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Indigenous Vegetable Production and the Economic Empowerment of Rural Women in Africa: Reality, Prospects, and Challenges in Rwanda

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In many parts of sub-Saharan Africa, indigenous vegetables have added important nutritional value to the diets of locals for hundreds of years. Women, cultivating or collecting indigenous vegetables. Studies on indigenous vegetables have pointed to the vegetables' higher levels of micronutrients.

These nutrients are greater than their modern or exotic counterparts, which are now more regularly consumed across the region. However, in more recent of indigenous vegetables across sub-Saharan Africa. In some communities, cultivation and consumption of indigenous vegetables have been relegated to the rural areas and have become the concern of older, rural women. This study explores the role of rural women in the production of indigenous vegetables in Rwanda, especially in view of the preponderance and consumer preference for modern vegetables in the country's recent history. Further, the study probes into the nutritional and economic importance of indigenous vegetables in Rwanda, with emphasis on how rural women stand to expand their earning power through scaling up their production capacity.

Keywords: *Rwanda, Indigenous Knowledge, Indigenous Technology, Indigenous Agriculture, Indigenous Vegetables, Nutrition, Farming, Women Empowerment, Economic Development.*

1.0 Introduction

Indigenous or traditional vegetables are vegetables that have been cultivated and collected within a locale for many generations. The environments in which these indigenous vegetables have traditionally thrived are suitable for their cultivation, and usually sustainable; in addition, through “natural selection and farmer-based breeding practices,” the genetic base of these vegetables has expanded over time (Mnzava et al. 1999, iii).

In many parts of sub-Saharan Africa, indigenous vegetables have constituted an important nutritional value-addition to the diets of local peoples for hundreds of years. Women, who are traditionally in charge of family nutrition, are also traditionally more involved in the cultivation or collection of indigenous vegetables.

In more recent times, a noticeable reduction in the cultivation and consumption of indigenous vegetables across sub-Saharan Africa has occurred. In some communities, cultivation and consumption of indigenous vegetables are relegated to only rural areas, and to the care of older, rural women. Studies concerning indigenous vegetables have pointed to these vegetables’ higher levels of micronutrients—much more than their modern or exotic counterparts, which are now more regularly consumed across the region (Flyman and Afolayan 2006; Ndlovu and Afolayan 2008; Odhav et al. 2007; Nesamvuni, Steyn, and Potgieter 2001). The result, in addition to other implications, is a rising deficiency in nutrition across sub-Saharan Africa with an estimated 265 million people undernourished (FAO 2010). Additionally, the viability of commercial production of indigenous vegetables for consumption has been established in previous studies (Lekgoa et al. 2016). In essence, the decrease in production and consumption of indigenous vegetables across sub-Saharan Africa is at great health (nutritional) and economic costs to the continent.

Some countries have realized that indigenous vegetables have become rare in places where they used to grow wild, owing to increase in population, coupled with environmental degradation. Also, there has been a decrease in terms of interest in the cultivation of indigenous vegetables by farmers who now prefer cash crops and other crops of interest to city dwellers, such as wheat, grains, and tubers. These countries, concerned about the decline of indigenous vegetables in the national diet, have embarked on deliberate efforts to increase the production and consumption of these vegetables. In Botswana, for example, the government has become involved in efforts to “identify the role of indigenous underutilized plants in national food dynamics and how they can be mainstreamed into the country’s agriculture” (Madisa and Tshamekang 2016, 1).

In Rwanda, the onset of the colonial era marked a steady decrease in the production and consumption of indigenous vegetables, in favor of less nutritious and more resource-intensive ones such as cabbage, cucumbers, and tomatoes. These exotic vegetables, in addition to requiring

more acreage for cultivation, require the use of many fertilizers and pesticides, and can be much more labor-intensive than their traditional counterparts. Therefore, women living in rural areas are less inclined, and lacking in the ability, to cultivate modern vegetables despite high consumer preferences.

This study explores the role of rural women in the production of indigenous vegetables in Rwanda, especially in view of the preponderance of, and the consumer preference for, modern exotic vegetables in the country's recent history. Furthermore, the study probes into the nutritional and economic importance of indigenous vegetables in Rwanda, with emphasis on how rural women stand to expand their earning power by upgrading their indigenous vegetable production capacity. Questions the research paper will seek to answer are: What historical role have indigenous vegetables played in the economic empowerment of women in Rwanda? What is the present production and consumption rate of indigenous vegetables in Rwanda? In present times, what role do indigenous vegetables play in the economic empowerment of women in rural Rwanda? What are the possibilities and challenges that exist when upgrading the production of indigenous vegetables for women in rural Rwanda? How can consumer interest in indigenous vegetables be increased to expand the market for rural women in Rwanda?

This study is necessary in the absence of any existing, notable academic work concerning indigenous vegetable production in Rwanda. Additionally, it is necessary to understand the opportunities and challenges faced during the cultivation of indigenous vegetables and the economic benefits the process stands to confer on rural women in Rwanda. This need is greater in the face of the overwhelming emphasis by the government and other stakeholders on the cultivation of exotic or modern vegetables in Rwanda. This study will be useful to the Rwanda research community, policy makers, NGOs, civil society, and all others interested in food security and the economic empowerment of women living in rural areas in Rwanda. Data were gathered qualitatively through semi-structured interviews and focus group discussions with females living and producing indigenous vegetables in rural areas, and with government officials concerned with the economic empowerment of women, rural development, and food cultivation. Interviews were conducted in June 2016 among 50 women in Musanze district in the northern province of Rwanda. Within the Musanze district, 2 sectors were selected due to the high number of women involved in cultivation of indigenous vegetables. These sectors are the Shingiro Sector and Nyange Sector. Within these 2 sectors, 10 villages were focused on, including Kadahenda, Cyimbazi, Byimana, Bikekeri, Rwinuma, Mutuzo, Budasubira, Terimbere, Rwebeya, and Ntamiziro.

The most common types of traditional vegetables identified in the two sectors were, in their local names: *inyabutongo*, *isogo*, *isogi*, *ibidodoke*, *urudega*, *inyinya*, *ibihaza* (pumpkins), and *isombe*.

All of these vegetables are found in both sectors; and the most produced vegetable, as well as the most liked vegetable, was found to be *inyabutongo*, also called “*Dodo*” (*amaranthus*).

Additional interviews were conducted among government officers from the Ministry of Agriculture at the national and district levels. Representatives of Rwanda Farmers Association were interviewed, in addition to consumers of indigenous vegetables and wholesale dealers.

2.0 The Economic Situation of Women in Rural Areas

Between 2000 and 2008, women living in rural areas fared lower than rural men as well as urban women and men for each Millennium Development Goal (MDG)¹ marker with accessible information (UN Women 2018). Several reasons account for this, including the fact that around 79 percent of women in developing nations consider farming their major enterprise, although just 15 percent of landholders are women. Essentially, rural women confront greater limitations than men in obtaining access to key productive assets, which include administrative support such as credit, income augmentation, and social welfare; these women face wage disparities in rural employment and regularly work without compensation on family plots, which restricts their ability to exploit new opportunities (FAO 2011a). For instance, in Malawi, women fetch wood and water 8 times more than their male counterparts, while in rural regions of Guinea, women spend more than twice the time men do on similar undertakings (Anderson 2012). Insights from the government of Kenya show a huge gap in poverty levels between female-headed and male-headed rural family units where 48.8 percent of male-headed families are named poor when contrasted with twice this figure for the female-headed families (Anderson 2012).

In Africa, 80 percent of agricultural work originates from smallholder farmers, and many smallholder farms are worked by women. Despite the important role they play in agriculture, women in rural sub-Saharan Africa control less land than men and have restricted access to information sources, seeds, credits, and expansion opportunities (UN 2012). According to UN Women (2016), the World Bank, and the Poverty and Environment Initiative, the gender gap in agricultural efficiency ranges from 4 to 40 percent and could cost up to USD 100 million in Malawi, USD 65 million in Uganda, and USD 106 million in the United Republic of Tanzania. At the national level, female staffing levels have remained especially low in Ethiopia, Togo, Niger, and Burkina Faso, while in Botswana, Mozambique, and South Africa over the past several decades, levels were high. Hussein and Nelson (2009) reveal that, in Africa, numerous women are occupied with the most minimal levels of small-scale undertaking, mostly family-unit-based wage-creating exercises.

2.1 The Economic Empowerment of Women in Rural Areas

A subject of deliberation among scholars in recent times has been what constitutes the economic empowerment of rural women. Kishor and Subaiya (2008) conceptualize empowerment in terms of agency, resources, and achievements. Agency is central to the concept of empowerment and is defined as the process by which a choice is made and transformed into effect. Resources are conceptualized as a medium through which agency is exercised, and achievements are conceptualized as outcomes of agency. Similarly, Samman and Santos (2009) highlight that agency and empowerment are interrelated concepts—that is, empowerment does not happen in a vacuum. Alsop and Heinsohn (2005) postulate that the level of empowerment for a given person is associated with his/her personal capacity to make meaningful and purposive choices (agency) and the institutional environment in which the choices are made (opportunity structure).

The economic empowerment of women living in rural areas entails exploring and entrenching avenues that will ensure a visible, sustained, and sustainable improvement in the overall economic situation of female dwellers in rural areas. Economic empowerment demands that women in rural areas are exposed to a variety of choices that hold the possibility of yielding economic rewards, are equipped to make wise choices, and are endowed with the ability to independently invest in their choices and nurture them over time through cycles of profit.

2.2 Economic Empowerment of Women Living in Rural Areas in Rwanda

The government of Rwanda is globally recognized for its commitment to the advancement of women across sectors. Gender equity is entrenched in the constitution, and Rwanda is the first nation in the world to possess a parliament composed of more than 50 percent female members. Women in Rwanda have rights to land titles and possess equal inheritance rights to their parents' property. Women living in rural Rwanda who are leaders in the village councils constitute 43.9 percent; women leaders in sector councils constitute 45 percent; and in district councils they constitute 43 percent (CLGF 2015). Notwithstanding Rwanda's extraordinary advancement in the economic empowerment of women, women in rural areas still experience challenges such as food insecurity and the lack of access to basic income (IFAD 2017). Their poor access to infrastructure in rural areas confines them from opportunity and limits access to certain support platforms and services that are available to their urban counterparts.

3.0 Indigenous Vegetable Production and Consumption in Africa

Africans have traditionally consumed indigenous vegetables made from the edible parts of species originating in Africa (Abukutsa 2010). The use of traditional vegetables is part and parcel of the cultural heritage playing a significant role in customs, traditions, and in maintaining

equity in the family. Studies conducted in different countries identify some widely consumed, traditional vegetables throughout Africa, including amaranthus species, spiderplants (*Cleome gynandra*), African nightshades (solanum species), cowpeas (*Vigna unguiculata*), African eggplant (*Solanum aethiopicum*), African kale (*Brassica carinata*), and jute mallow (*Corchorus olitorius*) (Abukutsa 2010).

In Rwanda, a study conducted by the country's Ministry of Agriculture (MINAGRI) indicates that indigenous vegetables, including *imbwija* (amaranthus), *isogi* (spiderplant), *inkoli* (cowpea), *isogo* (nightshade), and *ishunyafrica* (kale) (Gahakwa 2011), serve different roles, such as being high in nutritive value due to the abundance of vitamins, minerals, and moderate protein percentages (Aphane, Chadha, and Oluoch 2002). Rwanda's indigenous vegetables also have medicinal and health benefits; many have been known to cure ailments, such as upset stomachs (Kokwaro 2009). These indigenous vegetables are also known to grow to full maturity within a short period of time, produce seeds under tropical conditions, respond well to organic manures, and tolerate abiotic and biotic stresses (Abukutsa 2010).

Indigenous vegetables grown in Africa hold great potential for income generation across the region, especially in rural communities since they have led to the improvement of living standards among poor families in rural areas (Jacobs and Baiphethi 2009). Traditional vegetables, such as amaranth, and jute mallow, have market potential, and thus contribute towards enhancing income at the household level. In Kenya, it has been established that consumers prefer traditional vegetables because of their nutritional value, and would be willing to buy such vegetables, given that they are well produced and reach the market at peak quality (Ebert 2014).

3.1 Women in Production and Marketing of Indigenous Vegetables in Africa

In most African countries, indigenous vegetables are seen as crops that should be cultivated by women since they are mostly grown and sold by women, who make up a greater percentage of the agricultural workforce (Ayanwale and Amusan 2014). In Rwanda, for instance, the production and sale of indigenous vegetables were described, according to research conducted in the volcanic areas, as being a "business for women" (Taremwa, Mukakamali, and Butera 2016). Indigenous vegetables are a fundamental financial pillar for many rural women who depend on the production and sale of the vegetables to support their livelihood. These women cultivate, weed, harvest, pack, and transfer traditional vegetables to the nearest selling points and strategic wholesale urban markets. Women who produce and trade indigenous vegetables can generate up to a 74 percent profit margin, which is income that enhances food security; provides access to

improved health care, education, and housing; and allows women to exercise some degree of financial independence in the family budget (Aphane, Chadha, and Oluoch 2002).

3.2 Shift from Indigenous to Exotic Vegetables

Most non-traditional vegetables were introduced to Africa during early trade with foreigners, western missionary activities, and the colonial era; then they were integrated into the indigenous food systems. Globalization and the exchange between communities also introduced vegetables to the continent in more recent times (Maundu 1997). Through intercommunity exchanges, intermarriages, and domestic trade activities, imported vegetable species penetrated deep into the hinterland and spread widely across the region. In many instances, exotic vegetables have grown to dominate over indigenous vegetables, especially in urban areas, leading to the reduced consumption of the latter; however, rural dwellers, in many instances, still mostly consume traditional vegetables (Muhanji, Roothaert, Webó, and Mwangi 2011).

Many colonial powers did not support indigenous agriculture. Instead, they actively promoted imported crops and species. The introduction of exotic vegetables in Africa during colonial times was backed by state support and dealt a huge blow to indigenous vegetables. The net effect of such suppression flowed into the post-independent era, since many African governments continued with agricultural policies developed by the former colonialists; many depended on erstwhile colonial masters to provide funds and/or technical support for the development of the agricultural sector. The result has been a consistent decrease in the cultivation and consumption of indigenous vegetables, while the consumption of exotic vegetables increases. Among the younger generation, for instance, one who has cultivated a taste for exotic vegetables is usually considered modern, classy, and trendy (Onim and Mwaniki 2008). However, despite the observed decrease in consumption and production, indigenous vegetables still significantly contribute to the economic situation of rural women and can contribute even more if adequate investment is made in production and marketing (Chweya 1997).

3.3. Prevailing Trends in the Production and Consumption of Indigenous Vegetables

In general, investments in the production of indigenous vegetables are much less when compared to the production of exotic vegetables across sub-Saharan Africa. Despite their nutritional and medicinal benefits, indigenous vegetables are considered low standard and are not emphasized in research and development; as a result, they do not access markets beyond local consumption. In Tanzania, a study conducted in 2004 among local farmers established that of all the vegetables produced, 35 percent were indigenous vegetables that were mostly cultivated by small-scale farmers (Weinberger and Msuya 2004). Despite the low output of indigenous vegetables, literature shows that the production of indigenous vegetables is more advantageous compared to

exotic vegetables. According to Onim and Mwaniki (2008), indigenous vegetables are preferable due to their local adaptability and resistance to pests and diseases compared to exotic vegetables. In Tanzania, farmers said that a particular benefit from cultivating indigenous vegetables is that they can be repeatedly harvested with a lower maturity period (Weinberger and Msuya 2004). Research on indigenous vegetables conducted in Rwanda's volcanic area shows that women prefer the cultivation of indigenous vegetables to exotic vegetables for many reasons, including the multiple roles they play, such as medicinal and dietary, in addition to their resistance to adverse climatic conditions (Taremwa, Mukakamali, and Butera 2016). In Tanzania, indigenous vegetables make an important dietary component, especially during the rainy season; however, according to a study in Tanzania, "the share consumption in all vegetables consumed is much higher among poor households (40 percent) than among wealthiest households (11 percent)," and the consumption of exotic vegetables increases as one gets wealthier, while the consumption of indigenous vegetables decreases as a result (Weinberger and Msuya 2004). It has generally been noted across east Africa that indigenous vegetables are mostly consumed by those in the lower income bracket, especially in rural areas (Muhanji, Roothaert, Webo, and Mwangi 2011). It is important to note that the level of consumption of vegetables in sub-Saharan Africa is very low compared to other parts of the world, such as Latin America and Asia (Onim and Mwaniki 2008).

3.4 Challenges Facing Indigenous Vegetable Production

Challenges facing Africa's indigenous vegetables are significant and have diverse effects on their production and consumption. One of the challenges is the lack of information concerning indigenous vegetables, or a dearth of research and development on such indices as their nutritional value and uses (Afari-Sefa et al. 2011). Another challenge faced by growers of indigenous vegetables is the generation and safeguarding of seeds. The intentional and commercial production of indigenous vegetable seeds in sub-Saharan Africa is not common, making the availability of quality seeds difficult since farmers have to grow and maintain their own seeds (Afari-Sefa et al. 2011). This is an indication that growers of indigenous vegetables may not be prepared to respond to market demands if the preferences change from exotic to indigenous vegetables. A study conducted in Kenya in 2007 demonstrated that, as consumers became aware of the nutritive and medicinal value of indigenous vegetables, their relative demand increased, mainly in urban centers; however, the suppliers/farmers of indigenous vegetables were generally unable to meet increased demand (Ngugi, Gitau, and Nyoro 2007). In addition to this challenge, in sub-Saharan Africa, and mainly in East Africa, the percentage of women involved in agriculture is more than 50 percent, according to FAO (2011a), yet most of these women do not control the resources used in agriculture, including land. This indicates that

there is a high necessity for the empowerment of women if agriculture, and indigenous vegetables are to benefit from producers and consumers' attention.

4.0 Women and Indigenous Vegetable Production in Rwanda

Historically, indigenous vegetables grew as widely as any other natural herb in Rwanda. Older citizens in rural Rwanda recall a time when indigenous vegetables grew on the outskirts of the village, around where cows were reared; this was when cows were traditionally kept outside of homes and outside of human-dwelling places. Cows deposited dung that nourished the soil, thereby supporting the growth of indigenous vegetables. The land remained uncultivated and is called *ibiraraor ubugando* in Kinyarwanda, and citizens would source vegetables from these places. To date, vegetables such as *isogo*, which grows in forested areas, although now scarce, are considered of better quality. In Rwandan culture, these vegetables were eaten widely, especially with ground sorghum paste, *ugali* (thick paste made from cassava or maize flour), and potatoes. During harvest season, indigenous vegetables are specially prepared and consumed on *Umuganura*, the day of celebrating harvested crops.

Until the 1970s, indigenous vegetables grew wild across Rwanda; however, deforestation and overpopulation have led to the disappearance of much of the fertile, free grazing land and forested areas, where such vegetables thrived. Another reason for the disappearance of free-range indigenous vegetables in Rwanda is the villagization initiative that began in Rwanda after the genocide of 1994. Prior to 1994, Rwandans in rural communities lived in household farms in far flung places, but this ended when the government built villages and strongly encouraged Rwandans to live close to one another. Friesian cows were also introduced into the country. These cows produce more milk and require less grazing—in fact, the government of Rwanda mandates zero-grazing for a segment of its cattle rearing population. The result has been the scarcity of indigenous vegetables, such that some rural dwellers began to develop kitchen gardens to produce both indigenous and exotic vegetables. These kitchen gardens are constructed using sticks, old sacks, and stones, which all help to reduce soil erosion. Circular seedbeds are created in step-like ridges. Each ridge has a different type of vegetable planted. For instance, one ridge can hold *isogo*, another *isogi*, and another *inyabutongo*. As soon as the vegetables start germinating, the tasks of weeding, watering, and adding manure starts. After one month, harvesting can begin.

4.1 Women and Indigenous Vegetables in Rwanda: The Production Process

Production of indigenous vegetables in farms takes many forms and depends on the farmer and the farm. Usually, land is first ploughed, followed by the addition of organic fertilizers, such as cow dung and decayed leaves. Seeds are often self-generated from previous production by being

dried and stored in a small bottle. To be able to harvest seeds for storage, farmers usually allow the vegetables to grow old enough, or else they will not produce seeds. Seeds can also be borrowed from neighbors, and in rare instances, they can be purchased from the market. The actual process of planting indigenous vegetables can vary depending on the vegetable. For this study, we looked at the production processes of *inyabutongo*, *isogo*, *igihaza*, *urudega*, and *isosogi*.

Inyabutongo and Isogo: Once seeds are ready for cultivation, they are sown by being spread over a small patch of land, known as *umutabo*, to enable seedlings to germinate. This process of growing seedlings takes a period of two weeks, after which seedlings are transferred to a more permanent location. After transplantation, these vegetables need to be consistently monitored and cared for through daily weeding and watering, especially the latter during the dry season.

Isogo normally matures within one and a half months, and harvesting can begin right away once the plant has matured. After the initial harvesting, the stalk can grow other branches and leaves that can be harvested at a later date, and, normally, subsequent harvests can follow each other in a period of one week in between. An *isogo* planting usually lasts for five to seven months, depending on the climate, the fertility of the land, and coupled with the sort of manure utilized; afterwards, fresh seeds will need to be cultivated.

Igihaza: For *igihaza*, seeds are sown carefully to ensure sufficient space between two plants since this plant needs more space to grow. Seeds produce a plant after two to three weeks. *Igihaza* plants grow vertically at first, and later spread out horizontally, requiring much land space. *Igihaza* requires the input of manure and can produce in two to three months. One stalk can produce six or more *igihaza* branches at the same time. Harvesting is a continuous process since the lifetime of one *igihaza* plant is normally one year or more.

Urudega: *Urudega* has only one root and, therefore, is not given to transplantation. Weeding and adding manure is carefully coordinated due to the tenderness of the plant. Harvesting can commence after three months. Only the leaves are harvested while the stalk and branches are left intact. During the rainy season, the harvested *urudega* planting grows new branches and leaves within a period of one to two weeks to enable a second, and, eventually, more rounds of harvesting.

Ibidodoki: The seeds of *ibidodoki* are planted near a fence or tree to allow the climbing and spreading of leaves across a wider area since it is a climbing plant.

4.2. Motivation and Benefits from the Production of Indigenous Vegetables

Rural women dwellers in Rwanda noted several reasons for the decision to go into production of traditional vegetables that are explained below.

4.2.1 Health Reasons

There is a general belief that people who eat traditional vegetables did not fall sick often. Rural dwellers are motivated by this belief, and many were advised by healthcare practitioners to increase their consumption of indigenous vegetables when they or their children presented symptoms of malnutrition. Rural clinics would prescribe increased consumption of indigenous vegetables to people experiencing kwashiorkor, anemia, and ulcers.

Having heard of their benefits from family and community members, some rural women began to cultivate indigenous vegetables to forestall malnutrition among their wards. According to a respondent, “My grandmother used to tell me much about the benefits of these vegetables and, more especially, their benefits for children. So, when I got married, I thought of producing these vegetables since I had to nourish my children. The benefits were later emphasized by nurses at the hospital, and as a result, I decided to permanently have these vegetables at my home.”

Furthermore, rural dwellers believe indigenous vegetables act as a remedy as follows:

Isogo and *isogi* are used to prevent hepatitis A, malnutrition, different parasitic worms; loss of appetite, nausea from bingeing alcohol, ulcers, kwashiorkor, anemia, oral candidiasis skin infections, wasting disease or being underweight, and for the treatment of abdominal pain. It can also serve as prenatal multivitamin, help reduce pregnancy nausea, increase breast milk production, and facilitate food digestion. *Isogo* also helps to strengthen sperm production in men (*igihaza*), and a drunk person who has lost appetite due to excessive drinking is usually advised to eat the plant to gain an appetite.

Urudega is used by locals to treat diarrhea and to strengthen the joints. Locals also attest to the plant’s ability to heal backaches and cure worms if it is cooked without water; its own water heals worms. Rural dwellers attest to the ability of *urudega* to treat symptoms of autoimmune diseases. According to a respondent, “I used to have a problem in my veins. I could not walk well and, so, was advised by doctors to plant and eat *urudega*. I took the advice and was cured after some weeks.”

Inyabutongo is known to contribute to having a balanced diet since it is abundant in vitamins and irons.

4.2.2 Economic Reasons

Some rural women went into the cultivation of indigenous vegetables for economic reasons. Many learned from family members that cultivation and trading in indigenous vegetables can be a profitable enterprise. According to a respondent, “I started producing vegetables after seeing the income my mother was getting from it. I also wanted to get money by selling them in the market.”

For another, “I started producing this vegetable because their demand is high. They are liked by many people.”

Another said, “My number one reason for producing vegetables was household consumption and children protection against kwashiorkor; however, I also realized later that I can make money from these vegetables, and I started to produce more for the market.” Other economic uses include using a vegetable like *urudega* to mend holes in leaking sauce pans, thereby saving families money.

4.2.3 Food Security Reasons

Some women in rural Rwanda began to grow indigenous vegetables to add bulk to family staples. This is more so after observing that the vegetables had become scarce and expensive in the market and, therefore, quite unaffordable. According to one respondent, “The vegetables serve in increasing food security. If you have a large household, you prepare them mixed with other foods, and you are able to feed many kids. In 1998, I realized that these vegetables were becoming too expensive in the market, and yet, they were very important to my family, so I had to start growing them.”

4.2.4 Sustainability Reasons

It became apparent that some indigenous vegetables were becoming rare species, so older rural women began to grow them out of concern for the next generation. According to one respondent, “I decided to start growing indigenous vegetables to make sure that they don’t disappear.”

Others grow the vegetables out of fondness, nostalgia, or habit. According to a respondent, “My mother used to grow indigenous vegetables, so I learnt from her, and today, I am doing the same.”

4.2.5 Financial Benefits

According to all respondents, indigenous vegetables are profitable, even much more than modern vegetables, such as cucumbers, cabbages, carrots, and bell peppers. The market is also more available, and indigenous vegetables, such as *igihaza*, sell out quickly once harvested. According to a respondent, “If I take my indigenous vegetables to the market, they will be bought before cabbages. Although I grow both cabbages and *inyabutongo*, I am only able to sell cabbages after *inyabutongo* is exhausted.” In many instances, rural women note that they sometimes do not even need to get to the market before they sell off their indigenous vegetables because customers come to harvest them from the garden. Income reported by the women varies depending on available land for cultivation; however, on average, respondents earn between 1,000 and 15,000 RWF per month. Income is mostly used to purchase health insurance (*mutuelle*) and other household needs.

4.2.6 Food of Choice

As far as rural dwellers in Rwanda are concerned, indigenous vegetables are the food of choice for several reasons. First, these vegetables are cost-effective and do not require as many ingredients to cook as modern exotic vegetables (which require a lot of oil and other ingredients). Furthermore, indigenous vegetables are quick and easy to prepare. Indigenous vegetables can be prepared without being fried, and still taste sweet. Modern vegetables often require frying, which sometimes results in feelings of discomfort, and even indigestion, especially when eating at night. Also, many prefer the taste of indigenous vegetables; according to a respondent, “Myself, I don’t take modern vegetables because they are sugary. I eat only traditional vegetables.”

4.2.7 Community Living

In regards to communal life experienced in rural areas, indigenous vegetables are easier to share with neighbors compared to nontraditional vegetables, which producers grow mostly for profit. According to a respondent, “I cultivate much more indigenous vegetables than I need because I get to share with my landless neighbors. It strengthens our relationships.”

4.2.8 Production Time

Finally, traditional vegetables can be harvested in a shorter period of time compared to modern vegetables. For example, cabbages require a period of three months from the time of planting to mature and be ready for the market, whereas a farmer needs only one month for traditional vegetables like *inyabutongo* “dodo,” the amaranthus vegetable. Thus, female producers in rural

areas prefer traditional vegetables because, as noted by a respondent, they “need to produce very fast and take them to the market to get money.”

4.3 Challenges Faced by Women Living in Rural Rwanda When Cultivating Indigenous Vegetables

4.3.1 Limited Knowledge

Many women living in rural areas who produce indigenous vegetables note that very little training is given to them in cultivation, tending the vegetable garden, and harvesting and post-harvesting techniques. According to one respondent, “Currently we use only the knowledge from our elders.” Some women, however, acknowledged that they received some form of training from NGOs and the Rwanda Ministry of Agriculture, and some even received seeds of *inyabutongo* from their respective sectors (referred to as *Umurenge*: administrative unit in the local government). A few rural women received training from ActionAid under the Akalima Kigikoni program, but the training focused on the cultivation of modern vegetables since international organizations are more interested in exotic vegetables.

4.3.2 Limited Land

In rural areas, female vegetable producers have limited land and are only able to produce a limited amount of indigenous vegetables. Rwanda is a country where land is one of the scarcest commodities. This is especially so because rural dwellers now live in villages and no longer have access to large swathes of land as they once did. People cultivate only the land close to them since these vegetables can be stolen when growing them far from home. Furthermore, it remains a challenge for rural women to forego other traditional cash crops, such as potatoes, to produce indigenous vegetables.

4.3.3 Manure

Lack of sufficient organic manure is a major challenge among female producers of indigenous vegetables in rural areas. According to a respondent, “Sometimes I need to beg from my neighbors to get manure.”

Another respondent said, “Availability of manure depends on livestock, which I don’t have.” Some women who own livestock are able to generate organic manure to cultivate their fields.

4.3.4 Effects of Climate Change

Climate change leads to unfertile land, which then leads to the reduction of harvested crops. As dry seasons become longer, it becomes difficult to grow indigenous vegetables because of the need to irrigate crops. During this season, water is expensive, and irrigation may not be possible or otherwise affordable. According to one respondent, “It is quite difficult to irrigate indigenous vegetables in the dry season. We first have to build a shade for them so that they do not dry up. Also, drought comes with pests and diseases, which reduce the production of local vegetables. Production is really low in the dry season.” On the other hand, heavy rains can destroy seeds and make it impossible for vegetables to germinate and completely mature.

4.3.5 Diseases

There are many diseases that attack indigenous vegetables. One of them is *urusimba* disease, which is prevalent during the dry season. It occurs in the form of small black insects that destroy vegetables. A whole planting of vegetables can be lost to *urusimba*, therefore, there is a need to invest in research and development to find a solution to this disease.

4.3.6 Market Access

Limited markets in rural areas and lack of access roads to urban centers mean that rural dwellers produce a limited amount of vegetables, otherwise they will incur severe post-harvest losses. According to a respondent, “When grown in much quantity and by many people, we do not get the market for them because of too much supply, and, therefore, we sell them at lower prices or even waste them. Also, there is no road; however, if I grow them extensively and have access to the market, I can be able to supply to more people since their demand is also high in urban areas.”

4.3.7 Post-harvest Losses and Storage Challenges

Rural female producers of indigenous vegetables note that sometimes, they may harvest more vegetables than they can readily consume and sell, but because of lack of transport to cities where these vegetables are in high demand, they are left with the vegetables, which often spoil. There is need for transport and provision of some sort of storage facility that can extend the freshness of these indigenous vegetables.

4.3.8 Pests

Rural women producing indigenous vegetables say that birds and various insects, which eat up the seeds of *ibidodoki*, pose a concern to them because they are unable to afford preventatives such as traps and pesticides to contain the pests' activities.

4.3.9 Seeds

Some indigenous vegetable producers note that a lack of seeds is a major challenge. According to one respondent, "We lack the seeds of these vegetables, such as *urudega*, *isogo*, and *isogi*. If I can get more seeds and more land, the production would increase, and this would increase my income."

4.3.10 Consumer Perception

Most traditional vegetables are popular in Rwanda's rural areas. In the urban areas, only *inyabutongo* (dodo) is widely consumed, and younger Rwandans in urban areas prefer modern vegetables. In rural communities, some vegetables such as the bitter *isogol*, which grows wild, are eaten by the older generation partly because they constituted part of their diet from childhood. They are also linked with the consumption of sorghum bread, which has an important significance in their culture. In rural areas, vegetables like *inyabutongo* are consumed more than nontraditional vegetables like cabbages while in the urban areas, its consumption is limited only by unavailability and high prices. According to one respondent, "The problem is that they [indigenous vegetables] are grown by few people. For *igihaza*, Rwandans like it too much, but people have not yet started to produce them too much, and, as result, they reach the market when they are expensive."

Furthermore, the way in which the younger generation regards the consumption of traditional vegetables is a matter of concern. The younger generation, who prefers modern vegetables rather than traditional vegetables, believes that indigenous vegetables are for old and uncivilized village folks. One respondent noted, "We are putting serious measures to push young people to eat traditional vegetables by explaining their benefits to them often. When I prepare foods like potatoes or bananas, I mix them with traditional vegetables and make sure my kids cannot separate them, thus pushing them to eat traditional vegetables."

4.4 Expansion Possibilities for Female Indigenous Vegetable Producers in Rural Areas

4.4.1 Improved Technology

Over and above the traditional technology currently in use, rural female producers of indigenous vegetables need more modern technology for enhanced operation. According to respondents, “It is more difficult to water the vegetables during the dry season. It is very tiresome.”

4.4.2 Disease Control

Female producers of indigenous vegetables in rural areas are interested in learning disease control mechanisms against threats such as *urusimba*.

4.4.3 Establishment of Cooperatives

Rural women producing indigenous vegetables recognize the need to form cooperatives whose members can share ideas that can lead to increasing production through innovation.

4.4.4 Land Use Matters

Access to enough land for cultivation is a major issue identified by most rural women producing indigenous vegetables. Women producers believe the government of Rwanda should include indigenous vegetables as part of the crops required for cultivation under the government land consolidation program.

4.4.5 Citizen Sensitization

Women producing indigenous vegetables think there is a need to sensitize Rwandans on the benefits of indigenous vegetables. This can be done through various community engagements, such as the once-a-month mandatory community service (Umuganda, where citizens come together to work on common areas and address challenging issues). NGOs involved in health and nutrition can also assist the government in spreading knowledge of the benefits of local vegetables.

4.4.6 Improved Manure Availability

The government of Rwanda’s Girinka project, which gifts cows to the poorest households in communities, can be used to increase the availability of manure across communities. One way of doing this is by insisting that beneficiaries of Girinka should also cultivate indigenous vegetables and be open to sharing excess manure with other cultivators of indigenous vegetables.

4.4.7 Financial Support

Women producing indigenous vegetables note that they need financial support in order to increase production. This support can come in the form of materials to use for irrigation, additional lands, and acquisition of different equipment.

4.4.8 Sustainable Seeds

Women producing indigenous vegetables note their need for support to procure industrially produced seeds that can last for long time and can be purchased whenever they are needed. Although these women consider industrially produced seed, which has been pretreated with pesticides and even sometimes is genetically modified, as progressive, there might be need for more education regarding the benefits of organic farming and its health and sustainability benefits.

4.4.9 Training

Support for indigenous vegetable production and harvesting techniques is needed. Field visits with agricultural extension workers could be arranged at the district level with indigenous women producers who can then be trained to educate others at the village level.

4.4.10 Networking

Indigenous vegetable producers desire to network with their colleagues around the country to share knowledge and good practices. According to a respondent, “In some places in the southern part of the country, we hear they successfully produce vegetables, so if we could be facilitated to visit them and get knowledge through trainings, it can also contribute towards improving our production.”

4.4.11 Market Access

Assurance of market for their produce may lead female indigenous vegetable producers to put in more effort and increase their crop output. Many women note that the absence of market for much of what is cultivated often leads to reduced investments. According to a respondent, “We are discouraged from producing more quantities because of market. I think that by getting enough market, we can increase production and be able to sell in large quantity. We only have market for *inyabutongo* and modern vegetables in different hotels.” There are many ways that market access can be improved for women producers of indigenous vegetables, including:

- Exhibitions, such as trade fairs, expos, etc.

- Media formats, such as radio, television, documentary, etc.
- Training healthcare workers on nutritional knowledge concerning indigenous vegetables
- Training teachers who can disseminate information during parent-teacher meetings

There are also several platforms of interaction at the local level that can be used to disperse information on the benefits of indigenous vegetable production. One platform is Umuganda, which is a once-a-month event in Rwanda for communities to gather together, conduct community work, and for community leaders to inform citizens about important news and announcements. Umuganda is a traditional or indigenous knowledge-based concept that was reintroduced to Rwanda in 1998 as part of the post-genocide nation rebuilding efforts. Umuganda has proven quite a successful platform for the government to disseminate necessary information to citizens at the shortest possible time and to pass along critical information and necessary trainings to citizens. Another platform that can be used to inform citizens on the importance of indigenous vegetables is the Umugoroba Wababyeyi, or evening of parents, where all parents gather to discuss household issues and community development challenges.

In addition, researchers can be encouraged to conduct studies on indigenous vegetables and work with advocacy groups to attract the attention of stakeholders in order to gain policy support towards the improvement of indigenous vegetable cultivation and consumption.

5.0 Conclusion

Indigenous vegetables hold huge potential for strengthening the economic situation of women in rural Africa. Focusing on Rwanda, this paper presented a study on the place of indigenous vegetables in the livelihood of rural women and the opportunities for advancement in this field. Although most indigenous vegetables are quickly being replaced by exotic vegetables in urban Rwanda, rural dwellers, especially the older generation, still consume many indigenous vegetables. Rural women producing indigenous vegetables face many challenges, most of which are rooted in the absence of strong support by either government agencies or development partners involved in rural development. While the Rwandan government is heavily involved in rural development, with an emphasis on agriculture, recognition of the indigenous vegetables sector in government policies and decision has yet to be seen. Several development partners are also active in rural Rwanda, but most have shown a proclivity for training women on the production of exotic vegetables. On another hand, rural women producing indigenous vegetables are not organized and are unable to present a strong platform that is capable of influencing policy and project decisions. Formation of cooperatives and building of inter-community networks will go a long way in carving out a voice for rural women producing indigenous vegetables within the circles of government agencies and development partners. Government agencies and

development partners who desire to strengthen production capacities and become involved with these vegetables will do so through training; provision of improved technology; disease and pest control; sensitization of potential consumers; addressing land-use matters; infrastructural development; and many more. In all, strengthening the capacity of rural women producing indigenous vegetables, in addition to taking measures to expand the market, will be strategic to the advancement of rural Rwanda and Africa in the coming decades.

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Endnote

¹ The Millennium Development Goals (MDGs) “are eight goals with measurable targets and clear deadlines for improving the lives of the world’s poorest people. To meet these goals and eradicate poverty, leaders of 189 countries signed the historic millennium declaration at the United Nations Millennium Summit in 2000. At that time, eight goals that range from providing universal primary education to avoiding child and maternal mortality were set with a target achievement date of 2015” (MDGF 2018).