Rural Women Agriculturalists Interfacing Indigenous and Other Postharvest Technologies for Food Safety in South Africa

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Abstract

While the role of women in agricultural production systems has been generally acknowledged in literature, their associated indigenous knowledge and practices tend to be undervalued. Research has shown that despite the socio-economic and climatic challenges they face, women agriculturalists have the potential to improve the health status of their families through enhanced nutritive value of their agricultural products. This is especially due to their wide-ranging roles and use of indigenous knowledge in the postharvest process which comprises interconnected activities from the time of harvest through crop processing, marketing and food preparation, to the consumer. Since postharvest handling directly contributes to food safety and quality, the study uses case studies Zululand District in KwaZulu-Natal Province, South Africa to demonstrate women's indigenous knowledge, practice and innovation in postharvest processes. The study reveals that indigenous postharvest handling strategies were used to maintain and modify nutritive value and ensure food safety. It was also shown that interfacing indigenous postharvest practices with modern technologies presents an opportunity to vulnerable groups such as women and children in Zululand district to improve public health.

Key words: Indigenous knowledge, post-harvest technologies, agriculture, food preparation

Introduction

Agriculture and food safety are intimately linked (Hawkes and Ruel, 2006). This complex provision is most evident in the food, materials and livelihood that agriculture offers to the wellbeing of mankind. Agriculture also contributes to the economic well-being of the producing country. In the context of South Africa, agriculture is identified as a primary economic activity in National Development Plan (NDP) as practiced mainly in rural areas on subsistence and commercial scales. . Poor accessibility of healthy foods in low-income neighbourhoods has been linked to increased risks of such diseases as obesity. It is emphasized as a priority area for research, development, funding resources and knowledge

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transfer. There are growing demands for a wider knowledge base to accommodate increased food production, improved quality of life and to mitigate for health, environmental and climatic challenges such as disease, scarce resources and climate change (Food and Agriculture Organization 2010). With regard to health, food safety and quality are vital in all aspects of agricultural production systems. This is especially due to reports of associated chronic and acute communicable and non-communicable diseases (NCDs) in humans and livestock due to agricultural constraints. Most deaths worldwide are due to non-communicable diseases, such as cardiovascular disease, cancer and diabetes. The implementation of dietary improvements can have profound effects on health (Hill et al., 2009; Lazarou et al., 2015). Food borne diseases are a major burden to the healthcare system. Food safety research has focussed on reducing and/or prevention of food contamination from the farm to the consumers and methods to detect contamination at its earliest. There is, however, a lack of information on knowledge, practices and experiences of indigenous communities in acquiring food, nutrition and food safety for health. There is also limited evidence of interface of agricultural knowledge systems for health promotion. Challenges for food and agricultural research, education and extension programs include adaptation of dietary guidelines through agricultural production research and an improved understanding of nutrient physiology and consumer behaviour related to diet and health.

Socio-cultural elements of a population are the basis of agricultural practices within indigenous communities and therefore crucial to ensure sustainable agriculture for livelihood and health. Indigenous knowledge (IK) is the local knowledge that is unique to a given culture or society (Warren 1991). In devising agricultural strategies and innovations for health promotion; food safety, nutrition, health, agricultural systems and technology should refer to indigenous knowledge systems.

Women agriculturalists and Indigenous Knowledge Systems

A generally neglected consideration is the impact of poor health status of small holder farmers on agricultural production. The situation would compound any existing health concerns among community members if the key producers are in poor health. Mostly food producers, food preparers, holders of indigenous knowledge, and family providers are women. Basically women play multiple important roles in their households and communities and they directly contribute towards ensuring food security, health and safety in their households as well as communities.

In most parts of the developing world, women participate in crop production and livestock care, provide food, water and fuel for their families, and engage in off-farm activities to diversify their families' livelihoods (Iiyama 2006; Kimiywe et al. 2007; CTA 2014). The inclusion and participation of women in agricultural production and the entire value chain is highlighted in the NDP (National Development Plan 2030). It is envisioned that the increased income from agricultural practices should directly impact on nutrition and health status of the community. While the role of women in agricultural production systems has been generally acknowledged in literature, their associated indigenous knowledge and practices tend to be undervalued. Research has shown that despite the socio-economic and climatic challenges they face, women agriculturalists have the potential to improve the health status of their families through enhanced nutritive value of their agricultural products. This is especially due to their wide-ranging roles and use of indigenous knowledge in the postharvest process which comprises interconnected activities from the time of harvest through crop processing, marketing and food preparation, to the consumer.

The contribution of women to the development of rural and national economies is yet to be fully realised. They comprise 43% of the world's agricultural labour force, which rises to 70% in some countries (World Farmers' Organization-WFO 2013). In Africa, 80% of the agricultural production comes from small farmers, who are mostly rural women (WFO 2013). Despite their involvement in the agricultural sector, women have limited access and control of productive resources. Women have the potential to ensure health promotion and sustainable livelihoods, especially in rural areas (WFO 2013).

The paper is based on the call in the South African National Development Plan that links agriculture and nutrition and the need to strengthen these across the agricultural production system. Particular emphasis is made on indigenous post-harvest systems used in Zululand District to ensure nutritive value and food safety for health.

Description of Study Site and Methodology

The paper is based on cases from Zululand District in Kwazulu-Natal province South Africa. The district found in the northern part of KwaZulu-Natal Province comprises 5 local municipalities (eDumbe, uPhongolo, Abaqulusi, Nongoma and Ulundi). Nearly half of the district is governed by traditional authorities. There are influences from the Kingdom of Swaziland in the north and other districts surrounding Zululand (Zululand District

Municipality Integrated Development Plan 2015/2016). The district population (776801) reside mainly in isolated rural settlements and six urban areas. While the region has been identified as having the potential for economic growth in agriculture it is characterised by high levels of poverty and a high incidence of HIV/AIDS (Zululand District Municipality IDP 2015/2016). In response to this disease burden, a number of intervention programmes are hosted at the Princess Mandisi Health Care municipal health centre. Programmes include: the AIDS Council; Voluntary testing, counselling, health education and community awareness HIV/AIDS programme, Support group and Community Garden support for child-headed households, Lovelife Programme targeted to schools (Zululand District Municipality IDP 2015/2016).Key issues identified in the area include loss of agricultural land due to development pressure and loss of indigenous vegetation and habitats. In the District Growth and Development Plan "Vision 2030" the strategic goal for environmental sustainability recommends interventions that promote sustainable land use practices to preserve and enhance agricultural potential.

The data collection was based on examination of secondary sources which involved accessing information that is already gathered from past research papers, journal publications, books and archival materials relevant to the issues under discussion. The researchers used this method due to a number of factors: easy access of the sources online with limited costs compared to conducting primary research; the available diverse secondary sources helped the researcher to clarify the research questions; the secondary sources also assisted to realize that most of the required information relevant to the discussions were already available. This eliminated the need to carry out a field research in the district given limited financial resources

Results and Discussion

The study wanted to determine existing agricultural programmes in Zululand District which contribute to food safety.

The District Agricultural Council (DAC) and Farmers Associations in Zululand

The Zululand District Municipality Local Economic Development Project Database lists 33 proposed agriculture projects that aims at improving farmers' quality of life; Agricultural Production Opportunities in Abaqulusi, Agricultural Processing Opportunities in Abaqulusi, Inorganic Sesame Seed Production Abaqulusi, Organic Sesame Seed Production Abaqulusi,

Black Sesame Seed Production Abaqulusi Agriculture, Organic Sunflower Seed Production Abaqulusi, Rape Seed - Canalo Seed Abaqulusi, Hemp Seed Abaqulusi, Game Meats (Venison) Project Abaqulusi, Fruit growing Abaqulusi, Aquaculture and Hydroponics Project Abaqulusi, Traditional Medicines Project - Hypoxis (African Potato) Abaqulusi, Investigate agricultural support projects at Kwambudula/Cibilili Abaqulusi, Coronation Medicinal Plants Production Project Abaqulusi, Hydroponics gardens in TA Wards 5 & 6 eDumbe, Facilitate Irrigation Schemes eDumbe, Facilitate establishment of agricultural support office eDumbe, Feasibility Investigation: Poultry "home" Industries (Ward 6) eDumbe, Facilitate Poultry Production Project (Ward 5) eDumbe, Maphophoma Irrigation Scheme Nongoma, Horticulture Irrigation Project Nongoma, Mpungose Veld and Pastures Ulundi, Community Garden Augmentation Programme Ulundi, Soya Farming Ulundi, Community Market Gardens in Ulundi, Investigation of Beneficiation opportunties uPhongola, Establishment of Local Agricultural Development Units uPhongola, Agricultural Extension Services uPhongola, Product Diversification and Partnership uPhongola, Community Forests uPhongola, Beef Supply Chain Various Agriculture Economic Rejuvenation Study for the Coal Belt Region, Cashmere Farming Various Agriculture Economic Rejuvenation Study for the Coal Belt Region, KWANALU Information Centre Zululand Agriculture Coal Line Study, Hlobane Entrepreneurial Training and Support

The following section provides examples of cases from Zululand District on the contribution of agricultural systems and programmes for improved healthcare

Agricultural programmes in Zululand and contribution to health

Product Quality Case Study:

Product quality also depends upon implementation of acceptable protocols for harvesting, storage, and where appropriate, processing of farm products. Harvesting must conform to regulations relating to pre-harvest intervals for agrochemicals and withholding periods for veterinary medicines. Food produce should be stored under appropriate conditions of temperature and humidity in space designed and reserved for that purpose. Operations involving animals, such as shearing and slaughter, must adhere to animal health and welfare standards.

Resulting from this research will be providence of storage within the fresh vegetable industry with updated postharvest alternatives to reduce losses and increase product quality. The MRC could be utilised by growers in remote areas and small farmers to improve to quality of the produce that reach the markets and reduce losses. For instance, The Manyeding

Agricultural Co-operative project that is successfully winning the fight against hunger and poverty in communities near Kuruman in South African's Northern Cape Province.

The co-operative is part of a government intervention called Fetsa Tlala (End Hunger), which seeks to promote self-sufficiency by helping communities to produce food - including maize, beans, wheat, sunflower, ground nuts and potatoes - on communal and under-used land and manage the produce after harvesting.

The initiative aims to help small-scale and smallholder farmers put one-million hectares of land which has been lying fallow under production over the next five years, as well as to help small businesses process the crops once they have been harvested. The Manyeding co-operative - with a total of 159 beneficiaries from Manyeding and the surrounding villages - was situated on 137 hectares and produced organic vegetables such as potatoes, tomatoes, spinach, green beans, cabbage and pumpkins.

They have 24 permanent employees, and the people from that area are no longer travelling to Kuruman town to buy vegetables, because they know that they are the ones who are supporting Pick n Pay, Boxer and Spar with our fresh produce. There are three tractors at the project and a centre-pivot irrigation system - a highly efficient system which helps conserve water. Since they have connected water pipes from a fountain about 4.5 kilometres away into their small dam, Moacwi said they were thinking of expanding their project by producing bottled water.

Farmer empowerment Case Study:

Human welfare, health and safety are further components of sustainability. Farming must be economically viable to be sustainable. The social and economic welfare of farmers, farm workers, and their communities depends upon it. Health and safety are also important concerns for those involved in farming operations. Due care and diligence is required at all times. With regard to agricultural workers, the ILO in collaboration with governments, employers and trade unions, has developed core conventions on labour including codes of practice for agriculture, which have not been specifically included in the indicators and practices.

For instance, Agribusiness Development Agency Assisted Nkunzana Trust Farm, a farm that is located in Pongola, Northern KwaZulu-Natal, under the Zululand District

Municipality to enter the formal vegetable market.Nkunzana Trust Farm is a restitution project with 129 beneficiaries. The planting of vegetables is in full swing and centre pivots are being used to irrigate the fields where vegetables are growing. Tractors and other farming equipment have been purchased and a farm manager has been appointed. The commodity in this project is vegetables. This project has improved the farmers' quality of life by providing efficiency in sustaining themselves through the following: installation of irrigation, refurbishment of farm dwellings, procurement of tractors and other farm implements, fencing of farm dwellings, and procurement of vegetable production inputs; rehabilitation of dams, irrigation installation, procurement of farm implements and production inputs; provision of vegetable production inputs, and construction of farm pack-house.

The impact the project has had is that it has been such a success in that, the Trust has become one of the few land reform projects moving towards full production. It now plays a key role in contributing to uplifting the local economy through creating job opportunities for locals. The farm employs 52 seasonal and 25 permanent workers with 40% of these being youth. During harvest, the number of seasonal workers can increase to 400.Future developments, the Trust's long term objective is to establish a profitable commercial vegetable farming business in the area that will provide KZN and the country as a whole with a source of high quality vegetables that are produced in a sustainable manner and employ more people in the process.

Post-harvest Technology Good Practices Case Study:

Good practices related to harvest and on-farm processing and storage will include those that harvest food products following relevant pre-harvest intervals and withholding periods; provide for clean and safe handling for on-farm processing of products. For washing, use recommended detergents and clean water; store food products under hygienic and appropriate environmental conditions; pack food produce for transport from the farm in clean and appropriate containers; and use methods of pre-slaughter handling and slaughter that are humane and appropriate for each species, with attention to supervision, training of staff and proper maintenance of equipment. An exemplar would be that, South Africa is a net importer of agricultural products so the price fluctuations on a bag of maize meal are due to weather conditions in the US maize belts. A project in Umbumbulu, KwaZulu-Natal (KZN), is designed to reduce dependence on imported agricultural produce by helping small-scale farmers build commercially viable agri-businesses. The non-governmental organisation

Newlands Mashu Community Development Centre developed and implements its Partner Farmer AgriHub programme gives farmers help with developing their land, subsidises seed and seedling purchases and helps with safe handling of the produce and selling produce.

The project allows anyone to be involved. The project started with 50 small farmers. After the first few harvests the most productive farmers were identified so they can help to develop into commercial farmers. Developing from a subsistence farmer to one able to provide produce for your family and the market is dependent on your own efforts. The programme is designed to give farmers the tools to do that. The community benefits from the harvest by buying fresh and healthy produce at lower rates. As the project has grown, farmers have been able to create jobs in a region where unemployment is entrenched.

Theresa Mabhida, one of the 467 farmers in the Umbumbulu project, farms in Etsheni near Port Shepstone. "This project is doing away with unemployment and our healthy projects are curbing sickness," she says. "My sense of self-worth is high. I wake up every day knowing I have something to do for myself and my community."

The farmers in the programme are trained to use organic methods to produce crops for local consumption. Soils managed with organic methods have better water-holding capacity and infiltration rates. They also produce higher yields during both droughts and an excess of rain.

"The mentors for this project were trained. They are trained in holistic, ecologically balanced permaculture farming methods" Osborn. The harvest includes vegetables such as spinach, beetroot, red onions, potatoes and avocado. In a good month it is estimated that the farmers in Umbumbulu can harvest up to 10 tons of fresh produce based on the sales of seedlings and seeds supplied to farmers. Most of the harvest is sold to neighbours or used by the family, but one to two tons of that produce is sold to local restaurants and health food shops in KZN. What is not sold is packaged into "veggie boxes" that are sold to local schools, which sell them to students' parents.

Education and Training of Agricultural Support Sector Case Study:

The provision of skills development for researchers and agricultural support will promote capacity in IKS in agricultural production, food processing, marketing, forestry, food safety, nutrition. Further, training for agricultural extension officers forms part of the basis in

contributing towards food safety and quality. KZN Department of Agriculture offers relevant and accessible agricultural education and training in order to provide the basic principles of vegetable gardening for household food security. These courses cover the practical aspects of site selection, soil types, planning, fertilization, planting, crop management and harvesting. If it is a particular product course, it could cover nutritional information, health benefits, food safety and hygiene, and recipes on for example, baked products, canning products, drying products etc. These courses are not aimed at commercial producers but rather at advisors and trainers who work in the field of sustainable food security.

Knowledge Transfer and Innovation Case Study:

To improve understanding on the role of indigenous knowledge systems for promotion of food and agriculture in health programmes knowledge transfer, communication and innovation are essential. Education and training programmes, effective policies, institutions to systematise research and innovation agenda. An exemplar would be a project deep in the KwaZulu-Natal heartland that is an estate producing one of the most exclusive teas in the world. Ntingwe tea- it's also bringing employment to an underdeveloped area, and encouraging local "outgrowers" to grow tea on their own land. The Ntingwe Tea Estate was established in 1987 in a remote part of KwaZulu-Natal, near Nkandla- an area with unemployment and illiteracy rates of up to 60%. According to South Africa Info 2003, Ntingwe, is the only employer of significance in an otherwise underdeveloped part of the province, produces leaf which is fetching top prices on the London Tea Market and is being sold as a speciality tea in the United Kingdom and the United States. Ntingwe tea is rated among the five best teas in the world, according to Arnold Adhihetty, a senior buyer and blender at Taylor's of Harrogate, which markets Ntingwe tea in the United Kingdom, selling it as a pure tea under the estate's name - in teabags marked "Zulu Tea". Yorkshire Gold, a blend of Ntingwe tea and other varieties, is a second retail brand.

South Africa Info states that Ntingwe employs more than 200 people on a permanent basis, with a further 430 being employed seasonally, with total employment envisaged to grow to about 1 200 when the estate is in full production. This project is actively promoting an empowerment programme in areas surrounding the estate, establishing tea "outgrowers" on their own land, who will ultimately supply the estate's on-site processing plant with leaf. At the time, already five farmers, each planting 0.125 ha with 1 000 tea plants, were participating, and the estate had received a further 55 applications which were currently being

processed. It is expected that outgrowers will eventually farm up to 0.4 ha each, with Ntingwe laying down parameters for them to ensure that the quality the estate has established is maintained.

Although the area in which Ntingwe is developed has a high agricultural potential, this has never been realised in the past due to remoteness from input supplies and markets. The development of the tea estate has unlocked the potential of the region, and started a development process which will continue to gain in momentum as the expansion of the estate continues, the project also help farmers in terms of job creation, provision of potable water and electricity, the development of creches and schools, and the promotion of a small business sector within the communities surrounding the estate.

Conclusions and Recommendations

It is recommended that a comprehensive review of agricultural programmes and institutions implemented in the region be conducted to determine overall effectiveness and efficiency in the provision of health and health equity. This would highlight gaps for a more co-ordinated focus between the departments of agriculture and health. The call in the NDP for effective nutrition education of all stakeholders should be reemphasised.

The knowledge and discoveries that drive innovations and technological advances require fundamental research. Applied and translational research uses the resulting concepts and knowledge to solve problems. In other words, applied research operates within the framework of knowledge provided by fundamental research, and extension helps to transform the products of research both fundamental and applied to improve agricultural production, farm income, environment, health, and the quality of life of consumers and producers. Skilled and creative researchers, educators, and extension specialists are necessary to carry out those functions and to address challenges faced by the agricultural and food sectors.

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