



EFFECTS OF INDUSTRIAL PARKS ON FOOD SECURITY: EVIDENCE
FROM HAWASSA INDUSTRIAL PARK, HAWASSA, SIDAMA REGIONAL
STATE, ETHIOPIA

BY

ADDISHIWOT ARKISO MASEBO

JUNE 2022

ADDIS ABABA, ETHIOPIA

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A THESIS SUBMITTED TO CENTER FOR FOOD SECURITY STUDIES OF
THE COLLEGE OF DEVELOPMENT STUDIES, ADDIS ABABA
UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR
THE DEGREE OF MASTER OF SCIENCE IN FOOD SECURITY AND
DEVELOPMENT STUDIES

JUNE 2022

ADDIS ABABA, ETHIOPIA

ADDIS ABABA UNIVERSITY
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Declaration

This thesis is my original work and has not been presented for MSc degree in any other University and that all the sources and materials used for the thesis have been properly acknowledged.

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Dedication

This thesis is especially dedicated to my dear father (Arki), whom I have always loved sincerely and will always love.

Acknowledgment

This thesis becomes a reality with the kind support and help of many individuals. It's a pleasure to extend my sincere thanks to all of them.

Foremost, I would like to extend this endeavor to God who is the source of all good things and helped me accomplish this as it was part of his beautiful plans in my life and definitely for his absolute presence in my life which made me whole.

I would also like to express my sincere gratitude to my advisor Solomon Tsehay (PhD) for his continuous support, patience, immense knowledge and for teaching me more than I could ever give him credit for here. Besides, I want to thank all staffs at Center of Food Security Studies and my classmates.

My sincere thanks also goes to Hawassa Industrial Parks and IPDC staff for their unreserved support throughout the data collection. I am very glad to acknowledge the sample operators for their willingness and patience in responding to my questionnaires. This study definitely would have not been accomplished without your help.

I am always indebted to my family even just for having them in my life. Most importantly I would like to appreciate my very loving and supportive mother because her sacrifices are literally priceless. I would also like to thank my only brother who is the smartest and most humble person and on top of all these who always believes in me no matter what and keeps me on track in every aspect of life. Finally, my sisters, thank you so much for being my support system all the time.

ADDISHIWOT ARKSIO MASEBO

JUNE 2022

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Acronyms

CSA: Central Statistical Agency

CSI: Coping Strategy Index

ETB: Ethiopian Birr

FCS: Food Consumption Score

FDI: Foreign Direct Investment

FGD: Focus Group Discussion

FIES: Food Insecurity Experience Scale

GTP I & II: Growth and Transformation Plan

HFIAS: Household Food Insecurity Access Scale

HIP: Hawassa Industrial Park

IIED: International Institute for Environment and Development

IP: Industrial Park

IPDC: Industrial Parks Development Corporation

NUPI: National Urban Planning Institute

SNNPR: Southern Nations, Nationalities and Peoples' Region

SSA: Sub-Saharan Africa

VIF: Variance Inflation Factor

ZLD: Zero Liquid Discharge

Abstract

Industrial parks development has contributed to employment opportunity creation for the ever-increasing youth population in the country. In spite of a huge surge of employment opportunities, emerging evidences have revealed that the wage of the textile sector is so low that it cannot ensure a decent living to its employees. Thus, this study aims at examining the effects of industrial parks on food security by assessing operators' food security status, identifying determinants of food security and by assessing existing coping mechanism to food insecurity in Hawassa industrial park, Hawassa city, Sidama regional state, Ethiopia. A total of 268 sample operators were taken from 6 different foreign firms in the industrial park through multi-stage sampling techniques. Descriptive and inferential statistics notably, f-test and chi-square test as well as econometric model namely ordered logistic regression was used. Household food insecurity access scale and food consumption score were employed to examine the food security status of the sample operators while coping strategy index was applied to examine their coping mechanisms to food shortages or food insecurity. Findings of household food insecurity access scale indicated that 49 (18.28 %) of the respondents were food secure while 206 (76.87%) and 13 (4.85 %) of respondents were mildly and moderately food insecure respectively. The food consumption score results demonstrate that from a total of 268 respondents 14.9 of them have acceptable food consumption score while 85.1% of them have borderline food consumption score. The identified determinants of food security using ordered logistics regression are salary, provision of breakfast, provision of lunch, transportation services as well as receiving subsidy from family showing positive influence on food security while subsidizing one's family and origin showed a negative effect on food security. On the other hand, salary, lunch provision by factory, receiving subsidy from family and medical expenses have a positive influence while transportation cost and previous occupation have a negative influence on the dietary diversity of the operators. The study participants also reported that they were regulating their consumption patterns as a coping strategy. Among the coping strategies, the most common ones were, limiting portion size at meal times (88.8%), pursuing on less preferred foods or less expensive foods (79.1%) and reducing number of meals eaten in a day (66.8) while skipping meal the entire day and begging were not adopted at all. The study concludes that salary level significantly determines food security. In addition different benefit packages provided by factories such as breakfast, lunch and transportation service, significantly improve the food security status operators. Moreover, the most adopted coping mechanism by the operators limiting portion size. The study concludes that salary increase, provision of breakfast, lunch and transportation should be implemented by all factories and it has to be part of the policy. In addition to this, most workers spend a significant portion of their salary on rent and struggle to get by so integrating the work place with housing will improve their condition.

Keywords: *Hawassa industrial parks, operators, food security, household food insecurity access scale, food consumption score, coping strategy index*

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Food insecurity and undernourishment affect people in all regions across the world. According to FAO et al., (2019), more than 820 million people were undernourished globally in 2018 of which 704 million were severely food insecure. Unemployment is a major issue all over the world in both developed and under developed countries. In Sub-Saharan Africa (SSA), youth unemployment was reported as 11.1% in 2017 with an expectation to rise and the number is the highest amongst the regions of the world (ILO, 2017). Particularly in Ethiopia youth unemployment in February 2021, as reported by labor force survey, was 23.1%, of which males were 15.9% and females were 28.8% (CSA, 2021).

Ethiopia is always looking for ways to reduce the unemployment rate as well as tackle food insecurity and malnutrition. Industrial parks development has been one of the ways to tackle this chronic unemployment problem. Thus the government has put vast resources into the transformation of the agriculture-dominated economy into an industry-led economy. This basically depended on attracting foreign direct investments (FDI) to the sectors with abundant potential particularly, textiles and garments, by establishments of industrial parks (NPC, 2015).

It has invested significantly into enabling infrastructure and set up a series of special economic zones i.e industrial parks (IPs) with specific emphasis given to labor-intensive light manufacturing industries and with the intention of creating jobs for the ever-increasing youth population in the country (IMF, 2019). These recently constructed industrial parks have had some success in creating jobs through providing employment for about 88,000 workers. Job creation attempts to provide a stable source of income, which improves household welfare and food security during the highs and lows (shocks) of economic and food production cycles. Beyond contributing to direct job creation, these industrial parks are expected to expand the industrial base of the country, transform the wider economy, and raise living standards of the population (World Bank, 2021).

1.2 Statement of the problem

Ethiopia is classified as a food deficit, low income country. This is evidenced by the finding that 57% of the population is food insecure out of which 25 million are below the survival threshold (FAO, 2020). Unemployment is the critical problem in the country. Labor force survey shows that the youth unemployment in February 2021 was 23.1%, of which males were 15.9 % and females were 28.8% (CSA, 2021). In order to reduce this chronic unemployment along with food insecurity in the country, Growth and Transformation Plan I and II (GTP I, 2010-2015 and GTP II, 2016-2020) aspire to transform the economy by investing on industrial parks. Attention was given to priority sectors of which textile and garment is one of them (Eshete *et al.*, 2019). Apart from that, the recently endorsed 10 years development plan recognizes the textile and garment sector as an engine for economic transformation and employment creation.

Thus, the sector takes 50% share of the total industrial parks established in the country. As part of this endeavor Hawassa Industrial park, which is the largest in the country specializing in textile and garment, has been established to attract foreign companies. Until now it housed a total of 22 companies of which 19 of them are foreign textile companies and has created job opportunity to 38,000 individuals in two consecutive phases and it is expected to hire 60,000 employees when it fully operates (Mains and Mulat, 2021).

In spite of a huge surge of employment opportunities, emerging evidences have revealed that the wage of the textile sector is so low that it cannot ensure a decent living to its employees. For example wage rate of an operator in 2018 was approximately \$50.00 per month and can range from a starting salary of \$32.00 to \$122.00 for the most experienced operator (Cepheus Research and Analytics, 2019). It is even lower than the minimum living standard considered by ILO, i.e. ETB3500 (\$110) /month (ILO, 2018). Evidences show that 13% of all the employed persons in the world are moderately poor, while 8% are extremely poor. This situation remains most alarming in Africa, where the share of working poor was about 33% in 2018, implying that about one-third of all workers lived in extreme poverty despite having a job and thus representing more than half (56%) of the global working poor. In addition, 22% of African workers were moderately poor, while only 45% have been able to escape poverty (ILO, 2018). Thus, it is timely to meticulously examine the effect of industrial parks on food security at Hawassa Industrial Parks.

Many studies have been conducted over the past years on the effects and contributions of Industrial parks (Eshete *et al.*, 2019; Mitta, 2019; Barrett/Baumann-Paully, 2019 and Cepheus Research and Analytics, 2019). However, these studies focused only on macro evidences and issues related to economic growth, wage rate and working conditions. There is no research that has been conducted so far linking food security and employment opportunities at a micro level. The effects of employment opportunities created by the industrial parks on the food security status of operators and their coping mechanisms to food insecurity is not assessed yet. This study will aim to assess the effects of industrial parks on food security of operators in Hawassa Industrial Park.

1.3 Objectives

1.3.1. General objective

The overall objective of the study is to assess the effects of industrial parks (IP) on food security of operators in Hawassa Industrial Park.

1.3.2. Specific objectives

More specifically, the study planned to:

- Assess the food security status of the operators in Hawassa Industrial Park;
- Identify the determinants of food security status of operators in the study area;
- Assess the coping mechanisms adopted to food insecurity by operators in the study area.

1.4 Research questions

This research was intended to answer the following basic questions which are the derivatives of the above mentioned research objectives:

- What is the food security status of the operators in Hawassa Industrial Park?
- What are those demographic and socioeconomic factors that play determining role in food security status in the study area?
- What is the implication of benefit packages provided by the factories on food security status of these operators in the study area?
- What major coping mechanisms of food insecurity were adopted by the operators?

1.5 Significance of the study

The findings of this study will be a useful addition to the existing body of knowledge on the effects and contributions of industrial parks to the country. Several studies have been conducted in the past years with the aim of identifying the effects of industrial parks and foreign direct investment from macro perspective. However no rigorous study has been conducted on the effects of industrial parks on food security at household level. Thus, this study helps to understand the food security implications of industrial parks at micro level. Thus this study will be used as a source of additional material for any other further study in the area of the effects of industrial parks on operators' food security.

1.6 Scope and limitation of the study

The study was conducted to assess the effects of industrial parks on food security status of operators in Hawassa Industrial Park, Hawassa, Sidama regional state, Ethiopia. Socioeconomic factors, institutional and demographic related factors that determine the operators food security status were considered in this study. Food security measurement tools such as household food insecurity access scale (HFIAS), food consumption score(FCS) and coping strategy index (CSI) were applied to assess their food security status and dietary diversity, determinants of food security and coping strategies through questionnaire survey. In addition focus group discussion (FGD) was also conducted with the operators while interviews were also conducted with factory managers, officials in investor's association bureau of the Industrial Parks Development Corporation (IPDC) for the purpose of data triangulation and assessment. However the study was subject to some limitation. The data collection could not be completed in the expected time and took much longer time because it was allowed to conduct data collection with only few operators per day as their work does not allow them to have extra time. As a result it was impossible to replace the two questionnaires with missing information with two other because even collecting the required sample number was very time consuming. So the researcher considered 268 properly filled out questionnaires for analysis. In addition this study was focused only the access component of food security and it does not address all dimensions of food security.

1.7 Ethical Consideration

The study has adopted research ethical standards. Permission was granted from Addis Ababa University, College of Development Studies and Center for Food Security Studies in accordance with the university's plagiarism policy. Prior to the data collection, an official letter from the university was obtained to provide for Industrial Parks Development Corporation (IPDC) and obtained approval. At the beginning of data collection the purpose of the study was explained clearly and their full consent was checked. In addition they were also informed that their information will be kept confidentially and will be used for learning purposes.

1.8 Organization of the thesis

The first chapter is a general introduction to the study which discusses the problem of the study, objectives of the study, pertinent research questions that are to be answered by the research, and the scope and limitations of the study. The second chapter is literature review. It addresses relevant and related issues and concepts around the study from international and national experiences. It reviews about the urban food insecurity in the global south and review empirical literature related to determinants of food security in urban context and also discusses about Hawassa Industrial Park. The third chapter discusses the research methodology applied. This chapter describes the methodology, research design and why the specific methodology has been employed. The fourth chapter is about the result and discussion of the study. The collected data of the study is presented clearly and analyzed according to the research questions of the study with the set of parameters. The fifth chapter is the conclusion and recommendations. The conclusion part synthesizes the key points of the study and elaborate on the significance of the finding. The final recommendations include the ways forward to bring solutions to existing problem based on the findings and how they can implemented and the responsible body.

CHAPTER TWO: RELATED LITERATURE REVIEW

2.1 Concepts and definition

Food security: the most widely used definition of food security originated from the 1996 World Food Summit. It states that food security exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (FAO, 1996). There is a significant difference between the current definition and the pre-1996 because the previous definition had a narrow focus on food production while the recent one has a broader conceptualization by encompassing the four key dimensions of food security, such as economic , social, physical (i.e availability) access to food; sufficient quality and quantity of food to meet nutritional requirements the safety of food ; the safety of food; and the ability of individuals to make choices and consume culturally acceptable and preferred foods; as well as linking the definition of food security to key health and productivity outcomes. Therefore, is a difficult concept to measure since it deals in very broad terms with the production, distribution and consumption perspective. From the given definition, there are four basic pillars or dimension of food security

In contrast, food insecurity is a situation in which the individuals of the society have neither the physical nor the economic access to the nourishment they need (Reutlinger, 1987). It is also a situation that exists when people lack secure access to sufficient amount of safe and nutritious food required for normal growth and development and active and healthy life or when an individual's consumption falls to less than 80% of the Minimum Recommended daily Allowance (MRA) of caloric intake (WFP, 2014).

Unemployment: is a situation of a population able to work, available for work and actively seeking work It is one of the indicators of measuring the extent of unutilized human resource in the economy at a given area or region in a certain period of time (ILO Department of Statistics, n.d.).

Employee: employees are all those workers who hold the type of job defined as paid employment jobs. Employees with stable contracts are those employees who have had, and continue to have, an explicit (written or oral) or implicit contract of employment, or a succession

of such contracts, with the same employer on a continuous basis time (ILO Department of Statistics, n.d.).

Operator: in the textile and garment sector are those employees assigned to work on the sewing machines, cutting sections as well as other related work either sitting or standing in order to perform their task quickly (Sakthi *et al.*, 2019). The term employee and operator are used interchangeably in the study.

Foreign direct investment: is defined as a cross-border investment by a resident entity in one economy with the objective of obtaining a lasting interest in an enterprise resident in another economy and benefits both the recipient ('host') and the investing ('home') economy by increasing foreign capital, employment creation and increased know-how (OECD, 2008; OECD, 2013). Foreign Direct Investment helps to bridge the gap of capital shortages, deficiency of knowledge/technology, industry management skill and market access existing in the country and make the industry sector competitive. The purpose of attracting FDI is not to substitute local investors rather to help build their capacity and fill their gaps.

Industrial park: The common definition of an industrial park is "a tract of land developed and sub-divided into plots according to a comprehensive plan with the provision of roads, transportation and public utilities, sometimes also with common facilities, for use by a group of manufacturers". It has an integrated promotion due to its different facilities and infrastructures. Industries with different economic activities can act independently and use competitive advantages offered by co-location and centralization of infrastructure and services in a common area. Firms are attracted to industrial parks to derive and create economic benefit from localization economies such as increased ease of communication, access to a suitable labor pool, and facilities designed to fit their needs (Walcott, 2009). Industrial parks offer governments a potentially valuable tool to overcome some of the existing constraints that their economies face in attracting investment.

According to Bonde-Henriksen (1982), the term "industrial parks" is used to cover a broad range of concepts, such as free-trade zones, export processing zones, special economic zones, high-tech zones, free ports, enterprise zones, etc. The large number of terms and concepts associated with industrial parks is, among other reasons, the result of differences in the objectives, functions or forms of these parks, differences in the economic policy terminology of various countries, as

well as the desire of certain industrial parks or programs to differentiate them from the competition.

Urbanization: refers to the population shift from rural to urban areas, the corresponding decrease in the proportion of people living in rural areas, and the ways in which societies adapt to this change. It is a global phenomenon with a widely differing magnitude among regions (Reid, 1998). Urban population in many developing countries is increasing in an increasing rate while the opposite is true of rural population (Crush, 2010). Industrial growth has been contributing to rapid urban growth and driving rural-to-urban migration (WFP, 2014).

2.2 Theoretical literature review

2.2.1 Theory of food entitlement decline (FED)

This theory integrates both supply and demand sides. Until early 1980's researches focused mainly on food availability assuming that aggregate food supply in the country can guarantee food security. But in 1981 the focus was moved to people's inability to access food. Food availability alone cannot be sufficient to guarantee households' food security as *access* is mandatory to purchase those food items in the market. Certain members of a population could be short of food or starving while the region or nation still produces or imports sufficient calories to feed everyone. For example Wollo famine (1972-74) that occurred in Ethiopia was not due to local food availability decline rather it was due to the poor transport services which put a restriction on trade and aid transfer. If a given person or a group of people are lacking the necessary capacity or influence to acquire food, they will be subject to starvation. Thus, abundance in the food market is not ideal to determine food security of households. Components of the entitlement approach provide households access to and control over resources that can be used to meet one's living requirements including food (Sen, 1983; Reutlinger, 1985; Devereux and Maxwell, 2003).

2.2.2 Food access

It refers to the physical, economical, and social access to food. Access is ensured when all households have enough resources to obtain food in sufficient quantity, quality, and diversity for a nutritious diet (USAID, 1992). This depends mainly on the amount of household resources and on prices. Household food access is the ability to obtain sufficient food at

guaranteed quality and quantity and it should be at right place and time and households should have economic freedom or purchasing power to buy adequate and nutritious food. Access to food is realized through trade, own production, job opportunity, and social networks i.e food security is not possible without income security (Koirala and Thapa, 1997)

2.2.3 Theory of political economy

The core concept of this theory is that dysfunctional markets and poorly conceived government policies and strategies lead households to food insecurity. Unlike the public sector, private sector does not have a minimum wage policy which resulted in the very low wage rate that is endangering the food security attainment of households. The justification for this policy is that the government is following market economy i.e the demand and supply will set the price which leaves the employee and the employer to negotiate over wage (Redae, 2013). The problem of the working poor is lower wage associated with structural obstacles that limit poor workers to access better jobs, limited work opportunities, and lack of growth in sectors that absorb unskilled workers (Tobin, 1993).

2.2.4 Industrialization

2.2.4.1 Industry policy in Ethiopia

Industrial policy may be defined as “a strategy that includes a range of implicit or explicit policy instruments selectively focused on specific industrial sectors for the purpose of structural change in line with a broader national vision and strategy” (Oqubay, 2015). Structural transformation involves irreversible or permanent shift of economic activities or people between sectors to bring about more productivity through diversification, fostering domestic linkages and building technological capabilities (Ocampo *et al.*, 2009). Manufacturing has both direct and indirect effect on employment besides the strategic role of exports because they increase international learning, demand and production gains (Pasinetti, 1981; Thirlwall, 2011).

Industrialization in Ethiopia is mainly an post-Second World War phenomenon undergoing through evolution throughout the Imperial era, the Derg military regime (1975–1991), and the post-1991 period. The structural transformation of the economy has remained as the principal challenge. In an effort to focus on integration into global trade and production network the establishment of eco-industrial parks has been initiated (Oqubay, 2016).

2.2.5 Urbanization in Ethiopia

Multitude of problems are caused due to the rapid and fast growth of urbanization in Ethiopia. The major problems of the urban centers include poor housing and high and increasing rate of unemployment, ever-increasing level of poverty and limited coverage or lack of basic services and infrastructure. The already weak capacity of the urban center to offer basic infrastructure and employment has suffered significant (NUPI, 2003). Cities are currently growing rapidly. These urban centers are wrestling with rapid increase in unemployment because of urbanization. People from different parts and societies of the country migrate to urban areas in search of employment opportunities. This in turn created problems of overpopulation and number of poor dwellers in urban areas of our country because the cities have limited capacity to plan and accommodate the growing population by providing formal employment (OECD/ILO, 2019).

Unemployment probability is higher among chronically poor households and likelihood of being poor is higher among those who are not employed (Kedir and McKay, 2005 ; Tolossa, 2010). According to CSA (2020), the total number of unemployed population is 2,018,190 in the country with 18.7% unemployment rate at national urban level. From this total urban unemployment rate the youth unemployment in February 2021 is 23.1%, of which males were 15.9% and females were 28.8% (CSA, 2021). The unemployment rate particularly in SNNPR region is 7% and determinants of youth unemployment in Hawassa city are education level of the youth, credit facilities made available for the youth through microfinance and other financial institutions and a positive attitude towards a given job (Esay, 2020).

In urban areas food accessibility is achieved by purchasing power acquired from employment (Hart, 1973). Besides, insufficient income is one of the primary barriers to accessing adequate quality and quantity of food in urban areas. According to Osmani (2016), unemployment and low returns to labor leads to food insecurity. In addition to that most countries food prices are increasing and with distressing consequences for the food security of the poor and the most vulnerable populations are in the urban centers (Crush, 2010).

2.3. Review of empirical studies

2.3.1 Urban poverty and the working poor

No single definition of poverty has been provided so far because of its multidimensional nature. Many scholars argue that only one aspect of deprivation is measured by income and other dimensions of well-being are overlooked (Tacoli, 2012). While others argue that human welfare is objectively and without bias measured by income (Ravallion, 2011). According to Sen (2004), poverty is seen as deprivation of basic necessities i.e capacity and ability which can be defined as being well nourished, healthy, being able to live longer and literate than just low income. Furthermore the author argues that low income is one of the principal cause of deprivation of capabilities.

The difference between working poverty rates and poverty rates are not significant indicating that employed people are as vulnerable to poverty as anyone else. The urban poor have less access and inadequate provision to infrastructures and functioning services. They live in inadequate shelter with poor quality, insecurity, and crowdedness (Mabogunje, 2005; Desai, 2010). The working poor in Africa represented 57% of the world's working poor in 2018, showing that working poverty in Africa is prevalent and so significant while the employment represented only 14% of the global employment. Moreover only 9% of the global workers lived in low income countries in 2018 while 44% of the world's working poor lived there indicating the appalling situation of the workers.

In all regions of the world youth are more vulnerable to working poverty while women are more vulnerable than men only in Africa. Young workers (aged 15 to 24) are at higher rates in extreme poverty when compared to adults (aged 25 and above) in all regions of the world. In 2018 the youth working poverty rate in the world was close to 14% while the working poverty rate was 7% indicating that youth with job were almost twice as likely to be extremely poor than employed adult. Moreover, when compared to 31% employed adults in Africa, 39% of Africa's youth with job are living in extreme poverty. The working poor is prevalent in Africa and the youth are in distressing situation in terms of quality of earning and quality of employment.

2.3.2 Urban Food Insecurity in the global south

2.3.2.1 Latin America and the Caribbean

Food insecurity, malnutrition are increasingly becoming urban issues, affecting millions of in the Latin America and the Caribbean. Among the determinants associated with higher likelihoods of experiencing food insecurity in Latin America and the Caribbean are low levels of education and limited social capital. So in order to address challenges of food insecurity it is suggested that it is necessary to invest in the education and skills of the food insecure, expand gender-sensitive interventions to address the challenges of food insecurity, and invest to expand social capital (Smith *et al.*, 2017).

2.3.2.2 East Asia

In the poorest households of East Asian countries food is usually the main expenditure. For example those living in the towns Nepal and Cambodia often spend nearly their entire income on food and still not accessing nutritious food. Urban food insecurity is exacerbated by different deprivations such lack of basic infrastructure, services, social protection and healthcare which affect the ability of households to cope with risks. Urban transition can also impact affordability and accessibility of food (Crush, 2016).

Income impacts the food that comes onto one's plate in another way i.e lower income implies a lesser monthly expenditure on food. According to a study in Urban India, apart from income determinants, non-income dimensions food absorption is also affected by lack of access to basic services and infrastructure such as water and sanitation facilities (Athreya *et al.*, 2010). In addition to access, employment status and education level of the household head, household structure (including the gender of the household head), size of the household, dwelling type, migration status, and access to social safety nets are highlighted as impacts to food security (Maitra and Rao, 2015).

Another study in Belanguru, India shows that migrant households are worse off than non-migrant households. Those who migrated from other areas are more food insecure. The study also finds that informal settlements exacerbate food insecurity when compared to the rest of the city (Anand *et al.*, 2019). These findings reveal that food-insecure households in urban centers face

multiple deprivations, and that these could further exacerbate their risk from having insufficient quantity or quality of food.

2.3.2.3 Sub-Saharan Africa

Sub-Saharan Africa (SSA) is facing high rates of urbanization and increasing food insecurity. Food purchase is critical in urban area. However, insufficient income is one of the primary barriers to accessing adequate quality and quantity of food in urban areas. For example, evidence indicates that the urban poor in SSA rely on purchased food for 90% of their calories and spend up to 70% of their income on food (Jayne and Mason 2009; *Frayne et al.*, 2010). According to Crush (2016), in his study in Maputo, he finds that inconsistent access to any of the six “basic necessities” such as food, water, medical care, electricity, cooking fuel and cash income are associated with an increased likelihood of a household being food insecure.

A study by Tuholske *et al.* (2020), on the food security among urban dwellers of Accra, Ghana reveals that their food security status ranges from mildly to severely food insecure showing that households regularly worry about having enough food and, at times, majority do, however, experience regular inability to access “sufficient, safe, and nutritious food to maintain a healthy and active life. This result similar to many other case studies from urban areas in SSA that have also shown high levels of food insecurity. Among the determinant factors for the prevailing food insecurity, higher level of education are associated with fewer experiences food insecurity and it may reduce vulnerability to food insecurity among low and middle-income households. Moreover demographic composition of households plays an important role in determining food security status. Thus, smaller households have a greater likelihood of being food secure. Similar to findings in Bengaluru, India, a study by Crush and Mary (2014), in Msunduzi, South Africa finds that if the household head are women they are worse off because their incomes are lower than the average.

2.3.3 Industrial Parks and Welfare of operators

Even though industrial parks have contributed to ensuring developing country’s economic growth different studies reveal that there are unpleasant effects on the operators from working conditions, food security status, living conditions etc. Low payment and insufficient benefit packages are considered as the root cause of the high turnover at the park resulting in high

operators. According to a study by Essa (2001), 98% of industrial workers' households were food insecure and he finds the scarcity of money to buy food was the main reason for a large percentage of industry workers' households being food insecure. Another study in Bangladesh reveals that garment factory workers are unable to purchase enough food due to lack of money, the respondents sacrificed foods for the sake of their husbands and children. In Cambodia, garment workers had a low purchasing power of approximately \$1.50 USD per day and were unable to reach appropriate dietary diversity, and 31% were underweight and anemic (Eisenbruch, 2017).

In the garment factories of Bangladesh the workers work from morning to overnight to earn more and maintain a decent living but they are living from hand to mouth and they are unable to maintain their other basic needs as the earnings are very low (Sharmin *et al.*, 2020). Similarly in Hawassa industrial park operators work on Sundays and holidays for an overtime payment which is a little more than 1 dollar. The prevalence of excessive overtime to maximize income gradually leads to accidents (Francis, 2017). Furthermore, it is common for operators to faint due to the stressful workload and nutrient-poor foods. Moreover the food and water offered to operators during lunch in the factories are contaminated and endangers their health conditions. This in turn affects their food expenditure as medical expenses take up some portion of their salary. If these operators are not receiving any support from their relatives or families, they are definitely endangered to food insecurity (Mitta, 2019).

Moreover, long working hours that make purchasing fresh food from market impossible. Women in the study seldom cooked and they consumed street foods which increased the expenditure on food (Mitta, 2019). Labor standards promote productivity and economic condition. Fair wages and good working conditions can increase productivity while minimizing turnover in the sector and enables them to progress into an income that will provide a decent living standard. However the wage rate in the textile and garment sector is too low and it is the lowest rate in the world at 26 USD monthly minimum wage following Bangladesh and Myanmar at 95 USD minimum monthly wage. Similarly, monthly wage at the HIP is extremely low compared to similar opportunities elsewhere in the country (Scheel and Kerilyn, 2018). For example, internationally owned flower farms in Ziway, 110 kilometers north of Hawassa, have a slightly higher wages

and the cost of living is significantly lower than in Hawassa even though around 85% of worker income still goes to basic expenses (Mitta, 2019).

According to several studies conducted in the past few years, there are several factors that affects operators/households food security and these are discussed below.

Although Ethiopia is rich in labor force, lack of education affects earning capacity and leads to food insecurity because it hinders individual's participation in well-paying activities. Poverty-induced food insecurity is partly the function of failure to integrate the poor into economic processes due to their labor force characteristics such as lack of education, skill, and other productive assets. Consequently, lack of education is related to reduction of consumption (Etana and Tolossa, 2017).

According to Hiboro *et al.* (2019), on Hawassa's and rental housing, where some operators of HIP live, most residents are "shelter poor" meaning that after paying their rents they become unable to afford non-housing needs. They rank housing as their biggest expenditure. Industrial parks are developed with little housing integration to it. The housing conditions impact the food spending of the operators as the rental prices can take 30-38% of their income, which is already very low when compared with the minimum amount of money required for a decent living. So housing conditions are significantly impacting their economic situation (Jego, 2019).

Majority of HIP operators reside in 'Dato Odahe' and 'Addis Ketema' areas where both areas have their own impacts. Dato Odahe area has a lower rental cost but it can only be shared for two people and the individual share of the rental prices is around (42%). This is due to the comparatively confined spaces and lack of basic infrastructure such as water. The construction material has poor quality and locally available materials and most of the time are made of thatch with mud mix. But the food prices are comparatively cheaper as there are small markets. On the contrary Addis Ketema does not have a local market as that of Dato Odahe, where it is difficult to shop foods with small prices. This makes them to take a taxi to the big market incurring extra costs. However, there is no transportation problem to come from and to go to work. In the case of Dato Odahe area, some operators walk to and from work as it is not very far from the park. The operators share the rental houses with from two to four people so that they can offset the high rental prices. Informal settlements residents pay a lot of money for basic services than those residing in formal settlements. This results in an additional burden on low-income residents

which could have been spent on many other basic expenses (Jego, 2019). Consequently high housing expenditure minimizes food expenditures and affects food security. In order to improve this condition, IPDC has been intensively working with enterprises and four firms and they are currently undertaking the process of constructing residences for the operators (Girma, 2022).

Moreover, women with children struggle to access decent shelter because they face discrimination by landowners for renting. From the total female operators in HIP the majority are single young women with low income when compared to those who live in pairs. So the marital status of the operators has a significant impact on their income level. For such kind of reasons a number of HIP workers choose an informal settlement neighborhood located at the periphery of the city and alongside Hawassa's rural kebeles that are not within the plan boundary because they are affordable by low-income earning households. However informal settlement residents are subject to more basic service payments as utilities and services are not provided by the municipality unlike the formal settlements so it creates financial burden and minimizes their expenditures on other non-housing expenses. Disruption of electric and water supplies is very common in these settlements. In addition distance from factory site, shortage of adequate public transport along with street lighting makes it costly and unsafe for women operators of HIP to travel at night after late hour shift works (Hassan et al., 2020). Inconvenient housing conditions reflect poor facilities such as limited space, access to sanitation which influences their ability to cook and maintain good nutrition (Jego, 2019).

Poverty forces many females in rural areas to migrate to urban areas and take up jobs in garment factories. HIP relies on rural areas for recruitment of its operators which means that the majority of its employees originate from rural areas and have a difficulty to adapt to the new industrial working environment which is totally different from what they know from back home. Due to their cultural backgrounds and the new work ethic they face, their productivity is affected (Oya, 2019). According to Abebe *et al.* (2019), earning levels vary based on the skill value of workers. In addition there is a substantial difference in monthly income of male and female employees. There is a discrimination of pay equity and female operators are paid less than men Building their skill through trainings is essential to increase their productivity and take advantage of the existing abundant labor market (Etana and Tolossa, 2017).

2.4. Literature gap

From the reviewed theoretical and empirical literatures, it is evident that, most of the study focused on working conditions, labor force characteristics, inadequate access and provision of infrastructures of industrial parks in general and Hawassa Industrial Park in particular. But this study has tried to examine the effects of these working conditions, labor characteristics and inadequacy of infrastructures on the operators' food security. It is intended to contribute the knowledge gap regarding to food security and industrial parks.

2.5. Conceptual framework

In light of the empirical reviews presented above, food security is the function of entitlement and endowment which determines access to food. Food security cannot be attained without access to food. In order to address unemployment and enhance food security the government has created massive job opportunity in the industrial park. Although unemployment is one of the constraints of access to food, employment opportunity alone cannot guarantee food security unless decent work is provided. Several factors, which are mentioned in detail in the empirical review, are affecting the operators' food expenditure which has a negative implication on food security. The framework contains different factors that have the potential to determine food security of the operators either positively or negatively. These are socio-economic and demographic factors as well as other factors having either positive or negative influences. Thus this study assesses the effects of the industrial parks on food security of its operators and the relationship of the variables/ risk factors is presented in the diagram below.

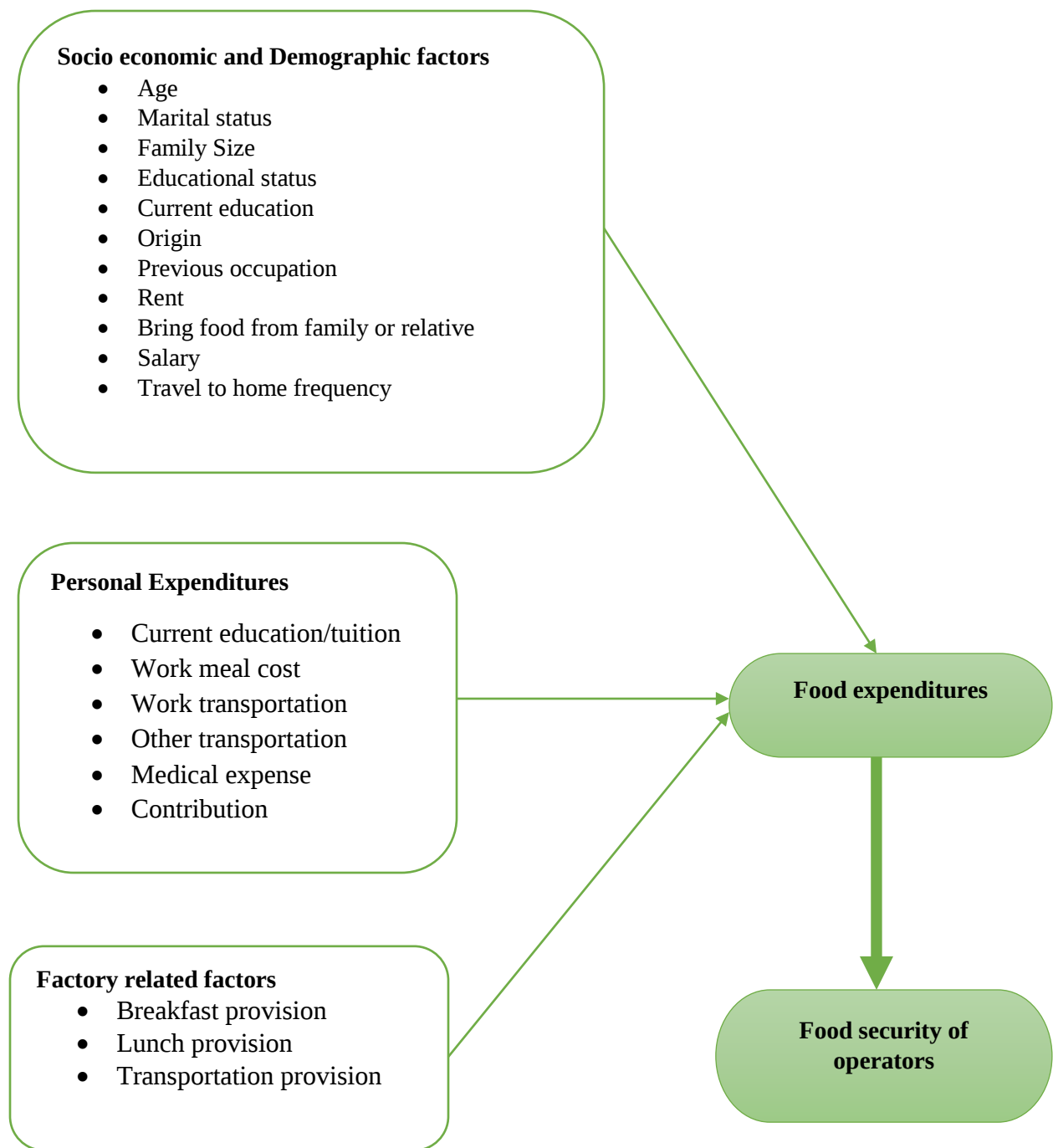


Figure 1: Conceptual framework

(Source: Own construction based on the literature and experience)

CHAPTER THREE: RESEARCH METHODS

3.1. Description of the study area

3.1.1. Location of Hawassa Industrial Park

Hawassa Industry Park is the largest industry park in Africa consisting 56 hangars built by a Chinese construction firm for \$250 million and it housed several international textile companies. Hawassa industrial park is found in the outskirts of the capital city of Sidama Regional State, Hawassa, which is a city on the shores of Lake Hawassa in the Great Rift Valley about 275 Km South of Addis Ababa via Debre Zeit, 130 km east of Sodo, and 75 km north of Dilla. It lies on the Trans-African Highway Cairo-Cape Town, and has a latitude and longitude of 7°3'N 38°28'E 7.050°N 38.467°E Coordinates: 7°3'N 38°28'E 7.050°N 38.467°E and an elevation of 1708 meters above sea level. The city is bounded by the lake in the West, Oromia Region in the North, Wondogenet woreda in the East and Shebedino Woreda in the south.

The Hawassa Industrial Park, in its first phase, was built at about 130 hectares of land with the potential of further development to 400 hectares of land. It is an Eco- Industrial Park with zero liquid discharge (ZLD) facility, a model industrial park in Ethiopia, which is built for garment, apparel and textile companies that fully engage on export only. In total, the park has 37 sheds (22 sheds of 11,000 m², 3 sheds of 5500 m² and the other 3 specialized sheds).

The industry park has massive investments in roads, hydroelectric dams, and other forms of infrastructure. After its first year, 13,000 Ethiopians were employed at the HIP, and 25,000 after the second year. According to Ethiopian Investment Commission it has the capacity of creating job opportunity for 60,000 people when it operates fully (Mains and Mulat, 2021).

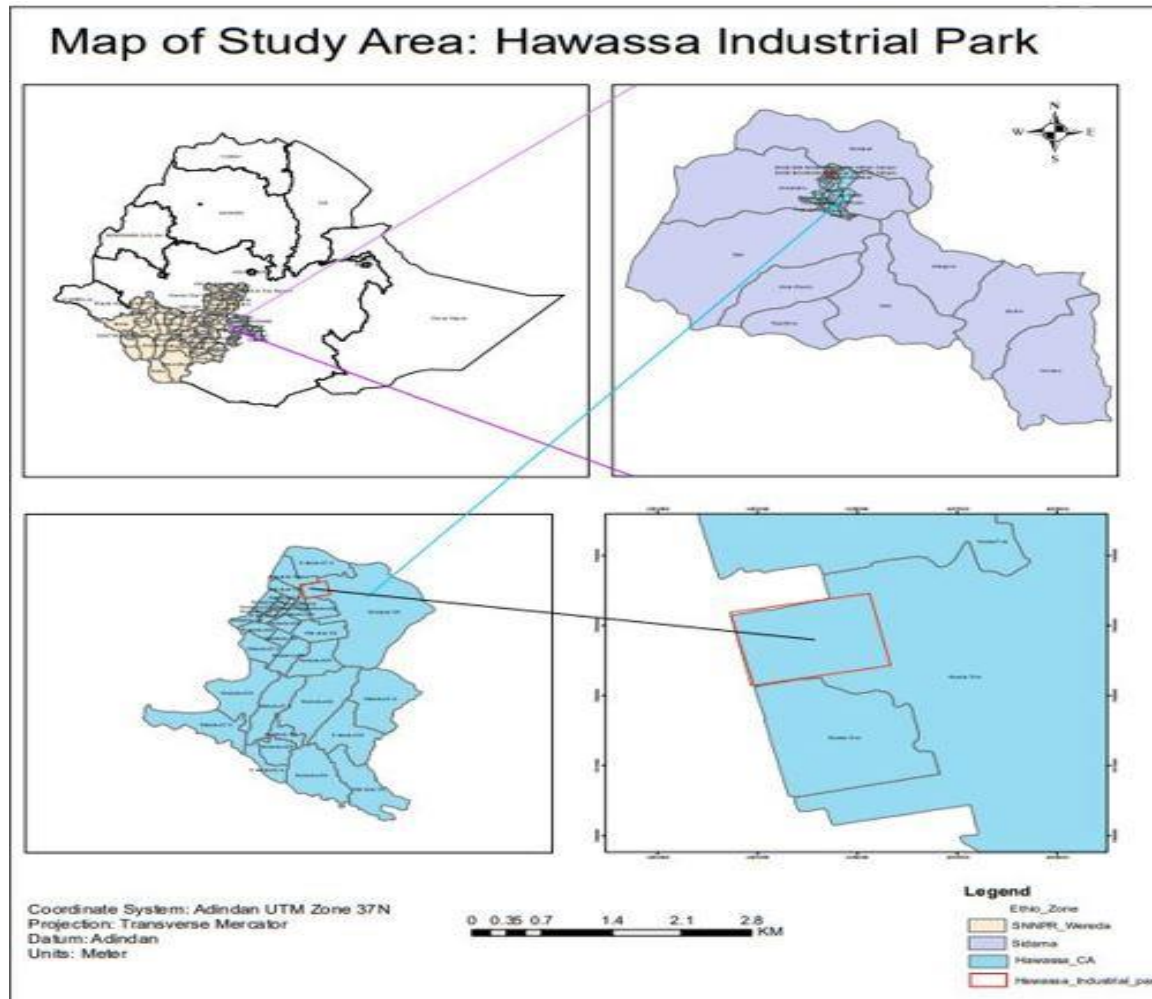


Figure 2: Map of study area

(Source : Ethio-GIS 2015)

3.1.2. Topography and climate

The Hawassa city has a warm temperature and this type of climate can be classified as dry to sub-humid. The city has a long wet season period from March to October with mean monthly rainfall varying from 85 to 133mm with the June to September rainfall contributing 44% of the mean annual precipitation. Its annual temperature ranges from 9°C to 29°C, whereas the mean monthly temperature is 19.7°C (NMA, 2017).

3.1.3. Demographic characteristics and major economic activities

The Ethiopian Central Statistical Agency estimates that the population of Hawassa is 351,469 and it has an annual population growth rate of 4%. The population is relatively young, with 65% under 25 years of age and around 5.5% over 50 years of age (CSA, 2015).

3.2. Research design and approach

The research design for this study was cross-sectional research plan since the study was conducted with fixed time interim through utilizing both qualitative and quantitative approach. The incorporation of quantitative and qualitative data in the form of a mixed methods study has the potential to greatly improve the accuracy of the research's analysis and findings. This was accomplished by using the mixed research design, which was compatible with the survey questions and met the resource restrictions. It also allows for a more in-depth awareness of both enumerators and respondents, and it contributes to being more significant in terms of the effectiveness of the chosen model and data analysis.

3.3. Sampling technique and sample size determination

The study applied a multi-stage sampling technique where both probability and non-probability sampling techniques (purposive and simple random sampling) were combined. In order to meet the objectives of the study the desired category were supposed to be identified with purposive sampling and then from these the respondents were selected with simple random sampling to avoid biases. For primary data collection, in the first stage, Hawassa Industrial Park was purposively selected because first it is the largest industrial park in the country, which solely specializes in the production of textile and apparel products taking 57% of the total industrial park share (Mains and Mulat, 2021; Diriba *et al.*, 2019). Second the sector is labor intensive recruiting a large number of labor and it lacks minimum wage standard. According to Kombo and Tromp (2006), population is a group of individuals, objects and items from which samples are taken for measurement. Depending on the data obtained from Industrial Parks Development Corporation about total population of the study, there are a total of 29,944 employees of all levels. Firms in the HIP were selected using purposive/judgmental sampling method to select a particular characteristic which is the researcher's interest. Accordingly six foreign firms were

selected from a total of 17 foreign firms in the industrial park to get the sample frame. The total number of employees in the selected six foreign factories is 9697.

Then, Yamane (1967) sample size determination (9697 employees) was applied in order to get representative sample size for the study because the population is finite and homogenous. The precision level used is 0.06 because according to Mitta (2019) the population is homogenous, having similarity in age, sex and origin etc. So in Yamane sample size determination precision level from 0.05 up to 0.07 is tolerable. Thus this study applied the average i.e. 0.06.

Thus,

$$n = \frac{N}{1 + Ne^2}$$

Where,

n = the sample size within the range of acceptable error margin

N = the total number of operators in the selected six factories

e = level of precision / acceptable error margin

Therefore:

$$\begin{aligned} n &= 9697 / 1 + 9697 (0.06)^2 \\ &= 270 \end{aligned}$$

Note: the calculated minimum sample size of operators is 270 but due to some missing information in 2 collected questionnaires 268 data were analyzed.

According to Denscombe (2007), stratified proportionate random sampling technique produces the overall population parameters with greater precision and ensures a more representative sample. So stratified random sampling was applied on the employees of the selected six factories based on their positions. Finally study participants were selected using a simple random sampling technique after establishing the proportionally allocated sample size of the six factories as presented below. This sampling ensures the proper representation of the total population and the results will be more reliable and detailed.

Table 1: Proportionate sample size of operators

Factories in HIP	Sampling population size	Percentages of samples	Sample operators
Silver Spark	2393	24.67	67
Everest	2447	25.23	68
Quadrant	318	3.27	9
Sumbiri	1528	15.75	42
Hela	2180	22.48	61
Tal	831	8.56	23
Total	9697	100	270

Source: Computed based on data obtained from IPDC

3.4. Data types, source and collection techniques

All relevant primary and secondary data source were employed in the study. Primary data was collected from household survey through structured questionnaire, key informant interview (KII) and focus group discussion (FGD), while secondary data was collected through intensive desk review of published and unpublished literatures such as books, journals, articles, reports and e-resources to complement the raw data collected from the primary sources.

3.4.1. Household survey

A survey design studies a sample of a population to provide a quantitative or numeric description of attitudes, trends, or opinions so that the researcher makes claims or generalizes about the population (Creswell, 2003). Household survey was conducted on operators to collect accurate comprehensive information. Questionnaire based household survey from 268 sample operators was conducted in the study area. These included diverse socio-demographic questions related to circumstances under which the respondents live, demographic characteristics and cultural factors which impact practices, as well as social and economic changes. HFIAS, FCS and CSI questionnaires were used to collect data about food security status (access component), dietary

diversity and how households manage to cope with a shortfall in food for consumption respectively. This was conducted after obtaining the consent of the respondents as a research ethics. When necessary the questionnaire was requested in their local language (Sidama Language) for the purpose of simplicity and ease of communication between enumerators and respondents.

3.4.2. Focus Group Discussion (FGD)

A focus group discussion (FGD) of diversified composition helps to obtain a rich data (Mack, 2005). It is important complement the information collected through surveys and semi-structured interviews methods. The focus groups consisted of 5 females each. The researcher took women as these operator positions are dominated by female operators and it represents 90% of the total population. The participants were respectfully requested for their consent and time. Topics related to issues of existing challenges, coping mechanisms and the corresponding determinants were discussed. To minimize dominance and biases equal chances were provided to each participant and their opinions, ideas and understandings was documented by the moderator.

3.4.3. Key Informant Interview (KII)

Interview is the most commonly used qualitative technique which can provide rich sources of data on people's experiences, opinions, aspirations and feelings (Kitchin and Tate, 2000). In order to get an in-depth information about a topic without limiting respondents to a set of predetermined responses, semi-structured interviews are suitable. They also enable the researcher to document a wide range of experiences gather important information on primary data about the demographic change, social, economic and environmental problems as the challenges and prospects in achieving food security, coping strategies and resilience in case of shock. The key informant interview involves officials from Industrial Parks Development Corporation (IPDC) and managers at the factories within the park. Key informants were selected based on reliability of the information related to the study (Smith, 2001).

The researcher applied purposive sampling to select experts and key informants for the interview from IPDC and foreign firms within the industry park. The selection of the group of these interviewees is to get the required data regarding any suggestions as well as plans to better the existing conditions.

3.4.4. Secondary data

Regarding secondary sources several different documents such as research works, books, journals, articles and reports related to this particular study has been reviewed to collect relevant data. In addition, documents from various official websites such as; Industrial Parks Development Corporation (IPDC) and Central Statistical Agency (CSA) were also reviewed.

3.5. Technique of data analysis

3.5.1. Analysis of food security

Household Food Insecurity Access Scale (HFIAS)

One of the study objectives is food security status of the operators and studies revealed that these operators earn very low income which can affect their access to food. According to Coates *et al.* (2007), HFIAS is based on the idea that the experience of food insecurity (access) causes predictable reactions and responses that can be captured and quantified through a survey and summarized in a scale. As the study is about the effects of employment opportunities provided it was relevant to measure their food security status applying HFIAS because it measures the access component of food security.

The HFIAS consists of two types of related questions. The first question type is called an occurrence question, which asks whether a specific condition associated with the experience of food insecurity ever occurred during the previous four weeks (30 days). Each occurrence question consists of the stem (timeframe for recall), the body of the question (refers to a specific behavior or attitude), and two response options (0 = no, 1 = yes). The second question type is called a frequency-of-occurrence question, which asks how often a reported condition occurred during the previous four weeks (30 days). Each frequency-of-occurrence question asks the respondent how often the condition reported in the previous occurrence-question happened in the previous four weeks. There are three response options representing a range of frequencies (1 = rarely, 2 = sometimes, 3 = often). The Household Food Insecurity Access category for each household was categorized as food secure, mildly food insecure, moderately food insecure, severely food insecure as explained below. It was applied to assess the food insecurity access category of operators (access component) and analyzed quantitatively. These generic questions are included in the appendix 6.

Food Consumption Score (FCS)

Food Consumption Score (FCS) was applied for this study to obtain data on their dietary diversity with 7 days recall time to complement the data to be obtained from HFIAS. It is a more complicated indicator of a household's food security status, since it considers not only dietary diversity and frequency, but also the relative nutritional importance of different food groups. Food composition score was collected by using standard questionnaire which consists of the following 9 food group for food security with systematic assessment nutrition diversity (1). Maize, maize porridge, rice, sorghum, millet, pasta, bread, and other cereals, cassava, potatoes and sweet potatoes other tubers, plantains (2) Beans, peas, groundnuts and cashew nuts (3) Vegetables, leaves (4) Fruits (5) Beef, goat, poultry, pork, eggs and fish (6) Milk, yogurt and other dairy (7) Sugar and sugar products honey (8) Oils, fats and butter (9) Spices, tea, coffee, salt, fish powder, small amounts of milk for tea (INDDEX, 2018).

To calculate the FCS from these results, the consumption frequencies are summed and multiplied by the standardized food group weight. Then households can be classified as having "poor", "borderline", or "acceptable" food consumption by applying the WFP's recommended cut-offs to the food consumption score (WFP, 2008). According to available literatures, logistic function is most utilized function in food security studies. The estimation equation applied in this study was

$$FCS = a \times f(\text{staple}) + \beta \times f(\text{pulse}) + \gamma \times f(\text{vegetables}) + \gamma \times f(\text{fruit}) + \delta \times f(\text{animal}) + \varepsilon \times f(\text{sugar}) + \delta \times f(\text{dairy}) + \varepsilon \times f(\text{oil})$$

Where FCS= food consumption score

f = food consumption frequencies (the number of days that each food group was consumed in the last seven days)

$a, \beta, \gamma, \dots$ = nutritional value/ weight of each food group

Accordingly the range of the cut-off point is as 0 -28 poor, 28.5-42 Borderline food secured, >42 Acceptable.

Coping Strategy Index (CSI)

It is household food security indicator which correlates well with more complex measures of food security. It is a simple numeric score resulting from a series of questions about how households manage to cope with a shortfall in food for consumption. The CSI was developed as a context-specific indicator of food insecurity that counts up and weighs coping behaviors at the household level. CSI tool could be used to track the impacts of long-term interventions such as development projects and programs on household food security by ensuring that short-term influences such as seasonality are factored out of the analysis (Maxwell *et al.*, 2008).

3.6.2. Method of descriptive and inferential statistics analysis

In descriptive statistics, percentage, mean, minimum, maximum were applied for summary of the statistics and to explore basic information. In addition to these, inferential statistical methods such as chi-square test and f-test, were applied to make inference about significance of relationships within variables using Stata version 16.0.

Chi- square test

The chi-square test of association is applied to make a conclusion about the association or independence between two categorical variables. Dummy and categorical variables such as marital status, origin, previous occupation and so on were tested by chi-square statistics (McDonald, 2014).

$$X^2 = \sum_{i=1}^n \frac{(O - E)^2}{E}$$

Where,

O =observed value

E =expected value

F-test (ANOVA)

The one-way analysis of variance (ANOVA) is used to determine whether there are any statistically significant differences between the means of two or more independent (unrelated) groups. In this study the one-way ANOVA was used to do the analysis of significance of age, number of children, educational status, park experience, factory experience , salary, contribution ,rent, number of people sharing rent, work meal cost, work transportation, other transportation ,travel frequency, medical, saving, subsidizing family, subsidy from family and tuition among different food security groups. The equation to compute f-test is as follows

$$F_c = \frac{GSS / c - 1}{WSS / n - c}$$

Where,

GSS =group sum of square (the sum of the deviation of each group mean from the grand mean)

WSS= within sum of square (the sum of the deviation of each observation from its respective group mean).

If F calculated is greater than F table we reject the null hypothesis that all mean values of a variable are equal in all groups.

Method of data analysis for FGD

Regarding data analysis from FGD, the collected data was based on classification and categorization of ideas forwarded on the thematic areas of food security, coping strategy, socio-demographic characteristics and socio-economic factors. The findings of FGD were used to supplement the discussion of results from operators of Hawassa Industrial Park

3.5.3. Econometric analysis

Econometric analysis was employed to analyze the determinants of food security status of operators in the industrial park. To achieve the second specific objective, the dependent and independent variables were identified and explained along with computational model specifications. The specific analysis method is presented as follows (Maxwell *et al.*, 2008)

3.5.3.1 Ordered Logistic Regression Model

This model is selected because both the results of food security status using household food insecurity access scale and food consumption score are categorical and ordinal in nature so they fit into this model. Ordered logistic regression model was applied to econometrically identify demographic and socioeconomic factors affecting household level of food security. Ordinal and categorical variables were analyzed using this model (Long and Freese, 2003). In ordered logistic regression analysis, the response variable is categorized into more than two having natural order or rank. It is applied when a dependent variable has more than two categories and the values of each category has a meaningful sequential order where a value is indeed higher than the previous one.

Suppose that Y is an ordinal dependent variable with (c) categories, and $pr(y \leq j)$ denotes the probability that the response on (Y) falls in category (j) or below (i.e., in category 1, 2... or j). This is called a cumulative probability. It equals the sum of the probabilities in category j and below:

$$pr(y \leq j) = pr(y = 1) + (pr(y = 2) + \dots pr(y = j))$$

A category (c) and dependent (Y) variable has cumulative probabilities (c) : $pr(y \leq 1)$, $pr(y \leq 2)$, ..., $pr(y \leq c)$. The final cumulative probability uses the entire scale; as a consequence, therefore, $pr(y \leq c) = 1$. The order of forming the final cumulative probabilities reflects the ordering of the dependent variable scale, and those probabilities themselves satisfy:

$$pr(y \leq 1) \leq pr(y \leq 2) \leq \dots \leq pr(y \leq c) = 1$$

In an ordered logit model, an underlying probability score for an observation of being in the i^{th} response category is estimated as a linear function of the independent variables and a set of cut points. The probability of observing response category i corresponds to the probability that the estimated linear function, plus random error, is within the range of the cut points estimated for that response (Long and Freese, 2003).

$$pr(\text{Response category for the } j^{th} \text{ outcome} = i) = pr(k_{i-1} < b_1x_{1j} + b_2x_{2j} + b_kx_{kj} + u_j \leq k_j)$$

It is necessary to estimate the coefficients $b_1, b_2, \dots, b_k$, along with cut points $k_1, k_2, k_3, \dots, k_{i-1}$, where (i) is the number of possible response categories of the dependent variable. The coefficients and cut points are estimated using maximum likelihood.

In HFIAS the outcomes are categorical having 3 a sequential order where the values have different values in an increasing order. They are categorized into the following orders :-food secure, mildly food insecure, moderately food insecure, severely food insecure. Given the value

of $Z_i = \sum_{k=1}^k \beta_k X_k$ the respective probabilities of the groups from the regression equation could be computed as follows;

$$P(y = fs) = \frac{1}{1 + \exp(Z_i - k_1)}$$

$$P(y = mfs) = \frac{1}{1 + \exp(Z_i - k_2)} - \frac{1}{1 + \exp(Z_i - k_1)}$$

$$P(y = mfs) = 1 - \frac{1}{1 + \exp(Z_i - k_2)}$$

3.6. Definition of variable

3.6.1. Dependent variable

Dependent Variable of the model: The dependent variable for analysis was operators' food security status measured by household food insecurity access scale and food consumption score.

3.6.2. Independent variables

The independent variables of the model are those variables that were expected to have relationship with the food security status of the operators and the determinants of the food security status. These variables stand alone and are not changed by other change in dependent variables. These independent variables were identified based on reviewing different literatures.

Age of the employee (RAGE): A continuous variable measured in years. Age can have a negative or positive relationship with dependent variable. In this study context the minimum age

for employment is 18 and neither forced labor nor is child labor carried out in the formal textile industry (Francis, 2017).

Marital Status (MARITAL): is one's situation with regard to whether one is single, married, separated, divorced, or widowed single households have low economic status when compared to those who live in pairs. So the marital status of the employees is expected to have a significant impact on their economic status (Hassan *et al.*, 2020).

Family size(FAMSIZ): It is the total number of people living in the household working for and dependent on household for their living and it is expected to have a negative impact as the number increases because demographic composition of households plays an important role in determining food security status (Tuholske *et al.*, 2020).

Origin(ORIGIN): It indicates if operators are from city or from the rural area. This shows whether they need to rent residences to work in the industrial parks or not. 90% of these workers came from rural areas and small towns surrounding Hawassa (Mains and Mulat, 2021). Migrating from another town increases the probability of food insecurity (Anand *et al.*, 2019).

Educational status (PRVOCC): It is a continuous variable, the year of education in grade maintained by the operators. Education is vital to adopt the new technology and the working environment. Moreover, higher level of education are associated with fewer experiences food insecurity (Tuholske *et al.*, 2020).

Current education (EDUCURR):It is whether the employee is attending an educational institution or not. It is a dummy variable that will take the value one if the employee attends an educational institution and zero otherwise.

Previous occupation (PRVOCC): It is a categorical variable and it is the previous work they were working before they got the employment opportunity in the industry park.

Rent (RENT): It is a continuous variable and it is the amount of money the respondents pay for house rent. The HIP workers live in rental houses paying from 30 % to 38 % of their income which makes it borderline affordable (Jego, 2019).

Contribution (CONTR): It is the amount of money the operators contribute for social events such as weddings, funerals etc. which can affect their food expenditure.

Travel to hometown frequency (TRVFR): It is a continuous variable and it is the number of times the operators travel to their hometown.

Bring food from family or relative (BRFF): It is a dummy variable which takes the value one if the operators bring food from family or relatives and zero otherwise.

Park experience (PAREXP): It is the number of years they have been working in the textile and garment sector. This is expected to affect their skill which in turn affects their earning capacity (Abebe *et al.*, 2019).

Factory experience (FACEXP): It is the number of years they have been working in the factory. Similarly, their work experience in the factory can advance their skills and tends to increase their income (Abebe *et al.*, 2019).

Subsidizing family (SUBTFAM): It is a continuous variable and it is the amount of money the employee sends to their family back home.

Subsidy from family (SUBFFAM): It is a continuous variable and it is the financial support the operators receive from their families

Work meal cost (WRKMC): It is a continuous variable and it is the amount of money they spend for purchasing lunch during their stay at work.

Work transportation cost (WRKTR): It is the amount of money they spend for transportation purposes to go and come back from work. This cost is not affordable by the operators as it takes a significant share of their salary (Oya, 2019).

Medical expense (MEDEXS): It is a continuous variable which is the amount of money they spend for medical expenses. Employees' health is usually endangered due to the contaminated food they are served during lunch which can affect their medical expenses (Mitta, 2019).

Other transportation (OTHTR): It is a continuous variable and it is the amount of money they spend for transportation purposes such as going to hometown or travel within the city.

Tuition (TUIEFEE): It is a continuous variable and it is the amount of money they pay for attending educational institutions.

Breakfast provision by factory (BRKPROV): It is a dummy variable which takes the value one if the operators are provided breakfast and zero otherwise. Some factories provide breakfast to their operators as an additional benefit (Beatrice *et al.*, 2019).

Lunch provision by factory (LUNPROV): It is a dummy variable which takes the value one if the operators are provided lunch and zero otherwise. Many firms provide lunch service to their operators as an additional benefit. (Beatrice *et al.*, 2019).

Transportation provision by factory (TRNSPROV): It is a dummy variable which takes the value one if the operators are provided transportation services and zero otherwise. Some factories provide transportation service to their operators as an additional benefit (Beatrice *et al.*, 2019).

The summary of the above description of variables coupled with their expected signs to food security status and dietary diversity is presented in the following table.

Table 2: Summary of explanatory variables, their measurement and expected sign

Variables	Nature of variables	Unit of measurements	Expected sign to food security
HFIAS	Household Food insecurity Access scale	Scale (1=food secure, 2 mildly food insecure, 3 moderately food insecure)	Expected sign to food security
FCS	Scale and measured food insecurity	Scale (1=poor, 2 border line , 3 acceptable)	
Age of the employee	Continuous	Years	-
Marital Status	Dummy	0=married 1= single	+/-
Family size	Continuous	Number	-
Origin	Dummy	0=other 1=Hawassa	+/-
Educational status	Dummy	Year of education	+
Current education	Dummy	0=non-student 1=student	+/-
Previous occupation	Dummy	1=unemployed 2=Government emp.3=student 4=private work	+/-
Rent	Continuous	Number	-

Contribution	Continuous	Number	-
Travel to hometown frequency	Continuous	Number	+
Park experience	Continuous	Number	+
Factory experience	Continuous	Number	+
Salary	Continuous	Number	+
Subsidizing family	Continuous	Number	-
Subsidy from family	Continuous	Number	+
Work meal cost	Continuous	Number	-
Work transportation cost	Continuous	Number	-
Other transportation	Continuous	Number	-
Medical cost	Continuous	Number	-
Tuition	Continuous	Number	-
Breakfast provision by factory	Dummy	0=not provided 1= provided	+
Lunch provision by factory	Dummy	0= not provided 1= provided	+
Transportation service provided by factory	Dummy	0=not provided 1= provided	+

CHAPTER FOUR: RESULT AND DISCUSSIONS

Introduction

This chapter presents the main results and discussions of the study. It is divided into four sub-sections. The first subsection describes the socioeconomic and demographic characteristics of the sample respondents with respect to identified explanatory variables using descriptive and inferential statistics notably, F-test (ANOVA) and chi-square. The second subsection presents the operators' food security status assessed using household food insecurity access scale (HFIAS) and food consumption score (FCS). The third subsection presents determinants of food security using ordered logistic regression and the coping strategies of food insecure operators. The final section presents the result of Focus Group Discussion (FGD) and Key Informant Interview (KII) to substantiate results obtained by regression, inferential and descriptive approaches.

4.1 Socio-economic and demographic characteristics of respondents

This subsection describes the socio-economic and demographic characteristics of the operators based on the most important attributes such as age, marital status, educational status, number of children, origin, previous occupation, park and factory experience, salary, provision of breakfast, lunch and transportation services by the factory, subsidy from family, subsidizing one's family which were assumed to have either positive or negative influence on food security status and dietary diversity of the operators. The chi-square test was used to determine the significance of potential discrete (dummy) explanatory variables of food secure, mildly food insecure and moderately food insecure operators, and the F-test was used to determine the significance of the mean value of continuous variables of the three groups of food secure, mildly food insecure and moderately food insecure operators.

The socio economic characteristics of operators who have fallen into different food insecurity statuses have been scrutinized. The results have revealed that the average age of respondents is 23.4 years with a maximum and minimum ages of 18 and 33, respectively. The mean ages of food secure, mildly food insecure and moderately food secure operators are 23.16, 23.41 and 23.76, respectively. The mean variation has been found out to be statistically insignificant with p-value of 0.65, suggesting that there is insignificant difference among the mean age of the

respondents across different food security statuses. The number of children of the respondents has a minimum and maximum value of 0 and 1 respectively while mean value for food secure, mildly food insecure and moderately food insecure operators was 0.02, 0.033 and 0.076 respectively with no statistical significance among the three food security groups with p value of 0.604. The results further revealed that the mean value of the educational status of food secure, mildly food secure and moderately food secure operators was 10.97, 10.86 and 11.07 respectively. In addition, the mean difference was found to be statistically insignificant with p-value of 0.756.

The mean industrial park experience of the operators for food secure, mildly food insecure and moderately food insecure was 1.96, 2.24 and 2.38 years respectively with minimum and maximum experience of 0.16 and 5 years respectively. The calculated probability implies that there is insignificant mean difference between the operators with different food security statuses at p value of (0.3294). Similarly the mean factory experience of operators of food secure, mildly food insecure and moderately food insecure operators is 1.63 , 1.86 and 2.3 respectively with minimum and maximum experience of 0.08 and 5 years respectively and there is insignificant difference between them.

On the other hand, the mean salary of food secure, mildly food secure and moderately food insecure operators is 1436.79, 1322.15 and 1371.92 respectively with minimum and maximum salary of 900 and 2800 respectively. The p-value implies that there is a significant mean difference between the food security statuses at p value 0.036. Operators with mean salary of 1436.79 are food secure while those with 1322.15 and 1371.92 are mildly and moderately food insecure respectively.

The mean contribution of food secure, mildly food secure and moderately food insecure operators is 42.92, 27.2, 36.92 respectively with minimum and maximum amount of 0 and 300 respectively. The calculated probability implies that there is insignificant mean difference between the contributions of food secure, mildly food insecure and moderately food insecure operators with p value of 0.057.

Similarly the mean rent of food secure, mildly food secure and moderately food insecure operators is 333.33, 379.71 and 378.2 respectively with minimum and maximum values of 0 and 1500 respectively. It was found to be statistically insignificant with p-value of 0.126. Similarly

the mean values for number of people sharing the rented rooms for food secure, mildly food secure and moderately food insecure operators was 2.4 , 2.61 and 2.61 respectively with minimum and maximum values of 0 and 4 respectively. The result shows that there is no statistical significance among them with p-value of 0.287.

Regarding transportation costs respondents spend for going to and coming back from work has a mean of 76.32, 103.91 and 77.69 for food secure, mildly food secure and moderately food insecure operators respectively with minimum and maximum values of 0 and 520 respectively. The result indicates that there is insignificant difference among the work transportation costs of operators with in different food security statuses. The meal costs incurred during work days for food secure, mildly food secure and moderately food insecure operators is 48.55, 27.04 and 88.46 respectively with minimum and maximum values of 0 and 728 respectively. The result shows that there is no statistical significance in their mean values with p-value 0.14.

The mean transportation costs for food secure, mildly food secure and moderately food insecure operators is 76.93, 71.786 and 59.935 respectively with p-value of 0.7208. the result shows that mean values of other transportation costs have no statistical significance difference among the different categories of food security status of operators with minimum and maximum values of 0 and 600 respectively.

The average number of travel to hometown was 5.02, 5.14, and 4.46 for food secure, mildly food secure and moderately food insecure operators respectively with minimum and maximum of 0 and 48 respectively. They have no statistical significance in their mean with p value of 0.928. Similarly mean values of medical costs incurred by respondents was 17.82, 11.7 and 13.46 for food secure, mildly food insecure and moderately food insecure operators respectively with maximum and minimum values of 0 and 300. This implies that the mean values have no significance among different food security groups with p-value of 0.598.

The respondents saving has a minimum and maximum value of 0 and 900 birr respectively. Their mean savings are 46.42, 4.9 and 0.76 for food secure, mildly food secure and moderately food insecure operators respectively showing statistical difference with p-value of 0.001. Operators within food secure category have the highest saving compared to those within mildly and moderately food insecure operators.

Apart from the above mentioned results, the mean value of subsidizing one's family showed statistical difference between different food security status categories with p-value of 0.026. The minimum and maximum values of subsidy to one's family was 0 and 300 respectively while the mean value between food secure, mildly food insecure and moderately food insecure respondents was 2.04, 2.18 and 23.07 respectively. On the other hand, minimum and maximum amount of subsidy received from family is 0 and 2000 respectively. The mean values of subsidy received from family by food secure, mildly food insecure and moderately food insecure respondents was 230.35, 139.69 and 90.06 respectively with no identified statistical difference among the mean values.

Table 3. Demographic and socioeconomic characteristics for continuous variables by food security status

Variables	Mean values			P- value
	Food secure	Mildly food insecure	Moderately food insecure	
Age	23.163	23.412	23.769	0.6503
Family size	0.020	0.033	0.076	0.6047
Park experience	1.965	2.245	2.386	0.3294
Factory experience	1.631	1.869	2.309	0.2071
Salary	1436.795	1322.155	1371.923	0.0360**
Contribution	42.924	27.204	36.923	0.0572*
Rent	333.332	379.715	378.204	0.1264
Number of people sharing rent	2.408	2.616	2.615	0.2872
Work meal cost	48.551	27.043	88.461	0.1402
Work transportation	76.326	103.912	77.692	0.3721

Other transportation	76.937	71.786	59.935	0.7208
Travel frequency	5.020	5.145	4.461	0.9284
Medical	17.822	11.706	13.460	0.5988
Saving	46.428	4.902	0.769	0.0012***
Subsidizing family	2.04	2.184	23.076	0.0263**
Subsidy from family	230.355	139.695	90.063	0.1222
Tuition	302.795	247.132	107.692	0.0027***

*Note: ***, **, *, show significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$ respectively*

Source: Own survey result (2022)

The study further carried out chi-square tests for dummy and categorical variables in order to substantiate possible difference between food secure, mildly food insecure and moderately food insecure respondents.

According to the marital status report of the study out of the total respondents single and married comprise 94.78% and 5.22 % respectively. The majority of the respondents in the sample are single while only few of them are married. Among the respondents 93.87 %, 95.15% and 92.3% of single respondents were food secure, mildly food secure and moderately food insecure respectively while 6.13%, 4.85% and 7.69% of married respondents are food secure, mildly food secure and moderately food insecure respectively. The chi-square result indicated that there is no variation between food secure, mildly food insecure and moderately food insecure operators with p-value of 0.862.

Origin is also another factor under consideration. Among the total respondents 93.28% of them are from rural areas while only 6.72 % of them are originating from Hawassa city. From the respondents originating from rural areas 87.75%, 94.66% and 92.3% are food secure, mildly food secure and moderately food insecure respectively while among those respondents originating from Hawassa city 12.24%, 5.33% and 7.69% of them are food secure, mildly food secure and moderately food insecure respectively. Based on this, the chi-square test shows that, there was statistical significance difference between the different food security groups.

Previous occupation is their occupation prior to working in the industry park and it is categorized in to unemployed, government job, student, private job and farming. Among those who were not employed 6.12%, 6.80% and 23.08% are food secure, mildly food secure and moderately food insecure respectively. From those engaged in government job 2.04%, 0.97%, 0% are food secure, mildly food secure and moderately food insecure respectively while those engaged in private work are 2.04% , 4.37% , and 0% food secure, mildly food secure and moderately food insecure respectively. On the other hand among respondents who were students prior to working at the industry park 89.8 %, 87.38% and 76.92 % of them are food secure, mildly food secure and moderately food insecure respectively. The chi-square test show that there exists no significance between them with p-value of 0.577.

Other influential variable is their current educational condition i.e. whether they are attending schools or not which incurs additional costs. As indicated below (Table 4), from respondents attending educational institution 77.55%, 69.42% and 30.77% are food secure, mildly food secure and moderately food insecure respectively while among those who do not attend educational institutions 22.45%, 30.58% and 69.23% of them are food secure, mildly food secure and moderately food insecure respectively. The chi- square test for attending educational institution was significant with p-value of 0.005.

The last variable tested by chi-square for assessing food security is bringing food from family. Among those who do not bring food from family 73.47%, 71.84% and 76.92% of them are food secure, mildly food secure and moderately food insecure respectively while among those who bring food from families 26.53%, 28.16% and 23.08% of them are food secure, mildly food secure and moderately food insecure respectively. The chi-square test result indicates that there is insignificant difference between the three groups in terms of bringing food from families with p-value of 0.908.

Table 4. Chi-square distribution of variables by food security status

Variables	Percentage values			Total
	Food secure	Mildly food insecure	Moderately food insecure	Chi-square value
Marital status	Single	93.88	95.15	92.31
	Married	6.12	4.85	7.69
0.862				
Origin	Hawassa	12.24	5.37	7.69
	Other	87.76	94.63	92.31
0.224				
Previous Occupation	Unemployed	6.12	7.28	23.08
	Government job	2.04	0.97	0
	Student	89.80	87.38	76.92
	Private job	2.04	4.37	0
	Farming	0	0.49	0
0.577				
Education	Student	77.55	69.42	30.77
	Non-student	22.45	30.58	69.23
0.005***				
Educational status	8 th	4.08	0.97	0.00
	10 th	48.98	61.65	46.15
	12 th	42.86	32.52	53.85
	Diploma	0.00	0.49	0.00
	Degree	4.08	4.37	0.00
0.475				

Bring food				
from family	Brings food	26.53	28.16	23.08
	Does not bring food	73.47	71.84	76.92
				0.908

*** show significance at $p < 0.01$

Source: Own survey result (2022)

4.2 Measuring Food Security Status of Sampled Household

4.2.1 Household food insecurity access scale (HFIAS) of respondents

The food security status of respondents was measured using household food insecurity access scale (HFIAS) by capturing and quantifying reactions and responses through a survey and summarized in a scale. The results have shown that from a total of 268 operators, 18.28 % of them are food secure , 76.87 % of them are mildly food insecure and 4.85 % of them are moderately food insecure while none of them are severely food insecure. The result is shown in (Table 5). From the focus group discussion it has been learnt that operators' monthly average salary, which is 1345, helps them to access foods but it didn't allow them to access adequate food at any instance. Owing to this, the food security status of operators largely fall between severely food insecure and food secure categories. This signifies that employment opportunities created by industrial parks partly helps the country to combat severe food insecurity.

Table 5. Food security status of respondents

Food Security Status	Frequency	Percentage
Food secure	49	18.28
Mildly food insecure	206	76.87
Moderately food insecure	13	4.85
Total	268	100

Source: Own survey result (2022)

4.2.2. Food Consumption Score (FCS) of the respondents

Apart from HFIAS, further analysis on the food security status of operators have been made using FCS. The variety and frequency of operators' food consumption was captured to identify the food groups consumed over seven days recall period. In practice, food frequency and dietary diversity proxy indicators are in correlation with regard to access and availability of sufficient quality food (Hoddinott and Yohannes, 2002). This helps us to examine the extent to which operators are able to access a variety of food items. The results demonstrate that the food secure respondents with borderline food consumption were 71.43% while those with acceptable food consumption were 28.57%. Mildly food insecure operators with borderline food consumption were 88.35% while those with acceptable food consumption were 11.65%. From moderately food insecure operators 84.62 % of them were with borderline food consumption while 15.38% of them have acceptable food consumption. This finding was in conformity with the study by Eisenbruch (2017).

Table 6. Food Consumption Score of operators

	Food secure		Mildly food insecure		Moderately food insecure		Total	
FCS	Frequency	%	Freq.	%	Freq.	%	Freq.	%
Acceptable	14	28.57%	24	11.65%	2	15.38%	40	14.90%
Borderline	35	71.43%	182	88.35%	11	84.62%	228	85.10%
Total	49	100	206	100	13	100	268	100

Source: Own survey result (2022)

4.3 Econometrics result

4.3.1 Determinants of food security status

The logistic regression model estimation result shows that out of the twenty factors that were expected to determine food security status of the respondents eight variables were found to have a significant effect on the food security status of the respondents. These variables are

origin, salary, breakfast provision, lunch provision, work transportation cost, rent, subsidizing one's family and subsidy from family. These variables were statistically significant at 10%, 5 %, 5%, 10%,5% ,10%, 10%, 10% respectively.

Origin of operators has a negative influence on probability of operators being moderately food insecure at 5% significance level and it has no significance on operators being food secure or mildly food insecure. Thus origin decreases the probability of being moderately food insecure at 0.023. This result is in conformity with the findings of previous study showing that origin can determine the food security status of household (Anand *et al.*, 2019).

Salary has a positive influence on operators being food secure at 5% significance level and it has a positive influence on operators being mildly food insecure and moderately food insecure. Therefore, salary of operators increases the probability of being food insecure while it decreases the probability of being mildly food insecure and moderately food insecure. In the current study, individual's income status was significantly associated with household food insecurity and it is one of the factors affecting food security in urban areas. Individuals with less income are more likely to experience food insecurity and this finding is consistent with previous studies conducted globally including (Acquah *et al.*, 2014; Tadesse Tantu *et al.*, 2017; Akinboade and Adeyefa, 2017).

Breakfast provision by the factory had a positive influence on being food secure, while it showed negative relationship with mildly and moderately food insecure households both at 10% significance level. The result revealed that breakfast provision increased the probability of households being food secure by 0.175, and decreased the probability of operators being mildly and moderately food insecure by 0.150 and 0.025, respectively. This result signifies that breakfast provision by factory improves the food security status of operators. Similarly, Lunch provision by the factory was another factor that negatively influenced the probability of households being mildly food insecure at 10% significance level, while it showed positive effect on food secure operators at 5% significance level and it has no significance on operators being moderately food insecure. Lunch provision by the factory increased the probability of being food secure by 0.135 while it decreased the probability of being mildly food insecure by 0.06. Another benefit package provided by the factories is transportation service. Those operators working in factories without transportation service provision are subject to

transportation costs. Work transportation cost has a negative impact on being food secure at 5% significance while it has a positive impact on being mildly food insecure and moderately food insecure at 10% and 5% significance level respectively. This was also mentioned by the discussants during the focus group discussion that work transportation for those operators residing in many other neighborhoods in the Hawassa city cost them a significant portion of their salary. Those operators living in areas closer to the park usually walk to their work places as a coping mechanism to their shortage of money even though it makes them so exhausted when they get to work. But it is better than spending enormous amount of money on transportation. Others take bajaj, taxi, or public bus to work as their residence is very far from the park. Even though Dato area is closer to the industrial park, those operators originating from rural *kebeles* of Sidama prefer to rent around Chefe because is relatively closer to their hometown so that they can travel with less cost. In addition to that they also prefer to reside in areas where there are operators from similar origin. The other criteria for choosing their residence areas is based on its proximity to the school or college they attend as transportation to their colleges will also cost them a lot of money and aggravate their situation. This implies that the benefit packages such as breakfast, lunch and transport improve food security status of operators.

On the other hand, rent negatively affected the probability of being food secure at 10% significance level while it showed no significance on the probability of being mildly food insecure and moderately food insecure. Rent decreases the probability of being food secure by 0.000. The negative effect of this variable shows that paying rent influences the operators ability to avoid food insecurity. This result signifies the result of a previous study showing that rent takes a large portion of their income and increases their vulnerability (Jego, 2019). This finding is similar to the result of the focus group discussion which was mentioned by the discussants that rent costs are too expensive and the cheapest rent they can find is at the peripheries of the city. This finding is inconformity with previous other studies (Hassan *et al.*, 2020). This will cost them a lot of money for transportation if their factory does not provide a transportation service which is also affecting their food security. It was also discussed that operators share housing with 2 or 3 other operators working with them. This not only minimizes their housing cost but also their food related expenditures as well. They cook their foods together in the same pot so that they will minimize their firewood costs as they usually use only firewood for cooking. Moreover, they may not get their monetary or food subsidies from their families at the same time so they

can survive on each other's subsidy until they receive their own. The other benefit of sharing rooms is that they don't always have to cook food because the factory work is very tiresome they sometimes get exhausted to cook, so they share the cooking responsibility as well. Despite the above mentioned benefits of sharing rent, the houses/ rooms are usually too small to accommodate 4 people.

Subsidizing one's family has a negative effect on operators being food insecure at 10% significance level while it showed positive effect at 10% significance level on both mildly food insecure and moderately food insecure operators. Subsidizing one's family can decrease the probability of being food secure by .001 while it increases the probability of being mildly food insecure and moderately food insecure by .001 and .0003 respectively. On the contrary, receiving subsidy from one's family increases the probability of being food secure by .0001 while it decreases the probability of being mildly food insecure and moderately food insecure by .0001 and .00003 respectively at 10% significance level for each category. It was further elaborated during focus group discussion. Among the coping strategies applied by the respondents receiving subsidy from family or relatives and regularly going to their home towns are mostly adopted by the operators. As their salary is too low they do not have enough amount of money for covering their educational costs which ranges from 320 to 700 ETB so they usually get money from their families or relatives. And some of them who are not able to frequently travel to their hometowns because it is too far, get support in kind such as maize powder, fire wood, *kocho* to help them survive. And the other coping mechanism is frequently travelling to their hometown to get some foods that can get them last the month. Moreover they can consume food items they wouldn't get to eat in their current city.

Table 7: Distribution table for determinants of household food insecurity access scale (HFIAS)

Variables	Food Secure		Mildly food insecure		Moderately food insecure	
	Coef.(Std.Err)	P> z	Coef.(Std.Err)	P> z	Coef.(Std.Err)	P> z
RAGE	.002(.008)	0.726	-.002(.006)	0.726	-.000(.001)	0.727
MARITAL	-.049(.125)	0.692	.040(.108)	0.707	.008(.017)	0.609
FAMSIZ	.016(.061)	0.789	-.012(.047)	0.789	-.003(.014)	0.791

ORIGIN	.036(.069)	0.604	-.027(.053)	0.603	-.008(.016)	0.614
PRVOCC	.025 (.041)	0.542	-.019(.031)	0.536	-.005(.010)	0.571
EDUSTAT	-.001(.013)	0.89	.001(.010)	0.890	.000(.003)	0.891
PAREXP	.004(.024)	0.867	-.003(.018)	0.866	-.000(.005)	0.867
FACEXP	-.037(.022)	0.09*	.029(.017)	0.092**	.008(.006)	0.152
BRKPROV	.175(.075)	0.02**	-.150(.071)	0.036**	-.025(.009)	0.007***
LUNPROV	.135(.033)	0.00**	-.060(.028)	0.035**	-.075(.041)	0.068**
		*				
CONTR	.000(.000)	0.196	-.000(.000)	0.210	-.000(.0001)	0.207
SALARY	.000(.000)	0.007*	-.000(.000)	0.015**	-.000(.000)	0.02**
		**				
RENT	-.000(.000)	0.01**	.000(.000)	0.021**	.000(.000)	0.022**
WRKMC	.000(.000)	0.168	-.000(.000)	0.188	-.000(.000)	0.165
WRKTR	-.000(.000)	0.033*	.000(.000)	0.050*	.000(.000)	0.044**
		*				
OTHTR	.000(.000)	0.738	-.000(.000)	0.738	-.000(.000)	0.739
TRVFR	-.000(.002)	0.728	.000(.002)	0.730	.000(.000)	0.727
MEDEXS	.000(.000)	0.407	-.000(.000)	0.413	-.000(.000)	0.413
SUBTFAM	-.001(.000)	0.02**	.001(.000)	0.030**	.000(.000)	0.044**
SUBFFAM	.000(.000)	0.019*	-.000(.000)	0.033**	-.000(.000)	0.029**
		*				

***, **, *, show significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$ respectively

Source: Own survey result (2022)

4.3.2 Determinants of Food consumption score (FCS)

The logistic regression model estimation result shows that from twenty variables only six of them have significance in determining the dietary diversity of operators. These variables are salary, lunch provision, work transportation, medical expense, subsidy from family and previous occupation

Salary level negatively influences having borderline food consumption score while it positively influences having acceptable food consumption score. The study result shows that salary

decreases the probability of having borderline food consumption score by .0001 while it increases the probability of having acceptable food consumption score by .0001.

Lunch provision by the factory has a negative effect on having borderline food consumption score while it showed positive influence on having acceptable food consumption at 10% significance level. This finding reveals that lunch provision by the factory decreased the probability of households having borderline food consumption by 0.104 and increased the probability of operators having acceptable food consumption by 0.034. This result signifies that lunch provision by factory improves the dietary diversity of operators and it is in conformity with the findings of a study by Makurat *et al.* (2019). Receiving subsidy from family also has a significant effect on dietary diversity. It has a negative effect on having borderline food consumption and decreased the probability of having borderline food consumption by .0001. On the contrary, it has a positive effect on having acceptable food consumption and increases the probability of having acceptable food consumption by .0001.

The other factors that affect dietary diversity are work transportation cost, medical expense and previous occupation. Work transportation cost has a positive effect on having borderline food consumption score and increased the probability of having borderline food consumption by 0.0002. On the contrary it has a negative effect on having acceptable food consumption and decreases the probability of having acceptable food consumption by 0.0002. Similarly previous occupation of operators has negative effect on having acceptable food consumption score while it has a positive effect on having borderline food consumption score. The study result shows that previous occupation increases the probability of having borderline food consumption score by 0.55 while it decreases the probability of having acceptable food consumption score by 0.55. On the contrary, medical expense negatively influences having borderline food consumption score and positively affects having acceptable food consumption score. According to the focus group discussion, the possible explanation is that sick operators are more careful about their diet and consume diversified foods. Moreover, previous occupation has a positive impact on having borderline food consumption while it has a negative influence on having acceptable food consumption score. It increases the probability of having borderline food consumption score by 0.055 while it decreases the probability of having acceptable food consumption score by 0.055.

Table 8: Distribution table for determinants of food consumption score

Variables	Borderline FCS		Acceptable FCS	
	Coef.(Std.Err)	P> z	Coef.(Std.Err)	P> z
RAGE	-.000(.009)	0.936	.000(.009)	0.936
MARITAL	-.005(.070)	0.939	.005(.070)	0.939
FAMSI	.034(.054)	0.530	-.034(.054)	0.530
ORIGIN	.024(.053)	0.655	-.024(.053)	0.655
PRVOCC	.055(.027)	0.041**	-.055(.027)	0.041**
EDUSTAT	-.013(.012)	0.312	.013(.012)	0.312
PAREXP	.024(.027)	0.372	.000(.027)	0.371
FACEXP	.006(.025)	0.788	-.024(.025)	0.788
BRKPROV	-.034(.058)	0.552	-.006(.058)	0.552
LUNPROV	-.104(.050)	0.041**	.034(.050)	0.041**
CONTR	-.000(.000)	0.602	.104(.000)	0.602
SALARY	-.000(.000)	0.001***	.000(.000)	0.001***
RENT	.000(.000)	0.182	-.000(.000)	0.182
WRKMC	-.000(.000)	0.531	.000(.000)	0.530
WRKTR	.000(.000)	0.071*	-.000(.000)	0.071*
OTHTR	-.000(.000)	0.765	.000(.000)	0.765
TRVFR	.003(.003)	0.443	-.003(.003)	0.443
MEDEXS	-.000(.000)	0.018**	.000(.000)	0.018**
SUBTFAM	-.000(.000)	0.265	.000(.000)	0.265

SUBFFAM	-.000(.000)	0.002***	.000(.000)	0.002***
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***, **, *, show significance at $p < 0.01$, $p < 0.05$, and $p < 0.1$ respectively

Source: Own survey result (2022)

4.4 Households' major coping mechanisms to food insecurity:

The study's findings indicated that households in the study area had a number of habits as a coping mechanism during times of food insecurity. Accordingly, 88.8% of the operators limit portion size at meal times while 79.1% of the sampled operators pursued on less preferred foods or less expensive foods as a coping mechanism followed by reducing number of meals eaten in a day (66.8), purchase food on credit (54.9%) and borrowing food from a friend or relative (20.9%).

This indicates that the most adopted coping mechanism is limiting portion size at meal times as large percentage of operators adopt this mechanism followed by relying on less preferred or less expensive foods, reducing number of meals eaten in a day and purchase food on credit while the least adopted coping mechanisms were eating food elsewhere and borrow food from a friend or relative because their own friends or colleagues are in the same situation and as the majority of the operators originate from rural parts of Sidama region their relatives do not live nearby so they cannot consume/borrow food from a relative. This is followed by using up savings. This mechanism is least adopted because very few number of operators save money as they are paid very low. The study further pointed out that begging and skipping entire day without eating are not at all adopted by the operators.

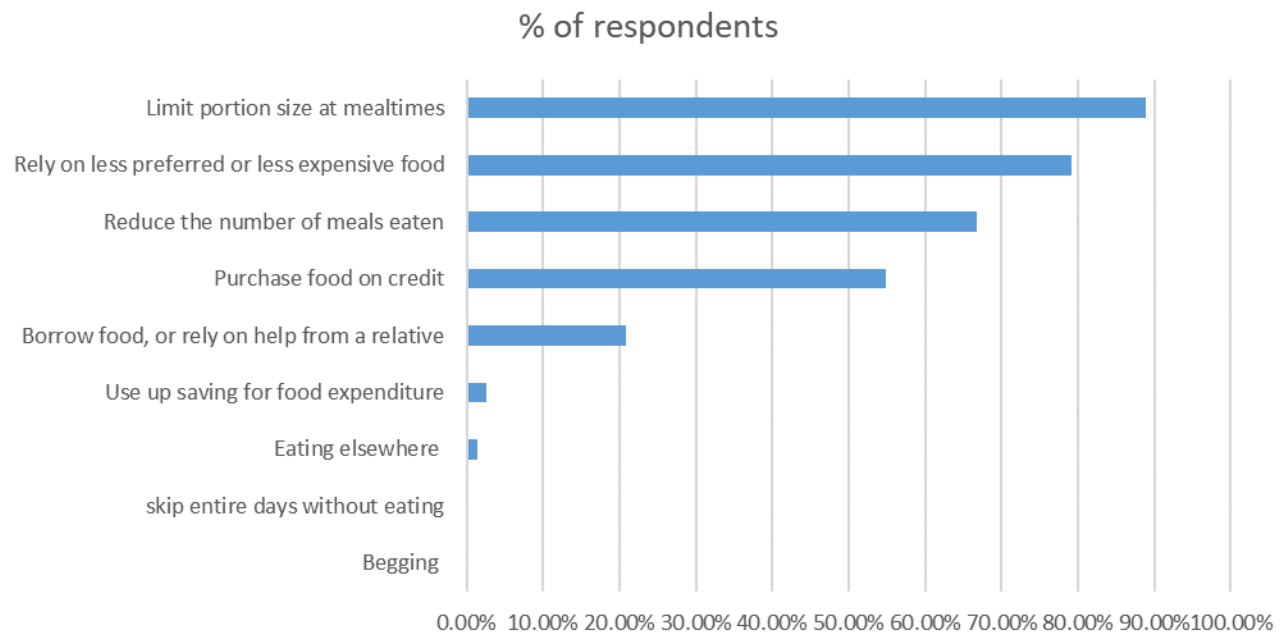


Figure 1. Coping strategies

Source: Own survey result (2022)

4.5 Result of Focus Group Discussion (FGD) and Key Informant (KII) Interview.

A focus group discussion was conducted with two group of operators each consisting 5 women. As discussed during FGD, rent and tuition fee take the largest share of their expenditure. Educational status does not have any contribution to the food security status of the operators as the positions they are working in requires a minimum of 8th grade completion certificate. They will get the required skill for operating the machines in 45 days prior to their employment in the factories within the park. So anyone with a university degree will be hired in the similar position as that of anyone with just 8th grade completion certificate but rather their hiring process will be affected by their performance during the 45days training period. All the operators are well aware that their educational status will not give them a better position or better pay with in the park but they are just hoping that they will get an employment opportunity in government offices or elsewhere. It is very rare to get a better position within the factory as the supervisor position is usually provided to those who graduated with an engineering degree from universities and it is a very competitive. Moreover, this is not possible as the available jobs and job seekers do not match. However they still believe that education is the only way to get out of the park job. Regarding the housing problem faced by the employees', construction of housing was started.

Unfortunately, it could not pass the first phase of construction due to price increase in construction materials. Consequently, the effort that was made to minimize the housing problem was not successful.

The other challenge faced by the operators is regarding food purchase. They purchase food items i.e. perishable vegetables such as '*gomen*', which is consumed on a daily basis, from a nearby markers known as *Kuchi*. Purchasing *gomen* from the nearby market costs more than buying a large amount from the big markets. They cannot purchase a large amount and keep them as the vegetables are easily perishable if not refrigerated which is not affordable at all by any of the operators. In addition these areas have a poor hygiene and the vegetables sold in these markets have a low quality. After work most of them attend night classes without eating any food after leaving from work because it is not affordable by many of the operators to regularly consume snacks on their way to night classes.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary and Conclusions

This study has been conducted in Hawassa Industrial Park, Hawassa, Sidama regional state Ethiopia. The study assessed the effects of employment opportunities created through industrial parks on the food security status of operators. The effects of industrial parks on a household level has not studied so far. This study was conducted therefore to fill the information and literature gaps so that it can be used by academia, the government, local practitioners, and the people. A total of 268 operators from Hawassa Industrial Parks were selected by multi-stage sampling technique from the industrial park. The descriptive statistics results showed that out of the total respondents, 18.28%, 76.87% and 4.85 were food secure, mildly food insecure and moderately food insecure respectively. The food security status of operators largely fall between severely food insecure and food secure categories. This signifies that employment opportunities created by industrial parks partly helps the country to combat severe food insecurity. Moreover, the results demonstrates that the food secure respondents with borderline food consumption were 71.43% while those with acceptable food consumption were 28.57%. Mildly food insecure operators with borderline food consumption were 88.35% while those with acceptable food consumption were 11.65 %. From moderately food insecure operators 84.62 % of them were with borderline food consumption while 15.38% of them have acceptable food consumption.

The f-test result showed that there was a significant difference between operators within different food security statuses in terms of salary and subsidizing one's family. The chi-square test also revealed a significant difference between food secure, mildly food insecure and moderately food insecure operators in terms of origin and educational condition.

Logistic regression model was used to identify factors determining food security status. The logistic regression model estimation result shows that out of the twenty factors that were expected to determine food security status of the respondents, seven variables were found to have a significant effect on the food security status of the respondents. These variables are origin, salary, breakfast provision, lunch provision, work transportation cost, subsidizing one's family and subsidy from family. These variables were statistically significant at 10%, 1%, 5%,

10%, 10%, 10% and 10% respectively. On the other hand, the logistic regression model estimation result for determinants of food consumption score shows that from twenty variables six of them have significance in determining the dietary diversity of operators. These variables are salary, lunch provision, work transportation, medical expense, subsidy from family and previous occupation. Finally, coping strategies of the operators was assessed and the result reveals that the limiting portion size at meal times (88.8%), pursuing on less preferred foods or less expensive foods (79.1%) reducing number of meals eaten in a day (66.8) were the most adopted coping strategies. From the FGD and KII conducted, operators face several challenges that has a negative implication on their food expenditure which actually affects their food security status. Among these identified problems, housing is one of them as it takes a large share of their income followed by tuition which takes a large portion of their salary as well. But the majority of the operators get financial support from their families to pursue their education. The benefits provided by the factories such as breakfast, lunch and transportation provision significantly improves their food security as well as dietary diversity. Moreover it helps them to avoid skipping meals and eating a small portion of meals which has been largely adopted by the operators as a coping mechanism.

5.2 Recommendations

Based on the finding of the study, the following recommendation have been suggested for critical consideration in light of the discussion drawn hereinbefore and concluded above. The recommendations are assumed to give insight for the future policy formulation regarding the industrial policy of Ethiopia, which gives prime attention to industrial parks, that it should be accompanied by other sector policies to ensure the food security of operators. The results of the study recommends the following specific areas of interventions:

- The study finding indicates that salary level has a significant impacts on the respondents as food security is basically dependent on food purchase in urban context. Therefore, in order to improve the existing food insecurity among the operators of the industry park this study recommends that the salary level of the operators needs to be increased so that decent living can be achieved.
- Provision of lunch by factory has showed a positive effect on food security and dietary diversity of operators. Its impact is worthy of consideration to be incorporated in policy interventions as their income is too low to consume lunch all the time. Moreover transportation provision which is adopted by some factories also has a positive impact on food security. Therefore, above all provision of lunch and transportation should be implemented by all factories and it has to be part of the policy.
- Provision of cheap and affordable houses to operators: As it is already indicated in the focus group discussion of the result sub section, rent affects food expenditure which in turn affects their food security. It has also been shown that most workers face a difficulty in accessing decent housing. Thus, provision of cheap and affordable houses to operators will enable to ensure the food security of operators.

References

- Abebe, G./Manie, G./Getahun, T. D. (2019). Baseline Report for the ILO Programme “SIRAYE: Advancing Decent Work and Inclusive Industrialization in Ethiopia. (Summary).
- Acquah, B., Kapunda, S., & Legwegoh, A. (2014). The Dimensions of Urban Food Insecurity in Gaborone, Botswana. *Urban Forum*, 25(2), 217–226.
- Akinboade, O. A., & Adeyefa, S. A. (2017). An Analysis of Variance of Food Security by its Main Determinants Among the Urban Poor in the City of Tshwane, South Africa. *Social Indicators Research*, 137(1), 61–82.
- Anand, S., Jagadeesh, K., Adelina, C., & Koduganti, J. (2019). Urban food insecurity and its determinants: a baseline study of Bengaluru. *Environment and Urbanization*, 31(2), 421–442.
- Athreya, V B, R Rukmani, R V Bhavani, G Anuradha, R Gopinath and A S Velan (2010), Report on the State of Food Security in Urban India, World Food Programme, Perungudi.
- Barrett, P. M./Baumann-Pauly, D. (2019). Made in Ethiopia: Challenges in the Garment Industry’s New Frontier. NYU Stern Center for Business and Human Rights, New York
- Beatrice, G./Damestoy J.-B./Gendt van M. (2019). Sourcing Textiles and Garments in Ethiopia. A new sourcing destination. MVO Netherlands, Utrecht.
- Bonde-Henriksen, Nils,.(1982), Industrial park development: An overview and case study of Myles Standish . University of Rhode Island.
- Bryman, A. (2004). Social Research Methods (2"d ed): Oxford University Press.
- Central Statistical Agency , (2015), Population and Housing Census Report-Country, Central Statistical Agency, Addis Ababa, Ethiopia
- Central Statistical Agency. (2020, October). *Statistical Report On The 2020 URBAN EMPLOYMENT UNEMPLOYMENT SURVEY* (No. 587).
- Central Statistical Agency. (2021, August). *ETHIOPIA 2021 LABOUR FORCE AND MIGRATION SURVEY KEY FINDINGS*.
- Cepheus Research & Analytics (2019). Ethiopia’s Industrial Parks: A Data Pack on Recent Performance.Cepheus Growth Capital Partners, New York.
- Coates, J., Bilinsky, P., & Coates, J. (2007). Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access : Indicator Guide VERSION 3. Washington DC.
- Creswell, J. W. (2003). Research design: Qualitative, quantitative and mixed method approaches (2nd ed): Sage publications, Inc.
- Crush, Jonathan and Bruce Frayne. (2010). “The Invisible Crisis: Urban Food Security in Southern Africa.” Urban Food Security Series No. 1. Queen’s University and AFSUN: Kingston and Cape Town

- Crush, Jonathan and Mary Caesar (2014), “City without choice: urban food insecurity in Msunduzi, South Africa”, *Urban Forum* Vol 26, pages 165–175
- Crush, Jonathan (2016), *Hungry Cities of the Global South*, Hungry Cities Partnership Discussion Paper No 1, Waterloo
- Degefa, Tolossa. (2010), “Some realities of the urban poor and their food security situations: a case study of Berta Gibi and Gemechu Safar in Addis Ababa city, Ethiopia.” *Environment and Urbanization*.
- Desai, R.M. (2010). The political economy of urban poverty in developing countries: Theories, issues, and an agenda for research. (Wolfensohn Center for Development Working Paper, 20). Wolfensohn Center for Development
- Devereux, S, & Maxwell, S. (2003). *Food Insecurity in Sub-Saharan Africa*. University of Natal Press Piemartzburg, South Africa.
- Diriba, M./Ghadai, S. K./Misra, S. N. (2019). Ethiopia as a Newly Emerging Global Textile Centre: A Review. In: *International Journal of Recent Technology and Engineering*, Vol. 7, No. 6
- Eisenbruch, M.(2017). Mass fainting in garment factories in Cambodia. *Transcult. Psychiatry*
- Essay, S. (2020). Determinants of Youth Unemployment: The Case of Hawassa City. *IOSR Journal of Business and Management*, 22(April. 2020).
- Eshete, Z. S., Tsehay Feleke, S., Tadesse, A., Tekeste, A., & Beyene, L. M. (2019). Resource Allocation Across Industrial Sectors, Growth, Poverty, and Income Inequality in Ethiopia: A Macro-Micro Approach.
- Etana, D., & Tolossa, D. (2017). Unemployment and Food Insecurity in Urban Ethiopia. *African Development Review*, 29(1), 56–68.
- Food and Agriculture Organization (FAO). (1996). Rome declaration on world food security and world food summit plan of action
- FAO, IFAD, UNICEF, WFP, & WHO. (2019). *The State of Food Security and Nutrition in the World 2019. Safeguarding against economic slowdowns and downturns*.
- FAO. 2020. Ten years of the Ethiopian Agricultural Transformation Agency. An FAO evaluation of the Agency’s impact on agricultural growth and poverty reduction. Rome.
- Francis, A. (2017). Mapping of the Garment and Textile Industry in Ethiopia. Mondial FNV, Amsterdam.
- Hart, K. (1973). Informal income opportunities and urban employment in Ghana. *The Journal of Modern African Studies*, 11(1), 61–89.
- Hassan, F., Grant, E., & Stevens, S. (2020). Understanding shelter from a gender perspective: the case of Hawassa, Ethiopia. *Environment and Urbanization*, 32(2), 463–480.

- Hirboro, SG, M MBatu and S Aseffa S(2017), “Rental house price determinants and affordability in Hawassa City, Ethiopia”, *Journal of Poverty, Investment and Development* Vol 39
- Hoddinott, J., & Yohannes, Y. (2002). Dietary diversity as a food security indicator
- IFPRI (2017), Global Food Policy Report, International Food Policy Research Institute, Washington, DC.
- ILO (2018). Decent Work Country Programmeme 2018-19. The international Labour Organization, Ethiopia, July 2018.
- ILO Department of Statistics. (n.d.). *Indicator description: Unemployment rate*. ILOSTAT. Retrieved June 10, 2022, from <https://ilostat.ilo.org/resources/concepts-and-definitions/description-unemployment-rate/>
- IMF, Federal Democratic Republic of Ethiopia: the 2019 Article IV Consultation and Requests for Three Year Arrangements Under the Extended Credit Facility and the Extended Fund Facility, IMF Country Report. [online]. Available at: <https://www.imf.org/en/Publications/CR/Issues/2020/01/28/The-FederalDemocratic-Republic-of-Ethiopia-2019-Article-IV-Consultation-and-Requests-for-48987> (2020)
- INDDEX Project (2018), Data Diets: Building Blocks for Diet-Related Food Security Analysis. Tufts University, Boston, MA. Accessed on 10 December 2018.
- Jayne, T. S., & Mason, N. M. (2009). Staple food consumption patterns in urban Zambia: Results from the 2007/2008 urban consumption survey
- Jego, S. T. (2019). Housing Condition of Industrial Parks Workers: The Case of Hawassa Industrial Park. Master’s Thesis. Addis Ababa University, Addis Ababa
- Kitchen, R. & Tate, N. J (2000). *Conducting Research in Human Geography: Theory, Methodology and Practice*. Pearson Education Limited, Harlow.
- Kedir, A. M. and A. McKay (2005), ‘Chronic Poverty in Urban Ethiopia: Panel Data Evidence’, *International Planning Studies*, Vol. 10, No. 1, pp. 49–67.
- Klassen, A.C., Creswell, J., Plano Clark, V.L., Smith, K.C., Meissner, H.I., 2012. Best practices in mixed methods for quality of life research. *Quality of Life Research*, 1-4.
- Koirala, G.P. and G.B. Thapa (1997). Food Security Challenges: Where does Nepal stand?, HMG/N, MOA/Winrock International, Kathmandu, Nepal, p. 41.
- Kombo, D.K. & Tromp, D.L.A. (2006). Proposal and Thesis writed: an introduction. New Delhi: New Age International Publishers
- Long, S. J., & Freese, J. (2003). Regression models for categorical dependent variables using STATA. A Stata Press Publication. STATA Corporation. College Station: TX.
- Mabogunje, A. L. (2005). Global urban poverty research agenda: The African case. In Conference of the Comparative Urban Studies Project of the Woodrow Wilson

- International Centre for Scholars. (Seminar Paper on “Global Urban Poverty: Setting the Research Agenda”). Washington, DC
- Mack, N. (2005). Qualitative research methods: A data collector’s field guide
- Mains, D., & Mulat, R. (2021). The Ethiopian developmental state and struggles over the reproduction of young migrant women’s labor at the Hawassa Industrial Park. *Journal of Eastern African Studies*, 15(3), 359–377.
- Maitra, Chandana and D S Prasada Rao (2015), “Poverty–food security nexus: evidence from a survey of urban slum dwellers in Kolkata”, *World Development* Vol 72, pages 308–325.
- Maxwell, D., Caldwell, R., & Langworthy, M. (2008). Measuring food insecurity: Can an indicator based on localized coping behaviors be used to compare across contexts? *Food Policy*, 33(6), 533–540.
- Makurat, J., Becker, N., Wieringa, F. T., Chamnan, C., & Krawinkel, M. B. (2019). Impact of lunch provision on anthropometry, hemoglobin, and micronutrient status of female Cambodian garment workers: exploratory randomized controlled trial. *BMC Nutrition*, 5(1).
- McDonald J.H. (2014). Handbook of Biological Statistics: Third Edition. University of Delaware. Baltimore, Maryland, U.S.A
- Mahari Redae ‘Employment and Labor Law’ (2013) Teaching Material
- Mitta, G. M. (2019). Labor Rights, Working Conditions, and Workers’ Power in the Emerging Textile and Apparel Industries in Ethiopia: The Case of Hawassa Industrial Park. Working Paper No. 01/2019. Kassel University, Kassel.
- National Urban Planning Institute (NUPI) (2003), Ministry of Federal Affairs, Urban Development Policy Design Project Office
- NPC (National Plan Commission of Ethiopia) (2015). Growth and transformation plan of Ethiopia II. Addis Ababa, Ethiopia
- Ocampo, José A., Codrina Rada, and Lance Taylor (2009). Growth and Policy in Developing Countries: A Structuralist Approach. New York: Columbia University Press.
- OECD. (2008). OECD benchmark definition of foreign direct investment. Retrieved from <http://www.oecd.org/daf/inv/investmentstatisticsandanalysis/40193734.pdf>
- OECD. (2013). OECD factbook 2013: Economic, environmental and social statistics.
- OECD/ILO (2019), "Definitions of informal economy, informal sector and informal employment", in Tackling Vulnerability in the Informal Economy, OECD Publishing, Paris.
- Oqubay, A. (2015). Made in Africa: Industrial Policy in Ethiopia. Oxford University Press, Oxford.

- Osmani, S.R., Ahmed, A., Ahmed, T., Hossain, N., Huq, S., Shahan, A. (2016). Strategic review of food security and nutrition in Bangladesh. World Food Programme.
- Oya, C. (2019). Building an Industrial Workforce in Ethiopia. In: Cheru, F./Cramer, C./Arkebe, O. (2019). The Oxford Handbook of the Ethiopian Economy. Oxford University Press, Oxford
- Pasinetti, Luigi (1981) Structural Change and Economic Growth: A theoretical essay on the dynamics of the wealth of nations. Cambridge: Cambridge University Press.
- Ravallion, M. (2011). On multidimensional indices of poverty (Policy Research Working Paper 5580). Washington DC: The World Bank Development Research Group
- Reid WV (1998). Biodiversity hotspots. Trends Ecol. Evol. 13(7):275- 280
- Reutlinger, S. (1985). Food security and poverty in LDCs. Finance & Development, 22(4), 7–11.
- Sakthi Nagaraj, T., Jeyapaul, R., & Mathiyazhagan, K. (2019). Evaluation of ergonomic working conditions among standing sewing machine operators in Sri Lanka. *International Journal of Industrial Ergonomics*, 70, 70–83.
- Schewel, Kerilyn. Zaway or Dubai: Can Flower Farms in Ethiopia Reduce Migration to the Middle East. Working Paper 55. International Organization for Migration, UN Migration: Middle East.
- Sen, A. (1983). *Poverty and Famines: An Essay on Entitlement and Deprivation* (Reprint ed.). Oxford University Press Geneva, 2018.
- Sen, A. (2004). Capabilities, lists, and public reason: Continuing the conversation. *Feminist Economics*, 10(3), 77–80
- Sadika Sharmin, Noor Aman Bin A. Hamid, and Wan Abdul Manan Bin Wan Muda, “Prevalence and Associated Factors of Food Insecurity among Women Garment Factory Workers in Bangladesh.” *Journal of Food Security*, vol. 7, no. 1 (2019)
- Tacoli, C. (2012). Urbanization, gender and urban poverty: paid work and unpaid carework in the city (p. 48). Human Settlements Group, International Institute for Environment and Development, London WC1X 8NH, UK.
- Tadesse Tantu, A., Demissie Gamebo, T., Kuma Sheno, B., & Yohannis Kabalo, M. (2017). Household food insecurity and associated factors among households in Wolaita Sodo town, 2015. *Agriculture & Food Security*, 6(1).
- Thirlwall, Anthony (2011) Economics of Development, 9th edn. London: Palgrave Macmillan.
- Tobin, J. (1993). Poverty in relation to macroeconomic trends, cycles, and policies
- Tuholske, C., Andam, K. S., Blekking, J., Evans, T., & Caylor, K. (2020). Measures and determinants of urban food security: Evidence from Accra, Ghana. *Intl Food Policy Res Inst.*

- Walcott, S. (2009). Industrial Parks. *International Encyclopedia of Human Geography*, 408–412.
- USAID. (1992). Definition of Food Security, Policy Determination 19. Washington, DC
- World Food Program [WFP]. (2008). Food consumption analysis: Calculation and use of the food consumption score in food security analysis. In United Nations Vulnerability Analysis and Mapping Branch. World Food Programme Rome, Italy.
- WFP(2014)https://documents.wfp.org/stellent/groups/public/documents/communications/wfp284681.pdf?_ga=2.201599569.1905210606.1542154554-895163974.1542154554
- World Bank (2021) World Bank Open Data. World Bank Group, Washington, D.C
- Yamane, T. (1967). *Statistics: An Introductory Analysis*, 2nd Edition. New York, Harper, and Row

Appendixes

Appendix 1: Variables and descriptions

Name of variables Descriptions

Name of variables	Description
RAGE	Age of operators
MARITAL	Marital status
FAMSIZ	Family size
ORIGIN	Origin
PRVOCC	Previous occupation
EDUSTAT	Educational status
EDUCURR	Current education
SALARY	Salary
PAREXP	Park experience
FACEXP	Factory experience
BRKPROV	Breakfast provision
LUNPROV	Lunch provision
CONTR	Contribution
RENT	Rent
WRKMC	Work meal cost
WRKTR	Work transportation
OTHTR	Other transportation
TRVFR	Hometown travel frequency
MEDEXS	Medical expense
BRFF	Bring food from family/relative

SUBTFAM	Subsidy to family
SUBFFAM	Subsidy from family

Appendix 2: Brant test (goodness of fit)

Brant test of parallel regression assumption

	chi2	p>chi2	df
All	22.01	0.284	19
RAGE	0.05	0.828	1
MARITAL	0.05	0.819	1
NCHLD	0.11	0.740	1
ORIGIN	0.23	0.635	1
PRVOCC	6.06	0.014	1
EDUSTAT	0.52	0.472	1
PAREXP	1.48	0.223	1
FACEXP	1.72	0.190	1
BRKPROV	2.83	0.092	1
LUNPROV	0.07	0.786	1
CONTR	2.21	0.137	1
RENT	1.10	0.294	1
WRKMC	3.88	0.049	1
WRKTR	0.75	0.388	1
OTHTR	0.04	0.852	1
TRVFR	0.06	0.811	1
MEDEXS	0.10	0.746	1
SUBTFAM	2.23	0.135	1
SUBFFAM	0.16	0.686	1

A significant test statistic provides evidence that the parallel regression assumption has been violated.

Appendix 3 Multicollinearity test(VIF)

. estat vif

Variable	VIF	1/VIF
PAREXP	3.15	0.317456
FACEXP	2.90	0.345251
FAMSIZ	2.18	0.458091
MARITAL	1.96	0.509026
LUNPROV	1.95	0.512779
OTHTR	1.62	0.617541
WRKMC	1.53	0.651745
TRVFR	1.53	0.654680
SUBFFAM	1.42	0.703950
RENT	1.41	0.708365
BRKPROV	1.29	0.777894
ORIGIN	1.27	0.784779
RAGE	1.27	0.786748
SALARY	1.26	0.792588
PRVOCC	1.24	0.809513
WRKTR	1.22	0.822466
CONTR	1.18	0.848047
MEDEXS	1.15	0.871509
EDUSTAT	1.14	0.880697
SUBTFAM	1.11	0.899093
Mean VIF	1.59	

Appendix 4 Regression estimation result for determinants of food security status (marginal effects)

Ordered logistic regression Number of obs = 268
 Wald chi2(20) = 55.19
 Prob > chi2 = 0.0000
 Log pseudolikelihood = -151.11624 Pseudo R2 = 0.1453

FSS	Coef.	Robust Std. Err.	z	P> z	[95% Conf. Interval]	
RAGE	-.024269	.0695118	-0.35	0.727	-.1605097	.1119717
MARITAL	.3735314	.8439414	0.44	0.658	-1.280563	2.027626
FAMSIZ	-.1393818	.522677	-0.27	0.790	-1.16381	.8850462
ORIGIN	-.3052884	.5866159	-0.52	0.603	-1.455035	.8444577
PRVOCC	-.2117229	.3495457	-0.61	0.545	-.8968198	.4733741
EDUSTAT	.0157645	.1143425	0.14	0.890	-.2083426	.2398717
SALARY	-.0022657	.0007962	-2.85	0.004	-.0038263	-.0007051
PAREXP	-.0342115	.2034707	-0.17	0.866	-.4330067	.3645836
FACEXP	.3205788	.1905676	1.68	0.093	-.0529267	.6940844
BRKPROV	-1.191413	.4249122	-2.80	0.005	-2.024226	-.3586009
LUNPROV	-1.60543	.5359332	-3.00	0.003	-2.65584	-.5550206
CONTR	-.0052385	.0040094	-1.31	0.191	-.0130968	.0026198
RENT	.0033113	.0012453	2.66	0.008	.0008706	.0057521
WRKMC	-.0026857	.001969	-1.36	0.173	-.0065449	.0011735
WRKTR	.0029501	.001383	2.13	0.033	.0002395	.0056607
OTHTR	-.0008506	.0025526	-0.33	0.739	-.0058536	.0041524
TRVFR	.0082931	.0239916	0.35	0.730	-.0387297	.0553158
MEDEXS	-.0031347	.0037762	-0.83	0.406	-.010536	.0042666
SUBTFAM	.0119802	.0051756	2.31	0.021	.0018363	.0221241
SUBFFAM	-.0013418	.000534	-2.51	0.012	-.0023884	-.0002951
/cut1	-5.734357	2.68875			-11.00421	-.4645037
/cut2	-.3580063	2.659476			-5.570483	4.85447

Appendix 5 Regression estimation result for determinants of dietary diversity (marginal effect)

Ordered logistic regression Number of obs = 268
 Wald chi2(20) = 43.18
 Prob > chi2 = 0.0019
 Log pseudolikelihood = -95.181047 Pseudo R2 = 0.1572

FCSctg	Robust		z	P> z	[95% Conf. Interval]	
	Coef.	Std. Err.				
RAGE	.0074804	.0925441	0.08	0.936	-.1739027	.1888635
MARITAL	.0554414	.7354886	0.08	0.940	-1.38609	1.496973
FAMSIZ	-.3450425	.5422382	-0.64	0.525	-1.40781	.7177249
ORIGIN	-.2422456	.5419953	-0.45	0.655	-1.304537	.8200457
PRVOCC	-.5598699	.2716004	-2.06	0.039	-1.092197	-.0275428
EDUSTAT	.1315372	.1322935	0.99	0.320	-.1277533	.3908277
SALARY	.0019618	.0006004	3.27	0.001	.000785	.0031386
PAREXP	-.2450915	.2721857	-0.90	0.368	-.7785657	.2883826
FACEXP	-.0698588	.2600403	-0.27	0.788	-.5795284	.4398107
BRKPROV	.3245697	.5200509	0.62	0.533	-.6947113	1.343851
LUNPROV	1.436588	.9792559	1.47	0.142	-.4827184	3.355894
CONTR	.0018404	.0035747	0.51	0.607	-.0051658	.0088467
RENT	-.0017204	.0013106	-1.31	0.189	-.0042891	.0008482
WRKMC	.0013757	.0022288	0.62	0.537	-.0029927	.0057441
WRKTR	-.002839	.0015382	-1.85	0.065	-.0058537	.0001758
OTHTR	.0007914	.0026483	0.30	0.765	-.0043991	.0059819
TRVFR	-.0305916	.0402305	-0.76	0.447	-.109442	.0482587
MEDEXS	.0087844	.0035871	2.45	0.014	.0017538	.015815
SUBTFAM	.0063628	.0056485	1.13	0.260	-.0047081	.0174337
SUBFFAM	.0017596	.0005264	3.34	0.001	.0007279	.0027913
/cut1	4.444882	3.166737			-1.761808	10.65157

Appendix 6 Household questionnaires

The aim of this study is to assess the effects of Industrial Parks on food security status of operators in Hawassa Industrial Park in Hawassa, Sidama regional state, Ethiopia. Therefore, dear respondent, you are kindly requested to read and complete all the questions patiently and carefully. Your answer will only be used to academic purpose and handled confidentially. You are also free to refuse to give ideas in case you do not feel comfortable and you are free to withdraw anytime. So, please feel freely and put a thick mark and short answer for the following questionnaires.

“I would like to thank you in advance for sharing your time with me!”

General Information

CODE_____ Name of the enumerator_____

Date_____ Factory Name_____

Employee Survey Questionnaire

Part I: Socio-demographic characteristics of the employee

No	Question	Response	Code
1.	Sex	1. Female 2. Male	
2.	Age	In years_____	
3.	Marital status	1. Single 2. Married 3. Divorced 4. Widowed 5. Separated	
4.	Number of children, if any		
5.	Maximum education level		

6.	Before you started working in HIP where did you live?		
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Part II: Information on employment, income and saving

1. What were you doing before you engaged in the current job?

1. ☐ Unemployed 2. ☐ Student 3. ☐ Private employee

4 ☐ Government employee 5 ☐ Other (specify) _____

2. Are you a student currently? 1. Yes 2. No

3. What is your monthly salary? _____

5. Do you save form what you earn per day/week/month?

☐ Yes 2. ☐ No

6.Do you financially support your family/relative

☐ Yes ☐ No

7. If your answer is yes for the above question how much money do you send monthly?

8. Do you get financial support from your family/relative?

☐ Yes ☐ No

9. If your answer is yes for the above question, how much money do you receive monthly?

10. Does your factory provide transportation services?

☐ Yes ☐ No

11. If your answer is no for the above question how much money do you spend for work transportation monthly?_____

12. Does your factory provide lunch services?

☐ Yes ☐ No

13 If your answer is no for the above question how much money do you spend for lunch expenses (during work days) monthly?_____

14. Does your factory provide breakfast services?

☐ Yes ☐ No

15. How much money do you contribute for social events such as weddings, funerals etc

16. How often do you travel to your home town?_____

17. How much money do you spend for travel costs other than going to work?_____

Part II: Household food insecurity questions

Food access information

Household Food Insecurity Access Scale (HFIAS) questions

No	Questions	Responses	Code
1	In the past four weeks, did you worry that your household would not have enough food?	0=No (skip to Q2) 1=Yes	
1.a	How often did this happen?	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	
2.	In the past four weeks, were you or any household member not able to eat the kinds of foods you preferred because of a lack of resources?	0=No (skip to Q3) 1=Yes	
2.a	How often did this happen?	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	
3.	In the past four weeks, did you or any household member have to eat a limited variety of foods due to a lack of resources?	0=No (skip to Q4) 1=Yes	

3.a	How often did this happen?	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	
4.	In the past four weeks, did you or any member have to eat some foods that you really did not want to eat because of lack of resources to obtain other types of food?	0=No (skip to Q5) 1=Yes	
4.a	How often did this happen?	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	
5.	In the past four weeks, did you or any household member have to eat a smaller meal than you felt you needed because there was not enough food?	0=No (skip to Q6) 1=Yes	
5.a	How often did this happen?	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	
6.	In the past four weeks, did you or	0=No (skip to Q7)	

	any other household member have to eat fewer meals in a day because there was not enough food?	1=Yes	
6.a	How often did this happen?	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	
7.	In the past four weeks, was there ever no food to eat of any kind in your household because of lack of resources to get food?	0=No (skip to Q8) 1=Yes	
7.a	How often did this happen?	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	
8.	In the past four weeks, did you or any household member go to sleep at night hungry because there was not enough food?	0=No (skip to Q9) 1=Yes	
8.a	How often did this happen?	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	

9.	In the past four weeks, did you or any household member go a whole day and night without eating anything because there was not enough food?	0=No (questionnaire is finished) 1=Yes	
9.a	How often did this happen?	1=Rarely (once or twice in the past four weeks) 2=Sometimes (three to ten times in the past four weeks) 3=Often (more than ten times in the past four weeks)	

Part III Food Consumption Score (FCS)

No	Food items	Food groups	A	B	FCS
		How many days, in the last 7 days, have you eaten the following food items?	Number of times 0-7	Weight	Food Consumption Score calculation ($A \times B = FCS$)
1	Maize, maize porridge, rice, sorghum, millet, pasta, bread and other cereals, Cassava, potatoes and sweet potatoes, other tubers, plantains	Main staples		2	
2	Beans, Peas, groundnuts and cashew nuts	Pulses		3	
3	Vegetables, leaves	Vegetables		1	
4	Fruits	Fruits		1	
5	Beef, goat, poultry, pork, eggs and fish	Meat and Fish		4	
6	Milk, yogurt and other dairy	Milk		4	
7	Sugar and sugar products, honey	Sugar		0.5	
8	Oils, fats and butter	Oil		0.5	
9	Spices, tea, coffee, salt, fish powder, small amount of milk for tea	Condiments		0	

Part IV Coping Strategy Index(CSI)

In the past seven days if there have been times when you did not have enough food and money to buy food , how many days has your household had to	Frequency: (0-7)	Severity weight	Weight score(Frequency *Weight)
Rely on less preferred or less expensive food			
Borrow food, or rely on help from a relative			
Purchase food on credit			
Use up saving for food expenditure			
Eating elsewhere			
Begging			
Limit portion size at mealtimes			
Reduce the number of meals eaten			
skip entire days without eating			

Checklists for Focus Group Discussion (FGD)

The study aims to obtain essential information about the effects of Industrial Parks on food security of Hawassa Industrial Park operators, Hawassa, Sidama regional state, Ethiopia. Your ideas are valuable and will be held in utmost confidentiality to be used only to analyze this research. If you accept participation in this focus group discussion (FGD), you will be doing so voluntarily. You are also free to refuse to give ideas in case you do not feel comfortable and free to withdraw from the FGD anytime you want. Therefore, your answer will only be used for academic purpose and handled confidentially.

FGD Questions

1. What is the major challenge you have been facing since you started working in the industrial park/factory?
2. What is the housing condition in the area and how do you manage it?
3. How do you cope with food shortage?
4. What will improve your situation and what specific recommendations do you have?

Checklists for Key Informants Interview (KII)

The study aims to obtain essential information about the effects of Industrial Parks on food security of Hawassa Industrial Park operators, Hawassa, Sidama regional state, Ethiopia.

1. What are the current challenges faced by operators of HIP?
2. What has been done so far to better the conditions?
3. How is the government or the private sector planning to tackle this problem?
4. What do you recommend the solutions to improve food security of the operators?