From Research to Resilience: Transforming Food Security, Nutrition and Livelihoods through Community-Based Soy Interventions in South Africa

Submitting University: University of the Free State

Name, position and email address of Contact Person for this case study: Prof Wilhelmina Hendrika (Wilna) Oldewage-Theron, Professor ARC/DALRRD/UFS, Co-Chair: Innovative Agro-Processing for Climate-Smart Food Systems and ARC/DALRRD/UFS Co-Chair: Climate-Smart Intervention Impact Assessment, Email: Oldewage-TheronWH@ufs.ac.za

Summary of the impact

Over more than two decades, Professor Oldewage-Theron has translated interdisciplinary nutrition research into a sustainable community intervention model that has improved food security, nutrition, health and livelihoods among vulnerable communities in South Africa and internationally. Originating in QwaQwa, Free State, the programme expanded across South Africa and internationally, including the United States and eight other countries, addressing both undernutrition and the growing burden of non-communicable diseases through an integrated approach combining nutrition assessment, nutrition education, soy production, household and school gardening, food preparation training, food-based interventions and community enterprise development.

The programme generated substantial societal reach through its research and implementation activities, including 21,929 Situation (SIT) analyses; 2,310 participants in nutrition education programmes; 536 participants in food-based interventions; 262 participants in soy product development and sensory analyses; and the establishment of 575 household and community gardens, to name a few. These activities informed evidence-based interventions that improved nutrition knowledge, food production, dietary practices and household food security across diverse settings.

The intervention also produced measurable health benefits. Among 90 participating women, the prevalence of metabolic syndrome declined significantly from 53.3% to 34.4% following an 18-month intervention. The programme generated sustainable community enterprises, strengthened educator capacity nationally, informed nutrition practice, and produced innovative educational resources recognised through one patent and three registered designs.

The programme's strongest evidence of sustained impact is its longevity: nearly 30 years after inception, it remains active through partnerships such as Best is Good Enough Academy in Gauteng, where soy-based meals are still served twice weekly.

Figure 1 - Policy brief written by Prof Oldewage-Theron.



CSL
CENTRE OF SUSTAINABLE LIVELIHOODS
Vaal University of Technology

SOY and VEGETABLE GARDENING and CONSUMPTION to ALLEVIATE POVERTY and ADVANCE HEALTH in SOUTH AFRICA

Wilna Oldewage-Theron & Abdulkadir Egal
Centre of Sustainable Livelihoods (CSL), Vaal University of Technology (VUT)
Tel: 016 950 9722/9538 e-mail: abdul@vut.ac.za

Introduction

Food insecurity has become a global crisis following the global economic meltdown[1]. The 2011 United Nations Food and Agriculture Organization (FAO) report on food insecurity indicates that the food and economic crises is obstructing the achievement of the Millennium Development Goal (MDG) of reducing hunger by half by 2015[2]. The global situation of food hunger is reflected in South Africa.

Poverty is one of the main factors affecting health in South Africa[3]. The Human Sciences Research Council (2004) stated that "the proportion of people living in poverty in South Africa has not changed significantly between 1996 and 2001… (and) those households living in poverty have sunk deeper into poverty and the gap between rich and poor has widened"[4]. Extensive poverty has lasting harmful effects on society, as poverty results in hunger and malnutrition. This has a direct impact on economic growth due direct losses in productivity as a result of poor physical status. Malnutrition can also increase health care costs which have a direct impact on economic. The World Bank indicates that malnutrition can contribute to a loss of up to 3% of the gross domestic product and should be addressed[5]. If a figure of 3% loss is applicable to South Africa, the costs of malnutrition alone could amount to at least two billion Rand per year. Malnutrition and its treatment is thus a costly drain on the national economy, specifically on the health budget.

Underpinning academic work

The impact originated from an interdisciplinary research programme investigating food insecurity, dietary diversity and community nutrition interventions in vulnerable South African communities. Baseline studies in Qwa-Qwa and the Vaal Region identified severe household food insecurity and a double burden of malnutrition, with child undernutrition occurring alongside obesity and cardiometabolic disease among adults. Between 2010 and 2019, research demonstrated that integrated interventions combining soy consumption, nutrition education, household gardening and food preparation training improved nutrition knowledge, dietary diversity, household food security and cardiometabolic risk factors. The programme also produced innovative nutrition education resources, including the patented Food Plate Puzzle, providing the scientific foundation for a scalable intervention model.

Narrative Description of the Impact

To address these challenges, Professor Oldewage-Theron developed an integrated intervention model that combines nutrition assessment, nutrition education, household and school gardening, soy cultivation, food preparation training, food-based interventions, and community engagement. Working with schools, community organisations and development partners, demonstration gardens were established, culturally appropriate recipes developed, and households trained to grow, process and prepare soy-based foods. The programme addressed the entire food system by linking food production, nutrition education, healthy diets and local livelihoods.

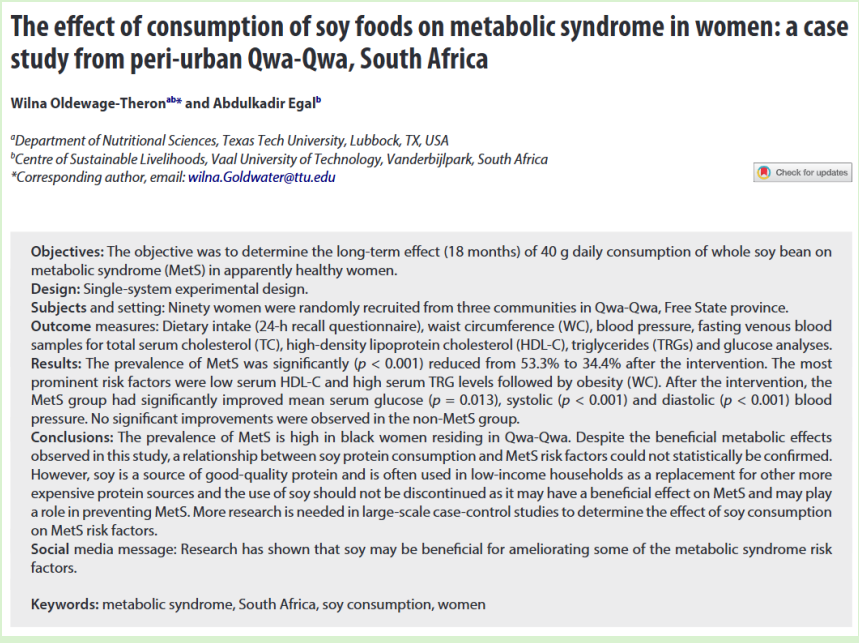
Over the course of this research programme, the intervention expanded far beyond its original study sites. Across South Africa and internationally, 21,929 individuals participated in Situation (SIT) analyses, providing one of the largest evidence bases informing community nutrition interventions. A further 2,310 participants completed nutrition education programmes; 536 individuals participated in food-based interventions; 575 household and community gardens were established; and 262 participants were involved in soy product development and sensory evaluation, showing its progression from research to sustained community development.

The Qwa-Qwa Integrated Nutrition Programme illustrates this approach. The programme engaged women, schoolchildren and community members through household gardening, nutrition education and training in food preparation. Low-income households participating in the soy nutrition education programme demonstrated significant improvements in knowledge of soy production and utilisation, with correct responses increasing from 65.0% before the intervention to 74.1% after the intervention. These gains strengthened household capacity to prepare nutritious foods, improve dietary diversity and increase food security.

The programme also transformed nutrition education through innovative resources based on the South African Food-Based Dietary Guidelines, including the patented Food Plate Puzzle, board games and teaching materials. Their originality was recognised through one patent and three registered designs.

The intervention generated measurable improvements in health. An 18-month study involving women from the peri-urban area of Qwa-Qwa demonstrated a significant reduction in the prevalence of metabolic syndrome from 53.3% to 34.4%. Significant improvements were also recorded in blood glucose control and blood pressure among women with metabolic syndrome (Figure 2). Earlier studies showed that long-term soy consumption significantly improved HDL cholesterol, LDL cholesterol and triglyceride levels, reducing cardiovascular disease risk among participants.

Figure 2



The effect of consumption of soy foods on metabolic syndrome in women: a case study from peri-urban Qwa-Qwa, South Africa

Wilna Oldewage-Theron[ab]* and Abdulkadir Egal[b]

[a]*Department of Nutritional Sciences, Texas Tech University, Lubbock, TX, USA*
[b]*Centre of Sustainable Livelihoods, Vaal University of Technology, Vanderbijlpark, South Africa*
**Corresponding author, email: wilna.Goldwater@ttu.edu*

Check for updates

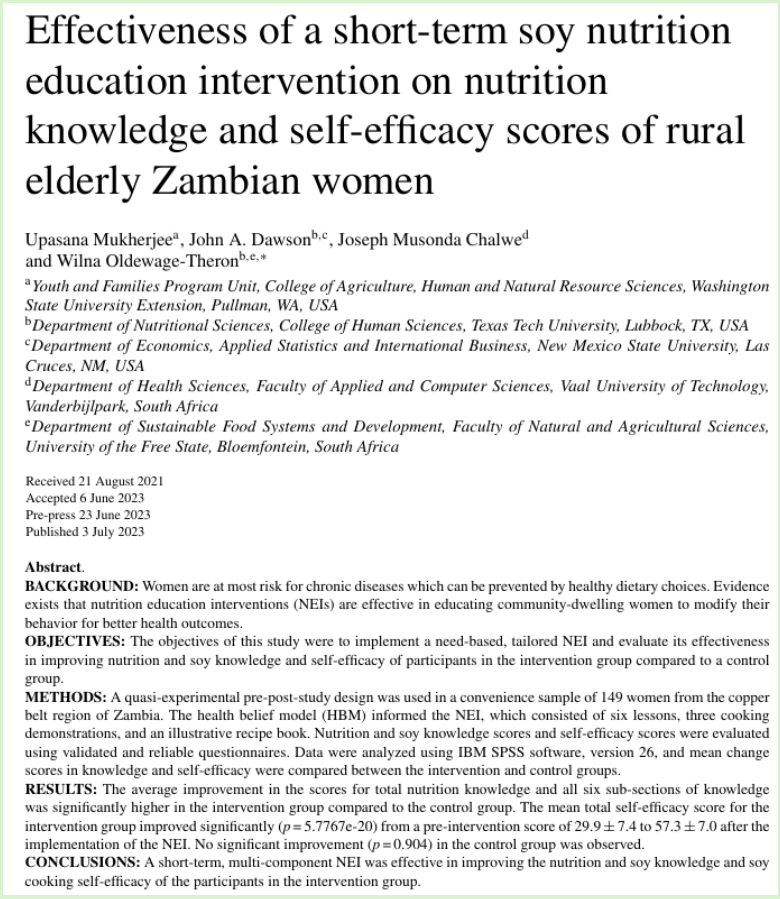
Objectives: The objective was to determine the long-term effect (18 months) of 40 g daily consumption of whole soy bean on metabolic syndrome (MetS) in apparently healthy women.
Design: Single-system experimental design.
Subjects and setting: Ninety women were randomly recruited from three communities in Qwa-Qwa, Free State province.
Outcome measures: Dietary intake (24-h recall questionnaire), waist circumference (WC), blood pressure, fasting venous blood samples for total serum cholesterol (TC), high-density lipoprotein cholesterol (HDL-C), triglycerides (TRGs) and glucose analyses.
Results: The prevalence of MetS was significantly ($p < 0.001$) reduced from 53.3% to 34.4% after the intervention. The most prominent risk factors were low serum HDL-C and high serum TRG levels followed by obesity (WC). After the intervention, the MetS group had significantly improved mean serum glucose ($p = 0.013$), systolic ($p < 0.001$) and diastolic ($p < 0.001$) blood pressure. No significant improvements were observed in the non-MetS group.
Conclusions: The prevalence of MetS is high in black women residing in Qwa-Qwa. Despite the beneficial metabolic effects observed in this study, a relationship between soy protein consumption and MetS risk factors could not statistically be confirmed. However, soy is a source of good-quality protein and is often used in low-income households as a replacement for other more expensive protein sources and the use of soy should not be discontinued as it may have a beneficial effect on MetS and may play a role in preventing MetS. More research is needed in large-scale case-control studies to determine the effect of soy consumption on MetS risk factors.
Social media message: Research has shown that soy may be beneficial for ameliorating some of the metabolic syndrome risk factors.

Keywords: metabolic syndrome, South Africa, soy consumption, women

The programme also strengthened local livelihoods through training in soy processing and value-added food production. Partnerships with the Oilseeds Advisory Committee introduced Soy-Cow technology to schools and community feeding schemes, while local women established small-scale enterprises supplying nutritious soy products to schools and feeding programmes.

The model was subsequently implemented across multiple South African provinces and internationally in Zambia, Zimbabwe, Bangladesh, Ghana, Nepal, Iran, Taiwan, Mexico and the United States, demonstrating its adaptability across diverse cultural and socio-economic settings.

Figure 3



Effectiveness of a short-term soy nutrition education intervention on nutrition knowledge and self-efficacy scores of rural elderly Zambian women

Upasana Mukherjee[a], John A. Dawson[b,c], Joseph Musonda Chalwe[d] and Wilna Oldewage-Theron[b,c,*]

[a]*Youth and Families Program Unit, College of Agriculture, Human and Natural Resource Sciences, Washington State University Extension, Pullman, WA, USA*
[b]*Department of Nutritional Sciences, College of Human Sciences, Texas Tech University, Lubbock, TX, USA*
[c]*Department of Economics, Applied Statistics and International Business, New Mexico State University, Las Cruces, NM, USA*
[d]*Department of Health Sciences, Faculty of Applied and Computer Sciences, Vaal University of Technology, Vanderbijlpark, South Africa*
[e]*Department of Sustainable Food Systems and Development, Faculty of Natural and Agricultural Sciences, University of the Free State, Bloemfontein, South Africa*

Received 21 August 2021
Accepted 6 June 2023
Pre-press 23 June 2023
Published 3 July 2023

Abstract.
BACKGROUND: Women are at most risk for chronic diseases which can be prevented by healthy dietary choices. Evidence exists that nutrition education interventions (NEIs) are effective in educating community-dwelling women to modify their behavior for better health outcomes.
OBJECTIVES: The objectives of this study were to implement a need-based, tailored NEI and evaluate its effectiveness in improving nutrition and soy knowledge and self-efficacy of participants in the intervention group compared to a control group.
METHODS: A quasi-experimental pre-post-study design was used in a convenience sample of 149 women from the copper belt region of Zambia. The health belief model (HBM) informed the NEI, which consisted of six lessons, three cooking demonstrations, and an illustrative recipe book. Nutrition and soy knowledge scores and self-efficacy scores were evaluated using validated and reliable questionnaires. Data were analyzed using IBM SPSS software, version 26, and mean change scores in knowledge and self-efficacy were compared between the intervention and control groups.
RESULTS: The average improvement in the scores for total nutrition knowledge and all six sub-sections of knowledge was significantly higher in the intervention group compared to the control group. The mean total self-efficacy score for the intervention group improved significantly ($p = 5.7767e\text{-}20$) from a pre-intervention score of 29.9 ± 7.4 to 57.3 ± 7.0 after the implementation of the NEI. No significant improvement ($p = 0.904$) in the control group was observed.
CONCLUSIONS: A short-term, multi-component NEI was effective in improving the nutrition and soy knowledge and soy cooking self-efficacy of the participants in the intervention group.

In Zambia, 149 women participating in soy nutrition education demonstrated substantial improvements in self-efficacy, increasing from 29.9 ± 7.4 to 57.3 ± 7.0. National educator training across South Africa similarly increased nutrition knowledge scores from 63.3% to 80.6% (Figure 3).

Perhaps the strongest evidence of sustained impact is the programme's continuation almost 30 years after its inception. At Best is Good Enough Academy in Ironside, Gauteng, learners continue to receive soy-based meals twice weekly, and nutrition education remains embedded in the school's curriculum. The school's founder, Mrs P.E. Mochela, describes the programme as having "improved children's health" and helping schools provide nutritious meals for learners.

Today, learners at Best is Good Enough Academy continue to receive soy-based meals twice a week, while nutrition education remains embedded within the school's holistic approach to learner well-being. Mrs Mochela states that the programme has ***"improved children's health"*** and that ***"we don't only offer good teaching but care about building a healthier future for our children"***.

Together, these outcomes demonstrate how rigorous nutrition research evolved into a scalable intervention model that has improved nutrition knowledge, dietary practices, food production, livelihoods and health across South Africa and internationally. Reaching more than 25,000 participants through research and community interventions, the programme continues to deliver societal benefits decades after the original studies.

Evidence and sources to corroborate the impact

"The programme has improved children's health... We don't only offer good teaching but care about building a healthier future for our children."

— Mrs P.E. Mochela, Founder, Best is Good Enough Academy (2026)



BEST IS GOOD ENOUGH DAY CARE AND PRE-SCHOOL
NPO No: 088-519
EMIS No: 700900955

Dear Sir/Madam

Subject: Professor Recommendation

Professor W.Theron is one of the hardworking passionate, dedicated willing person I have worked with. We have been together with her for almost 30 years.

We first met at Setlabotjha Primary School in Eatonside where she offered a food and nutrition programme to my teachers and learners.

Most of the people in that area were unemployed and children were starving because of poverty and some were sickly. She came as Good Samaritan and rescued my children. She even went to an extend of encouraging us as the school to start our own food garden as well as the parents in that area and provided us with seeds. Parents were very happy and supported her, and we too were very much encouraged to an extend that our District office was also informed about the programme. I use to take a box of veggies for our District Director.

After my retirement I decided to build my own Independent School for my community in Ironside. Professor again searched for me and came to join me in my school.

Like I have indicated earlier on that she is passionate about what she's doing. She came to introduce the Nutrition Programme in ways to use soy feed our learners. Children have it twice or once a week.

Parents are very happy because some can't afford a lunchbox because of the rate of unemployment that we are experiencing in our country. They love and enjoy it very much and look very active and healthy. Most of the people and even nearby areas want to see their children at Best is good academy.

We don't only offer good teaching but care about building a healthier future for our children.

As a school we are proud to connect with this special Professor because Best is known to be best academically and also keeping their learners healthy.

Thank You

infocreche@bigeacademy.co.za



Figure 4 - Prof Oldewage-Theron and Mrs Mochela.

Figure 5 - Soy recipe development.







Capacity-building evidence

- Seven book chapters.
- Three Department of Basic Education Nutrition Education Programme manuals.
- 156 peer-reviewed publications generated from the research programme.
- 33 Master's graduates trained.
- 28 PhD graduates trained.
- 14 Postdoctoral graduates trained.
- 15 national and international consultancies.
- Prof Oldewage-Theron's soy projects led to her facilitating the USDA/WISHH School Nutrition Workshop held in Washington, DC, from 2016 to 2018.
- Numerous national and international conference presentations were delivered to support the dissemination and uptake of the intervention model.

Figure 6 - Soy recipe development.





Figure 7 - School feeding scheme with added soy protein.



Figure 8 – Nutrition education.





Publications

Figure 9 - Assessment of children participating in the nutrition programme.



The publications listed below represent a selection of the research outputs that underpin and document the societal impact described in this case study; they do not represent the complete body of work arising from the programme.

- KORIR J, OLDEWAGE-THERON W, MUGAMBI G & GICHOHI-WAINAINA WH. 2024. Utilising Emerging Perspectives at the Global and Regional Level to Frame Multisectoral Nutrition Governance Landscape in Kenya. Public Health Nutrition, 27(e99): 1-12. doi:10.1017/S1368980024000727
- KLOBODU SS, OLDEWAGE-THERON WH & CARPIO CE. 2018. Soy and vegetable gardening with skills training and soy consumption are cost-effective methods to improve the blood lipid profiles of women in Qwa-Qwa, South Africa. African Journal of Food, Agriculture, Nutrition and Development, 18(3): 13792-13807. Dec 2018. https://doi.10.18697/ajfand.83.17625
- MUKHERJEE U, DAWSON JA, CHALWE JM & OLDEWAGE-THERON W. 2023. Effectiveness of a short-term soy nutrition education intervention on nutrition knowledge and self-efficacy scores of rural elderly Zambian women. Nutrition and Healthy Ageing, 8(1): 97-108. https://journals.sagepub.com/doi/10.3233/NHA-210138
- OLDEWAGE-THERON W, MORALES S & EGAL A. 2020. Change in soy and nutrition knowledge and perceptions of smallholder South African farmers after attending a single one-day soy nutrition training workshop: a pilot study. African Journal of Food, Agriculture, Nutrition and Development, 20(6): 16604-16621. https://www.ajfand.net/Volume20/No6/Wilna18545.pdf
- LEE H, OLDEWAGE-THERON W & DAWSON JA. 2023. Effects of a Theory-Based, Multicomponent eHealth Intervention for Obesity Prevention in Young Children from Low-Income Families: A Pilot Randomised Controlled Study. Nutrients, 15: 2296 (14 pages). https://doi.org/10.3390/nu15102296.

Figure 10 - Homegrown soy garden.



Figure 11 - Vermiculture for waste management.



Figure 12 - Soy-Cow – Soy milk and soy yoghurt at Best is Good Enough Academy.





