by students at universities across Africa, specifically speech therapy and education students. A research study to determine the feasibility of an ITS as a mechanism to teach AAC was therefore one of the project's anticipated outputs.

Together with Prof Dada, co-researchers included Prof Nelishia Pillay, Dr Alecia Samuels, Prof Kerstin Tönsing, Maureen Casey, Mia Gerber and Cathy Flores, postdoctoral fellows Dr Kirsty Bastable and Dr Adele May, and PhD students in the CAAC Katherine Smith, Refilwe Morwane, Zakiyya Laher, Robyn Moore, Nothando Tshabalala, Mavis Mohuba and Rahab Mothapo.

Collaborators at other universities across South Africa and Africa included the following:

- Dr Legini Moodley and Saira Banu Karim, University of KwaZulu-Natal, South Africa
- Dr Unathi Stemela-Zali, University of Fort Hare, South Africa
- Rahab Mothapo and Mavis Mohuba, Sefako Makgatho Health Sciences University, South Africa
- Josephine Ohenewa Bampoe, University of Ghana, Ghana
- Dr Sourav Mukhopadhyay, University of Botswana, Botswana
- Dr Isanda Beatrice Onchari, Kenyatta University, Kenya

The response from women scientists and individuals from historically disadvantaged institutions who were invited to participate in the project was extremely positive. The cohort that joined the training and testing phases of the project included 14 students from the University of Ghana, 40 students from the University of Botswana and 32 students from the Kenyatta University. Undergraduate speech therapy students from the University of KwaZulu-Natal and the University of Fort Hare also joined the project at a later date.

Eight phases were identified for the implementation of this project:

- Engagement with stakeholders by means of a two-hour webinar with university partners, doctoral students and collaborators describing the goals of the project, and planning the development of the AAC module content that would be included in the ITS.
- Training in the form of a two-hour webinar presented by Prof Pillay on ITS considerations when developing an AAC module.
- Further training in the form of a three-hour webinar to identify contextually relevant case studies for the AAC modules. This would include using clinical reasoning pedagogy, and determining approaches to the use of case studies.

- The development of the modules by means of a two-hour webinar that focused on how to develop and write the training modules for the content areas and developing a pool of assessment questions for inclusion in the ITS.
- Training on clinical insights with the ITS interface. This entailed developing the ITS interface with the modules and case studies created. Doctoral students worked with the Department of Computer Science to ensure that the ITS worked, and that the clinical reasoning, as contained in manuals, was captured.
- Community engagement and piloting the system. This entailed testing the ITS AAC module with students at the partner universities. Students in special education and speech-language therapy at the partner universities participated in testing the modules.
- Revising the ITS AAC modules through feedback from the pilot to refine the modules. Participants were supported by mentors in the production of materials for the project.
- Community engagement and conducting training on the use of the ITS AAC module. This entailed testing the ITS AAC module with the other half of the partner universities. Students in special education, speech language therapy and occupational therapy at the partner universities could participate in the training.

The four modules that were developed covered the following:
- An overview of AAC
- Assessment in AAC
- Communication partner training for AAC
- Literacy and AAC

The process of data collection entailed five steps:
- Students indicated an interest in participating in the project by completing a Google Form.
- Students provided their consent to participate in the project.
- Students completed a pre-test questionnaire.
- Students were given access to the AAC modules on the ITS, and were given three weeks to work through them.
- Students completed a post-test questionnaire.

The data that was generated was also used to draft two scientific papers: one on designing and developing an ITS to support AAC knowledge and skill, with a focus on transdisciplinarity, and the other on the effect of an ITS AAC module on professionals' knowledge and skills.

It was decided that further workshops should be conducted to include themes such as how to guide students to develop their clinical reasoning skills, and the accessibility requirements for students with disabilities. It was found to be beneficial to run such workshops prior to the production of the modules.

The development of the training modules was completed by the end of August 2021, and the development of the ITS started in September 2021. A pilot study was initiated with the University of Ghana in November 2021. Based on the results of the pilot study, revisions were made to the ITS in preparation for its final roll-out.

In February 2022, the ITS modules were tested by undergraduate students at the other partner universities. All four modules were completed by 14 students from the University of Ghana, 40 students from the University of Botswana, 32 students from Kenyatta University, two students from the University of KwaZulu-Natal and 10 students from the University of Fort Hare.

The results of the study were analysed empirically to provide clarity on the feasibility of using the AAC ITS as a means of training in AAC, as well as the implementation of the AAC ITS at other universities in Africa. The preliminary results were shared with the project team on 17 May 2022.

On 30 May 2022, the results were discussed with the students who had participated in the project. The potential of taking this project forward was also discussed. The partners are keen to explore opportunities for further funding to make this a reality.

Reflecting on the success of the project, Prof Dada feels that the project made good progress as one of the first of its kind to integrate AAC modules into an ITS.

There is a logical progression of this project going forward to improve on the computer science aspect of the ITS, as well as the modules and AAC content.

"It is important to expand access to the project so that more students in South Africa and the continent can be trained in AAC," remarks Prof Dada. "The potential to expand this for other communities can also be explored in future."

THEME 5
ARTS FOR HEALTH

SINCE ITS ADVENT IN 2019, THE COVID-19 PANDEMIC HAS CLEARLY IMPACTED SOCIETY AT EVERY LEVEL OF WHAT IT MEANS TO BE A HUMAN BEING, AND WHAT IT MEANS TO BE IN COMMUNITY WITH OTHERS. IN OBSERVING RESILIENT COMMUNITIES, RESEARCHERS IN THE UNIVERSITY OF PRETORIA'S SCHOOL OF THE ARTS CAME TO THE REALISATION THAT SOCIAL SUPPORT MAY MATTER THE MOST, AS THIS ADDRESSES THE ABILITY TO RECOVER FROM HARDSHIP AND MOVE FORWARD IN A POSITIVE, ADAPTIVE WAY.

They also noted that research surrounding resilience is complex and varied, as it depends on the impact of the hardship being faced, and the protective factors that may help a group of people to face it. They reached the conclusion that exploring values and social norms can reveal important aspects for the design of effective interventions.

The programme conceptualised by researchers in the School to empower the youth as part of the first phase of the Future Africa-Unicef partnership included seven individual sub-projects that focused on the development of resilience in the context of COVID-19. These projects were initiated by researchers in several of the School's disciplines, including classical voice and opera studies, classical music, art therapy, and interdisciplinary and museum studies, as well as the Javett-UP Art Centre.

During the second phase of the partnership, the project to determine the impact of arts on the health and wellbeing of children and youth in South Africa was upscaled to empower women researchers and historically disadvantaged institutions with the aim of establishing a community of practice for arts-based psychosocial development practitioners in South Africa.

SCHOOL OF THE ARTS

The University of Pretoria's School of the Arts is located within the Faculty of Humanities. It strives to be the academic locus in South Africa that produces the most distinguished postgraduate researchers, prolific creative talent and performing artists, and provides access and opportunity across demographics to all talented students from all South African communities who wish to maintain standards of excellence at UP and thereby make a contribution to society.

MUSIC PROGRAMME

The University of Pretoria's Music Programme is one of the largest in South Africa and is a vibrant hub of musical and academic activity, built on a legacy of excellence, spanning six decades. It offers a broad range of undergraduate and postgraduate degree programmes covering classical music, jazz, African music, music technology, opera studies, music therapy and performing arts.

INTERDISCIPLINARY AND MUSEUM STUDIES

This is an interdisciplinary programme in the School of the Arts that brings together the practices of heritage, history, preservation and archaeology. It focuses on theoretical and practical approaches to museum and heritage practices within a local and global context.

JAVETT-UP ART CENTRE

The Javett Art Centre at the University of Pretoria (Javett-UP Centre) is a partnership between the Javett Foundation and UP. It is a space that enhances unique and exceptional transdisciplinary learning through the arts. It aims to engage diverse publics in exploring the human condition and reimagining our futures. It furthermore aims to make the art of Africa accessible, relevant and engaging to all people.

THE TEAM

The Unicef-funded initiative to empower the youth to deal with the health challenges associated with COVID-19, as well as women and historically disadvantaged institutions, through exposure to arts-based therapy and research to achieve resilience was led by Prof Alexander Johnson and Dr Andeline dos Santos. Sub-projects within this cluster were led by Dr Dos Santos (Music Therapy), Dr Carol Lotter (Music Therapy), Prof Hanli Stapela (Opera Studies), Prof Siona O'Connell (Interdisciplinary and Museum Studies) and Puleng Plessie (Curator: Education Mediation at the Javett-UP Centre).

A number of professional consultants were also involved in some of the projects. These included Ms Beth Arendse, founder of the Creative Industries Incubator in Eersterust, Ms Marlize Swanepoel, drama therapist and co-founder of sp(i)eel, and Ms Sunelle Fouché, music therapist and co-founder of MusicWorks.

Prof Alexander Johnson
Prof Johnson is Head of UP's School of the Arts, and former Head of the Department of Music. He is an internationally renowned composer. His compositions have been performed in South Africa and abroad over the past 25 years. He has published over 50 compositions, including prescribed compositions for national and international competitions, and for examination bodies in South Africa and the UK.

Puleng Plessie
Puleng is the Curator: Education Mediation for the Javett-UP Art Centre. Her research explores the notion of facilitating through dialogue to improve pedagogy by localising content and introducing different terminologies in isiZulu that can be used to reimagine the language and practices associated with arts education. She is a member of the Board of Trustees for the Curriculum Development Projects Trust.

Dr Carol Lotter
Dr Lotter is a senior lecturer who co-directs the School of the Arts' music therapy programme. She also coordinates the School's Arts Therapies Division. She has worked in the areas of adolescence, adult mental health, neurocognitive disorders and oncology. She is currently the Public Relations Chair for the World Federation of Music Therapy.

Dr Hanli Stapela
Dr Stapela is an associate professor and coordinator of Classical Vocal Studies in the University's School of the Arts. Her creative output and research build on a long career as a performing artist and award-winning opera singer, and mainly fall within the gamut of performance research and practice-as-research, using hermeneutic, performance-led and performance-based methodologies. Her research interests include the art song as theatre, vocal music through a chiaroscuro lens, and the Afrikaans art song.

Prof Siona O'Connell
Prof O'Connell is a founding member of the Critical African Studies project at UP (CAST UP). She has published widely, curated numerous exhibitions, and directed and produced ten films that consider life after racial oppression in South Africa. Her work pivots on ideas of place, belonging and freedom, focusing on land restitution and restorative justice. Her research centres on "colouredness", memory and trauma, and how to think about freedom after apartheid.

Dr Andeline dos Santos
Dr Dos Santos is a registered music therapist. She has worked in childhood speech and language impairment, autism spectrum disorder and childhood emotional adjustment difficulties, and with adults in substance abuse and rehabilitation after gang membership. She works with teenagers referred for aggression. She recently completed a five-year term as the Arts Therapies representative on the Health Professions Council of South Africa.

EMPOWERING YOUTH TO RESPOND TO THE COVID-19 PANDEMIC

The seven individual sub-projects in the School of the Arts that were aimed at fostering resilience as a means of empowering the youth to deal with the challenges of the COVID-19 pandemic included the following:

- Shape Shifters: An arts-based participatory action study with youth not in employment, education or training
- The impact of arts on the health and wellbeing of children and youth in South Africa, and the development of a community of practice
- Opening up empathy by learning with each other: Piloting experiential arts-based knowledge-making workshops
- Creative collaborations: Using art therapy approaches to build resilience in teachers
- An indispensable redress: Harfield Village Social Network Analysis
- Developing grit among undergraduate singing students during the COVID-19 lockdown
- Javett-UP job shadowing/mentoring interns to curate art exhibitions

Shape Shifters

This arts-based participatory action study with youth not in employment, education or training was led by Dr Andeline dos Santos from the Department of Music. She collaborated with Beth Arendse, the CEO and founder of the South African Creative Industries Incubator in Eersterust, just outside Pretoria. This is a turnkey creative hub that provides technical skills training, business incubation, production facilities and networking for artists and entrepreneurs in the creative industries.

The intervention entailed an eight-week programme that made use of arts processes to allow participants to build social capital, develop prospects for entrepreneurial endeavours, critically examine social issues that directly impact their lives, and enable them to be witnessed as strong and resourceful (able to build agency, self-confidence and belief in their own leadership capacities).

The conceptualisation of the project was based on the fact that unemployment is a significant challenge in South Africa. According to Statistics South Africa, 29.1% of South Africans were jobless in 2019, with 32% of South African youth not in employment, education or training (NEET). It has been argued that NEET youth are the most vulnerable to chronic unemployment and poverty.

Unemployment does not only have economic and societal ramifications, but also serious psychological consequences. Employment is a central factor in the transition from dependence to independence, and from youth to adulthood. The long-term effects of youth unemployment represent a form of social exclusion. During the course of the project, the facilitators gained insight into how individuals in an under-resourced community were able to critique social norms related to their experiences of being sabotaged by other members of the community when finding success, and to build spaces that were both safe and brave.

Eight workshops were held with 17 youths in Eersterust in September and November 2020. The workshops included musical improvisation, song writing, drama and visual arts processes. Although the project team had developed an outline of the process, they allowed participants agency to develop the project according to their own needs, and according to needs that were identified in the community. Participants were provided the opportunity to pinpoint problems that were most relevant to them, and to explore ways of developing solutions. The facilitators' role was to create the space for this process, to listen and learn from participants, and to affirm the resources they already possessed.

Creative arts-based processes were used to offer the participants a vehicle through which to identify, articulate and explore barriers and opportunities. According to Dr Dos Santos, "the arts offer a diverse and culturally sensitive medium for this type of experience". The team's resource-oriented focus was on affirming resilience, grit, agency, problem-solving abilities, positively restoring a sense of self and social networking.

Upon conclusion of the process, the participants were given the opportunity to launch more Shape Shifters groups themselves to create a groundswell of change within their community. As an extension of this project, the members of Shape Shifters groups have continued to meet and develop additional community projects that they will be facilitating. The incubator has offered space for these groups to continue meeting. The group is currently designing and decorating the space that has been allocated to them.

The project also led to the development of a youth outreach group, comprised of youth leaders from the Eersterust community, who have established themselves as a permanent group. This group came about in response to the question about what it would be like to create a space for young leaders to be creative and think about various societal challenges and how the youth could effectively help to solve them. This provides a platform for young people to shape themselves, their minds and their communities.

According to Nsamu Moonga, a facilitator for Shape Shifters in Eersterust, "many older people have grown cynical and have lost interest in engaging with the youth." He explained that Shape Shifters is trying to narrow the gap between those with experience and those without, and to provide person-to-person support for younger people. "This initiative enabled young people to find confidence and agency, while working alongside other youth and in their communities."

One of the participants provided the following testimony of the impact of the project:

"First of all, thank you so much for this programme. We will be forever grateful. I can't talk enough about Shape Shifters. The entire group of Shape Shifters has so many talents and every individual wants to do good and make a change in the community. This programme has touched and inspired me so much that I want every person in Eersterust to attend it. I want to continue with this programme even if the incubator can no longer do so. This programme has provided me with the confirmation that politics is indeed my passion. It has restored the hope that everybody can play a role to make our community, the country and the world a better place. I am so hopeful. Thank you once again for giving us such a high-quality programme."

The impact of arts on the health and wellbeing of children and youth in South Africa

This intervention explored the impact of arts-based programmes on the mental health and psychosocial wellbeing of children and youth in South Africa. These programmes were seen as a means of contributing to the evidence base and developing insights that will be useful for organisations as they develop arts-based practices that can contribute to the resilience of the individuals and communities they serve. Its objective was to define the concepts of arts and health from an indigenous knowledge perspective by producing a map of the landscape of Arts for Health practices with children and youth in South Africa.

As the facilitator of this project, Dr Andeline dos Santos collaborated with Marlize Swanepoel, a drama therapist and co-founder of sp(i)eel, an arts therapies collective in Cape Town, Sunelle Fouché, a music therapist and co-founder of MusicWorks, a music therapy community clinic in Cape Town, Malika Ndlovu, an author, poet, arts activist and community arts practitioner, and Prof Dominik Havsteen-Franklin, professor of Practice in Arts Therapies at Brunel University London. They established two online priority-setting groups, comprising 24 individuals between them, using an arts-based, focus group format. They developed an adapted research protocol and completed a scoping review. The feedback from the participants led to a redefinition of the parameters of the scoping review. Finally, they conducted a concept analysis to elucidate a contextual meaning of the concepts of "arts" and "health".

The project team learnt several lessons. They discovered the need to be flexible and adaptive so that they could respond ethically to the material that surfaced from the priority-setting groups. This led to the inclusion of a concept analysis and meant that they had to take a step back to co-create definitions with practitioners and artists on the ground.

The focus of this part of the project was a mapping exercise to determine what is being done with children and youth in South Africa in terms of arts and health. The project team also came to understand that language, as it is presented in academic texts, does not always serve the wealth of knowledge inherent in indigenous practice. They are therefore expanding their key word searches and concept analysis frameworks to include images, symbols and metaphors.

They also learnt that, as a model of practice, "arts in health" seems to be a Western term for a practice in Africa that is ancient and indigenous. While not called arts in health, these concepts have always been integral

and inseparable to the wellbeing of South Africans. Through this concept analysis, the team hopes to present a term that better reflects this. Swanepoel believes that the term "arts for health" may be introduced to better reflect arts practice in South Africa.

A community of practice was formed in 2019 as an output of the initiative. It consisted of organisations, individuals and programmes engaged in arts-based activities organised to promote the psychosocial health and wellbeing of individuals and communities.

The feedback gained through various gatherings held during 2019 indicated that practitioners involved in these programmes often feel undervalued and overwhelmed. The mental health needs in the communities they serve are vast, yet they often struggle to access sustained funding for the projects that address these needs. Practitioners feel that various government sectors, including education, health and social development, do not value the contribution arts-based programmes can make to the health and wellbeing of people in South Africa's under-serviced communities.

A need was therefore identified for continuing research that aims to present evidence on the impact that arts-based activities can have on the health and wellbeing of people in South Africa. Although research had previously been done on a range of arts interventions and the benefits they hold for people, this was seldom accessible to practitioners outside academic institutions. This project only focused on the concept analysis. Further studies will depend on the availability of funding.

Such further studies will collate the evidence that already exists, and present it in the form of a research report to be used as motivation to lobby for access to arts-based programmes, to obtain funding for arts-based programmes, and to promote the inclusion of the arts in various sectors, such as education and health. It will also equip organisations with standardised methods for monitoring and evaluation, and lay the foundation for further impact studies.

Opening up empathy by learning with each other: Piloting experiential arts-based knowledge-making workshops

Empathy is a key component of resilient communities. Dr Andeline dos Santos had previously developed a framework of empathy that can be used flexibly in a range of social contexts and with communities who hold varying individualistic or communal ways of being in the world. This framework was expanded upon in this project.

The framework has two orientations. The first is built upon a constituent ontology, where separate individuals are considered to develop relationships with one another. The second is built upon a relational ontology, where relations are the ontological foundation through which people emerge as individuals.

This intervention, which Dr Dos Santos undertook in collaboration with two independent music therapists, Sunelle Fouché and Sherri Symons, aimed to explore how these two orientations of the framework offer resources, and may be limited in certain contexts and in certain kinds of work. It entailed running collaborative arts-based workshops that were focused on building resilience by sharing knowledge on empathy with music therapists, members of arts-based psychosocial development organisations, teenagers and children so that they can gain an understanding of empathy and apply it in their daily lives.

In this way, empathetic practices were enhanced through four separate (but interrelated) studies with the music therapists, arts-based practitioners at the Field Band Foundation and MusicWorks, teenagers and schoolchildren. The training that formed part of the study entailed eight online workshops with 15 music therapists, five online workshops with eight members of MusicWorks and 12 members of the Field Band Association, six online workshops with teenagers and six workshops with schoolchildren.

Functioning with heightened empathy is a protective, restorative and growth-oriented skill for individuals and groups. Dr Dos Santos observed that participants in the workshops greatly valued being able to understand and apply empathy through a relational lens rather than through an exclusively individualistic and largely Western lens, which is how empathy is typically framed. "This training has potential for enhancing resilience by developing greater understanding and practices of empathy within interpersonal relationships and within organisations."

Participants expressed how they are using the concept of empathy more intentionally in their work and interpersonal lives. The music therapists reflected on the many aspects of insight they had gained on empathy, which impacted their therapeutic practices, and enhanced their ability to work in more context-sensitive ways, their ability to engage in cultural humility, and their desire to develop formalised assessment tools that draw directly on empathy.

One of the therapists remarked: "It's almost like I was working in two dimensions, and all of a sudden, it's like five-dimensional. There's so much depth in it."

Another said "...I can see the understanding about empathy in music therapy, not only in the moment of the session or after, but when I'm assessing the data from the session, and when I'm planning the session. If I fully consider empathy before, during and after the sessions, I will have more tools." Other feedback received commented on the transdisciplinarity of the training: "I think it's not only bringing this to our area, but also to take it to other areas, and I think it will help in terms of speaking to other professionals about what we do. I think it will help a lot for us to build bridges with other professionals to understand what we do and the similarities that we have in our work together".

The participants from MusicWorks and the Field Band Foundation all commented on how the insights they had gained on empathy impacted their organisations, and how they were able to share what they had learnt in practical ways with the community members they serve.

The members of MusicWorks were very enthusiastic after the training as they were about to embark on envisioning the way forward for their organisation, and they decided to use the framework they had implemented in these workshops as the basis upon which to develop this vision. One group member commented: "I think the timing of this training is perfect because we are dealing with these issues during our work now, so it's really relevant. It's not just theoretical. We can actually go into the sessions, explore some of these issues, apply it to our own lives, personally, practice it and then see how it makes sense in our work. So, it was just wonderful to be part of this training."

The tutors and mentors from the Field Band Foundation immediately decided to host workshops for the children and youth in their bands. This would empower them to also start implementing methods of understanding others' emotional worlds, and building empathetic and resilient spaces together.

The teenager workshops were focused on empathy in the context of leadership. The teens consistently commented that they had found the workshops highly engaging and fun because they were active participants throughout. They contrasted this with their experiences of school (particularly Life Orientation lessons), where they feel

they are placed in a position of being passive recipients of information. They explored what it means to be an empathetic leader, not only in their current lives (in group projects, sports teams and peer groups), but when engaging with others one day when they create their own families and participate in the workforce.

Reflecting on the impact of the workshop, one teenager remarked: "Everyone is involved in the workshops, and that doesn't happen in school. The teachers want that, but it doesn't always happen. And we did other things, like with the stories, and we weren't forced to write anything down or put pressure on ourselves. It was more enjoyable." Another teenager said: "I just thought that empathy was looking at someone's perspective, but there is actually quite a bit more to it. So, it's also about looking at their perspective, thinking about what they are thinking and feeling, knowing what they could be going through."

The children's workshops were focused on empathy in relation to friendship. The participants quickly grasped the notion of "making kind spaces together" and were able to generate many feasible ideas of how they can actively be part of creating such environments. Their reflections also served to illustrate the success of the workshops. One of the participants remarked: "When new children come to school now, I know how to make kind spaces for them. I can show them around the school and help them." Another observed: "Empathy is about not getting lost in someone else's feelings, and making sure that you always get out and make sure that it's not an angry feeling."

By piloting these experiential arts-based knowledge-making workshops, the project team succeeded in opening up empathy by learning with each other. They also showed participants how they can use empathy to develop resilience.

Creative collaborations: Using art therapy approaches to build resilience in teachers

Teachers face a host of challenges under "normal" teaching circumstances. During the COVID-19 pandemic, certain challenges were amplified. Teachers were faced with uncertainty, anxiety and continuous change. They had limited contact with their learners, needed to implement social distancing in their classrooms, and experienced a lack of resources and intense stress.

They were required to create opportunities for connection with their learners and for leaners to experience some connection with each other. When a portion of teaching was conducted online, opportunities for play and spontaneity were reduced. This was of particular importance in primary school settings.

Teachers were navigating work (and their own home lives) in the context of a risky world where distance, separation and boundaries are more prevalent. In the spaces in which the project team members work, teachers had noted that they do not always feel heard, and that their struggles were not always taken seriously within their school systems and within their communities. In addition, they were teaching in contexts in which they and/or their learners might be experiencing various layers of grief. The team members felt concerned that teachers did not always appear to be receiving sufficient support. They were also aware of teachers expressing a lack of personal resources to provide experiences of connection, play, spontaneity and support to their learners in the current context of the pandemic, in particular.

The arts therapies, which include music, drama, art and dance movement therapy, offer psychosocial support that is flexible, creative and context sensitive. The intervention, developed collectively by a music therapist, a drama therapist and an art therapist, was aimed at supporting primary school teachers during the COVID-19 pandemic.

Online workshops were developed, which were facilitated as a collaborative arts therapies process. It modelled how support can be given through arts-based group experiences so that participants could be empowered to use such techniques with their learners. Furthermore, the project built a group or groups going forward that could continue to serve as a support system.

The project was facilitated by Dr Carol Lotter and Dr Andeline dos Santos from the School's Music Therapy programme. They worked with Faith Busika, a drama therapist, Kate Dodd, an art therapist, and Danielle McKinnon, a music therapist. This demonstrated the rich potential of joint work between arts therapists. The aim of the project was to create a space for the teachers to engage in supportive processes that are directed at the stress and challenges that they had to face in a year marked by adjustments to teaching and learning caused by the pandemic. Nine schoolteachers participated in five two-hour online workshops, which were collaboratively facilitated by therapists in music, art and drama.

The project also sought to document how such a collaborative process could take place, as it is novel in the South African context. The therapists carefully tracked their own collaborative process through extended meetings after each session to unpack themes and explore how the different therapeutic mediums could best serve the group in the following session. The team learnt that creative online spaces can provide teachers with a platform to support one another in a way that they perceive to be deeply meaningful.

Through the sessions, teachers were able to express their emotions, find shared experiences, connect and create ways to care for themselves and others. They found a sense of community and common humanity. The participants built friendships with each other that have been sustained outside of the sessions. Their experiences were validated and they were able to generate a resource-oriented approach to face similar challenges going forward. They were inspired and equipped to continue meeting as a group after the formal process had been completed, and gained the necessary knowledge to use arts-based techniques to support learners in their classrooms.

An indispensable redress: Harfield Village Social Network Analysis

Against the historical backdrop of forced removals in South Africa, combined with the effects of the COVID-19 pandemic on a community in the southern suburbs of Cape Town, the Harfield Village Project sought to understand the construction of a community that had been dispossessed of their land in the race-based evictions during apartheid in the 1970s. This demonstrative project was led by Prof Siona O'Connell of the School's Interdisciplinary and Museum Studies programme. It highlighted the devastating impact of forced removals and how it still impacts on the lives of its victims, especially when a pandemic such as COVID-19 brings further layers of adversity.

The dispossessed families who formed part of the study had been evicted from their homes in the former suburb of Claremont in the 1970s (renamed Harfield Village when it was declared a white area) and had been relocated to new homes across the Cape Flats: their community fragmented. These people were living in an area that was hard hit by the pandemic, due, in a large part, to poor infrastructure and overcrowding, which resulted in disrupted communication and support to deal with the emotional consequences of the pandemic.

The project aimed to represent the spatial and social fragmentation exacted by race-based forced removals from the village and how these shape ideas of community and cohesion. In addition, it sought to understand how this community had been constructed and how it had been torn apart through the Group Areas Act of 1950.

Through quantitative and qualitative data, the project drew attention to network analysis concepts such as connectedness or fragmentation and the importance of key figures that influenced the construction and cohesion of communities.

It examined how the former members of Harfield Village view where they come from, and who they can rely on. This shed some light on the development of resilience, and the ability of a fragmented society to develop a sense of community and social cohesion.

A comprehensive questionnaire was drawn up in collaboration with commissioned researchers. Telephonic surveys were conducted with members of the community who had previously experienced forced removals. Forty participants were randomly selected from a pool of 60 individuals. Among many other topics, including a section on COVID-19, the survey questioned respondents on their experience of forced removals, how they view their current neighbourhood, their involvement within these communities and their cohesion with other members of these groups. They were also asked about their social interactions and networks, and how these might have been affected by the forced removals.

Many of the issues broached raised difficult questions, which were necessary to determine the long-term effects of displacement, and who these people could draw on for support, particularly

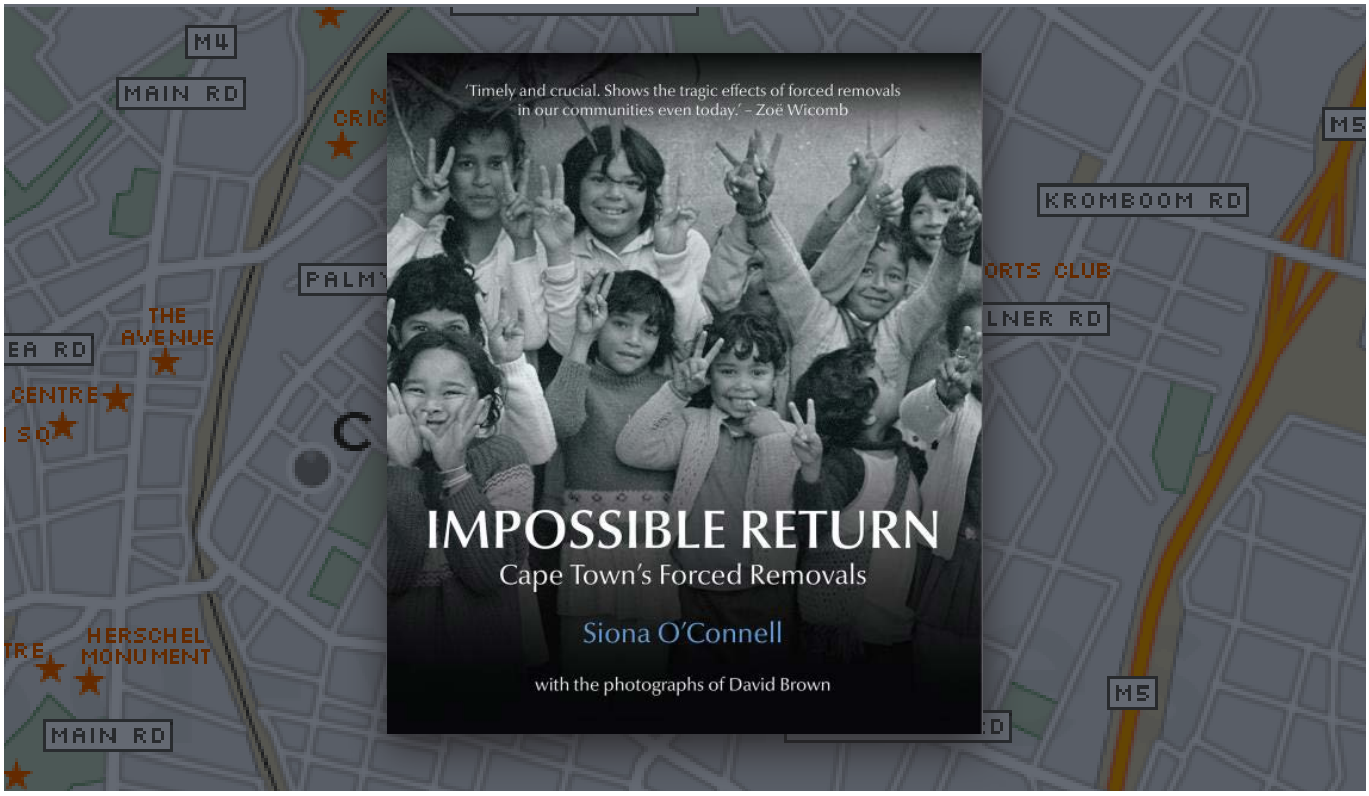
during times of crisis, like a pandemic. This provided an understanding of the qualities that are needed for the emergence of a healthy, resilient community.

More than 50 years after their forced removal in the 1970s, it was clear that families still feel the pain of losing the lives they knew. The dispossession of their homes had resulted in the traumatic loss of community and belonging, as families were forced into designated areas, fragmenting the community they knew. Prof O'Connell observed that just being able to talk about their experiences and tell their stories provided the participants with a form of recourse, which was necessary to achieve a sense of belonging.

According to Prof O'Connell, conducting the survey was an arduous task, with many respondents expressing fatigue and hopelessness. "It took much longer than anticipated as respondents were also restricted by data costs." She stresses that although this was a demonstrative study, the lessons learnt will be incorporated into a new, larger study at Elandskloof, South Africa's first successful land restitution case in 1996, which is now an impoverished and fractious community. "The project succeeded in opening up opportunities for further research that could highlight the long reaches of evictions on the vulnerable, including children and the elderly, while providing insight regarding questions of resilience and trust among those affected by forced removals."

Understanding how functioning communities were constructed before their forced removal from their homes may also shed light on how resilient, healthy communities can emerge from the detritus of evictions and crises. "Contemplating the effects of historical injustices, particularly those related to race-based displacement, is the first step to engineering resilient recoveries that will allow communities to form some sort of buffer against future crises," remarked Prof O'Connell.

The project formed part of Prof O'Connell's ongoing interest in Harfield Village. It was also the subject of a film, produced in 2015, and a book, which she authored in 2019, *Impossible return: Cape Town's forced removals.*



Developing grit among undergraduate singing students

Since the COVID-19 lockdown began in March 2019, students have been deprived of constructive interaction and mutual support. Developing resilience and, in the long term, grit, is essential to negotiate and overcome such challenging and disruptive times.

When education moved online almost overnight, the University's practical modules were arguably the most affected by the sudden lack of face-to-face learning. The Classical Voice students were no exception. While training in this field requires mostly one-on-one teaching, singing is inherently a group activity; all singers collaborate at the very least with a pianist, and even professional soloists mostly function within a group, such as performing in an opera or oratorio. Most singers are sociable creatures, and the Classical Voice and Opera Studies programme encourages collaboration, cooperation and positive working relationships between students.

With this project, Dr Hanli Stapela aimed to create awareness among undergraduate students about the role of engaging in deliberate practice to develop grit. She therefore designed a study to explore students' resilience, particularly during the time that education had to take place online. Four master's students participated in the study as co-researchers: James Paradza, Edrich du Toit, Stéphanie-Claire Hansen and Michelle Weyers.

The goal of the study was to create awareness among the 12 participants in the study about the role of engaging in deliberate practice in the development of grit, a connection that had come to light in previous research. Understanding the importance of and being able to practice deliberately also contributes to a musician's level of performance.

She included three contact sessions with the participants, all undergraduate students in the Classical Voice and Opera Studies programme.

The first session entailed semi-structured interviews to evaluate the participants' ability to adapt to new circumstances, their understanding of grit, their understanding of deliberate practice, and whether they understand that deliberate practice can improve grit.

In the second session, she established a personalised practice routine for each student to fit into their schedule. She provided them with guidelines detailing how to practice deliberately, which she discussed with each participant. The schedule was flexible, and could be adapted if it proved to be challenging. The participants had to commit to implementing the programme for three weeks.

In the third session, she obtained feedback from the participants. This related to the increased regularity and amount of their practice, the perceived improvement in their performance, and the increase in their confidence and achievement in relation to singing. Words used repeatedly by participants included "joy", "hope", "positivity" and "passion". The consensus was that they regretted not having had such a tool before.

During the final contact session, most participants showed a clearer understanding of the concepts deliberate practice and grit. Most of them displayed an improved understanding of the fact that the skills acquired for deliberate practice: learning to plan and structure activities, the discipline needed to practise even if you do not feel like doing it, the mindful approach to important activities, and the importance of prioritising the various elements of the activities, play a significant role in the long-term development of grit.

It is clear that being part of a longer-term study will be of benefit to music students by equipping them with the knowledge and skills to engage in deliberate practice, as improvement in practical music can only truly be judged over a longer period of time.

Javett-UP job shadowing by interns to curate art exhibitions

The Javett-UP job shadowing project was premised on the enhanced wellbeing, humaneness and resilience to be derived from appreciating beauty and aesthetics. It aimed to equip potential young early-career artists with strong foundations, training and skills to embark on the path towards curating art exhibitions, specifically in becoming adept and confident to host an exhibition. It explored how such an internship can take the restrictions imposed by a global pandemic into account.

The project made provision for the mentoring of three interns: a curatorial intern (Genre Pretorius), an education intern (Danielle Oosthuizen) and an administration intern (Kimberley Moolman). Their internships lasted between three and nine months, which is roughly the time needed to stage a typical exhibition. The exposure they received included the planning of an exhibition, setting it up, developing and implementing public programmes, and eventually striking the exhibition down again. They worked closely with a guest curator/art practitioner, as well as Javett-UP's Assistant Curator at the time, Shenaz Mahomed, its Events and Administration Coordinator, Mpho Mothoa, and Curator: Education Mediation, Puleng Plessie.

In addition to the intensive mentoring the interns received, they also had the opportunity to attend three training workshops: an education, art restoration and conservation, events and administration workshop on 10 October 2020, an event management and protocol workshop on 30 October 2020, and a branding and communication workshop on 4 November 2020.

During the workshop of 10 October 2020, Prof Karen Harris, Head of the Department of Historical and Heritage Studies, presented a session on how to conduct guided tours. Ernest Bellingan Scott, an art conservator who specialises in art restoration, provided hands-on training in art handling, conservation and the restoration of artworks. The interns were introduced to the different types of damage by various elements (including water, fire, insects, light and the environment) an artwork can endure and how to avoid, identify and repair the damage. They were also provided with art handling tips and learnt the importance of using the correct equipment and materials for museum artworks.

The feedback received from the interns was very positive. Curatorial intern Genre Pretorius, who is now the Curatorial Manager for the Student Gallery, says that she learnt a lot from the workshops in terms of overall branding, managing events, how to be an effective tour guide and art conservation. "This was a great experience to add to my repertoire, as I have never worked with such a large institution before," she remarked. Education intern Danielle Oosthuizen, who is now Javett-UP's Education and Public Engagement Coordinator, commented that this internship was undoubtedly one of the most valuable learning experiences she had engaged with to date. "We not only gained an abundance of practical knowledge, but were subjected to incredible lectures that can be applied to all aspects of our lives." Events and Administration intern Kimberley Moolman believes that her experience at the Javett-UP Centre has set her ahead of the pack in her professional journey of working in a gallery space. "I had the opportunity to learn about the storage, restoration and conservation of artworks, as well as the history of the artworks in the museum. This gave me added knowledge about art in South Africa."

The three interns successfully completed their programme on 4 December 2020, and received certificates indicating their successful completion of the programme on 10 December 2020.

EMPOWERING WOMEN SCIENTISTS AND HISTORICALLY DISADVANTAGED INSTITUTIONS

During the second phase of the Future Africa-Unicef partnership, the creative collaborations between arts therapists that were established in the first phase were upscaled to empower women scientists and historically disadvantaged institutions.

The previous project to determine the impact of arts on the health and wellbeing of children and youth in South Africa had as one of its objectives defining the concepts of "arts" and "health" from an indigenous knowledge perspective by producing a map of the landscape of Arts for Health practices with children and youth in South Africa.

An output of this initiative was the formation of a community of practice, comprising organisations, individuals and programmes engaged in arts-based activities that were organised to promote the psychosocial health and wellbeing of individuals and communities. This community of practice would serve as a platform for connection, sharing, collaborating, advocating and lobbying for Arts for Health in South Africa.

Three sub-projects formed part of this initiative in the second phase of the partnership. They were linked to the mapping of the Arts for Health landscape in South Africa and the further development of the community of practice. These projects were the following:

- Arts for psychosocial support workshops
- Building networks for an Arts for Health community of practice through knowledge dissemination
- Musicking with children in the context of ongoing violence and poverty

They had the following overlapping aims:

- Define the concepts of arts and health from an indigenous knowledge perspective
- Produce a map of the landscape of Arts for Health practices with children and youth in South Africa
- Advocate for an Arts for Health agenda in South Africa

The implementation of these three sub-projects would further develop the research that had been conducted in the first phase to determine the parameters for a concept analysis and scoping review, and elucidate the meaning of "arts" and "health" from a South African perspective.

Arts for psychosocial support

The professional use of the arts in psychosocial programmes refers to the practice of applying a culturally sensitive and collaborative creative-expressive modality within a social context as the focus of the intervention. This method contributes to collective healing.

According to Marlize Swanepoel, a creative arts therapist and facilitator of this sub-project, arts-based practice is nuanced and highly varied, and can include several techniques and processes, including image making, role-play, dance, movement, storytelling, music and improvisation. Its core principles are being compassionate, non-judgmental and upholding the rights and beliefs of a community to support social cohesion and collaboration. The benefits of community arts-based psychosocial practice include offering a safe space for expression, applying the arts as a means of expressing difficult and painful feelings, building self-esteem, developing positive relations, social cohesion and a connection to the community, reclaiming history and identity, and promoting positive social change.

This sub-project was therefore aimed at developing and implementing psychosocial support workshops, where community practitioners could be trained to co-create community maps (through arts-based and storytelling processes) that could identify risk and protective factors in communities of location, interest and identity. The idea was to strengthen social capital in community-based psychosocial care. The workshops were creative and experiential, offering a tool that invites the co-creation of individual mental health and wellbeing care plans that are rooted in collective resilience.

The first step in achieving this objective was to develop the content and material for the training workshops that would be offered at identified African universities. Dr Andeline dos Santos worked in collaboration with research assistants at the Cape Town-based arts therapy collaborative sp(i)eel (in collaboration with Marlize Swanepoel) to develop the training material.

Two training workshops were presented. The first, held on 22 October 2021, included community workers, social workers and early childhood development practitioners. The second, held on 15 November 2021, included artists and students in the social development fields in collaboration with the University of the Western Cape.

The workshops were followed by the development of a training manual to expand on the skills taught at the workshops. This could be used by participants as a resource when implementing psychosocial support practices. In addition, a psychosocial care plan tool was developed, known as the Resilience-focused Trauma Intervention (RFTI) tool.

An outcome of the workshops, together with the development of the guidelines and tool for psychosocial support, is that arts-based organisations in South Africa are now better equipped for psychosocial practice. They also have a practical tool that can help them address collective resilience and develop social capital.

The workshops succeeded in promoting networking and collaboration across sectors and between individuals to co-create a community-based model for psychosocial practice, which will further advance the cause of Arts for Health practices in southern Africa.

Psychosocial support intervention at the University of the Western Cape: A case study

During 2021, three female students from the University of the Western Cape reached out to sp(i)eel, the creative arts therapies collective in Cape Town, expressing their need for a supportive, processing space after witnessing and intervening in the attempted suicide of a fellow student. Therapists led a two-hour session with the students to help them deal with the impact of the trauma, exploring coping skills, identifying resources and using creative methods for them to process the impact of the traumatic event. They were given resources for further support, as well as a workbook with creative, regulating exercises to take home with them.

According to the therapist who facilitated the session, the students initially seemed nervous and uncertain. However, by participating in song, rhythmic movement and breathwork, they became more comfortable. They recognised the common trauma responses that the therapist had shared, and admitted that this exercise had helped them normalise their own responses to the traumatic event that they had experienced as a group.

In a projective map-making process, using the metaphor of the "river of life", the participants told the story of "where I was, where I am now, and where I hope to be". In this story sharing, a strong theme of "post-traumatic growth" emerged, as well as the theme of choice (choosing how to live and respond to stressful situations). The students were invited to connect their individual "rivers of life" into a collective artwork, and to comment on the gifts that this artwork could give them. It reminded them of the power of their connection as a group, and their ability to collectively find the strength to carry heavy burdens. One participant shared the fact that she felt rejuvenated after the intervention.

While the women were focusing on their "post-traumatic growth", there was scope for further intervention on a group level to process the traumatic event that they had gone through together in more depth. One participant, in particular, commented that she still felt as if she was in a "dark place". In this case, the therapist recommended that she could benefit from individual therapeutic work.

Developing an arts-based community of practice

The aim of this sub-project was to disseminate the knowledge generated through the first phase of the community of practice research project. This research project had included a concept analysis to elucidate a contextual meaning of the concepts of "arts" and "health". This had led to the co-creation of the definitions with practitioners and artists on the ground. This led to a mapping exercise to determine what was being done with children and youth in South Africa in terms of arts and health.

In this phase, the research findings from the concept analysis and the Arts for Health map of practices in South Africa were developed into training material that could be shared with Arts for Health practitioners and educators during online workshops. The material that was developed would be made available to participants.

The first step in achieving this objective was to develop the content and material for the training workshops that would be offered at identified African universities. Dr Andeline dos Santos worked in collaboration with research assistants at the Cape Town-based arts therapy collaborative sp(i)eel (in collaboration with Marlize Swanepoel) and the music therapy non-governmental organisation MusicWorks (in collaboration with Sunelle Fouché).

The content analysis of the literature used to revise the definitions of "arts" and "health" in the research was used to develop the content for the workshops. The workshop material included an infographic illustrating the findings of the content analysis of Arts for Health in South Africa. The first workshop was held with the women leaders of community-based arts organisations who had taken part in the priority-setting groups of the research project in Phase I, and who are part of the community of practice. This took place in Hamburg in the Eastern Cape from 28 to 30 January 2022. Two workshops were also held with participants from historically disadvantaged institutions across Africa. These took place on 6 November 2021 and 23 May 2022.

At these workshops, the concepts of "arts" and "health" developed through the focus groups and scoping review that had taken place in the first phase were shared with participants, as well as the map of the landscape of Arts for Health practices with children and youth in South Africa.

The continuation of the research project based on the discussions generated and the information gathered at the workshops led to the identification of further focus groups and the conducting of additional interviews. This would contribute to the further development of the research project through its concept analyses and Arts for Health map of practices, and would contribute to the integrity of the project. It would also ensure that the research remains sensitively aligned with the dynamic landscape of Arts for Health in South Africa. In this way, it could support practitioners in arts-based therapy, and advocate for a national Arts for Health agenda.

By contributing to the body of knowledge of arts-based practices in South Africa, the project hopes to build the capacity of the Arts for Health sector by lobbying for access to arts-based programmes, funding for arts-based programmes, promoting the inclusion of the arts in various sectors, such as education and health, and laying the foundation for further impact studies.

A further outcome of this initiative was the development of a web page to depict the map of Arts for Health organisations and practices in South Africa that can serve as a tool for networking and growing new organisations. The website provides an introduction and background to the project, the aims of the research, and the key questions that were asked.

www.artsforhealthsa.org.za

The researchers explain that a new research framework can only be created by decolonising the research paradigm and co-creating knowledge with the participation of both Western and indigenous researchers. This is illustrated by the words of Drama Therapy student Sanelisiwe Dlamini: "Where I learnt musical stuff was literally from just the community members teaching back to the community."

They learnt that the arts offer a helpful way of navigating uncomfortable experiences and co-creating knowledge by connecting with each other through image and metaphor to find a shared language. "Essentially we learnt that the collective, cyclical nature of Africanism does not resonate with the Western linear approach to Arts for Health," explains Dr Dos Santos. "We needed to go back to the drawing board in the planning of this study. Following the priority-setting groups, we took a hermeneutic loop and applied a concept analysis to the transcribed interviews, as well as existing literature, to excavate an indigenous definition of concepts around the arts and health in South Africa."

Once the research has been concluded and the themes from both the transcripts and the literature have been collated, the researchers will present them to the participants once again in an experiential arts-based process of engaging with these ideas.

Musicking with children in the context of ongoing violence and poverty

This sub-project explores how "musicking" can contribute to the psychosocial health of children growing up in communities with high levels of violence and poverty. It entailed a participatory action research study undertaken in conjunction with the Cape Town-based non-profit organisation MusicWorks. It also forms part of a PhD degree in the University of Pretoria's School of Arts conducted by Sunelle Fouché under the supervision of Dr Andeline dos Santos.

The research project will provide useful insights for children as they navigate the challenges of growing up in contexts of ongoing violence and poverty. It will also enable MusicWorks, as an organisation, to continue to strengthen its music-centred psychosocial support practice. It will furthermore support music therapists, community musicians, community development workers and other Arts for Health practitioners who offer psychosocial support programmes to children in contexts of ongoing violence and poverty. These programmes offer a safe space for vulnerable children who live in township areas where violence is commonplace, using music to transform their lives.

A workshop was held on 18 October 2021 to generate collaborative research questions. This was followed by a second workshop with five community music facilitators from MusicWorks and 12 Music Therapy students from the University of Pretoria. This took place between 15 and 23 March 2022. The students and community music facilitators were trained in the development, implementation and evaluation of a health musicking service at Lentegeur Hospital in Cape Town. This hospital serves as a placement site for Music Therapy students from the University of Pretoria.

The participants in the health musicking service included children and youth with a range of mental health challenges. These are individuals who are currently receiving treatment and care at Lentegeur Hospital, as well as the health care workers responsible for their care and treatment. The workshop equipped the Music Therapy students and community music facilitators with the theoretical knowledge and practical skills they needed to set up contextually responsive community music therapy services in under-resourced settings.

This project served as a preliminary enquiry to inform Sunelle Fouché's PhD research, a participatory action research study that would be aimed at mapping the pathways that could lead to the integration of music therapy services as part of the service offering at Lentegeur Hospital. The ongoing development of this project will continue to inform the research study.

REFLECTION
a two-year journey

Rachel Fischer

This publication provides a narrative of an extraordinary programme and its people across two phases. It reflects on the academic approaches, community projects and continuous problem-solving efforts to transcend the variety of challenges faced in a myriad of ways.

The Unicef-funded projects occurred in a very distinct milieu in our history. This is a context in which a global pandemic brought the world to its knees. Literally, COVID-19 grounded us, halted us, and forced us to pivot in remarkable ways. A hundred years since the Spanish Flu – another global pandemic – we were forced to change. Unicef and Future Africa were swift to observe the pending trials to be faced and created a suitably named programme to attend to this. The Youth Empowerment and Health/Economic Responses to COVID-19 (YEaH) programme was realised.

Another critical aspect is the spatio-temporal dimensions of this programme. The programme would not have looked the same in a pre- or post-COVID-19 era. This is because the particular period of 2020–2022 required the shift from offline and in-person engagements to online and virtual engagements. Meetings, classes, social and professional activities had to continue. But they had to continue in a different manner. No one told us how to do this. There was no roadmap in place to guide the Vice Chancellor, deans, lecturers, students and project staff on how to function during social distancing and hyper-sanitised environments. Had the projects been implemented pre-COVID-19, it would have been yet another academic endeavour following the patterns set across decades. Had the projects been implemented now, it would have done so in the 'new-normal' hybrid life that we have come to accept. Our old patterns are creeping back, yet we have the ability to negotiate greater flexibility in our time and project management. Not everything has to happen in person. We have come to the realisation that it is much more efficient to have some activities take place online. Moreover, we also know how some activities are more meaningful in person.

The programme would not have looked the same had any other institute or faculty – other than Future Africa – taken it on. Future Africa, with its pan-African mandate and unique academic cum industry position, made it the perfect host to achieve Unicef South Africa's vision. Indeed, Future Africa is a visionary institute, with a staff complement that is required to think creatively, being a melting-pot of international grants and industry-relevant activities, while remaining true to its academic requirements.

Unicef made a profound contribution to the University of Pretoria. By prioritising the youth, young women researchers and historically disadvantaged universities, it gave the University an opportunity to showcase its strengths and talents. Unicef also tested the University's mettle and whether it could adapt to this new milieu. The thousands of stakeholders who benefitted from this programme showcased their resilience and ingenuity.

In reflecting on this two-year journey, we would one day consider this to be a remarkable period in our human history. However, in reflecting on this two-year journey, I can only remark with pride that it was an honour to have been a part of it.

THE WAY **FORWARD**

DUE TO THE PROGRESS MADE IN PROJECT ACTIVITIES, AND INSPIRED BY THE BREADTH OF ENGAGEMENT AND QUALITY OF COLLABORATION, FUTURE AFRICA SEEKS TO PRIORITISE THE PARTNERSHIP WITH UNICEF AND, BY EXTENSION, GEN-U. THE RELEVANCE OF THE PROGRAMME TO UNICEF LIES IN THE FACT THAT YOUNG PEOPLE ARE AT THE HEART OF GEN-U, AND THE PARTNERSHIP MUST BE STEERED BY THE YOUTH.

Gen-U involves young people in the co-creation of its agenda. Its ongoing governance and implementation ensure that the youth guides the partnership every step of the way. It is also about prioritising "connecting the next generation". COVID-19 has put a spotlight on the digital divide within and between countries and regions. This emphasises the urgency to close this gap, and place universal connectivity and digital learning higher on the agenda. In response, Gen-U is working to connect every child and young person to the internet, and scaling up IT-enabled solutions to boost young people's skills, improve teaching, and enhance the effectiveness and efficiency of education systems.