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The efficacy of Prison Farms towards food security at Chikurubi Maximum Prison

By

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DECLARATION

I, Munyaradzi Panganai, do hereby declare that the thesis submitted for the Master of Arts (MA) at the Midlands State University is my work and has not been previously submitted to any other University.

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DEDICATION

This research is dedicated to my beloved late mother Blandina Clementine Horomba who always encouraged me to further my studies. May Her Soul Rest in Peace. To my family and friends, I say Thank You for the support.

ABSTRACT

The research sought to find out the contribution of Chikurubi Farm Prison Towards Food Security in the ZPCS. The ZPCS has been affected by food insecurity and due to several factors that include the nation's economic problems and successive droughts. The concept of food insecurity caused immense suffering to inmates. This has caused the student to research how Chikurubi Farm Prison can contribute to food security in the ZPCS. This research sought to explain the food security situation in the ZPCS. Causes of food security and insecurity were also highlighted. A detailed explanation and analysis of the production systems in the ZPCS was made with potential production systems being highlighted. Factors that affect production were listed and explained. The challenges that are faced by the ZPCS as far as food security is concerned were explained with a view of finding a way forward for prisons to successfully tackle the issue of food insecurity in future.

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INTRODUCTION

The 1996 World Food Summit pledged to reduce the number of undernourished people by 2015. However, statistics prove that the number is continuing to rise despite the pledge. In the developing world, there is a food insecurity situation that has affected the livelihoods of the people. Food security and insecurity situations have implications on the welfare and economic status of the people. *"Food security exists when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life"* (http://fao.org). High food prices and drought are driving more people into poverty, hunger and being more food insecure. Global food security threats are a frequent situation. According to CIDA (2013), the 2007-2008 food price predicament drew international attention to the issue of food security. Sufficient, safe and nutritious food was inaccessible to more than 980 million people before the said predicament. By 2009, an estimated number of 1.02 billion people were food insecure. In Africa the food security situation is critical such that the majority of people are undernourished. FAO (2013) explains that the majority of undernourished people live in Sub-Saharan Africa. Everyday many children and the elderly die from hunger induced diseases. PRI (2002 discusses how prisons in Africa can improve production. The journal goes on to discuss that apart from staff salaries, food for prison rations is a challenge to most African governments. Most prisons have free labour and have access to more unutilised land that can be used for profit purposes.

It is the culture by prisons establishments in Eastern and Southern Africa to rely on treasury to assist with funds to buy food for prisoners, year in year out. However, the Penal Reform International (2013) explains that most Prison services are underfunded by the government. The Deputy Commissioner General of the ZPCS was quoted as *saying "We are only getting*

*US$300 000 from Treasury monthly, yet our institution needs US$1.3 million to sustain operations and that includes food and fuel procurement" (*The Sunday Mail 15 March 2015). It also explains that Prisons are not a priority spending for the Treasury. Horticultural ventures are a recent phenomenon in the prison system Gilbert (2012).

The concept of food security in the ZPCS has always been advocated for in the past. This was done in many ways including Prisons (General) Regulations, Statutory Instrument 1 of 1996 and the Prisons Act which is in the process of being amended. The Zimbabwean Constitution also assures prisoners the right to safe and nutritious food. Below are some of the prescribed food needs that every prisoner has rights to. However, all this affected by several issued that are explained in the research.

This research is a case study of Chikurubi prison Farm and it strives to establish the contribution and effectiveness of Chikurubi Farm Prison towards food security in prisons. Food security is an essential part of any establishment. Several prisoners suffer or even die from malnutrition. The study strives to establish why there is food insecurity in prisons despite having many farms in the ZPCS establishment. On the 13th of March 2015, prisoners at Chikurubi Maximum Security Prison rebelled against hunger and malnutrition problems at the institution (The Sunday Mail 15 March 2015). It will also bring about solutions to challenges within the prison system. It will highlight the role and objectives of international and local players in combating food security. The study will highlight how the ZPCS can save lives, protect the livelihoods of prisoners and officers, support the food security and 3nutrition situation and reduce under-nutrition in whilst breaking the cycle of hunger in prisons.

The study also exposed some success stories and failures in prisons with the aid of any suitable theories of food security, survival strategies/skills or production. The missing link for production to take place has been explored. Also, ways of averting hunger in future shall be discussed. The mission statement of the Zimbabwe Prisons and Correctional Service clearly brings about a rehabilitative approach. The rehabilitation stance is mainly hinged on developing, empowering and developing offenders for their successful reintegration into society.

4Several approaches and competing schools of thought on agriculture and food security have been used as part of the research methodology. These are the Food & Livelihood Security Theory of Change, the Livelihoods and Food Security Trust Fund (LIFT) Theory, New Modernists and Sustainable Intensification approaches. The research sought to highlight how food security in prisons is affected by several factors including climate change. Recommendations to improve production in ZPCS Farms were made in the face of the continuous climate change shall be made. The research however found that there is food insecurity in the ZPCS. However, Chikurubi Farm Prison can effectively contribute to food security in the ZPCS. There are recommendations that are put so as to increase production in the ZPCS.

Background to the study

The Prison system was introduced into this country during the times of colonization (in Rhodesia). The aim of imprisonment was not to rehabilitate offenders but to economically, 4socially and politically subjugate the indigenous people and to stifle any form of or any anticipated rebellion or resistance against colonization. Some of the first prisons to be

established in the 1890s were Salisbury Prison (where Mbuya Nehanda and Sekuru Kaguvi were incarcerated and later hanged), Bulawayo Prison and Fort Victoria Prison.

Prisons in Zimbabwe fall under the Ministry of Justice, Legal and Parliamentary Affairs and are classified into grades according to the prisoners they admit, their holding capacity, the nature of crimes, the inmates committed, their sentences and location of the prison. There are four grades/classes of Prisons in Zimbabwe, which are classified as follows:

Examples of prison grades

GRADE	**EXAMPLE**
1	Connemara Open Prison
2	Zvishavane, Shurugwi, Mberengwa Prisons
3	Chikurubi Farm, Chikurubi Female, Masvingo Remand, Mutimurefu, Whawha Young Offenders
4	Chikurubi Maximum, Khami Maximum Prison

Table 1.1 above shows prison grades and examples of prisons that suits those grades in Zimbabwe. Grade four prisons according to Statutory Instrument Number one of 1996 are those that accommodate high security risk prisoners, those serving sentences of more than 5 years going upwards and life sentences. In the above example, Chikurubi and Khami Maximum prisons are in grade 4. Grade 3 prisons are remand and farm prisons. Farm prisons can accommodate inmates who are serving sentences of 5 years and below. Remand prisons house prisoners who are still on remand of those with further charges. Grade 2 prisons are 6small prisons like Zvishavane and Shurugwi prisons and grade 1 prisons are open prison and in Zimbabwe there is Connemara Open Prison.

There were very few Prison Farms during the colonial times and these included Khami, Chikurubi, Umtali (now Mutare), Whawha and Marondera (Correctional Bulletin first edition 2015). The food needs of the prisoners were provide for by the then government of Rhodesia. The few farms that were there supplemented the food requirements of prisoners. Production in Prison Farms started at a limited scale during the colonial era. Production in the prisons system ensures food security in the prison establishment and also for the nation (Correctional Bulletin First Edition 2016). The Rhodesian Regime used imprisonment to politically and economically subjugate blacks and to thwart all elements of revolting against the government. However, the aspect of rehabilitation was fully adopted after independence when a new government was elected leading to the employment of rehabilitation officers towards the turn of the century. Crop and animal production, carpentry, welding and other aspects of production were introduced as the process of rehabilitation was gaining momentum in the prison system. Several reforms were made to the prison system in Zimbabwe (Correctional Bulletin Second Edition 2016). The system had less than 2000 officers by 1980 (Prison Registers). After the advent of Independence, the number of prison farms rose to over 10 farms as shown on the table below. Farming in prisons is regarded as rehabilitatory initiative by which farming skills are imparted to prisoners for their successful re-integration into society.

Examples of Prison Farms

Farm Prisons in Zimbabwe

Serial	Farm Prison	Province
1	Whawha	Midlands
2	Gokwe	Midlands
3	Connemara	Midlands

4	Mutare	Manicaland
5	Chipinge	Manicaland
6	Chikurubi	Harare Metropolitan
7	Chinhoyi	Mashonaland West
8	Kadoma	Mashonaland West
9	Hurungwe	Mashonaland West
10	Marondera	Mashonaland East
11	Mutoko	Mashonaland East
12	Marondera	Mashonaland East
13	Rigidita	Mashonaland East
14	Mutimurefu	Masvingo
15	Chiredzi	Masvingo
16	Mazowe	Mashonaland Central
17	Bindura	Mashonaland Central
18	Mt Darwin	Mashonaland Central

Chikurubi Farm Prison

Chikurubi Prison Complex is endowed with free labour in the form of over five hundred (500) prisoners, trained and expert personnel and about three hundred hectares (300 Ha) of arable land. Although it is a male offender dominated complex female inmates at Chikurubi Female Prison engage in different off farm activities which can improve the food security situation in prisons. According to the ZPCS Farm Profiles (2015), Chikurubi farm is endowed with more land which amounts to about 1694 hectares. This can sustain over 500 herds of cattle and over 500 goats. The pig sties can house over 1000 pigs. The fowl runs available can house over 50

000 birds, both layers and broilers included. It has a farm office, a combine harvester, tractors, planters and other farming accessories. Also at the farm are qualified agriculture personnel and veterinary surgeons.

Prisoners, officers and the government are affected by the issue of food insecurity in prisons. Chikurubi Farm Prison sits on 1694 hectares farmland. The current total arable land is 300 hectares. The complex has an irrigable 30 hectares of land and this is aided by an earth dam and it falls under natural region 2B which receives moderate +/-700-1000 mm per annum. The average is 750 mm per annum. The soil types is clay and a generally medium red soil and are a mixture of moderate deep soil to darkish red brown clay and yellowish grey to slightly reddish brown loamy soils to clay loams which are slightly acidic (ZPCS Farm Profiles 2015).

Chikurubi Farm Prison is endowed with a 30 hectare field which is under irrigation but needs rehabilitation. Currently the field is used for vegetable production. Also on the farm, there is underground water which can be tapped to beef up irrigation on the fields. The potential 300 hectares can be irrigated using water from the Lafarge Quarry Mining (ZPCS Farm Profiles 2015). The whole farm is a potential area for crop and animal production. The estimated average maize yield is about 10 tonnes per hectare. Once a viable irrigation facility is fully established there will be crop production throughout the year. Both cereals and legumes are targeted crops as they are necessary prisoners' dietary requirements. The problem is that prisoners are suffering from the effects of malnutrition and hunger yet the Zimbabwe Prisons and Correctional Service has the capacity to produce for its own consumption.

There is food insecurity in prisons owing to many factors that hinder production in prison farms. These include poor or dilapidated farming infrastructure, negative climate change

effects that affect agriculture, lack of technical expertise and sabotage among others. The main aim of the Zimbabwe Prisons and Correctional Service is to modify offenders' behaviour so that they can be successfully reintegrated into the society. Since rehabilitation through behaviour modification is the main aim of the ZPCS, psychologists and social workers have been employed. Inmates are taught skills ranging from, metalwork, upholstery, market gardening, farming, carpentry, tailoring, bricklaying and plumbing. These skills are imparted by officers and other skilled inmates.

Statement of the Problem

It has been noted that prisons in Zimbabwe are failing to meet food security requirements for inmates and personnel. For instance in March 2016 inmates from Chikurubi Maximum Prison protested against food shortages and type of food provided (The Sunday Mail 15 March 2015). Many prisoners are suffering from hunger and malnutrition. In the face of these problems, the ZPCS has the capacity to meet its own food security requirements given the fact that it is endowed with many farms which have water and free labour. The ZPCS has qualified personnel in the form of prisoners and personnel who can assist in ensuring production in prisons. Also, in terms of budgetary concerns, the ZPCS is underfunded by treasury such that it cannot meet inmates' dietary requirements using the finances availed by the treasury. Production in prison farms enhances the food security status of prison institutions. Due to hunger and under-nutrition, inmates end up suffering from malnutrition related diseases like pellagra. It is against this background that this research seeks to find out the efficacy of these prison farms in the provision of food to its inmates. Each of the farms boasts of over one hundred hectares (100) of arable land. All of the farms are endowed with good agricultural soils and sweet veldt for animal pastures. All the farms have access to either dam water or underground/borehole water.

Therefore, thus study seeks to examine the extent to which prison farms are providing food to the inmates.

Conceptual Framework

According to the 1996 World Food Summit, "Food security exists when all people, at all times, have physical and economic access to sufficient safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" Development can only take place in a food secure environment. Since the end of the Second World War, living in a food secure world has been the main issue which led to the subsequent creation of the Food and Agricultural Organisation in the 1940s.

Below is a table which shows food security indicators and their explanations.

Physical AVAILABILITY of food	Food availability addresses the "supply side" of food security and is determined by the level of food production, stock levels and net trade.
Economic and physical ACCESS to food	An adequate supply of food at the national or international level does not in itself guarantee household level food security. Concerns about insufficient food access have resulted in a greater policy focus on incomes, expenditure, markets and prices in achieving food security objectives.
Food UTILIZATION	Utilization is commonly understood as the way the body makes the most of various nutrients in the food. Sufficient energy and nutrient intake by individuals is the result of good care and

	feeding practices, food preparation, diversity of the diet and intra-household distribution of food. Combined with good biological utilization of food consumed, this determines the *nutritional status* of individuals.
STABILITY of the other three dimensions over time	Even if your food intake is adequate today, you are still considered to be food insecure if you have inadequate access to food on a periodic basis, risking a deterioration of your nutritional status. Adverse weather conditions, political instability, or economic factors (unemployment, rising food prices) may have an impact on your food security status.

Adopted from FAO, Food Security Information for Action Guides (2010)

Food security as a concept originated only in the mid-1970s, in the discussions of international food problems at a time of global food crisis. The initial focus of attention was primarily on food supply problems - of assuring the *availability and to some degree the price stability of basic foodstuffs at the* international and national level. That supply-side, international and institutional set of concerns reflected the changing organization of the global food economy that had precipitated the crisis. A process of international negotiation followed, leading to the World Food Conference of 1974, and a new set of institutional arrangements covering information, resources for promoting food security and forums for dialogue on policy issues (ODI, 1997).

The recent food crises have revealed deep structural problems in the global food system and the need to increase resources and foster innovation in agriculture so as to accelerate food production. Food production will have to increase between 70 and 100 per cent by 2050 to feed a growing population. With current agricultural technology, practices and land-use patterns,

this cannot be achieved without further contributing to greenhouse gas emissions, water pollution and land degradation. The consequent environmental damage will undermine food productivity growth. Achieving sustainable food security would provide a long-term solution to the challenge of combating hunger and malnutrition, mitigating food price volatility and protecting the environment. It will require, however, a radical change in existing policies. A change that would result in a strengthening of currently fragmented systems of innovation and an increase in resources for agricultural development and sustainable resource management

The main challenge is to improve incentives so that they promote and lead to the development of sustainable agriculture by small farm holders. Evidence has shown that, for most crops, the optimal farm is small in scale and it is at this level that most gains in terms of both sustainable productivity increases and rural poverty reduction can be achieved. The increase in prices underlying the 2007-2008 food crisis and the food price spikes in 2011 have exposed the presence of serious threats to the sustainability of the global food system and its capacity to provide adequate and affordable access to food. Meeting the challenge of expanding food production to feed the world population over the coming decades requires a major transformation in agriculture. The so-called green revolution of the 1960s and 1970s helped boost agricultural productivity worldwide, but did not conduce to a sustainable management of natural resources, nor to food security for many of the world's poor. The world now needs a truly green revolution in agriculture. One that is conducive to the kind of technological innovation that aims to radically improve the productivity of small farm holdings through environmentally sustainable natural resource management embedded in broader developmental agricultural support measures.

Hoddinott and Yohannes (2002) explain that indicators of food security are dependent on the definition of food security. From the above definition of food security, four pillars which are

indicators of food security can be deduced and these are availability, access, utilisation and stability. These pillars establish whether a household has the required amounts of food. Pangaribowo et al (2013).

Pillars of Food Security

Choosing pillars of food security is dependent on the definition of food security (Hoddinott and Yohannes 2002). This paper follows the FAO definition which explains that food security exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. To support policy purposes, this research explains the food security indicators based on the four dimensions of the definition. The purpose of indicator differentiation is to ensure that each indicator is suitable for its purpose and useful for decision making. It is also important to note that this research emphasizes the indicators from economic dimensions to reflect the effect of recent food and non-food price changes and variability, as well as income changes and variability, as key determinants of and risk factors to food security

Availability

It is a difficult issue to gather all the information needed for some indicators above across nations. Pangaribowo et al (2013) says "… availability is a measure of the amount of food that is and will be physically available in a population during a certain period of time. It is most likely related with production and market availability". According to USAID (1995), attaining food security entails that the collective availability of physical supplies of food is enough, and

households have adequate access to the food provisions through production, the market and other sources, and also the utilisation of those food supplies is enough to meet the specific dietary needs of individuals. Household food production and food crop diversity are the main factors considered and they also entail the issue of gender whereby the scale of is household and community levels of food.

Utilisation

Food utilisation checks the extend access to nutritious food and also utilities like water, sanitation and health facilities. Gender issues may also be considered. This is mainly done locally. In prisons, the main indicator in this domain is low to no levels of malnutrition and deaths of prisoners. Food security in prisons will ensure that enough and nutritious food is available to inmates and officers.

Accessibility

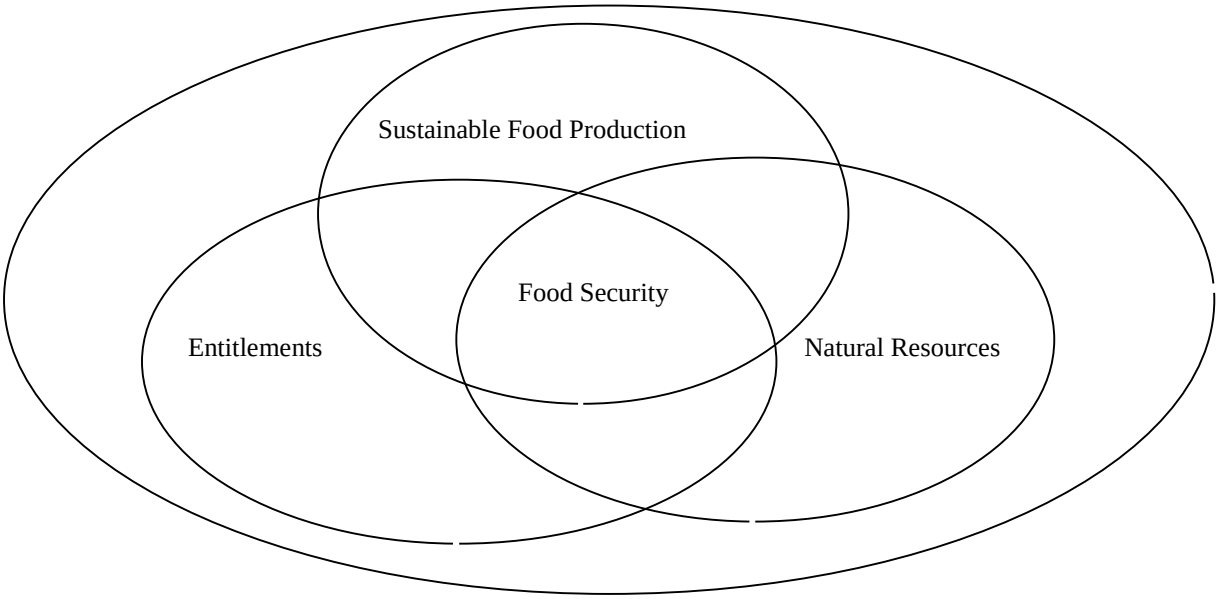
Sen (1981) explains that food availability does not guarantee that everyone is free from hunger. The accessibility indicator goes along with Sen's thesis. As a result, food availability alone is an insufficient predictor for food and nutrition security. Accessibility is when nutritious food is within everyone's access. Prices must be regulated to ensure that they are within everyone's reach. Accessibility as the third indicator is mainly about sufficiency of food for household consumption, amount of household expenditure on food, number of meals taken in a day (Masters 2005). In prisons, the continuous use of the same faming tactics which does not yield any results has led to the development of food insecurity in prisons.

Stability

When the indicators mentioned above are without risks at all times they are referred to as being stable and this becomes the fourth indicator of food security. While this indicator recognises that the food security status can change, it also encourages that it changes for the better. It emphasises the vitality of putting some mechanisms in place to guarantee that availability, access and utilisation may change with risks. The measures may include promoting sustainable and resilient production systems among others (Pangaribowo et al 2013).

Theoretical Framework

The research is hinged on different approaches of agriculture and food security. The New Modernist approach to agriculture and food security which was led by Sasakawa Global (2000) argue that food security can be attained via high external input farming on existing high potential lands that were missed during the past years of agricultural development. Jules contends that high input agriculture is more sustainable as far as the environment is concerned than low input agriculture. These new modernists argue that farmers should use artificial fertilisers, high yield seeds and input so as to reduce pressure on the natural environment and improve yields (Jules et al 2003). The new modernists approach is very suitable to the ZPCS situation where more yields can be obtained thereby improving food security.



Source: Jules et al (2003)

Figure 1 above shows the link between sustainable agriculture and food security. According to Jules et al (2003) food security in the above figure is a result of sustainable food production, entitlements and natural resources. Entitlements are simply the access to food via approaches which encourage the building of strong and different rural economies. A strong natural resource base is obtained via approaches and innovations that enhance diversity of natural resources without exhausting them. Sustainable food production is when regenerative expertise is combined with the full involvement of locals in the planning and implementation (Jules et al 2003).

Hinchcliffe et al (1996) explains that there are many examples of food deficit areas in areas that are in East and Southern African nations like Ethiopia, Kenya, Uganda and Zimbabwe

becoming food surplus areas following adoption of sustainable agriculture. The sustainable intensification approach argues that significant growth is possible in degraded areas and concurrently regenerating natural resources. Jules et al (2003) argues that agriculture is rewarding as long as farmers are co-actors in the technology development process (Thompson 1995). The sustainable intensification approach also with its environmental friendly approach was used to come up with strategies that can enhance production. The sustainable livelihoods framework was used to explain the efficacy of Chikurubi Farm Prison to the food needs of the entire ZPCS.

A livelihood was defined by Chambers as comprising of the capabilities, assets and activities required for a living. Chambers also explains that a livelihood is sustainable such that it can cope and recover from stress and shock thereby maintaining and enhancing its capabilities Chambers (1989). The main challenge for sustainable agriculture is to make use of the biophysical and human resources present. Jules (2003) explains that this can be done through limiting external input use and maximising the use of inside resources or a mixture of both.

OBJECTIVES

Main Objective

The overall objective of the study is to establish the contribution of Chikurubi Farm Prison Complex to food security in prisons.

Specific Objectives

a To assess the determinants of food security/insecurity in prisons.

b To explain the nature of production systems at Chikurubi Farm Prison.

c To highlight the extent to which Chikurubi Farm Prison is addressing food needs of the prisoners

Research Questions

a How is the food security situation in prisons?

b What are the production systems in the ZPCS?

c How can the production systems be improved?

Literature Review

Concepts of food security have evolved in the last thirty years to reflect changes in official policy thinking (Clay 2002). The term first originated in the mid-1970s, when the World Food Conference (1974) defined food security in terms of food supply - assuring the availability and price stability of basic foodstuffs at the international and national level *"Availability at all times of adequate world food supplies of basic foodstuffs to sustain a steady expansion of food consumption and to offset fluctuations in production and prices".* In 1983, FAO analysis focused on food access, leading to a definition based on the balance between the demand and supply side of the food security equation *"Ensuring that all people at all times have both physical and economic access to the basic food that they need"* (FAO, 1983). The definition was revised to include the individual and household level, in addition to the regional and national level of aggregation, in food security analysis. In 1986, the highly influential World Bank Report on Poverty and Hunger (World Bank, 1986) focused on temporal dynamics of food insecurity (Clay, 2002). The report introduced the distinction between chronic food

insecurity, associated with problems of continuing or structural poverty and low incomes, and transitory food insecurity, which involved periods of intensified pressure caused by natural disasters, economic collapse or conflict. This was complemented by Sen's theory of famine (1981) which highlighted the effect of personal entitlements on food access i.e. production, labour, trade and transfer based resources. The widely accepted World Food Summit (1996) definition reinforces the multidimensional nature of food security and includes food access, availability, food use and stability. It has enabled policy responses focused on the promotion and recovery of livelihood options. Initially made popular by academics such as Chambers and Conway (1992), livelihood approaches are now fundamental to international organizations' development programmes. They are increasingly applied in emergency contexts and include the concepts of vulnerability, risk coping and risk management. In short, as the link between food security, starvation and crop failure becomes a thing of the past, the analysis of food insecurity as a social and political construct has emerged (Devereux 2000). More recently, the ethical and human rights dimension of food security has come into focus. The Right to Food is not a new concept, and was first recognized in the UN Declaration of Human Rights in 1948. In 1996, the formal adoption of the Right to Adequate Food marked a milestone achievement by World Food Summit delegates. It pointed the way towards the possibility of a rights based approach to food security. Currently over 40 countries have the right to food enshrined in their constitution and FAO estimates that the right to food could be judicial in some 54 countries (McClain-Nhlapo, 2004). In 2004, a set of voluntary guidelines supporting the progressive realization of the right to adequate food in the context of national food security were elaborated by an Intergovernmental Working Group under the auspices of the FAO Council.

Over the past two decades, the number of food emergencies has risen from an average of 15 per year in the 1980s to more than 30 per year from 2000 onwards. Major human induced food

emergencies persisting for several years are known as protracted emergencies. The vast majority of protracted crises are in Africa, where the average number of crises has tripled over the last two decades. These crises are fueled mainly by armed conflict, often compounded by drought, floods and the effects of the AIDS pandemic. The impact on food production and food security has been catastrophic for millions of people who are driven from their homes, unable to work their fields, cut off from markets for their produce and from commercial supplies of seed, fertilizer and credit (FAO 2006).

In this literature review, the researcher's main interest is to fill the gap left by other scholars in the area of research and also to accustom himself with other findings made by other researchers on the area of food security in prisons. The researcher indicated the gaps in knowledge concerning the theoretical and pragmatic literature written by other scholars. The researcher also reviewed the existing literature to put forward evidence which indicate that food security is critical in the prison establishment. Whilst there is limited literature about the food security situation in prisons the world over, there is more data o food security in nations and how it can be improved or reduced. In this research, food security is a variable that is dependent on several factors which are explained in the research. Although food security is a phenomenon that is affecting the whole world, the most affected is the developing world. According to Guerrero, Martinez, & Ramos (2009), most prisons in El Salvador are located around urban centres. This is also the same as Zimbabwean prisons. Most of them are located about 24 Km from towns or urban centres. Many scholars have written about food security as a leading topic in the 20th and 21st centuries. Mwaniki (2005) explains that achieving the status of being food secure has continuously become a challenge both in the developing and developed world. The difference is in the degree of the problem and its magnitude and ratio of the population that has been

affected. In the developing world, solutions to problems are provided by providing strategies and which include food aid in the form of relief or subsidised food production.

Perez-Brignoli (1989) explains that the broadness of landless poor people by the end of the 19th century facilitated the provision of rural cheap labour. The establishment of prison farms in El Salvador according to Gondles (1999). Perez (2012) points out that the prison farm initiative is seen as a way of reducing overcrowding in prisons by the creation of new places where inmates can stay and also improving food security in prisons. The United Nations declares that there are 1.4 billion poor people living on less than US$1.25 a day. One billion of them live in rural areas where agriculture is their main source of livelihood. Buckland (1993) explains that in most of the national economies in SADC, about 70% of the population's livelihoods are agriculture dependent and if rainfall deviates from the norm, both in terms of total precipitation and in timing, food insecurity is most likely to be the result. Agriculture plays an important role in the development of the Zimbabwean economy through its impact on the overall economic growth, households' income generation and food security (Mlambo and Zitsanza, 2001). Juana and Mabugu (2005), explains that it offers income and employment to about 70% of the population, 60% of the raw materials required by the industrial sector and is the largest export earning sector contributing about 45% of total exports in most years. As such, the sector creates employment opportunities for about 25% of the total work force in formal employment and contributes an estimated 17% of Gross Domestic Product (GDP) (Tekere and Hurungo, 2003). In comparison other sectors such as mining, manufacturing, electricity, construction and services contribute five percent, twenty seven percent, three percent, three percent and 47 percent respectively to the GDP (Juana and Mabugu, 2005). However the prevalence of drought has undermined agricultural production in Zimbabwe. Juana and Mabugu (2005) indicate a situation where in Zimbabwe, between 1960 and 1992, average annual rainfall was 662.3 mm

and maize yields fluctuated widely at that time, ranging from 2.4 tonnes per hectare (2.4 t/ha) in 1986 to as low as 0.4 tons per hectare in 1992. Brown *et al* (2012) reiterates that in 2007, only 45 per cent of national cereal requirements were produced in the country leaving a deficit of over 610,000 metric tonnes to be covered by imports and cattle population declined from approximately 6.1 million in 2000 to 5 million in 2011, while dairy production dropped from over 100,000 cows in 2000 to approximately 22,000 cows in 2010. In this regard rural livelihoods are negatively affected as there is a higher dependence on agriculture.

Brown *et al* explains that rising temperatures and increasing rainfall variability, notably drought, are also expected to exacerbate declining agricultural outputs, further compromising economic growth and stability, employment levels, food insecurity, demand for other goods, and poverty reduction. IPCC (2007) propounds that climate change is expected to lead to the expansion of marginal lands, which is already beginning to occur in Zimbabwe. It is alleged that if changing climatic conditions continue to expand, traditional agricultural systems will become increasingly unsustainable to such an extent that even diversified livelihood systems with a livestock component are expected to become more vulnerable (Brown *et al*, 2012).

Brown *et al* (2012) reports that Zimbabwe's water supply is depreciating as a result of continuous drought that severely strain surface and ground water systems. Surface water from mostly rivers and dams is the major source of water in Zimbabwe accounting for 90 per cent of supply while the potential to use ground water has not yet been realised mainly due to the unaffordability of the required technology (Brown *et al*, 2012). They allege that surface water is prone to high loses due to evaporation caused by high temperatures, where for example, in 2007, evaporation led to extremely low water levels in most of Zimbabwe's dams, causing many to be decommissioned and the situation becomes worse with climate change where

evaporation is predicted to increase by between 4-25 per cent in the river basins and runoff is also projected to decline by up to 40 per cent, with the Zambezi Basin worst affected (Brown *et al*, 2012). Annual rainfall levels based on the 1961–90 average are also projected to decline between 5–20 per cent by 2080 in all of the country's major river basins and these projections will worsen the existing deficiency of water resources, particularly in the agro ecological zones IV and V. In this regard this research proposes that more research be done in prison farms so as to increase production. In addition, the research will give an improved insight through the qualitative research approach. Most researches done on food security have tended to be quantitative. A qualitative approach will be used as a way of confirmation and as a way of bringing new results in the field food security in the prison system.

Winters (2013) explain that in the public eye prisoners in their usual uniform are a stereotypical truth. However, there are some penitentiaries that have success stories as far as production is concerned. Professor Winters also goes on to say "*In some cases substantial prison farm operations remain. The Mississippi State Penitentiary farm used 600,000 man-hours in fiscal 2012, planting over 5,700 acres in vegetables, rice, corn, wheat, and soybeans and producing over two tons of vegetables worth more than $1.3 million and almost half a million eggs. Oklahoma's highly organized prison farm system, Agri-Services, produces or processes some 723,000 pounds of beef, 115,000 pounds of pork, 1,445,000 pounds of processed meat, and 568,000 gallons of milk, along with 7,500 tons of hay and 4,500 tons of livestock feed, in a typical year. In the late 1990s the Georgia Department of Corrections enjoyed a per-inmate food cost that was 30 percent below the national average thanks to its 10,000-acre farm system and food processing and distribution network"* (Winters R 2013). This shows great strides in an attempt to create a food secure penal system in the USA.

Prisons in Zimbabwe are struggling to meet the food security demands of the prison system. According to The Sunday Mail dated 15 March 2015 the ZPCS has been struggling to feed inmates with the recommended diet. In this regard, there are several literatures on food security Food security is a variable that is used mostly alongside other variables but there has been less concentration on prisons and their input to their and national food security situation.

According to Mlambo and Zitsanza 2001), agriculture is the backbone of the Zimbabwean economy. It is the income generator for many households and the guarantor of food security. Agriculture or farming accounts for employment of most rural people and add greatly to the nation's Gross Domestic Product. Dikotter (2007) explains that just like other institutions, prisons are improved by many factors and success stories depend on their innovativeness and flexibility. The modern Zimbabwean prison system is mainly a result of European influences. Success of the Zimbabwean Farm Prison story mainly depends on the innovativeness and flexibility of the institution. The food security situation in Zimbabwe was worsened by the El Nino phenomenon that caused drought.

There is no problem of underdevelopment that can be more serious than food insecurity (World Bank, 1986). The majority of Ethiopians live in rural areas and confronts similar challenges in securing sufficient food, but given the topographic and biophysical variation throughout Ethiopia, seasonal undernourishment varies across geographic space and time. Access to sufficient food and nutrients is essential for household welfare, as well as for accomplishing other development objectives. Households with insufficient access to food often face other challenges related to food insecurity including poor health and a decline in productivity. These challenges can often create a vicious circle whereby households are unable to produce enough

food, even in good years, because they are battling chronic health issues and are unable to work to their full potential (Schmidt and Dorosh, 2009).

The student can refer to prisons as independent households which require all household necessities to survive and develop. As said earlier above in the past it was argued no issue of underdevelopment can be more extreme and serious that food insecurity. However, Eneyew and Bekele (2012) examined the causes of food insecurity in Walayta. Their studies proved that about 74.2% of rural households were food insecure. The results obtained from the analysis indicate those households with large family sizes, large dependents, and young heads were food insecure. Besides livestock ownerships, farm inputs, employment in off farm sectors and value own consumption were the determinants of household food security. Equating this to the prison situation in Zimbabwe, despite having abundant land and several means of production, the institutions are still food insecure.

Reinhart (2008) gives an explanation of why many of the United States' prison farms were closed. One of the reasons was that they outclassed local farmers by putting them out of business leading them to launch complains to the State. According to the Corrections yearbook (2002), more prisoners were involved in farm labour production. Below is a table showing the statistics of prisoners working on different prison farms in the in different states of the United States of America.

Inmates Working on Farms, January 1, 2002		
	Number of Inmates	***Percent of Total Prison Population***

Alabama	364	1.3%
Alaska	94	3.1%
Arkansas	5,120	40.4%
Colorado	272	2.1%
Delaware	5	.1%
Florida	751	1.1%
Idaho	13	.3%
Indiana	89	.5%
Iowa	88	1.1%
Kansas	10	.1%
Kentucky	171	1.7%
Louisiana	2,500	16.3%
Massachusetts	17	.2%
Mississippi	125	.9%
Montana	64	3.5%
Nevada	23	.2%
New Hampshire	20	.8%
New Jersey	155	.7%
New Mexico	20	.6%
New York	250	.4%
North Carolina	*	*

Ohio	707	1.6%
Oklahoma	566	3.8%
South Carolina	176	.8%
Tennessee	113	.6%
Texas	22,148	17.1%
Utah	17	.4%
Wisconsin	92	.5%
Wyoming	40	3.9%
Federal prisons	170	.1%
Total	**34,180**	**3.6%**

Jurisdiction

It is important to carry out this research because it will help the ZPCS to avert the food security situation in its institutions. It is also an awakening call which will help the ZPCS to realise its full potential as far as food security and nutrition is concerned.

METHODOLOGY

Research design

A case study is one of the approaches used to collect data in this research. It allows a deep analysis of a small area over a certain time. It also allows thorough investigation of how Chikurubi Farm Prison can contribute towards food security in prisons. The research employed the qualitative research design. Qualitative research involves fieldwork whereby the researcher observes and records behavior in its natural surroundings. In this research, the researcher physically went to the respondents at Chikurubi Farm Prison to gather information on food security.

Research Methods

To understand people's social world, one needs to analyse their experiences, values and beliefs. Interviews, focus group discussions and questionnaires as components of qualitative data collection methods were used to collect data for this research. Parker in McQueen et al (2002) explains that qualitative research commands more involvement of the researcher in the process.

Questionnaires

Questionnaires were used as a data collecting way. Open ended and closed questionnaires were prepared a given to inmates, 10 questionnaires were given general duties and agricultural specialist officers. Questions on how the ZPCS food security situation can be improved were asked. Questionnaires were also used to answer research questions and also to meet the objectives of the research. Structured and unstructured questionnaires were used in the

research. The main purpose of the questionnaire is to solicit information of how Chikurubi Farm Prison was being run and also how it can be improved for the betterment of food security in the organisation. Some new information can also be obtained when respondents answer to some questions hence enriching the research.

Interviews

Key informant interviews were used in a bid to solicit more information vital for the research. 10 randomly chosen respondents were interviewed. The 10 respondents were chosen basing on their qualifications, duties and responsibilities. Panneerselvan (2004) explains that random sampling as a probability sampling technique and each unit had a chance of being picked in the sampling process. Selected officers will be interviewed and their responses will be used to draw conclusions. They also were used so as to analyse respondents' interpretations of different situations. Interviews had the advantage that the researcher receives instant
responses was also able read facial appearances and non verbal cues of the respondents.

Focus Group Discussions

These allow the researcher to obtain data on the opinions respondents. Focus group discussions are clusters of subjects who are assembled by the researcher and discussions about a topic are made. Holding focus group discussions is a good way to learn about people's interests, perspectives, opinions and knowledge about different topics. Knowing the perspectives, attitudes and desires of the researcher's target audience is essential in developing relevant techniques and approaches to conducting relevant and focused discussions. Focus group discussions were done officers. Each focus group had a key informant and it is the informant who acted as the important person. In this study the researcher conducted 3 separate focus group discussions. Some of the main advantages of using focus group discussion are that they

allow for interactive research with a small group as the opposite of individual responses on surveys (Anonymous). Through this interaction, the student got the information from responses, and observed participants' emotional responses, enthusiasm and other feelings that do not come through a structured questionnaire. Focus group discussions evoke more useful data than a collection of individual research responses with little to no technology and are often completed in just a few hours or one day (Scherman, 2006). In this study the researcher used focus group discussions to solicit data so solicit information on food security and on how to improve the food security situation in the ZPCS. Five groups of focus group discussions were conducted.

Secondary sources

According to Jewel (2001), secondary data is information that was collected and is available from other ready sources. Besides the techniques mentioned above, the researcher used other cheaper sources to gather information for the research. These include text books, electronic journals and the internet.

Ethical considerations

Professional codes that protect participants from harm in research are called ethics. These ethics include informed consent and the right to privacy among others (Mermon (1998). Invasion of privacy will lead to the infringing of participants' rights (Hammersley etal 2012). The researcher sought permission from the ZPCS to conduct research at Chikurubi Farm Prison.

Delimitation of the Study

Chikurubi Farm Prison is located 17 Km east of Harare Metropolitan Province along Arcturus Road. Chikurubi Farm is in Chikurubi Complex houses three prisons which are Chikurubi Maximum Prison which accommodates high security risk prisoners, Chikurubi Farm Prison which accommodates convicted prisoners who are serving sentences of two years and below and Chikurubi Female Prison which houses female prisoners, both convicted and non-convicted. It is Chikurubi Farm Prison that is responsible for the complex's farming activities.

Limitations

The study is predominantly qualitative and the researcher shall come up with a small sample because it is compatible with the qualitative design. As such, these results may not be generalised for the entire Prison Farms in Zimbabwe as it will be based on the experiences of Chikurubi Farm Prison which is in Harare.

It is difficult to carry out this research due to limitations of time. Since the researcher will be going to work, and will have to allocate time for this research, family and even social events. The researcher shall use his salary for this research and studies, family expenses, transport expenses and social events. The researcher is also bound by the Official Secrecy Act and will not release some of the information gathered if it is of a security nature.

Conceptual Framework

Prison Farm - McCall D.A. (2006) defines "a prison farm is a large correctional facility where penal labour convicts are put to economical use in a farm (in the wide sense of a productive unit), usually for manual labour, largely in an open air, such as on agriculture, logging, quarrying, and mining".

Inmates/Prisoners - Those are inhabitants of a prison. When offenders are arrested and convicted they are admitted to prison. They then become inmates/prison.

Production Systems – in this research, this refers to crop production, livestock production, aquaculture production, apiculture production and fruit growing.

Food Security – As defined above, this is when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life. Food Security is hinged on four pillars which are availability, accessibility, utilisation and stability.

Abbreviations

ZIMVAC - Zimbabwe Vulnerability Assessment Committee

ZPCS – Zimbabwe Prisons and Correctional Service

UNHCR – United Nations High Commissioner for Human Rights

Significance of the Study

Studying the effects of climate change helps to realize causes underlying the changes and prepares the nation for any natural danger and excessive changes that can be foreseen. The research will enable the classification of the causes into natural or man-made causes. The effects of climate change on human and animal health or the environment.

The study will enable the ZPCS to come up with strategic measures to counter the effects of climate change and produce more to feed inmates and also provide for officers' rations. It also allows the ZPCS to prepare for the after effects of the disaster caused by climate change. It also enables the organisation to set aside some funds for other programmes to do with averting the

effects of climate change. The nation will be able to predict the catastrophes associated with climate change. These include malaria, heat and cold stress which affect production and development. It will also be able come up with policies that will enable the nation to deal with the effects of climate change. Studying the effects will enable the organisation to come up with a legal instrument that will regulate the effects of climate change. The research will also allow the investigation of economic impacts of climate change.

Inmates will be equipped with the necessary skills to avert the effects of climate change. They will also benefit immensely from the improved diet that they will receive whilst under incarceration. The communities that surround Chikurubi Complex will benefit immensely from the improved production in terms of food security.

DISSERTATION STRUCTURE

Introduction

The introduction is composed of the background to the study, statement of the problem, conceptual and theoretical framework, objectives and methodology used in the study.

Chapter 1

An Overview of food security situation in ZPCS

This chapter explains the food security situation in the ZPCS. Causes of food security and insecurity will also be highlighted.

Chapter 2

Production Systems in the ZPCS

This chapter will make a detailed explanation and analysis of production systems in the ZPCS. Potential production systems will also be highlighted. The challenges and success stories will also be explained in detail. Factors that affect production will also be listed and explained.

Chapter 3

Contribution of Chikurubi Farm Prison to food security in prisons

The chapter explains the contribution of Chikurubi Farm Prison to food security in prisons.

Chapter 4

Way forward as far as food security is concerned in the ZPCS

The chapter explains the challenges that are faced by the ZPCS as far as food security is concerned. It also gives a way forward for prisons to successfully tackle the issue of food insecurity in future.

CHAPTER 1

OVERVIEW OF FOOD SECURITY SITUATION IN ZPCS

1.1 Introduction

This chapter explains the food security situation in the ZPCS. Causes of food security or insecurity will also be highlighted. Prisons the world over are guided by United Nations guidelines for the treatment of prisoners. Zimbabwe is no exception. The Zimbabwe government is guided by the United Nations guidelines and standards for the treatment and upkeep of prisoners (United Nations 2005). The office of the UNHCR elaborated that "*Adequate food and drinking water are human rights. All prisoners shall be provided with wholesome and adequate food at the usual hours and with drinking water available whenever needed"* (United Nations 2005). The ZPCS is bound by the Prisons Act, Statutory Instruments, Commissioner General's Standing Regulations and the Constitution of Zimbabwe. It is in these instruments that the food and nutrition needs of prisoners are elaborated. Section 50 of the Prisons (General) Regulations (1996) elaborates on prisoners' diet. The Statutory Instrument 1 of 1996 dictates that vital nutritious food must be given to prisoners.

Among all continents, Africa is the most affected by drought and the effects of food insecurity. FAO (2013) explains that, "*Africa remains the region with the highest prevalence of undernourishment, with around one in four people estimated to be undernourished*". Poverty, HIV/AIDS, malnutrition and other ills affect Africa at a greater magnitude than other continents (IPCC 2007). Food security in Africa is linked to agriculture and any disturbance in agriculture will lead to food insecurity. From the information on the table below, Africa has more people who are undernourished as compared to other continents.

Table 1.1

Continent	Number of Undernourished people between 2011- 2013	Prevalence of Undernourished people between 2011- 2013
Africa	226.4 Million	21.2%
Asia	552 Million	13.5%
Latin America and the Caribbean	47 Million	7.9%

Information in the table above was adopted from FAO, IFAD and WFP (2013), Page 8

Zimbabwe was once regarded as the bread basket of Southern Africa until the turn of the millennium. Today, three quarters of the Zimbabwean population's lives are dependent on subsistence agriculture. The 2015/6 agricultural season was greatly affected by the El Niño induced drought which caused a lot of suffering to the majority of the Zimbabwean people. In this regard the WFP Situation Report Number 5 explains that, "…… Zimbabwe is faced by the strongest El Niño event in 35 years". This has adversely affected people's harvests and together with the deteriorating economy has caused much suffering from the people. The ZIMVAC projected an estimated write-off of most crops and WFP estimated, *".....prevalence of food insecurity in the rural population to fluctuate from 30% in April and 49% (approximately 4.4 million people) during the peak of the lean season from January to March 2017"* (www.wfp.org/Countries/Zimbabwe). In this regard, prisons are not an exception. Most prisons were hit by the El Nino induced drought and they did not have many yields.

Prisons in the developed world especially in Africa are underfunded by the treasury. The PRI (2002) explains that when it comes to spending concerns of the treasury, prisons are not a priority. This is the same in Zimbabwe. Little funds are availed to the ZPCS by treasury through the Ministry of Justice Legal and Parliamentary Affairs during the availing of budget each year.

This makes it difficult to successfully fund its operations including ensuring food security. This chapter will also explain the food security in the ZPCS particularly at Chikurubi Farm Prison.

1.2 Concept of Food Security in Prisons

With the ever changing dynamics of life, so is the definition of food security. The definition has evolved since the 1940s. Sen (1981) devised the theory of entitlements. The aspects of access and consumption through entitlement are emphasised in his work. In his publications, Amatye Sen explained that food security problems are not only affected by agriculture and production activities but also specifically by the governance structures and processes that are central to the economies and societies. This means food insecurity is also caused by governance, institutional, departmental or organisational failures. FAO (2000) defined food security as a situation that exists when all people at all times have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life.

Food Security in Zimbabwe is influenced by a number of issues. Unstable economic environments affect food security in Zimbabwe. An unstable political and economic situation in a nation affects food security. Zimbabwe is a nation under economic sanctions in the form of ZIDERA which was imposed on the nation by the United States. This affects the capacity to produce food for the nation. Zimbabweans ended up importing cheap and unhealthy foods from neighbouring South Africa. The ability and capacity of the ZPCS to produce was also affected greatly by the unstable economic situation encountered by the nation. A poor human resource base can also lead to underproduction which will lead to food insecurity. Also, trade imbalances and inadequate education can also affect the food security situation of a nation. There are times

when natural disasters affect a nation. These include drought, floods and cyclones which once hit Zimbabwe thereby affecting agricultural production including that of prison farms.

The main indicators of food security are availability, utilisation, access and stability. Food availability is mainly about whether food is availed or supplied to and obtainable by every household. It should be supplied in the right quantities including nutritional value. Availability is dependent on production, stocking and food prices among others. Food access is the remedy of food demand. It is dependent mainly on factors like consumer choices, infrastructure and economic factors. Prices of basic food commodities also affect accessibility to food by people. Domestic production of food for own consumption also affect accessibility. The ZPCS as a community also takes into account the issue of accessibility. This also is accessibility by prisoners and also by officers. In the ZPCS inmates are also provided with food by their relatives and also the ICRC also gives a helping hand by donating food to prisoners. Utilisation is all about how the available food is consumed. It is all about it is taken in and the metabolism of the nutrients by individuals. It is dependent on how food is prepared, processed, stored and also the health of the people among others. Individuals' special needs are also taken into consideration when it comes to access. Inmates with special needs are also taken into consideration (Masters 2005).

The fourth indicator which is stability is all about constancy and dependability of availability and access. The ZPCS must produce food that will enable them to feed prisoners at all times including times of drought and other disasters that are a threat to food security in Zimbabwe.

Saad (1999) summarised the four pillars as saying *"household is food secure when it has access to the food needed for a healthy life for all its members (adequate in terms of quality, quantity,*

safety and cultural acceptability) and when it is not at undue risk of losing such access". During the past ten years, Zimbabwe has been failing to produce food that meets its national food security needs and requirements and relied mainly on imports from neighbouring countries. This has caused continuous and severe malnutrition especially among children.

The government intervened to solve the issue of food security in the advent of the 2015/16 drought by providing 5000 metric tonnes of grain to the ZPCS. This grain is expected to boost food security in the organisation until March 2017. Chronic food insecurity as a long term failure to meet the least amount of food requirements can lead to stunt growth. On another hand, transitory food insecurity or rather a passing or a temporary failure to meet minimum requirements is that which is mainly affecting the ZPCS and it is mainly due to drought and some factors that will be mentioned in this report.

1.3 Factors that Contribute to Food Insecurity in the ZPCS

Drought together with other factors like economic decline has contributed to food insecurity in the ZPCS. Economic decline caused the rising of agricultural inputs prices thereby making it difficult to do farming in the ZPCS. This also caused the organisation to avail inputs when the agricultural season has progressed. The ZPCS also benefited from the fast track land reform programme in the early 2000. A lot of developments needed to be done on the farms like Mt Darwin and Rigidita farms but due to economic constrains, this was not the case. In trying to develop the newly acquired farms, funding for existing farms was reduced thereby contributing to food insecurity in the organisation. In this chapter, the factors that contributed to food insecurity with special reference to how the indicators of food security are affected will be highlighted and explained.

Saad (1999) highlights that a household is deemed food secure if it has the adequate quality and quantities of food for all its members at all times. The Commissioner-General of the ZPCS said that currently there are 17477 inmates across the country and each inmate's upkeep currently stands at US$3.05 per day (the Herald 26 August 2016). Underutilization of arable land often leads to food security in the ZPCS. Underutilisation of farm or arable land is when some land is left idle or is used to grow very little crops than should be on the land. This is a catalyst for food insecurity.

1.3.1 Financial Constraints

First and foremost the, problem curtailing production in prison farms is financial constrains which is further exacerbated by liquidity crunch. Prison service relies on the insufficient budget from the government which need to be distributed within several departments as a result the finances will be prioritized to other departments with more pressing issues than prisons farms. This will leave the farms more vulnerable because they are no longer able to finance their projects. In such a scenario there is no way in which production can take place without necessary finances for inputs.

In addition to, most of food in security in the prison services is directly linked to the government policies and politics. The government of Zimbabwe is facing financial constrains due to hyperinflation, deflation and liquidity crunch thus as a result the government will not be in a positions to provide financial resources to cushion food security. Whenever government avails the funds they will be a piece-meal which seems to provide cosmetic solutions whilst worsening the situation. For example, the government may provide funds to buy food when there is already a crisis especially after riots. It is observed that there is an element of policy relaxation and bureaucracy on how to create sustainable food security in government. For

example, in the past two decades policy inconsistency has been affecting government agriculture administration. Policy makers are focusing on trying to solve current problems without proper sustainable future plans. Government was also focusing on how to improve food security in the general populace whilst neglecting prison farms. An example is when the prison farms were left out during the farm mechanization scheme spearheaded by former RBZ Governor Dr Gideon Gono.

Also, sanctions were imposed to the Zimbabwean government by the USA and the EU. The sanctions made the government to be blacklisted making it impossible to access loans from international financial house like IMF and WB thus making if extremely difficult to bail out prisons farms and improve food security.

1.3.2 Top-Down Approach to Decision Making

The top-down approach according to Matland (1995) *"... the starting point is the authoritative decision; as the name implies, centrally located actors are seen as most relevant to producing the desired effect".* The ZPCS is struck to old ways/methods of management. In this case they rely on how the system worked in the past rather and this has become the prescription for disaster bedevilling the food in security situation in the organization. In this view prison service as a para-military institution rely on the commanditarian management system which is a top down approach were decisions are being enforced instead of the bottom up or participatory approach which involves all structures in decision making. Top down approach has resulted in resistance by junior, middle or senior management whereby one commands and the other one resists. In this case the superiors regard their juniors as amateurs who are remotely knowledgeable in the spheres of administration, therefore their ideas are will lead to detriment of organization but the reality is the junior officers are consciously aware of how the system

can be managed to curb food insecurity since they are on the ground and have a hands on to production on the ground. Decision making process and management culture within the prison system which relies on a top down approach hinders production through this bureaucratic inefficiency that destroys creativity and innovation to the junior officers who have the practical grasp and reality about what is on the ground. This contributes to inefficiency and food insecurity in the organisation.

1.3.3 Climate Change

According to Serigne *et al* (2006), increase in greenhouse gas releases in the atmosphere will have detrimental effects to the climate, human and economic activity. The IPCC (2007) explains that it is now obvious and undeniable that climate change is human caused. It is also caused by many activities that humans are doing. These include urbanisation, weapons making and testing and also wars. All these activities are adding on to the destruction of the ozone layer thereby causing more climate change. Drought and extreme weather conditions resulted in crop failure and livestock mortality as a result the prison service has been plunged into food insecurity since most of its farms are rain fed. Food insecurity in Prisons farms is attributed to climate change, for the past 10 years, rainfall patterns in Zimbabwe were unreliable. Zimbabwe is experiencing erratic rainfall patterns which threaten agriculture production and prison farms are not spared. Currently we are facing devastating effects of El Nino which has rendered some crops and animals useless, for example crops in Masvingo and Matabeleland provinces were written off. In the prison context this compromised food security. Although some farms are irrigable like the Anju Farm Prison, the water supply is insufficient to support large scale farming throughout the year due to the dry spell. Most of prisons farms rely on rain-fed agriculture and therefore without adequate rainfall production there is no production. The

situation is further exacerbated by dilapidated boreholes and piping equipment that needs resuscitation.

While food security depends on access, availability and utilization of food which is determined by culture, politics, infrastructure, markets and resources, availability of food is linked to household agricultural production which is often at the mercy of the timing and amount of rainfall (Serigne *et al*, 2006). Climate change has become a tropical issue in the 21st century mainly because of its detrimental effects on agriculture in Africa and Zimbabwe in particular. Serigne *et al* (2006) goes on to state that studies and reports show that the projected increase in greenhouse gas emissions in the atmosphere over the 21st century will have detrimental and disruptive effects on human and economic activity. Africa is known to be the most negatively affected continent on the planet due to a combination of particularly severe projected impacts and relatively low adaptive capacity. It also needs to be noted that climate change has been taking place for many decades but its effects are now clearly being witnessed now and are likely to continue rapidly taking place. A warming trend in Africa has been observed since the 1960s and this is expected to continue as global mean temperatures rise mostly consistently across the continent (Frost, 2001). With global-mean warming of 4°C above pre-industrial levels by the end of the century, monthly summer temperatures across Sub-Saharan Africa are projected to increase by 4-6°C above present day temperatures, and reach 5-7°C over North Africa (Schellnhuber *et al*., 2013). These increases are limited significantly to around 1°C above present-day temperatures in a scenario approaching 2°C globally by 2100. Some experts suggest, that drought and extreme weather in regions affected by food crises in the recent decades could be a result of climate change. This is the same situation that has affected the semiarid regions in Zimbabwe which are facing food insecurity. Climate change has grossly affected food production in Zimbabwe and ZPCS farms. It must be noted that extreme heat

stress during the crop reproductive period can be critical for crop productivity. Considering the fact that Zimbabwe consist of semi-arid and arid zones climate change has been detrimental as it has increased the dryness in these zones already. In other words a bad situation has been worse.

Climate change is defined as a shift of climatic conditions in a directional incremental mode, with values of climatic elements changing significantly (Houghton *et al*. 1990). IPCC (2007) also defined climate change as the significant variation of the mean state of climate relevant variables such as temperature, precipitation and wind in a certain period of time, usually over 30 years. The United Nations framework Convention on Climate Change (UNFCCC, 2006), states in article 1 that climate change is a change of climate which is attributed directly or indirectly to human activity that alerts the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. Levels of viable arable land for production are predicted to decline by 2080, with 9-20% of arable land becoming much less suitable for agriculture due to climate change (UNFCCC, 2006). What makes climate change important in Africa's development is the reliance of many African countries on rain-fed agriculture. Climate change determine agricultural production as unfavourable weather conditions affects agriculture. Changing rainfall patterns, for example, threaten to severely impact agricultural activities in Africa especially in the Sahel, East Africa and Southern Africa reducing rain fed agriculture by as much as 50 percent in some countries (Garcia 2008). It needs to be highlighted that agriculture and climate change are inextricably linked. According to Nelson (2000), climate change threatens agricultural production through higher and more variable temperatures, changes in precipitation patterns and increased occurrences of extreme events like droughts and floods. Increase in temperatures across Africa has negatively affected crops like maize and rice. Hulme (2001), points out that temperatures

are expected to increase by between 2°C and 6°C by 2100.There are significant regional variations within these projections. Using a medium warming scenario, Hudson and Jones (2002) found out that temperatures in southern Africa would increase by 3.7°C in the summer and 4°C in the winter. Under a high warming scenario, temperature increases are expected to be more dramatic (Ruosteenoja *et al*. 2003), temperatures could increase by up to 9°C for North Africa in June to August, and by up to 7°C for Southern Africa in September to November by the end of the century. Rainfall currently varies considerably across Africa, both spatially and temporally (Boko *et al*. 2007). In recent decades, the continent's sub-tropical zones have become more arid, particularly the Saharan and Mediterranean regions and Southern Africa. In Southern Africa, there has been an increase in inter annual variability over the past 40 years, with more intense and widespread droughts. Southern Africa is faced by a number of weather and climate-related hazards, particularly cyclones, floods and droughts. The impacts and losses caused by these events are high because poverty and weak institutions make populations very vulnerable, with little capacity to prepare for and recover from these natural occurrences. Human-induced climate change has caused an increase in the frequency and intensity of extreme events as well as gradual changes in the rainfall and temperature patterns. This is expected to continue to varying degrees under different climate scenarios for the future. People who live on semi-arid or arid lands, in low lying coastal areas, in water-limited or flood prone areas, or on small islands are particularly vulnerable to climate change (Waston *et al*, 1996). The prevalence of climate change has put the lives of those people living in semi-arid areas at stake, bearing in mind that as much as these areas are already dry they are becoming drier due to climate change.

Zimbabwe is no exception as far as the effects of climate change are concerned. Climate change is one of the major threats to the food security in the ZPCS, and without wide-ranging

adaptation policies the challenge it pose cannot be met. It is one of the major challenges that is impacting sustainable development, food security and poverty reduction in the country. Considering the importance of agriculture in Zimbabwe, climate change poses a risk in agricultural production. The most dangerous aspect is the fact that on its own the agricultural sector in the country is already facing problems of providing a sustainable livelihood for the prison population, let alone to ensure national food security. The advent of climate change is hurting the agricultural sector with dreadful effects. Zimbabwe for the past years has been experiencing high temperatures like the rest of the world. On the 24th of October 2011 Zimbabwe experienced hottest temperatures in almost 50 years, with temperatures soaring to 42 Degrees Celsius (Zimbabwe.com). Places like Lupane recorded highest temperatures of 41 degrees Celsius which were last recorded in 1962. Temperatures in Plumtree and Tsholotsho also rose above the previous records of 1962 with the mercury hitting 39 degrees in Plumtree and 42 degrees in Tsholotsho. Rusape and Harare were not exempted from these high temperatures for they both recorded a temperature of 35 degrees Celsius (Newzimmbabwe.com).

The reliance by the majority of Zimbabweans on rain-fed agriculture and the sensitivity of major sectors of the economy to the climate makes Zimbabwe particularly susceptible to climate variability and change. As already mentioned, Zimbabwe's climate is mostly semiarid. The country lies in a region with limited and unreliable rainfall patterns. Climate change in Zimbabwe has greatly affected the semi-arid regions with frequent droughts being felt more in dries regions iv and v. Other effects of climate change can be witnessed in the country's increasing variability in rainfall patterns and increased and extremity of droughts and floods. According to Magadza (2008), Zimbabwe has experienced more recurrent drought and flood episodes in recent times. According to Mugabe (2010) by the end of the twentieth century,

Zimbabwe was a warmer and drier country than it was at the beginning. Annual mean temperatures had increased by about 0.4 degrees Celsius since 1900, and rainfall had declined by nearly 5 percent across the country. The 1990s were on record as the warmest and driest decade of the century. Temperature analysis results from meteorological stations in Beitbridge, Bulawayo and Harare indicate a rise in daily minimum temperatures of around 2.6 degrees Celsius in the last century *(ibid).* The number of cold days is decreasing at a rate of about fifteen days per 100 years. Further, six of the warmest years on record have occurred since 1987. It has come to the attention of most researchers that, more than 80% of Zimbabwe is subject to conditions which make dry land cropping a risky undertaking because of low and erratic rainfall (Gambiza and Nyama, 2000).

Agriculture has always been the most important economic activity in Zimbabwe, with about 60% of industry being agro-based with maize as the main cultivated crop (Rukuni, 1994). Furthermore, in previous years, the agricultural sector consumed about 20% of total output of industry (CFU, 2000). The agricultural sector employed a large proportion of the country's labour force and contributed about 18% of GDP and 40% of export earnings annually in a normal year. Noteworthy is that about 70% of the population is dependent on farming for a livelihood (CFU, 2000). With the emergence of climate change some areas that were regarded as agricultural zones are no longer yielding any positive results. Given such a situation, climate change is likely to determine the future of many Zimbabwean people countrywide who strongly depend on agriculture. In other words, global climate change raises major dilemmas for developing nations such as Zimbabwe mainly because of their dependence on rain-fed agriculture. It is imperative to state that agriculture is important for food security in two ways. Firstly, it produces the food people eat. Secondly, it provides the primary source of livelihood for 36% of the world's total workforce (Garcia 2008). If agricultural production in the low

income developing countries of Asia and Africa is adversely affected by climate change, the livelihoods of large numbers of the rural poor will be put at risk and their vulnerability to food insecurity increased (FAO 2008). Agriculture, forestry and fisheries are all sensitive to climate. Their production processes are therefore likely to be affected by climate change. An average of 500 weather related disasters are now taking place each year, compared with 120 in the 1980s, the number of floods has increased six fold over the same period (Oxfam 2007). Such evidence indeed shows the negative effects of climate change on agricultural production.

The fact that climate change is an irreversible process makes climate variability a recurring topic and calls for the dire need to adapt to it especially among many people who have become vulnerable. It has become common knowledge that the poor people will be hit hardest by climate change due to obvious reasons. For instance, it appears clear that vulnerability to climate change is closely related to poverty, as the poor are least able to respond to climatic stimuli. It has also become common knowledge that capacity to respond to climate change is lowest in developing countries' semi-arid areas. Certain regions of the world are more severely affected by the effects of climate change than others. Generally speaking, vulnerability and adaptation to climate variability and change are urgent issues needed in Zimbabwe's semi-arid areas. The urgency to address the climate change phenomenon is evidenced by the situation prevailing in ZPCS farms around the country. Semi-arid Zimbabwe experiences frequent droughts and dry spells during the growing season, making rain fed cropping risky. In some years the rains start early whereas in others they arrive late. An abrupt end of the growing season in semi-arid parts of Zimbabwe has been experienced in some years (Mupangwa, 2008). This annual variability makes the selection of crop types and varieties and planning of planting dates critical, yet also difficult, for successful cropping in rain fed systems (Hussein, 1987, Kinsey *et al*, 1998, Raes *et al*, 2004). Crop yields are often reduced significantly due to the late

start and early cessation of the growing season. This is further complicated by the occurrence of long dry spells during the January to February period when most crops are in their vegetative and reproductive growth stages. It need to be highlighted that climate change is irreversible so it therefore poses as a major risks compared to other factors that can be corrected. According to Mugabe (2010), "In Zimbabwe sectoral impacts are beginning to be witnessed on the environment due to exposure to extreme events resulting in droughts and floods and the expansion of semi-arid areas". For example some shifts in natural regions have been noted at stations such as Chinhoyi, Chibero and their surroundings which were formerly in natural region II but are now classified under natural region III (Mugabe 2010). The size of natural region I has been reduced, while natural region II has been pushed further east and natural region III has shifted slightly upwards with Kwekwe and surroundings now classified as natural region IV. From what has been mentioned above it can be seen that the major negative impact of climate change in Zimbabwe is the erratic rainfall pattern that has led to recurrent droughts (Dube, 2008). As already mentioned about 70% of Zimbabwe's population derives its livelihood from subsistence agriculture and other rural activities, but these livelihoods are threatened by climate change. Climate change is one major contributory factor that has affected agricultural production which in turn has reduced food security in Zimbabwe. The agricultural sector's reliance on seasonal, rain-fed cultivation makes the sector particularly vulnerable to climate variability and change (Andear, 2009). The country is prone to drought which has become more frequent in the past decade (Andear, 2009). Climate change is now posing a threat to food security through erratic rainfall patterns and decreasing crop yields, contributing to increased hunger. Furthermore, adverse climate change impacts on natural systems and resources, infrastructure, and labor productivity may lead to reduced economic growth, exacerbating poverty. This can be summarized out by Manyeruke S *et al* (2013) who state that despite other factors that have affected Zimbabwe's agricultural sector such as agrarian land

reforms, climate change has played a major role in destabilizing food production in the country. It has worsened drought and dry spells in the country.

1.3.4 Nepo-politics, Corruption and Homeboyism

Nepo-politics was derived from nepotism. According to Kiechel (1984) the word nepotism is from the Latin word "nepos" which means nephew. Today the concept of nepotism is used as reference to the misuse or abuse of office in favour of family members and this act is considered unprofessional. This culture of management has resulted in food insecurity in the sense that poorly performing managers or officers in the farms are spared from strict monitoring or disciplinary actions because some are somehow related to the some senior people in the system. Prison farms will be managed using a system of patron-client agent relationship instead of meritocracy and as result, a culture of laziness, and redundancy is being cultivated thus comprising food security. On the same vein, the process of acquiring or procuring produces/rations are done in unprocedural manners were the qualification will be based on the homeboyism/corruption which in turn cause frustrations amongst the suppliers. It is strongly argued that corruption makes it very expensive to do business with the prison. The writer of this paper strongly argued that some of food insecurity is as result nefarious conduct of business which tends to scare away investors and qualified personnel.

The Herald dated 20 January 2014 published a story about corruption in the ZPCS by which officials were up for bribery. In the same vein, the Herald dated 7 May 2014 published a story when corrupt officials in the ZPCS were dismissed from the organisation due to crimes ranging from corruption, misappropriation of funds to flouting of tenders. Corruption and

maladministration within the prison system has been cited as the major problem that has continued to hinder production in Prison farms. It is alleged that there was unprocedural flouting of tenders in the procurement of farming inputs and this has resulted in the supply of black market seeds which are not suitable to the cultivated land. For instance the Prison may decide to plant drought tolerance crops but it will be supplied with high breed seeds. In some cases the supplied inputs are being stolen due to lack of follow up during the planting process, worsened by the *"I don't care attitudes from both officers and inmates".* There are times when prison farm produce is stolen by officers through pilfering. Pilfering is detrimental to efforts of quelling hunger.

1.3.5 Cash crops dependence

Some of the prison farms encourage production of the so-called cash crops, the income from which is used to pay recurrent expenditure. As a result, prison farms which depend on cash crops will be vulnerable to food insecurity. For instance Hurungwe and Chinhoyi prioritize the cultivation of tobacco at the expense consumables because they do not have quick wins. In this case they will use the hand to mouth survival strategy of prison farms but this is further worsened by misappropriation of funds are which are supposed to be used to boost food security.

1.3.6 Poor Farming and Planning Methods

Prison farms are practicing poor farming methods like mono cropping which affect soil fertility. There are some farms where tobacco and maize are grown mainly. It may be convincing to support the view that lack of production in prisons farms is due to the decline in soil fertility but in such farms where tobacco is grown, the ZPCS has not made efforts to by

lime so as to improve the soil PH. This problem has been noticed in several prisons farms across the country like Chikurubi, Mutimurefu and other farms. There is a tendency of poor planning and poor land preparation. There is a system of failing to prepare the land before rainy season due to neglected responsibility by the ZPCS. Every season, the ZPCS farming activities will be lagging behind and hence land preparation may be regarded as luxury. However, they may manage to cultivate but some of the crops are destroyed by pests or may have stunted growth due to weeds thus reducing yields which facilitates food insecurity.

There are several personnel with the qualifications in agriculture veterinary services. Some of them are pooled at one farm and this usually cause discord which leads to underproduction thereby causing food insecurity. On the same not, recycling of dead wood also facilitates underproduction. Recycling of dead wood is when some personnel who are know that they never produce results are always recycled in the organisation just for the purpose of keeping them there. When such personnel are recycled, nothing new is expected in terms of production and this enhances the issue of underproduction. Also, when some employees' tenure of work has expired but they are given extensions, some of them will not concentrate on producing for the organisation but will mainly be concerned about developing their own life since they will have failed to do so before their tenure ends. Some farming practices that are employed on the farms cause environmental degradation. They cause soil erosion and siltation of dames thereby causing the dams to dry up.

1.3.7 HIV/AIDS and other Diseases

The prevalence of AIDS and other diseases continue to rob the ZPCS of qualified personnel and prisoners for its labour force. It is alleged that prisons depends on a sick labour force suffering and this includes psychological disorders. HIVAIDS is a phenomenon that has

affected many people in the country and prisons are not an exception. Some prisoners are receiving anti-retroviral drugs and some even died due to HIV/AIDS. The UN (2004) explains that *"One of the main impacts of HIV/AIDS on agriculture is its impact on food security"* According to the social contingency theory human beings cannot perform to their full capacity if they are experiencing uncertainties. To elaborate further, inmates contribute the vast labour force of prisons farms of which they are succumbing to food and anti-retroviral (ARV) shortages. One cannot deny the fact that reward management influence production of prison farms, therefore food insecurity is directly linked to the health conditions of the inmates since they are a reliable source of labour.

1.3.8 Other Factors

There is a severe personnel shortage in the ZPCS since the government suspended recruitments. One may argue that there is more free labour in the in the form of prisoners, but inmates can work only when monitored by the officers. Lastly, power struggle between the ranks and files of the ZPCS is a recipe for underproduction which leads to severe food insecurity. For example trained officers who master farming through work experience will neglect ideas from technical experts.

For quite some time public opinion has been questioning why prisons farms are not producing despite graced with several farms and more free labour in forms of inmates, qualified personnel employed by the Zimbabwe Prisons and Correctional Service. Through further survey and scrutiny the researcher has attributed the lack of production in farms is due to factors which include financial constraints, inadequate and lack of modern farming equipment, poor farming practice and planning, climate change, lack of inputs, lack of motivation among the prison

labour force which is curtailing the spirit of innovation and creativity, centralization of decision making in the top management which makes shop flow workers more resistant, overdependence on few producing farms which destroy continuity in production, misappropriation of funds and profits.

1.3.9 Fast Track Land Reform Program and its effects on food security

Policies have a huge impact on food security and livelihoods of the people in a country. They have the potential to improve a country in terms of economic, social, cultural, political and if they are not adequately implemented they can harm the poor at large. The problem with policies arises when the focus on policies, structures and institutions is put above that of the people themselves. When policies are not inclusive in their design they tend to handicap the exempted lot by providing barriers. Some policies that the government undertakes can affect food security in a country. For instance, when the Zimbabwean Government sanctioned the fast track land reform programme, the west imposed sanctions onto the country and this affected the nation's ability to produce for its people. Food security was affected and people suffered greatly. Some government policies and sanctions regime handicapped the economy and the agricultural sector thereby affecting population at large. The fast land reform programme, with the aid western polices like the ZIDERA has negatively affected all the four pillars of food security. According to Mudzonga (2009), the human rights violations and political tensions around the land reform have often obliterated the fact that a meaningful land redistribution, accompanied with relevant financial and technical support to resettled farmers, was essential to eliminate poverty and food insecurity in a country suffering from a highly skewed land repartition. According to Ignowisk (2012) another cause for Zimbabwe's food security challenges has been the fast-track

resettlement program, which started in 2000 as an extension of the land reform that began in 1979. Before this program, Zimbabwe had a thriving agriculture sector and was a net exporter of food but the majority of black Zimbabweans were suffering because they did not own the land which is the main means of production although Zimbabwe was considered the bread basket of Africa.

While it is a fact that most of the people who acquired land during the fast track land reform programme did not have the required farming qualifications, experience and finance to do farming, the government tried to assist through the mechanisation programme which was affected by the sanctions regime. This does not remove the fact that the programme came with a lot of suffering to most people. The programme however is now realising more yields than before as more products like tobacco are now being harvested in large quantities than it was before the land reform programme. However, since the ZPCS also acquired farms during the land reform programmes it must utilise them to their full capacity. The farms include Ridigita, Hurungwe, Little Kraal, Mt Darwin and others.

1.4.0 Conclusion

This chapter explained gave an overview food and nutrition security situation in the ZPCS. Financial constraints, top-down approach to management, climate change, corruption, poor farming practices and others have been listed as the causes of food security and insecurity in the ZPCS.

CHAPTER 2

FOOD PRODUCTION SYSTEMS IN THE ZPCS

2.1 Introduction

It is generally considered that the highway to food security is through agricultural production but because of problems such as climate change, low produce natural disasters and poor information and knowledge links, this is not the case (Alampay E 2005). This chapter will make a detailed explanation and analysis of production systems in the ZPCS. Potential production systems will also be highlighted.

"Food security is based on the integral connections between the three commitments, to zero hunger, healthy and safe food, and a sustainable food production and distribution system – in other words, a food system based on the principles of social justice and economic and environmental sustainability" (http://www.foodsecurecanada.org)

2.2 Food systems

Porter et al (2014) explain that a food system includes all processes and infrastructure involved in meeting a population's food security needs. The structures include growing, harvesting, catching, storing, processing, packaging, marketing, consuming and disposing of waste among others. Food outcomes of the named activities are related or linked to availability, access and utilisation of food and other socio-economic and environmental factors (Ericksen 2008). Changes in food systems affect food security outcomes. The ZPCS has the structures needed for growing crop. These structures include the land and the necessary inputs needed for production to take place. Storage facilities for the ZPCS may be limited in the same manner

that that processing, packaging and marketing are limited but all these structures may be revamped or erected for the betterment of the food security situation in the organisation.

2.3 Food Production Systems

The extent to which climate change and other factors affect food production systems and food security is going to be explained. According to Porter J.R et al (2014), there are several food production systems which include crop, livestock and fisheries production among others. Fruit tree growing, apiculture and aquaculture will be some of the production systems to be included.

2.4 Crop Production

Crop production has been the main farming activity in prison farms. At Chikurubi Farm, maize and soya beans have been the main crops produced but due to the severe droughts, the yields were reduced. Other crops like wheat can also be grown in the farm to boost food security. Horticulture is another practice that is dominant at Chikurubi Farm prison. This is done at the 30 hectares of land that is irrigable. The main varieties grown at the irrigable land is vegetables, carrots, sugar beans and onions. These are cultivated to boost the prisoners' food but due to lack of fertilisers and poor planning and other factors mentioned above, the yields are also reduced. The ZPCS needs to practice sustainable crop production techniques that will also improve soil fertility and enhances environmental protection. These include conservation agriculture techniques (Mazvimavi et al 2010).

2.5 Livestock Production

In the developing world, direct meat and milk production is a major activity. Anteneh (1989) explains that two thirds of the gross value of livestock products is composed of meat, egg and

milk production. The other third is made of livestock products that do not directly contribute to food. The table below shows the relative contribution of food and food-related livestock outputs.

Table 2.1 Relative contribution of food and food-related livestock outputs

Output	**Sub-Saharan Africa**	**Developing Countries**	**Developed Countries**
Meat	47	45	53
Milk	15	15	34
Eggs	4	7	8
Direct Food	**66**	**67**	**95**
Draught	31	29	3
Manure	3	4	2
Total	**100**	**100**	**100**

Adopted from Anteneh et al (1989)

Beef, dairy, pork and poultry production are the main activities in prison farms when it comes to livestock production. At Chikurubi farm, livestock production is done but at a small scale. All ZPCS Farm Prisons are involved in livestock production but also at a small scale. It is however affected by drought, pests and veldt fires which destroy pastures. However, if other intervention strategies are employed, more livestock products will be harvested for the benefit of the ZPCS. There are some food production systems that can be added to those that are already in the ZPCS. These are aquaculture, apiculture and fruit tree growing. These will enable the provision of more food which is nutritious to the inmates.

2.6 Aquaculture

As the world population is increasing, the current levels of per-capita aquatic foods consumption, the world will require an additional 23 million tonnes the about 2020 (www.fao.org/icatalog/inter-e.htm). In Zimbabwe, fish ponds can be built and fish can be bread in the fisheries. Calcium and protein are nutrients found in fish. Fish is very important if added to prisoners' diet as they are instrumental in alleviating malnutrition related. Though not that very dominant in the ZPCS aquaculture or fish farming is done at a small a small scale at Whawha Prison Farm. At Chikurubi Farm Prison, there is enough space for building fish ponds.

2.7 Apiculture

In May countries the world over, bee products have a wide consumer preference and they contribute to sustainable livelihoods of small scale farmers (Hilmiet al 2011). Nyatsande et al (2014) explain that in Zimbabwe apiculture started as far back as the 18th century. Apiculture or bee keeping is not done yet in the ZPCS but if done, it has very important nutritional and economic value that will benefit the ZPCS. Agritex (2014) proved that Zimbabwe has the potential to produce about 427 105 Kg of honey since there are about 15 967 beekeepers. Beekeepers in Zimbabwe use three major types of hives and these are the Langstroth, Kenyan Top Bar and the Traditional Hives. The distribution is as shown below.

Table 2.2 Distribution of Hives by Type and Province in Zimbabwe

Province	Traditional Hives	Kenyan TBH	Langstroth Hives	Provincial Total
Manicaland	10 098	1 324	135	11 557
Mash East	1 530	1 337	10	2 877
Mash Central	5 034	274	15	5 343

Masvingo	2 160	435	23	2 718
Mat North	64	11	954	1 029
Mat South	38	130	15	183
Mash West	16 793	3 531	1 100	21 424
Midlands	33 586	7 062	15	40 663
National Total	**67 172**	**14 124**	**2 215**	**85 794**

Source: Agritex reports, 2014

2.8 Fruit Tree Growing

Zimbabwe has a wide range of fruit trees that are grown. These range from bananas, mangoes, apples, avocadoes guavas. The Mazowe citrus plantations are a good example of fruit plantations in the country. Fruits are not grown on a large scale in the ZPCS but it would be beneficial if they are added to the ZPCS farming plan as they are a vital source of vitamin which is needed in people's diet.

2.9 Conclusion

The chapter did dwell on the food production systems that are employed in the ZPCS. Also, it also explained on the potential production systems that can be used by the ZPCS to alleviate the issue of food insecurity.

CHAPTER 3

CONTRIBUTION OF CHIKURUBI FARM PRISON TOWARDS FOOD SECURITY IN PRISONS

3.1 Introduction

The chapter focuses on the contribution of Chikurubi Farm Prison to food security in the ZPCS. It examines the effects or impacts of food production systems to food security in the ZPCS. These food production systems are crop, livestock, fisheries, fruit tree growing, apiculture and aquaculture. In order to address the food insecurity situation in the ZPCS there is need to increase its availability and access to adequate food by inmates and officers. Food production systems have an impact to food security in the ZPCS. The chapter will go a long way in explaining how the systems can enhance food security. The ZPCS can use the following food production systems to ensure food security in the organisation: The research findings are explained in this chapter

a. Crop Production

b. Fisheries Production

c. Livestock Production

d. Fruit Tree Growing

e. Apiculture Production

3.2 The relationship between food production systems and food security

"Food security exists when all people at all times have both physical and economic access to sufficient food to meet their dietary needs for a productive and healthy life" (http://fao.org). Food security systems are the ways by which healthy food can be produced for the benefit of the people. The relationship between these two concepts is what will guarantee a food secure

environment. When more crops are cultivated, more yields realised, and the food becomes accessible to those who need it at the right time in a stable manner then food security will be achieved. Stable maize production ensures a stable and secure staple diet for the people. Protein and calcium are a vital component of prisoners' diet. Livestock and fisheries production has both dietary and non dietary benefits. Fish can also feed on chicken droppings. Eggs, meat and milk are the dietary benefits of livestock production. These are very vital in prisoners' diet. Manure as a non dietary benefit is very important for crop and fruit tree production. More fruits and crop harvests guarantee food security and less of these often result in food insecurity. When bees produce honey, they gather pollen from different plants and herbs. This means that honey has some curative properties for ailments like asthma. In this manner apiculture production is another component of food production systems that will guarantee access to healthy and nutritious food.

Production is the provision of sufficient food that is needed to support life without risking human well-being. Thus at this particular juncture the relationship between production and food security is hinged on the indicators of food security which are availability, accessibility, utilization and stability. The chapter shall examine the relationship between production systems and food security. However the relationship between production and food security is not always positive because there are some factors that can cause food insecurity despite more production. Production systems allow the production of enough food to feed prisoners. In this case futuristic mechanisms are put in place to guarantee constant supply of enough food. Existence of surplus food will not provide piece meal supplies but facilitate the construction of sustainable ways of preservation. Therefore the relationship between production and food security is complementary.

The relationship between production and food security is also influenced by systems of production. For example the use of machinery and inputs like harvesters and fertilizers respectively will boost production thus increasing in food security. Efficiency in production and minimization of wastes and over-investments may reduce prices, making food more affordable. Thus whenever production increase, surpluses are generated for future use or supply. In this case the relationship between production and food security is positive or in harmony.

Increased production will keep product prices down and thus allowing access to food. Production triggers low prices allowing Prisons on to increase their supply for consumption by buying from other farms to boost their stores for future use or consumption. Whereas low production will increase the prices of food, therefore one can safely say production is a dependable variable that can or complement food security depending on the circumstance. It must also be noted that decline in production result in food insecurity. This is supported by the principle of demand and supply were the absence of a commodity will lead to high price thus making food scarce and unaffordable to the general populace

Production will contribute to sustainable food security especially when mixed farming is being practiced were species of crops, livestock, apiculture and aquaculture being produced. It has been proven beyond any reasonable doubt that mixed farming is more ideal to achieving food security since a particular season is characterized by a particular yield. There is an element of interdependence between species such that the consumption of one commodity will be supporting another form of production. For example in the ancient Zimbabweans never suffered from food insecurity due to the availability of fruits, domesticated animals, crops and this actually gave room for preservation for future use and food security was guaranteed by a

combination of natural and domestic production systems. This therefore rubber stamps the notion that production is a determinant factor for sustainable food security. Increase in production also is associated with the generation of disposable income when surpluses are sold. It will also allow the purchase of some commodities like sugar, salt, sugar, cooking oil, and inputs for sustainable production in the farms. Thus for food security to be sustained, production must be consistent with consumption. It must be emphasized that surplus or mass production creates a buffer through providing emergency measures to influence against food insecurity

More on that because of massive production, by-products that can last more than fresh products can be generated and they can have economic benefits in terms of food security and accessibility. For example soya beans and sunflower can be pressed into oil whilst fish and fruits can be dried. Some fresh farm produces like groundnuts and sweet potatoes can be produced in abundance can be preserved and can be consumed within a period of 6 months and thus basically interlinking with the next agricultural season. This shows that there are elements of a harmonious coexistence between production and food security. However, it must be noted that the relationship between production and food security is not always positive because in some cases production is simply the yield per harvested crop which cannot automatically contribute to food security (anonymous). For example over in the past prison farms produced enough maize and beans but food insecurity continued to persist. Therefore precautions must be exercised in trying to explain how these two variables are related. It seems as if the concept of food security is an entangled web of complexity that encompass external factors independent from production

3.3 Contribution of Chikurubi Farm Prison Towards Food Security in ZPCS

It has very large tracks of fertile land, favourable climatic conditions and has various sources of water in the form of boreholes and a dam. It is also near a market of more than 2 million consumers. With all these conditions, it is convincing to explore how these conditions can contribute to food security in the ZPCS. Also, it has the capacity to support poly culture which fosters interdependence within the production system. The student is going to extrapolate the aforementioned facts and establish the extent to which way they can contribute to food security in the ZPCS.

In addition to the above, Chikurubi farm is mechanized with a variety of farming equipment that makes it possible to do massive crop production at large scale. It can contribute indirectly through providing technical assistance, hiring of equipment to other under privileged farms. Thus it becomes the centre for nurturing other small prison farms on how they can produce what is sufficient for their consumption. In this juncture the prison has capacity to utilise its equipment to decentralize the farming process so as to manage other small farmers thus creating interdependence which provide security if the centre fails to produce.

Also, Chikurubi Farm Prison has abundant water in the form of surface and underground water which can be used for irrigation. That can be vital tools towards achieving food security ion the ZPCS. The respondents also pointed out that maize is the major crop that is grown at Chikurubi Farm Prison. However, some crops like soya beans and vegetables are grown. Apart from that, Chikurubi is located at the centre of major water supply sources of Harare particularly Morton and Jeffery Water Works and Lake Chivero thus it has the capacity to produce throughout the year using irrigation facilities in large quantities. Also present at the farm are several boreholes that can also support the cultivation and irrigation of winter crops

and market gardening. It is an undeniable factor that with proper farm management, Chikurubi Farm contributes very significantly to prison food security since crops food can be produced throughout the year to feed the organization rather than relying with rain fed agricultural products. Potatoes can be cultivated all year round just like beans and vegetables while poultry, fish and livestock will be produced.

Chikurubi farm is very close to the CBD thus making it very essential in the generation income that can be used to procure inputs to support sustainable food security. There is a readily available market of more than 2 million people that can buy and consume farm produce on a daily basis. This will enable the farm to generate more income that will be used to buy other food stuffs like rice and sugar. One might argue that Chikurubi has a very big sphere of influence in terms of market base to the extent that it does not necessarily need to deliver its produce to the market because dwellers from Mabvuku, Mandara, Manresa Park and many other locations can afford to walk to the prison farm or commute to access fresh clean farm produce.

90% of the Farm officers pointed out that basing on the size of Chikurubi, the farm have the capacity to feed all prisoners countrywide. If maize is grown on a 300ha field with an expected target of 2400 tonnes and with irrigation, twice the output will guarantee food security to all prisoners countrywide.

Lastly, Chikurubi Farm is closer to institutions and companies that are capable of supporting agriculture production like Seed Co, Farm and City, Wind Mill and many others. As a result it very cost effective to practice farming activities in an area with low production costs supported by free labour. It must be noted that Chikurubi is surrounded by agriculture experts and giants

that can be utilized to provide technical assistance and knowledge to boost food security. For example companies like Irvine's and Surrey can impart knowledge on sustainable animal production whilst academic centres like University of Zimbabwe, Women University in Africa or the Zimbabwe Open University can provide research facilities on possible ways to support sustainable agriculture to enhance food security. Such an enabling environment will make Chikurubi Farm contribute significantly to ZPCS food security especially as centre for innovation/ by utilizing local knowledge like Information and Technology from Harare Institute of Technology and other institutions.

3.3.1 The Impact of Food Production Systems to Food Availability

FAO (2010) explains that food availability addresses the "supply side" of food security and is determined by the level of food production, stock levels and net trade. The ZPCS food production systems will allow the production of more food for the prisoners if well managed. Success and stability of the production systems will allow the availability of more food in the ZPCS.

3.3.2 The Impact of Food Production Systems to Food Accessibility

Accessibility is also another factor that is needed to ensure food security. According to Gregory, P et al (2005), food access refers to the affordability and allocation of food, as well as the preferences of individuals and households. Poverty, unstable yields and poor harvests can affect food accessibility by people. An adequate supply of food at organisational or national level does not in itself guarantee household level food security as explained on table 1.3 above.

A nation may have large stocks of food but if the food is not accessible by the majority then it all contributes to food insecurity. Direct access to food by prisoners is determined by how it is produced. Food must be sufficient such that the prices and are within the reach of all people. Since physical access is all about human and direct accessibility to food by prisoners. The land and location that the prison is situated determines accessibility to food. Chikurubi Farm Prison is located just out of the City which makes it easy to access through purchasing basic commodities that are not produced at the prison. Successful crop production, livestock production, aquaculture, apiculture and fruit tree growing will promote physical accessibility to food while poor land use will also affect food accessibility by prisoners. Economic access is when there are funds to purchase food that is needed in the institution (Ecker and Breisinger 2012). Due to poor harvests and economic sanctions imposed to the country by the west, the government has not been able to avail funds that are needed to meet the food requirements of the ZPCS. In Zimbabwe during the 2007/8 era where the nation was hit by the hyperinflation situation many people were not able to buy basic commodities. Concerns about insufficient food access have resulted in a greater policy focus on incomes, expenditure, markets and prices in achieving food security objectives (FAO 2010). Access to food must not by all means affect emergency food supplies. It must also be achieved I socially accepted ways without stealing or scavenging.

3.3.3 The Impact of Food Production Systems to Food Utilisation

Utilization is commonly understood as the way the body makes the most of various nutrients in the food. It is mainly about metabolism of food by people. Sufficient energy and nutrient intake by individuals is the result of good care and feeding practices, food preparation and diversity of the diet and intra-household distribution of food. Combined with good biological utilization of food consumed, this determines the nutritional status of individuals (FAO 2010).

Several factors affect the quantity and quality of food that that inmates consume. The way the food is prepared, processed and consumed in the prison establishments always affect how it is utilised. Also, the health of the inmates affects the way the food is utilised. Access to health as another factor that affects utilisation is another that factor that respondent pointed out. The psychological wellbeing of prisoners also affects food utilisation. A mentally retarded or challenged individual may not realise the value of the food that he takes in and may throw it away but one who is mentally fit will appreciate the nutritional value of the food he/she consumes. Therefore, food that is produced by the food production systems of the ZPCS affects the choice of food by prisoners. Genetically modified foods are not favoured by Zimbabweans who prefer naturally produced foods. All interviewees responded as saying that a fruit that is known to have been produced from prison orchard is favoured than one that is known to have been imported from South Africa which is known to be a hub of genetically modified foods. Also, other production systems affect food utilisation when they are not known by the consumers. Some respondent who were interviewed said that they prefer to eat fish that are produced locally from fish ponds than those from Lake Chivero because those from Lake Chivero are known to be sewage and chemical infested which affect the quality and nutritious value of fish. Also, many respondents prefer borehole water than the council produced water which comes from Lake Chivero. Favourable food production systems usually enable better utilisation of the food. Education on food production systems and nutrition affect food utilisation. Prisoners who were interviewed pointed out that they also need to be educated on the nutritional value of the food they take such that they will appreciate it when they eat.

3.3.4 The Impact of Food Production Systems to Stability of the indicators

Prisoners may have adequate food on one day but that does not guarantee that there is food security. If the infrastructure that connects the food production places and the consumer does

not allow the movement of food then accessibility is affected leading to food insecurity. Food security is affected by economic factors which include rising costs of living and unemployment, political instability and natural disasters may affect food security status of the ZPCS. Some farm managers who were interviewed expressed concern on the stability of food security status of the ZPCS. They said that as long as there is no continuity of food availability, accessibility and better utilisation there will never be food security in the ZPCS. Poor production systems will lead to food insecurity whilst appropriate and sustainable production systems will guarantee stability of all the indicators of food security thereby making the ZPCS food secure.

3.4 Research Findings

The respondents who answered the structured questions had varying responses. The questionnaires evoked some responses that are as follows. The student interviewed ten officers on how Chikurubi Farm Prison can contribute towards food security in the ZPCS. The officers had been working at Chikurubi Farm Prison for about 8 years. When asked about how the food security situation was in the ZPCS, they replied as saying that there was food insecurity in the ZPCS as there was not enough food for prisoners. Some responded positively whist some just said that there is nothing new that can be done to improve food security in the ZPCS. Those who responded positively said that the nature and form of Chikurubi Farm prison is very conducive in that makes it a very productive centre for agriculture production. Key informants however explained that while it was true that there was a severe drought in the 2015/16 farming season, the prisons received grain from the National Drought Relief Committee but the fact that there is enough grain till 2017 does not guarantee food security because other basic components of human diet are missing. This does not guarantee food security.

The table below shows crops that are grown by the ZPCS and their targeted rewards. When asked about if Chikurubi Farm Prison can contribute to food security in the entire ZPCS, all respondents responded as saying that according to ZPCS Farm Profile, there is enough land and space for production at the farm. They however responded as saying that there is maladministration which leads to underproduction in the ZPCS.

Table 3.1

Serial	**Targeted Crop**	**Targeted Ha**	**Targeted Yields/Ha**	**Targeted Quantity of Produce**	**Unit Cost (USD)**	**Gross Income/Revenue**
1	Maize	300 Ha	8t/Ha	2400t	378	907 200
2	Soya Beans	300 Ha	3t/Ha	900t	580	522 00
3	Sugar Beans	100 Ha	3t/Ha	300t	1 300	390 000
4	Wheat	200 Ha	4t/Ha	800t	480	384 000

Source: ZPCS Farm Profiles.

According to the ZPCS dietary needs and targeted quantity of produce, Chikurubi Farm Prison can produce food for the entire ZPCS population. For the quantities that have been listed above as the ones needed for all prisoners the whole nation. If irrigation is introduced and grain is grown twice a year, then the ZPCS grain requirement will be met. As listed on table 3.2 below, the ZPCS can meet the food requirements for the whole nation by utilizing Chikurubi Farm Prison to its full capacity. This will include all the meat and vegetable requirements for the ZPCS.

The table below shows stipulated dietary quantities and requirements for inmates in Zimbabwe according to the ZPS Statutory Instrument Number 1 of 1996.

Table 3.2

Item	**Daily Need/Prisoner**	**Yearly Need/Prisoner**	**Yearly Need for 20000 Prisoners**
Maize Meal	550g	198Kg	4015tonnes
Potatoes	400g	144 Kg	2920tonnes
Millet-Meal	550g	198Kg	4015tonnes
Rice	200g	72Kg	1460 tonnes
Cassava	550g	198Kg	4015tonnes
Sugar	50g	16.8Kg	365 tonnes
Meat	130g	46.8Kg	949 tonnes
Fish	140g	50.4Kg	1022 tonnes
Fruit	200g	72Kg	1460 tonnes
Beans	100g	36Kg	730 tonnes
Milk	100ml	36Litres	730 000Litres
Fresh Vegetables	200g	72Kg	1460 tonnes

Source: **Prisons (General) Regulations, Statutory Instrument 1 of 1996**

The ZPCS needs about 4015 tonnes of maize grain to feed 20 000 prisoners per year. Some of the officers interviewed explained that the quantities of food needed to feed prisoners in the whole nation can be produced at Chikurubi Farm Prison. This means that other farm prisons

can produce to meet market demands thereby making more capital to purchase those commodities that are not produced by the ZPCS.

90% of all respondents pointed out that according to the ZPCS Farm Profiles (2015), Chikurubi farm has more land which amounts to about 1694ha. This can sustain over 500 herds of cattle and over 500 goats. The pig sties can house over 1000 pigs. The fowl runs available can house over 50 000 birds, both layers and broilers included. On the farm, 10 hectares of land can be spared for the production of fruit tree plantations. An acre of apple fruit trees is expected to produce at least 16,000 pounds of fruit, and on a good site, with favourable climatic conditions and excellent management, as much as 20,000 pounds can be harvested (http://fruit.cfans.umn.edu/apples/). 20 000 pounds of apples can feed over 10 000 prisoner and increasing the land for cultivation will allow the ZPCS to provide all inmates with a fruit at least after every meal daily. Diversifying the types of fruits grown will also enable the ZPCS to continuously provide inmates with a fruit everyday because when some are off season, some will be with fruits. This will allow the indicator of availability to be fulfilled in a stable manner. Availability also means that there must be adequate supplies of nutritious basic foodstuffs at all times in a way that will offset production costs and prices.

When asked about if Chikurubi Farm Prison was affected by the drought, the respondents explained that Chikurubi Farm Prison has been hit by the El Nino induced drought but it can cope to it if irrigation is to be introduced. Below are maize yields that were harvested from 2012 to 2016 and the yearly requirements for 20 000 prisoners.

Table 3.3

Year	Crop	Total Ha	Yields	Requirement/Year/20000 Prisoners
2012	Maize	130	109.9	3960 tonnes
2013	Maize	130	111.8	3960 tonnes
2014	Maize	130	330.2	3960 tonnes
2015	Maize	57	95.6	3960 tonnes
2016	Maize	130	202.6	3960 tonnes

From the above table of yields, it is evident that the farm is underutilised. According to ZPCS Farm Profiles (2015) and as shown on table 3.1 above the targeted area for cultivation at Chikurubi Farm Prison is 300 hectares with a targeted yield of 8 tonnes per hectare. However on the ground according to key informants, 200Ha is the largest area cultivated so far since 2012. The yields shown on table 3.3 above not tally with the expected or targeted yields per hectare. The yields alone do not guarantee food security at Chikurubi Prison Complex alone bearing in mind that maize is Zimbabwe's staple crop. On one focus group discussion that was held, the respondents explained that mixed farming was practiced in the farm but it was on a small scale. The respondents' opinion as far as food security was concerned were that the concept was greatly dependent the provision of inputs in a sustainable way. Farm managers explained that first and foremost, the farm can be able to accommodate mixed farming activities which are a mixture of various crops and livestock production at the same time. For example poultry, cattle production, horticulture, fish production, production of variety of crops. Because of mixed farming practice Chikurubi farm is capable of producing variant outputs that fosters interdependence amongst farming activities there by reducing costs of production. For example crop residue can provide food for the animals at the same time animal waste provide organic fertilizers to boost fertility. In this case mixed farming reduces vulnerability of food shortage

due to crop failure since farming activities complement each other. Mixed farming makes all the necessary food nutrients available under one roof which is the Chikurubi Prison Farm. Table 3.3 above shows that there are poor harvests. However, interview respondents explained that the poor harvests were due to several factors which included late provision of inputs, droughts and pilferage by officers and prisoners.

Table 3.4 below shows the livestock production yields from 2012 to 2016 and the yearly requirements for 20 000 prisoners.

Table 3.4

Year	**Livestock**	**Quantity**	**Yields**	**Requirement/Year/20000 Prisoners**
2012	Cattle	176 Beef Cattle	Estimated output of 150 Kg/Beast	936 Tonnes
		52 Dairy Cows	26 390 Litres	720 000 Litres
	Pig	Pork		936 Tonnes
	Chicken	------		936 Tonnes
2013	Cattle	175 Beef Cattle	Estimated output of 150 Kg/Beast	936 Tonnes
		Milk	22 348.5 Litres	720 000 Litres
		42 Dairy Cattle		Not Defined
	Pig	Pork		936 Tonnes
	Chicken	-------		936 Tonnes

2014	Cattle43 Dairy Cattle	153 Beef Cattle	Estimated output of 150 Kg/Beast	936 Tonnes
		Milk	9 919 Litres	720 000 Litres
	Pigs	22		936 Tonnes
	Chicken	------		936 Tonnes
2015	Cattle	150 Beef Cattle		936 Tonnes
		43 Dairy Cattle	10537Litres Milk	720 000 Litres
	Pigs	251		936 Tonnes
	Chicken	2000 Broilers		936 Tonnes
		Manure		Not Defined
2016	Cattle	178 Beef Cattle		936 Tonnes
		34 Dairy Cattle	11180Litres Milk	720 000 Litres
	Pigs	225		936 Tonnes
	Chicken	1500 Broilers	195 Tonnes	936 Tonnes

Table 3.4 above shows that there is food insecurity in the ZPCS because the quantities shown are way below the minimum standard requirements. Respondents who also are livestock specialists who also were in one focus group discussion explained that Chikurubi Farm Prison

have the capacity to sustain over 500 herd of range cattle and 200 dairy cattle. In this regard more beef and milk can be realised thereby boosting food security. Key informants who answered leading questions explained that poor cattle production in the livestock sector is caused by several factors which include poor and improper breeding programmes, veldt fires poor grazing control measures. There are no paddocks at Chikurubi farm and the whole farm is not even fenced.

Natural and animal manure which are encouraged by the proponents of the sustainable intensification approach to agriculture and food security. This approach is very vital in this context as it allows the use of natural manure which does not affect the soil PH. Merging the sustainable intensification approach and the new modernist approach to agriculture and food security will ensure more yields. 70% of the respondents who were part of the focus group discussions explained that natural manure can be used to assist in cases where there are shortages of fertilisers. It is said that a quarter of sustainable farmers in the United States of America obtained better gross margins and better yields than much of the conventional farmers (NAF 1994). On the same note, there is also abundance of waste that can be exploited to provide organic fertilizer after recycling water which is rich in essential nutrients to crop production at very cost effective rates. One cannot deny the fact that crop residue, lawns, food left over can be useful to support agriculture to a large farm like Chikurubi thus boosting production at very low costs whilst converting money to areas where there is high demand. Therefore the contribution of Chikurubi farm to food security is its ability to provide affordable diversity of food to the prison at very low costs like feeding fish with chicken droppings or food leftovers and road runners with honey waste/residue.

To those who completed the closed questions, responded as saying that there are some partners like the ICRC who helped with food for the prisoners. However, just like what all other respondents said the questionnaires proved that the Chikurubi Farm Prison can contribute more towards food security in the ZPCS. On the Focus group discussions held, respondents' opinions regarding to food security in prisons were mixed. Half of them responded as saying that the ZPCS is recycling dead wood such that as long as unproductive and counterproductive people are recycled in the ZPCS, prisoners will never be food insecure. The other half said that the issue of food security is not about recycling dead wood but it was a matter that is in the hands of those on the ground. They explained that all that mattered were the policies and decisions made in the organisation are a top down approach. Those who make the decisions do not have more knowledge of what is on the ground.

On the focus group discussions, respondents pointed out ways that can be used by the ZPCS to improve production especially at Chikurubi Farm Prison. 50% of the respondents also pointed out that more activities that can boost food security in the ZPCS can be done at Chikurubi Farm Prison. Chikurubi farm has abundant arable land that can be used to install processing plants or commodity cartels to produce finished products. For example perishable crops like tomatoes, peas, and fruits can be canned and whilst crops like sunflower, nuts, and honey can be turned into oil and honey products respectively. These products can be stored easily. This contributes to consistence supply of food throughout the year without worrying about climatic conditions. In this case Chikurubi Farm can be the centre for production and food bank. It must be emphasized that Chikurubi Farm has reliable electricity which makes it possible to process agriculture produces and ensure storage facilities in form of silos and cold rooms making it easy to supply other farms when the need arise.

60% of the officers interviewed pointed out that the food security situation in the ZPCS is not good and there is need to improve the food production systems. They pointed out that the most expensive component in trying to achieve food security labour. But the ZPCS has free labour in the form of prisoners. However, respondents pointed out that the ZPCS was underfunded by treasury. This makes it difficult for the ZPCS to finance agricultural operations. Farm managers who were interviewed explained that the ZPCS does not realise profits from its farming activities because the harvests have never surpassed the costs of inputs.

3.5 Conclusion

This chapter did dwell on how Chikurubi Farm Prison can contribute to food security in the ZPCS. The student explained on how the indicators of food security can be affected by food production systems in the ZPCS. It went on to explain the relationship between the indicators of food security which are availability, access, utilisation and stability with food production systems in the ZPCS. The research found out that there is food insecurity in the ZPCS. It however established that Chikurubi Farm Prison can greatly contribute to food security in the ZPCS. To achieve the status of food security, the ZPCS only needs to improve on some matters like administration and others.

CHAPTER 4

RECOMMENDATIONS AS FAR AS FOOD SECURITY IS CONCERNED IN THE ZPCS

4.1 Introduction

The chapter shall give the way recommendations for prisons to successfully tackle the problem of food insecurity in future. Prospects of food production in the ZPCS will be explained also. It will give a detailed explanation of some of the factors that can facilitate towards food security in the ZPCS. Also, a vision for the ZPCS future projection of food security is made. The chapter ends with some recommendations for the ZPCS as far as food security is concerned.

4.2 Recommendations

Improving and monitoring food security requires many elements. First, a clear and universally agreed upon definition of food security must be identified. Food security exists when all people at all times have physical, social and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life. There are four dimensions to food security and these are availability, access, utilization and stability. Secondly, a sound conceptual theoretical framework to guide the choice of food security indicators is required. A conceptual framework has been presented above. The conceptual framework and existing studies suggest that the measurement of food security should include anthropometric measures, as the true indicators of the impacts of food and nutritional insecurity at the individual, biological level.

In order to produce, the ZPCS must devise ways that will allow it to produce and improve the food security situation of the organisation. After analyzing why prison farms are not producing

the student have come up with a number of propositions on how these farms can produce and contribute to food security. These include public and private partnerships, irrigation farming, farm mechanization, thorough and timely land preparation before the farming season begins, inclusiveness in decision making, timely sourcing markets before harvesting, increase the budget and sourcing of credit facilities, financial autonomy, decentralization of decision making, mixed farming practices and use of modern technological farming methods

4.2.1 Public Private Partnerships (PPPS)

Public Private Partnerships are partnerships between the public companies and private companies. First and foremost prisons farms can partner with the private companies through Public Private Partnership with companies that can produce input and services. For example prison farms can partner with private companies like Seed Co, Zimphos or Wind Mill. Such partnerships will boost production the companies are manufacturers of inputs like fertilizers, chemicals and have the technical expertise especially about the performance of such crops. Accelerating the implementation of Public Private Partnerships (PPPs) to fund economic revival and infrastructure development (ZIMASSET 2013) will assist in funding agriculture in the ZPCS.

4.2.2 Employment of New Public Management Skills

In order to increase production in prisons farms, new public management skills must be employed instead of the old or traditional management practices. New public management

skills emphasize on bottom up approach instead of a top down approach to management. This allows the decentralization of decision making by allowing junior employees to contribute towards strategic planning and steering of organizational goals. New public management allows junior employees to set their targets, whilst the top management will also make their own but at the end they should able to harmonize the individual goals with organizational goals to facilitate smooth running of the farms. In prison farms, junior officers are on the ground and more close to reality than the top management. However trying to impose decisions to them will create an indirect power struggle within the management spectrum and this often leads to sabotage of activities. However, employing new public management skills will increase production since it curtails resistance during implementation as junior workers have the zeal to see their ideas coming to fruition. Therefore the inclusion of all levels of management in decision making will boost production thereby increasing food and nutrition security.

4.2.3 Access to Finance and Financial Autonomy

Since most of the problems curtailing production are mainly financial constraints, government must increase the budget allocation channelled to prisons farms. In the same vein the responsible ministry should grant borrowing powers to the ZPCS which enable Prisons to access loans from financial institutions. However, the government must control the borrowing powers. Access to commercial loans makes it flexible for prison farms to acquire inputs timely thereby boosting production. On the same note financial discipline and financial autonomy should be the foundation of successful agricultural production. This can be achieved through several pieces of legislature and regulations which allow the prison management particularly to decide what is suitable for their land and how much to spend without limitations and conditions from parent ministry. In addition to the above, prisons farms can come up with

strategic ways of raising money to bankroll their farming activities. For instance officers can contribute towards money to buy inputs and this has proven to be successful in the areas like sport. Due to the contribution of workers the prison team managed to be a vibrant competitor in this Premier League without any funding from the Ministry. This therefore means production is not only dependent on external funding but the ability and willingness by members of staff to achieve certain ends.

4.2.4 Modernization of Farming Techniques

There is need to make improvements in crop and animal husbandry through the use of modern farming techniques, new seed and fertilizer varieties, genetically modified varieties, crop protection techniques, greenhouses and irrigation facilities to increase production within the prison. Agricultural lime must also be used to improve soil PH. Also, Prison farms can use modern farming practices and equipment that are more efficient and effective. Farming machinery like planters, combine harvest, tractors can be used at a large scale for activities are labour intensive. In this context government must assist in the mechanization of prison farms. The government must also provide technical expert and meteorological equipment to prison farms so that they are always up to date with weather patterns and this is very essential in farming production. Over the years it farmers were relying on the Meteorological Department but sometimes they may provide inaccurate information that that often leads to farming failure.

4.2.5 Monitoring and Evaluation

Government must appoint an independent commission which has expertise in Agriculture and Nutrition. This Commission should make a follow up on the day to day running farming

activities within prison farms. The commission should be empowered such that it can exert pressure on farm managers to make sure they have executed farming activities timeously to avoid crop failure due to a combination of reasons like late planting and other human errors. As alluded to before, there is lack of monitoring and evaluation skills that makes sure farming activities are being carried out expeditiously without a compromise.

4.2.6 Motivation

The ZPCS must motivate its employees and inmates so as to improve their moral both at and off work. Prison farms must come up with incentives that can motive farm workers to work hard to improve production. In most cases the officers and inmates do not have the moral and social support and this makes them to perform below the expected standards. For instance going to work after taking very little or no food curtails the spirit of hard working since a hungry person cannot perform as expected. Sufficient time off is very important to officers as they will have time for their own personal advancement.

4.2.7 Sustainable agriculture

This is farming that is based on good knowledge of how the ecosystem functions and the relationships between living organisms and their environment. This is also a combined or interlinked method of livestock and crop production ways at specific places and this is expected to last for very long times. Conservation agriculture is all about using conservation farming methods which includes that that shall be explained in this chapter below. Cover crops such as rye help in insect and weed suppression and also improve soil fertility. Rotational grazing systems allow the provision of high quality forage which help reduce feeding costs for livestock especially cattle and goats. Livestock need little attention from the farmer as they help in

distributing manure across the fields and this reduces fertiliser costs. Conservation tillage practice is another way by which soil erosion is minimised. It also allows the minimisation of soil compaction and preserve water. Ecological weed and insect management practice is practice by which there is avoidance of single bullet solutions which destroy insects that help the environment in other ways. Physical removal of seeds, trap crops for insects and chemicals to be applied only when necessary are important factors. It is also important to plant crops that shade out weeds. Animal and crop diversity help very much in making farms become disease and pest resilient (www.sare.org).

4.3 Prospects on Food Security in the ZPCS

The coming together of several factors will go a long way in magnifying the food security situation in the ZPCS. The future view of food security in the ZPCS is hinged in the improvement of the current food production systems and the adoption of sustainable production systems. This together with what has been listed above as ways that can improve the food security situation can be utilised for prospects in the ZPCS.

With the ever increasing number of crimes being committed, the ZPCS are becoming overpopulated such that more food will be needed. FAO (2010) predicted that the world population will grow up to 9.6 billion by 2060. Feeding the growing population requires producing more food and distributing it more people require more resources. The only way to alleviate this is to make sure that sustainable production systems are put to use such that there the ZPCS will always be food secure. Since it is very difficult to predict the number of people who are admitted into prison, it is also very difficult to predict the amount of food needed to cater for the ever rising prison population. The rising population is made up of people from different countries and they require different types of foods. Increasing population causes changes in consumption patterns.

The ever-changing consumption trends all add up to the obstacles to achieving food security. The rate of urbanisation and globalisation contributes to changing diets for the people.FAO (2010) also predicted that by 2050, 70% of the world's population will live in cities the economies and incomes are already catalyzing the tendency to consume more animal protein in the developing world and the whole world will consume about two thirds more. In Prisons an observable boost in food production is needed to meet the ever increasing demands. This will demand more improvements in yields and productivity and making sure that all arable land at Chikurubi Farm Prison is utilised. Also, aspects like double cropping and growing improved genetics must also be taken advantage of for the improvement of the food security situation.

Several factors lead to food insecurity in the ZPCS. These include production losses, wastes and disruptions in the supply chain. One of the main problems that may affect the ZPCS future prospects is that of pilferage and sabotage. The problem of pilferage mainly by members of the ZPCS and their dependence is an immense threat to food security.

4.4 Cultivation of Drought Prevalent Crops

Small grains (sorghum, pearl and finger millet) are ranked second as staple cereal crop after maize in Zimbabwe.

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4.4.1 Finger Millet or Rapoko

Millets are an agronomic group of hardy, small seeded cereals important around the globe for food and fodder. Among cereals, millet ranks sixth in world area production behind wheat, maize, rice, barley and sorghum. In sub-Saharan Africa it is the third most widely grown crop.

Africa produces 56% of the world output, of which 99.9% is produced in sub-Saharan Africa (FAO, 2013). The top world producers are India, followed by Nigeria, Niger and Mali and they alone make up 70% of sub-Saharan Africa's production. There are several millet species which include foxtail, barnyard, proso, finger and peal millet (Evenson, 2003). Among them two are mainly grown in Zimbabwe which are pearl and finger millet. Pearl millet originated in Africa and is the hardiest and most important staple food among the millets. It can survive the hottest climates and driest regions, making it a staple food of many poor people. Finger millet also originated in Africa in and it originated from Ethiopia and Uganda. In Zvishavane finger millet is more common than pearl millet and this study is going on focus on finger millet.

Finger millet has an annual production of 4.5 million tonnes of grain, and Africa produces around two million tons (Maunder, 2006). Though it was a predominant crop in Africa until recent decades, the crop's production has declined significantly (*Ibid*). In Zimbabwe the crop is more produced at a subsistence level than commercial and smallholder farmers are the main producers. Zimbabwe is no twenty-three and produces 55MT /1000MT with India being on the top followed by Nigeria producing 5000 MT (DFID, 2013). Finger millet is the third important crop next to maize and sorghum in the communal areas of Mashonaland, Midlands and Manicaland provinces. Its other names are rapoko, rukweza, njera or zviyo.

It is said to be one of the most nutritious all of the world's major cereal crops. This is mainly because the grain is rich in methionine, an amono acid lacking in diets of many who rely on maize meal, cassava and plantains as their carbohydrates (National Academic Press, 1996). Finger millet carbohydrates are reported to have the unique property of slower digestibility and can be regarded as food for long sustenance. It provides 8-10 times more calcium than wheat

or rice. The excellent malting qualities have added to the uniqueness of the grain in expanding its utility range in food processing and value addition.

Finger millet is a tufted annual crop, growing to a height of 30–150 cm and maturing in 75–160 days (National Research Centre, 2006). Leaves are narrow, grass-like and capable of producing many tillers and nodal branches. The panicle consists of a group of digitally arranged spikes often referred to as fingers. Some of the fingers are curled into fists. Finger millet cultivation is more widespread in terms of its geographical adaptation compared to other millets. It has the ability to withstand varied conditions of heat, drought, humidity and tropical weather. It grows best in an environment with medium rainfall (29–429 cm) and an annual temperature range of 11 to 27°C, and is reported to tolerate a soil pH of 5.0– 8.2 (Duke 1978, 1979). Areas with low precipitation and low relative humidity during seed ripening and maturation are best for regeneration. Easy to grow, it succeeds in ordinary garden soil in a sunny position.

Finger millet is suitable as a subsistence food crop particularly in dry ZPCS farms because it can store safely for many years without insect damage due to its small seeds, hence fitting well in farmers' risk avoidance strategies in drought-prone regions Asia (Holt, 2000). The crop is ideal for dry areas as it can lie dormant for weeks. Once the rains do come, the grain springs to life and can be ready to harvest in about 2.5 to 6 months. This makes the crop to be adaptable in hot humid areas like the South-East Low Veldt. During its growth the grain is tolerant to weevil damage probably due small seed size. This is in opposite to maize which can be exposed to different diseases and pests resulting in major losses especially left untreated. Furthermore the grain can be stored for years without insect damage, which makes it a particularly valuable crop for poor households who cannot afford pests control treatments. This makes it an ideal

important staple when no other food is available. If dried well and stored in a dry place, it can be stored for as long as up to five years. The long storage life makes it an important crop in risk-avoidance strategy in food security. The grain tastes better than other small grains. One factor that makes it attractive is that the locals stated that the grain tastes better than other small grains. It has a high impact in regards to the poor particularly looking at the indicators of food security as it provides stability which has been explained above. Finger millet has the potential of enhancing food security in the ZPCS. It is encouraged as will ensures food security by providing stability, accessibility, improve nutrition and availability of food at all times unlike maize.

4.4.2 Sorghum

According to Makiwa (2002), of all Africa's cereal grains, sorghum is the most important especially in drought prone areas. Two varieties of sorghum which are SV3 and SV2 are grown mainly grown in Zimbabwe. It is a staple food crop for millions of the poorest and most food-insecure people in the semi-arid tropics of Africa, Asia and Central America. The crop is genetically suited to hot and dry agro-ecologies where it is difficult to grow other food grains. These areas are frequently drought-prone and characterized by fragile environments. It is crucial to a substantial portion of the millions who coax from their meagre and often declining lands barely enough to sustain life. For them, it provides the dietary energy and nutrients that make the difference between health and hunger. It can tolerate poor soils and thanks to some unique features of its anatomy, prevails in drought. It is usually grown without application of any fertilizers or other inputs by a multitude of small-holder farmers in many countries. This makes it perfect for the prison farms with poor soils. Sorghum originated in northern Africa and has spread to many tropical and subtropical regions of the world. According to Carney

(2003), it is an important cereal crop in marginal areas of Africa where other cereal crops such as maize would normally fail. Sorghum has been for centuries, one of the most important staple foods for millions of poor rural people in the semiarid tropics of Asia and Africa.

For some impoverished regions of the world, it has remained a principal source of energy, protein, vitamins and minerals. Its main strengths is that sorghum grows in harsh environments where other crops do not grow well, just like other staple foods, such as cassava, that are common in impoverished regions of the world (Gopal, 2006). Also, sorghum is drought tolerant and heat tolerant, and is especially important in arid regions. It requires an average temperature of at least 25 Degrees Celsius to produce maximum grain yields in a given year. Maximum photosynthesis is achieved at daytime temperatures of at least 30 Degrees Celsius. For sorghum to be effectively produced the night time temperatures should not be below 13 Degrees Celsius for more consecutive days as this reduce the potential grain production and the soil temperatures have reached 17 Degrees Celsius. Another feature that makes sorghum to be adaptive in Zvishavane is that it has a very large root-to-leaf surface area. The leaves have a waxy cuticle for protection and under water stress, the leaf margins roll up to reduce transpiration. Plants will go into dormancy if the stress is too great. This makes sorghum a very important crop for millions of poor farmers around the world. The production of sorghum in the ZPCS will go a long way in enhancing food security.

4.5 Conclusion

This chapter made recommendations on how the ZPCS can produce for the betterment of the food security situation. The recommendations included the ZPCS entering into Public Private Partnerships, the employment of new public management skills, access to finance and financial

autonomy, modernisation of farming methods, monitoring and evaluation practices motivating its personnel and the employment of sustainable farming methods. Ways of improving food production were explained together with prospects on food security in the ZPCS.

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ZPCS Farm Profiles 2015

APPENDICES

Appendix 1

Section A

QUESTIONNAIRES

For Prison Officers at Chikurubi Farm Prison

Dear colleague

I am a Midlands State University student who is studying for a Master of Arts in Development Studies. In partial fulfilment of the degree, I am supposed to undertake this research. My area of research is as referred above. The result of this research will be of great importance to the Zimbabwe Prisons and Correctional Service, Ministry of Justice and other stakeholders in achieving food security.

I am therefore kindly requesting you to honestly complete the attached research instrument (questionnaire) to the best of your ability and knowledge on the items. Your frankness in responding to the questionnaire will go a long way in facilitating better programmes and strategies that will assist in achieving food security. The research has since been approved by the ZPCS National Headquarters.

May I also take this opportunity to assure you that you are not forced to respond and when you do so, your responses will be treated with the strictest confidentiality and will be used only for the purpose of this research. Information submitted will be destroyed upon completion of this research.

I would be grateful if you could complete and return the enclosed questionnaire not later than 30 September 2016.

I would like to thank you most for your cooperation and contribution to this research.

Thank you

Munyaradzi P. Panganai

……..

Structured (open ended) Questions

1. How long have you been working at Chikurubi Farm Prison?

……

2. How is the food Security situation in the ZPCS?

……

3. Are there partners that are assisting the ZPCS in combating food insecurity?

……

4. What crops are grown at here?

……

5. How are the rainfall patterns here?

……

6. Besides crop farming, what other farming activities are done at Chikurubi Farm Prison?

……

7. What other production systems do you think can be introduced to prisons to boost food security?

……

8. During times of drought, have you ever tried growing drought resilient crops?

……

9. How was the 2015/6 agricultural season harvest?

……

10. Do you think Chikurubi Farm Prison can contribute to food security in the ZPCS?

……

Semi-Structured (closed) Questions

(a) Answering these questions is voluntary.

(b) All answers are strictly confidential.

(c) Please tick the most appropriate answer.

1. How long have you been working at Chikurubi Farm Prison?

a. 1-2 Years ☐ b. 2-4 Years ☐ c. 4-8 Years ☐ d. 8 years and above ☐

2. How is the food Security situation in the ZPCS?

a. Good ☐ b. Bad ☐ c. Worse ☐ d. Worst ☐

3. Are there partners that are assisting the ZPCS in combating food insecurity?

a. Yes ☐ b. No ☐

If the response to question 3 above is yes please write the name of the partner

…….

4. What crops are grown at here?

a. Maize ☐ b. Beans ☐ c. Wheat ☐ d. Groundnuts ☐

Other (Specify)…….

5. How are the rainfall patterns here?

a. Reliable ☐ b. unreliable ☐

6. Besides crop farming, what other farming activities are done at Chikurubi Farm Prison?

a. Livestock ☐ b. Aquaculture ☐ c. Apiculture ☐ d. Apiculture ☐

7. What other production systems do you think can be introduced to prisons to boost food security?

a. Livestock ☐ b. Aquaculture ☐ c. Apiculture ☐ d. Apiculture ☐

8. During times of drought, have you ever tried growing drought resilient crops?

a. No ☐ b. No c. If yes above please specify……

9. How was the 2015/6 agricultural season harvest?

a. Good ☐ b. Better ☐ c. Worse ☐ d. Worst ☐

10. Do you think Chikurubi Farm Prison can contribute to food security in the ZPCS?

a. Yes ☐ b. No ☐

c. If yes or no please specify ……

Appendix 2

Section B

FOCUS GROUP DISCUSSION GUIDE

Date of Discussion……./…../16

1. What are your opinions regarding food security in prisons?

2. Do you think the ZPCS can win the war against food insecurity?

3. What are the production systems in Prisons and how can they be improved?

4. Do you think agricultural specialists in the ZPCS are helping in fighting food insecurity?

5. What are your views as far as mixed farming is concerned?

6. How is livestock production in the ZPCS?

7. Can Chikurubi Farm Prison contribute to food security in the ZPCS?

8. Does the ZPCS utilise some drought coping strategies like Indigenous Knowledge Systems (IDS)?

9. Which one between rain fed agriculture and irrigation gives the ZPCS more yields?

10. Does the ZPCS cultivate small grains?

Appendix 3

Section C

INTERVIEW GUIDE

Date of Interview ……../……/16

1. How is the food security situation in the ZPCS?

2. How can it be improved?

3. What agricultural production systems are employed in the ZPCS?

4. How do you think Chikurubi Farm Prison can contribute to food security in the ZPCS?

5. What are the obstacles to achieving food security in the ZPCS?

6. In terms of funding, do you think the ZPCS is being funded well by the government?

7. Does the ZPCS use whether forecasts in its farming activities?

8. What are the ZPCS Coping strategies when droughts and disasters hit?

9. Does the ZPCS realise profits from farm produce?

10. How are the profits used?