The socio economic impact of institutional childcare based drip irrigation gardens on the livelihoods: A case study of John Smale Children’s Home nutrition garden in Bulawayo Metropolitan Province.

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Abstract
The study sought to evaluate the impact of institutional drip nutrition gardens in addressing nutrition and food insecurity at childcare centres.
A study was carried out at John Smale Children’s Home in Bulawayo. Various stakeholders involved in the implementation were interviewed. A survey was undertaken on all the children using a questionnaire. Data were analysed using SPSS Version 16 and MS Excel.
The results showed that production has been intensified and diversified. The home used to grow three but now grows at least seven vegetables per cycle with a 300% cropping intensity. The garden has ensured a diverse vegetable mix that positively affected the nutritional status of the children. The home has developed market linkages with vegetable suppliers. This has increased the food security and improved the home’s nutritional balance. There was a high return to land and labour than dry land agriculture. The processing of vegetables ensured year-round supply. Employment had been created for one gardener. The results showed that the generated income was used for utility settlements, school levies, medical fees and purchasing of toiletries. Savings of up to $2 885.00 per year was made by producing its own vegetables. Life skills have been imparted on the children. It is recommended that a comprehensive study of all the other institutional gardens that benefitted from the nutrition garden programme be carried out to find out the impact and come up with best practices and implementation models.

Key words: Institutional drip gardening, urban agriculture, socio economic impact.

1.0 Introduction
Urban agriculture is viewed as both the vehicle for empowerment, self reliance, income generating and sustainable use and management of natural resources. Urban agriculture in developing and developed countries provides meaningful contribution towards household food security, which ensures accessibility and availability of unprocessed and processed vegetable and food products. Urban agriculture is the practice of cultivating, processing, and distributing food in or around a town or city. Urban agriculture can also involve animal husbandry, aquaculture, agroforestry and horticulture. Urban agriculture can reflect varying levels of economic and social development.

As noted in Olufunke et.al, (2003) that ensuring food security and appropriate nutrition of the urban population and in particular of the poorest households has become a special challenge in the tropics where rural food production is limited by marginal soil fertility and too low incomes to buy necessary inputs. Therefore many innovative ways should be adopted to promote urban agriculture in order to attain food security of urban households. This will enhance improved nutrition. (Bulawayo City Council Urban Agriculture Policy, 2000).

Bulawayo has a good potential of economic development but has been retarded by lack of sufficient water. The city currently relies on five surface sources in the Umzingwane Catchment. The boreholes in the Nyamandlovu Aquifer in the Gwayi Catchment, developed as an emergency measure during the 1992 drought, are currently not fully operational. Alternative water supply sources are far and expensive.

Due to the continuous rise in population of orphans and vulnerable children (OVCs), there is a serious need to meet the nutritional requirements of these orphans. This has given rise to the urban agricultural policy, formulated in October 2005 to improve livelihoods of urban and peri urban dwellers. The water situation in Bulawayo has led to the use of wastewater for irrigation purposes and the introduction of water efficient irrigation systems such as drip irrigation. This has been spearheaded by non-governmental organisations (NGOs) promoting sustainable development of people and institutions catering for OVCs and their environment, so that these institutions can produce vegetables for own consumption and sale.

The study was influenced by the development of the Bulawayo urban agriculture policy and the use of gravity drip irrigation technology for agricultural
development. The benefits to the population in terms of impact and economic benefits of these practices have not been documented.

Institutions catering for OVCs have over the years been facing food shortages and under funding from government as well the dwindling funding from donors.

Studies have shown that most water is lost through evaporation and drip irrigation has been found to be one of the water saving technologies. In India, drip irrigation was found to reduce water use by 30-70% and increased yields by over 50%, (Keller 2004). There is improved quality of crop, water use efficiency, intensification and cultivation of high value marketable crops. Urban horticultural producers can apply various strategies to optimise their water utilisation.

Water conservation measures need to consider not only soil and crop types, but behavioural and cultural factors as well. Growers need access to affordable technologies designed to reduce water loss, waste or use – such as irrigation, better drainage systems, low pressure drip irrigation systems, hydroponics, mulching and conservation agriculture approaches that minimize soil evaporation, (FAO, 2010).

1.1 Urban agriculture.

Urban agriculture is often advocated as a means to address growing vulnerability and poverty, persistent food insecurity, declining livelihood opportunities and gender inequality in the contemporary urban economy. This involves local production of food and associated local marketing of fresh and processed products, increase in the food security of the poor by making food locally available and at lower prices and by improving the nutritional balance of the family diet. Creation of better conditions for peri urban and urban families to produce and market vegetables, fruits and livestock products can positively affect the nutrition and health of vulnerable urban groups, especially in situations where women gain control over the destination of the produce and revenues from sales, (Bruinsma and Hertog, 2003).

Urban agriculture involves the production of vegetables, tree crops and animal husbandry on plots, in open public spaces and on unused privately owned land within the city and in the peri-urban zone. According to Bilkey and Nasr, (2000), urban agriculture is often associated with intensive plant cultivation due to the water challenges as well as scarce agricultural land. The land market for urban agriculture is mainly informal and most people cultivate land they do not own or have legal access to. In Southern African cities, squatting, borrowing and user rights are the most common methods of accessing cultivable land for urban agriculture. The most commonly cultivated crops are leafy vegetables and maize, which is the staple crop in most parts of the continent, but urban agriculture usually also, includes livestock rearing.

1.2 Forms of urban agriculture.

In overcrowded Southern African cities, many households (especially low-income households who live on residential properties of less than 350 square metres) do not have enough land on their own plots. This has given rise to ‘open space’ or ‘off-plot’ food production.

Urban agriculture is to a large extent, being done on land that is not owned by the user: roadsides, riverbanks, along railroads, idle public lands and parks. The use of such areas is, in principle, transitional and user rights are minimal. However, various systems of informal rent, lease and inheritance exist (Bilkey and Nasr, 2000).

The quality of the lands to which urban farmers do have access is often very marginal to start with. The poverty of the majority of the urban farmers and the insecure land-tenure situation has led to low investments in the land, low productivity and further deterioration of the soil. Fear of eviction leads people to plant quick-yielding seasonal crops and to avoid investments in soil quality, tree and shrub components, erosion prevention, water-harvesting measures, among other things. Next to land, the access to water (especially water of good quality) and nutrients (especially manure and compost of good quality) is crucial to urban farmers and both are difficult to obtain (although more widely available as in many rural areas). Use of water sources is often informal (for example, tapping off wastewater disposal pipes and canals), (RUAF Foundation, 2010). In Gaborone, some 60 per cent of urban food production enterprises operate on allocated plots on tribal land, (Hovorka, 2004). The land is allocated free of charge and based on usufruct rights to communal land.

In Harare, it was observed that economic hardships which emerged following the implementation of the Economic Structural Adjustment Programme had compelled many middle income households to engage in urban agriculture on their plots and on open municipal land, (Smith and Tevera, 1997).

According to Byerley, 1996; Dima et al., 2003, urban households, choose to cultivate in order to attempt to preserve their standards of living during inflationary times of crises and also to reduce their vulnerability to the possible breakdown of formal food channels. Households in this category grow primarily for their own consumption but may also market any surplus on an occasional basis. A recent study of the production and marketing of indigenous vegetables in Durban, for example, found that the bulk of the produce was consumed at home, (Shackleton et al., 2010).

While most urban farmers did not sell any vegetables, some did in small quantities and at irregular intervals. Another study of households in Lilongwe and Blantyre in Malawi found that urban food production is dominated by higher income households who are able to access more land and agro-inputs, (Mkwambisi, 2009). The study showed
that urban production is a source of both food and income, though the relative importance of each varied by type of household, with higher income households selling a larger absolute (but lower proportional) volume of produce and female-headed households selling more than male-headed households.

Over time, a third group of urban cultivators has emerged. These are small-scale entrepreneurs who engage in urban food production explicitly for sale rather than home consumption. (Nugent, 2003). The entrepreneurial form of urban production has been observed in a number of Southern African cities. In Botswana, studies in the 1990s initially showed only limited agricultural production in and around the main urban areas of the country, (Matsila, 1999; Molefi, 2000; Mosha, 1996, 1999). This was attributed to harsh climatic conditions, scarcity and expense of water, land access and availability, rural cultivation preferences, poverty, cultural/attitudinal factors and government safety nets.

1.3 Benefits of urban gardening

1.3.1 Promote the economic benefits of gardening

According to Diouf, (2012), urban areas should be viewed as important areas where poverty, healthy and nutrition consequences can be addressed. He further states that increasing biodiversity of urban food systems can enhance food and nutrition security of a country. The same author further notes that the task of feeding the world’s cities constitutes an increasingly pressing challenge requiring the coordinated interaction of food producers, transporters, market operators and input suppliers. It can be noted that new innovations that suit urban agriculture should be adopted so as to address urban poverty by increasing and promoting better urban agriculture practices. Farming in urban areas offer alternatives to urban food security. A criticism of past nutrition-oriented garden projects has been their insistence on production exclusively for home consumption and their discouragement of gardening for income generation. Traditionally, gardeners would feed their families first and then sell, barter or give away surplus garden foods. In certain contexts, however, income generation may become the primary objective of the home garden. In any case, it is counterproductive to impose the nutrition objective to the exclusion of the income generation objective, since in most gardening contexts they are linked and compatible.

Community or institutional gardens are helping to create a sense of place and a spirit of community in neighborhoods, where friendship and fellowship can develop. These gardens promote a community atmosphere and give people an opportunity to meet others, share concerns and solve a few problems together. The gardens have also become an active and experiential learning environment - providing the space, the skills building, the inspiration and the support to become eco-literate or ecologically literate. In addition, these gardens are places where people get to know one another, share knowledge, skills and experience and learn how to work together in positive constructive ways. (Hungwe, 2005).

Economical, community gardeners are saving money on their grocery expenses. The community gardeners and their children are healthier due to vegetable diets as suggested in Hungwe, (2005). The urban agriculture practice also promotes self-production and self-reliance among the vulnerable groups such as widows, unemployed youths, the economically disadvantaged and those living with HIV/AIDS. Urban agriculture practices contribute to income generation of surplus products which can be sold for cash needed for education, health, clothing among others.

As a response of the urban poor to inadequate or costly food supply, food (crops and livestock) production in urban backyards became worldwide a common feature. But the related increase in urban food demand opened the door for farming systems in and around our cities specialised on perishable products, such as vegetables, taking advantage of every open space, market proximity and the general lack of a functional cold chains. All these farming systems are part of a phenomenon called Urban and Peri-urban Agriculture (UPA).

The United Nations Development Programme (UNDP) estimated in 1996 that 800 million people engaged in urban agriculture worldwide. Of these, 200 million are considered to be market producers employing 150 million people on full-time basis. Urban agriculture contributed 15% of world food production in 1993 and this is expected to grow to 30% by 2005 (Smit, et al., 1996). There are also additional benefits of easier access to some of the horticultural products for growing urban populations. Several studies on urban agriculture have shown that the practice of urban agriculture is mainly for poverty alleviation and food provision, (Mlozi & Sawio, 1993).

1.3.2 Roles of women and children nutrition gardens and urban agriculture.

Although it is often assumed that women are the principal home gardeners, the role of women in gardening varies by region and culture. Gardening is typically a family activity involving women, men, children and the elderly, with some tasks carried out separately and others jointly. Men generally participate in the heavier tasks (bed establishment, fence building, well digging and tree harvesting), while women manage the day-to-day maintenance tasks. Women and children typically care for small livestock. The elderly have a special role in passing down traditional gardening knowledge to the next generations, especially their understanding of the care and use of indigenous plants.

Accordingly, it is important to involve the whole family in gardening promotion projects. This is especially true in cultures where women are not generally exposed to outsiders and will hesitate to get involved in new activities without the approval of their husbands. In addition, women may have
limited time available for gardening, especially when they are employed in own-farm or off-farm field production as well as time-consuming domestic tasks such as gathering fuel and water and preparing food.

Marketing of garden produce can be an important source of independent income for women. This aspect is particularly critical in female-headed households, where men migrate for long periods or in cultures where women traditionally feed the family through their own work. Where females cannot leave the home to sell in markets, garden food can be sold from the garden or by male children in the markets. In parts of Africa, there is evidence that as gardens become more profitable, men intervene to take over the management and marketing functions. Project implementers need to be aware of this and to assist women in preserving the gains they achieve through gardening, (Marsh, 1998).

1.3.3 Work towards an integrated food security strategy

The most successful home gardening activities involve both the nutrition and health and the agriculture sectors in an integrated approach. Too often these two sectors work separately and even competitively. Equally important is the participation of both private and non-governmental organisations and government ministries, even when government is only involved in a facilitative role. For small, isolated gardening projects to develop into effective regional and national programmes, governments must provide basic policy support, e.g. through appropriate research and extension services, provision of basic access to land and water and supportive land use regulations, especially in urban areas.

1.4 Water use efficient irrigation systems

According to Simonne et al (2008), drip irrigation is an irrigation method that allows precisely controlled application of water and fertiliser by allowing water to drip slowly near the plant roots through a network of valves, pipes, tubing and emitters. Alam et al (2006), also share their thoughts on drip irrigation system by stating that it is a method in which water is supplied to crops at “specific point” usually at the base of the plant. This method uses a network of pipes ending with small emitters to give water to the plant roots. In other words drip irrigation is a system that allows and promotes efficient use of water by specifically watering the concerned plant and not the whole garden.

1.4.1 The concept of drip irrigation

According to Newton (2012), when setting up drip irrigation it is important to consider factors such as crop being irrigated so as to determine the spacing. Soil characteristics are also important in determining the nature of the drip system. He further states that, the cropping structure also determines the type of tubing and drip spacing and the water supply is also important when setting up a drip irrigation system. Simonne et al (2008), notes that, when properly designed, maintained and operated, it can be a production asset for a small farm or plot. Using drip irrigation for profitable vegetable production requires an understanding of several basic engineering and horticultural concepts and their application. In other words drip irrigation is suited for small gardens. Bolder et al (2007), argue that such micro-irrigation systems can lead to substantial gains in production for smallholder farmers because drip irrigation technologies are relatively inexpensive, can be individually managed and provide households immediate gains. Therefore drip irrigation can be applied at household level as it suits micro environments. In urban areas where there is scarce agricultural land, drip irrigation can be applied. Alam et al, (2006), states that the drip systems are suitable where traditional surface irrigation methods do not work properly such as in desert and hilly terrains.

Moyo (2005) notes that areas with scarce water should adopt drip irrigation systems. Childcare centres located in urban set up have the opportunity to realise their potential in food production through practicing urban agriculture using technologies like drip irrigation gardens. Ensuring food security and appropriate nutrition of the urban population and in particular of the poorest households has become a special challenge in the tropics where rural food production is limited by marginal soil fertility and too low incomes to buy necessary inputs (IWMI; 2006).

Childcare institution in the City of Bulawayo like John Smale had continued to rely on well-wishers and donor for their food requirements. The introduction of drip irrigation projects had some effects on these institutions.

The study sought to investigate the socio economic impact of institutional drip nutrition gardens on the livelihoods of OVCs at John Smale Home in Barham Green of Bulawayo Metropolitan Province.

1.5 Problem Statement

Institutions catering for OVCs have over the years been facing food shortages and under funding from government and the dwindling of funding from donors. Due to the high demands of food requirements, NGO’s promoting community development through sustainable use of available natural resources have encouraged the use of drip irrigation for irrigation purposes in urban agriculture so that these institutions can produce vegetables for own consumption and sale. The socio economic impact of these interventions has not been evaluated so has to find out their impacts.

1.6 The objectives of the study were:

- To analyse the vegetable cropping patterns practised and evaluate the factors that have led to the adoption of drip irrigation at the institutions.
- To evaluate the vegetable yields, productivity of the garden and impact of the drip garden on the nutrition, livelihood and food security at the institution.
2. METHODOLOGY

2.1 Site Description

John Smale Children’s Home was established in 1972 as a juvenile correction centre for children from the Asian and White community. A Trust ran the home with state assistance until 1986 when the home was handed over to the Department of Social Welfare. It was then transformed to an orphanage with a carrying capacity of 82 children aged between 10 and 18 years. The home has 60 children and these attend schools in the surrounding community. The children stay in dormitory type accommodation with communal eating facilities. The 13 home staff assists the children with psycho-social support and life survival skills training such as gardening, rabbit and poultry rearing, knitting, sewing and cooking. These are meant to empower the children and prepare them for life outside the home.

Secondary data collection of the monthly vegetable production, consumption and income generated from the sale of surplus vegetables were collected from Leveraging Economic Assistance to the Disadvantaged (LEAD) and John Smale reports and files.

Individual key informant interviews were conducted with the LEAD Programme Manager and Projects Officer, John Smale’s Acting Superintendent, garden supervisor, Accounts clerk and the gardener.

Data sort from LEAD and John Smale staff was on the selection criteria, implementation, agricultural production, technical back up, data on monthly vegetable production and the impact that the garden has had on the home.

A questionnaire was designed and administered on all the children at the home. The children had been made aware of the survey and consent had been sort from the management of JS Home.

The data was analysed using SPSS Version 16 and Ms Excel.

3. RESULTS

According to the LEAD staff, the institutional drip garden was implemented in May 2007. The main objectives of the project were food security, income generation and transformation of the garden into a learning centre where cutting edge technologies, best management standards, knowledge and experiences would be exposed to the surrounding communities.

3.1 Demographics of the children at John Smale

The respondents were 46% boys and 54% were girls. The 10 to 13 years age group had 41% respondents, whilst, 45% were from 14 to 17 and 15% from over the 18 years age range. This is shown in the figure below.

The study revealed that 54.5% of the children are at secondary school and 45.5% are at primary school level. Table 1: below shows the grades of the children.

<table>
<thead>
<tr>
<th>Grade/Form of Children</th>
<th>Per cent of Children</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grades 4 – 5</td>
<td>18.2</td>
</tr>
<tr>
<td>Grades 6 – 7</td>
<td>27.3</td>
</tr>
<tr>
<td>Forms 1 to 4</td>
<td>45.5</td>
</tr>
<tr>
<td>A’ level</td>
<td>9.1</td>
</tr>
</tbody>
</table>

3.2 Activities carried out by children.

Agricultural and environmental activities at school were done by 68%, whilst 32% did not. The children who did agricultural and environmental activities reported using the garden for their school work.

The study also revealed that 96% of the children reported assisting in working in the garden, whilst 4% do not assist. The children assisted in a number of activities such as preparation of seed beds and vegetable beds, watering the garden, harvesting, cleaning and grading of vegetables, sowing and transplanting and selling of vegetables.

The figure below shows the percentage children involved in certain activities.
3.3 Training and extension

Before the drip installation, the gardener and other John Smale staff were trained by LEAD staff. The training covered aspects on project management and implementation, pest, weed and disease management options, crop selection and cropping programmes, fertility trench making, fertility management options, drip irrigation installation, operation and maintenance, irrigation water management, crop rotation, crop harvesting, handling and marketing and maintenance of boreholes.

The John Smale staff was also trained in agribusiness skills such as record keeping and establishment of market linkages with vegetable buyers. All these managerial practices and technical advice sought to make the home’s garden a horticultural hub for availing gardening knowledge, skills and experiences to the community.

The garden site was based on the soils, water and land slope. The 1500 m² drip system was designed by Drip Tech (Pvt) Ltd of Harare in consultation with the management of the home. Drip Tech (Pvt) Ltd installed the system with LEAD and John Smale staff. This involvement was to train LEAD and J. Smale staff in drip installation as this would make the operation and maintenance of the system easier.

The AGRITEX urban extension staff was trained in irrigation agronomy and water management.

3.4 Agricultural activities

Before the intervention by LEAD, the study found out that the crops grown were covo, maize and shallots. Maize was grown in summer and harvested as green mealies. Covo and shallots were grown year round using the bucket system. The home used to buy in vegetables such as cabbage, tomato and onions from vegetable markets. If the home had no money from government’s per capita grants, it had to do with covo and shallots from its garden.

The study found out that the garden had increased the choice of vegetables. The following vegetables were now being grown: tomatoes, garlic, onion, green beans, green maize, butternut, peas, tsunga, covo, okra, rape, spinach, pumpkkin, green pepper, carrots, beetroot, lettuce, cucumber cabbage, potatoes, choumollier. The introduction of drip irrigation system had increased the range of crops grown and the production levels. The garden now produced up to 42 857 kilograms per hectare of mixed vegetables per annum with an average of 32 143 kilograms over the five years that the garden has been in operation.

Besides growing of vegetables, the institution was also given a starter pack to keep broilers and rabbits. These enterprises were introduced after the installation of the drip irrigation system. The aims were to create synergies between the garden and the small livestock enterprises. The reject vegetables were fed to the rabbits, whilst the manure from the broilers and rabbits were a source of manure for fertility management. The manure was used for basal and top dressing of vegetables. The meat from the livestock was a good source of proteins for the children. According to the records kept by the institution, a total number of 800 broilers had been produced and marketed in 2012 giving a total amount of $4500 at a price of $7 per bird. The bulk of the work in the broiler unit was managed by the children. The income from these enterprises helped in the up keep of the institution.

3.5 Institutional garden production

The crops grown can be classified into six different classes: leafy vegetables, fruit, bulbs, tubers, roots and pods. The table below shows the different classes of vegetables.

<table>
<thead>
<tr>
<th>Class of Vegetables</th>
<th>Types of Vegetables in Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leafy</td>
<td>Covo, Choumollier, Spinach, Rapé, Lettuce, Broccoli, Cabbage, Tsunga</td>
</tr>
<tr>
<td>Fruit</td>
<td>Butternut, Tomatoes, Cucumber, Green pepper, Pumpkin, Squash</td>
</tr>
<tr>
<td>Bulbs</td>
<td>Onion, Garlic, Shallot</td>
</tr>
<tr>
<td>Tubers</td>
<td>Sweet potatoes, Potato</td>
</tr>
<tr>
<td>Roots</td>
<td>Carrots, Beetroot</td>
</tr>
<tr>
<td>Pods</td>
<td>Okra, Peas, Green beans</td>
</tr>
</tbody>
</table>

Leafy vegetables were the most grown at (35.80%), followed by fruits (24.9%). Tubers were the least grown crops at only (5.4%). Leafy vegetables were the most grown crops as they are easy to manage and generally consumed by people and children. The most consumed leafy vegetables were covo, rape and spinach. The most commonly grown fruit was tomatoes. These were said to be easy to grow and have a good market. The most grown pod vegetables were green beans followed by okra and peas. The buyers were reported demanding a lot of cucumbers, carrots and beetroots and these were reported to be the main crops for income generation.

3.6 Sustainability of the project

LEAD carried out training on irrigation operation and maintenance, borehole maintenance, pest and disease management, agronomy and soil management after the assessment of the previous project implementation weaknesses. These trainings assisted the involved personnel to get used to the system.

The study found out that the centre had diversified and intensified its vegetable production. The vegetable mix had changed from covo and shallots to seven vegetables at any one crop cycle. This has led to meeting the nutritional requirements of the home.

Table 3 below shows the annual garden production from 2008 to 2012.
In 2008, the home donated 125kgs of vegetables to the staff and OVCs in Percy Ibbotson and Girl’s Remand in Luveve high density suburb.

### 3.7 Intensification

The study found out that the home had intensified its vegetable production. At inception, the garden had covo and shallots. Currently the garden carried out three crop cycles per year. Each crop cycle had at least seven vegetable crops. This gave a 300% cropping intensity. The drip installation had enabled production to be intensified, thus increasing production and availability of vegetables at the home.

### 3.8 Training benefits

Children at the home were trained on horticultural activities. The training of staff members and children on operation and maintenance had enabled the home to maintain the drip irrigation system. The training of the children had empowered the children in terms of knowledge and life skills. All the children interviewed were grateful for the trainings as they felt empowered. The figure below illustrates the different trainings that the children did.

### 3.9 Market Linkages

John Smale had established market linkages with Spar Supermarkets in Morningside and Bellevue, where they sold their surplus produce. Although being verbal agreements, Spar Supermarkets promised to buy the garden produce from the home. This was reported to have improved the garden sales since the home was assured of a buyer.

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**Table 3: Summary of J. Smale Vegetable Production and Income Projection per hectare**

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Production (kg/ha)</th>
<th>Income Generated ($) (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2008</td>
<td>43 167.90</td>
<td>6 778.90</td>
</tr>
<tr>
<td>2009</td>
<td>64 701.80</td>
<td>16 766.90</td>
</tr>
<tr>
<td>2010</td>
<td>14 193.90</td>
<td>7 490.10</td>
</tr>
<tr>
<td>2011</td>
<td>13 468.50</td>
<td>6 103.50</td>
</tr>
<tr>
<td>2012</td>
<td>26 401.00</td>
<td>8 422.70</td>
</tr>
<tr>
<td>TOTAL</td>
<td>161 926.00</td>
<td>45 562.13</td>
</tr>
<tr>
<td>AVERAGE</td>
<td>32 385.20</td>
<td>9 122.43</td>
</tr>
</tbody>
</table>

The home produced 6040 kilograms on the 1500m² or 43 168 kilograms per hectare in 2008. Of that production, 3779kgs were consumed and donated, 2261kgs sold to raise USD 948.50. The highest production was in 2009 and was lowest in 2011. The production increased in 2012.

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**Figure 3: Total Vegetable Production, Consumption and Sales Figures in kgs.**

The highest consumption was in the years 2008 and 2009. In 2009 and 2010, the income generated by the home was $2346 and $1048 respectively. The prices of vegetables were very good during these two years. The prices fell in 2011 due to cheaper imports from South Africa. The 2012 income had improved due to that the community was now aware of the good quality vegetables produced by the home. The community was now the main buyer of the surplus vegetables.
Children were involved in the marketing of the vegetables as they were the ones who sell these vegetables to the local community. The children sold these at the home’s main gate in the afternoons after school. The children harvested, cleaned and packed the vegetables and erected a market stall at the main gate. Residents from Hillside, Morningside, Four Winds, Newton West and Burnside stopped over and bought the vegetables.

The community and buyers reported getting fresh vegetables from the J. Smale nutritional garden. Plate 1 below shows the vegetable stall erected by the children at the home’s main gate.

Plate 1: Market stall for vegetable sale at John Smale’s main gate

The study revealed that vegetable sales were the major primary sources of income at J. Smale. Through vegetable sales, the home had been able to supplement their daily food requirements, pay school levies for the children, bought stationery for the children, toiletries (soap, toothpaste, shoe polish and sanitary pads for girls) for the home. In 2008, the home reported buying plates for the communal dining room, repairing the doors and bathing facilities in the children’s bathrooms. The income was also used for the transportation of the children to hospital.

The home has been able to buy seed using funds from the garden. The current average monthly earnings from the garden are US$ 300.00 or an equivalent of US$2 144.00 per year.

The variety of vegetables grown has improved and boosted the nutrition base of the home. The availability of fresh vegetables ensures that the children’s diet was well balanced.

In addition to the financial benefits from the garden, children were trained on good agricultural practices, conservation and environmental sciences.

3.10 Horticultural knowledge hub

The John Smale garden has now turned into a resource centre for the best practices in gardening. The children are taught hands-on life skills in gardening and nutrition. Some senior students had used the nutritional garden for their school projects. Several organisations had been reported to have visited the home to learn on how to run a successful nutrition garden.

The project had positively impacted on the children by empowering them with horticultural skills.

3.11 Savings

The average vegetable consumption at J. Smale was 2585 kilograms per year. Using an average price of US$1.00 per kilogram of mixed vegetables, the home had been making savings of $ 2 585.00. This money would have been used by the home to buy in vegetables.

3.12 Job creation

The gardener employed by J. Smale was being paid from income realised from the nutritional garden. The garden though small had created employment for one person. The gardener had been trained and equipped with agricultural skills.

4.0 DISCUSSIONS

The successful implementation of the garden depended on the implementation model used. LEAD began the programme by having extensive stakeholder consultations. A memorandum of understanding was signed with the Department of Social Welfare. LEAD targeted J. Smale since it had some experience and history of gardening and built on that to enhance food security. All stakeholders and home management were trained. There was an integration of nutrition awareness and education into garden planning. There was also flexibility in the choice of vegetables, cropping patterns, encouragement of diversity and use of locally adapted varieties.

LEAD had a two year period to monitor the project with regular feedbacks, fine-tuning of training and other needs and minimised “giveaways”.

4.1 Build on indigenous knowledge

Understanding the traditional gardening system was vital. Even in communities that have not traditionally gardened, exploration of nearby communities that do gardening can give a more thorough understanding of the constraints that have inhibited gardening in the past. If these constraints: whether climatic, economic or cultural are overwhelming, they may signal the need to abandon the idea of a garden promotion project, (Marsh, 1998). LEAD carried out an appraisal before implementation of the gardening project.

The continued support and technical back up by LEAD has helped in ensuring that John Smale team remained on track.

4.2 Life skills development

Children at the home were encouraged to participate in garden activities during their spare time. The children were trained in many aspects of horticultural production and this has imparted practical skills to them. The children can fall back or build on these skills in the harsh world when they leave J. Smale. Through participation in the harvesting and sale of vegetables, the children learnt mathematical and logistical lessons in small business, accounting and organisation in addition to nutrition planning.
4.3 Sustainability of the livelihood of the children

The Zimbabwean economic down turn of 2008 and 2009 saw the institution producing mainly for consumption rather than for sale as there were no alternatives in other markets. The garden ensured food security for the children. The income from the garden has improved the livelihood of the orphans educationally as income is used to purchase stationary, pay school levies, tuition and examination fees for the secondary school children. This will see the orphans becoming educated citizens.

Institutional and commercial gardening contributes an important percentage of total non-grain urban food supply in many developing countries, adding significantly to urban food self-sufficiency (UNDP, 1996). The more intensive urban and peri-urban gardens create jobs and offer potential positive opportunities for recycling city garbage for productive purposes (e.g. fertilizer, land fill), (Marsh, 1998). The J. Smale garden has created employment for one person.

However the emphasis on income generation might lead to the Home concentration on the production for cash and giving the children the second grade vegetables that cannot be sold.

4.4.1 Nutritional value and health benefits of the fresh vegetables

The diversification of the vegetable crops has drastically improved the nutritional levels of the inmates. The vegetable composition provides a combination of essential nutrients namely vitamin A, B, C, D and minerals. The legumes provide the inmates with a cheap source of proteins. The green vegetables also provide the children with carbohydrates, minerals, pytochemicals like carotenoids and fibre.

4.4.2 Community supply of fresh vegetables

The institutional drip garden has become the main supplier of vegetables to the surrounding community. This has helped reduce the transport costs of these communities in that they get the vegetables nearby than to travel to the main markets in the town. The community enjoys the same nutritional and health benefits like the children.

4.4.3 Work towards an integrated food security strategy

The most successful gardening activities involve both the nutrition and health and the agriculture sectors in an integrated approach. Too often these two sectors work separately and even competitively. Equally important is the participation of both private and non-governmental organizations and government ministries, even when government is only involved in a facilitative role.

Furthermore, institutional gardening is only one of the possible interventions for enhancing food security for the poor and it should be considered in the context of a broader national food security strategy. Indeed, the complex synergies of food availability, access, consumption and nutritional status with poverty, health, mental ability, productivity and economic development demand an integrated approach to solving food insecurity in the long term. Institutional gardening has a special role in this strategy, in providing direct access to food through self-reliance rather than dependance on externally supported programmes such as food-for-work, targeted subsidies and supplementation and fortification schemes, none of which can be counted on for sustained support.

5. Conclusions and Recommendations

The diversification and intensification of cropping in the institutional garden has resulted in relatively higher value of crop production per unit of cultivated land and per unit of water used.

The skills introduced and adopted at John Smale were in the areas of vegetable production, water management, agronomic practices (organic, correct time of planting and integrated pest management), marketing, institutional arrangements as well as leadership and management. The home staff and more than 60% of respondent children indicated that there was an increase in their knowledge and skills in horticulture and drip irrigation. There was also an improvement in marketing.

The home had improved its land use intensity. This was due to increases in cropping intensity and continually cropping throughout the year, in both seasons (summer and winter).

The garden made significant contributions to home’s income, though lower in 2010 than in 2008, 2009 and 2012. The home made most money on cucumbers, carrots, beetroot, green beans, cabbages and butternuts. The increase in incomes had a positive effect on food security status of home.

The home has made savings by producing its own vegetables.

The home is now self sufficient in all its vegetable needs and the nutritional requirements of the children is being met. The home management indicated that they were more food secure than was the case before the implementation of the project.

Skills development of staff, children and community

In general, it can be concluded that introduction of the drip nutritional garden project has had immense positive impacts on the socio-economic welfare of both the John Smale inhabitants and the surrounding communities.

Recommendation

1. The home creates a fund for repair and maintenance of the borehole in order to reduce down time and improve production.

2. Participatory stakeholder involvement, crop selection and knowledge in irrigation agronomy resulted in high performance; this variation is shown clearly between the “without” project years and the “with” project years. This suggests the extension service on crop selection, irrigation water management and input utilization has strengthened.
3. Creating convenient market access and linkage is also important; such action will have a positive impact on the performance of a project.

4. It is recommended that a study of all the 14 nutritional gardens implemented by LEAD be looked into and document their impact.

References


11. Diouf, J. (1998), The state of food and agriculture, FAO.


