SELINUS UNIVERSITY
OF SCIENCES AND LITERATURE

Exploring the Cost of Undernutrition Among Adolescent Working Women and Its Effect on Wellness and Economic Productivity: The Case of Ethiopian Garment Workers in Industrial Parks

By
Asmelash Rezene Berhane

A DISSERTATION

Presented to the Department of
Scientific Nutrition with Intervention
in Maternal and Infant Nutrition
program at Selinus University

Faculty of Natural Health Science
in fulfillment of the requirements
for the degree of Doctor of Philosophy
in Scientific Nutrition with Intervention in Maternal
and Infant Nutrition

2024

ABSTRACT OF THE DISSERTATION

This formative research presents estimates and sets the context of the health, WASH, Nutrition, Food security and Livelihood situation amongst the garment workers and their practices based on the results of formative research conducted between May and June 202 at three of industrial parks in Hawassa, Bole Lemi and Adama. The research was a cross-sectional survey utilizing quantitative and qualitative methods of data collection.

The current research identified twelve per cent female garment workers are underweight or thin. On the contrary, the prevalence of overweight and obesity (the opposite of thinness) is 11% and 1.4% respectively is quite alarming and one that has passed the current aggregated prevalence for overweight and obesity as 21.0 [20.0-22.0] 0.4 [0.2-0.8] respectably. Furthermore, analysis of the meals provided at the workplace (poor calorie and micronutrient content), an overwhelming micronutrient deficiency as observed from the MDD-W findings, the scarcity of drinking water both at home and at workplace, unhygienic sanitary practices have further exposed them to recurrent illness such as typhoid, urinary tract infection and micronutrient deficiencies. All these factors contributed to high staff turnover and lowered the economic productivity of the companies and that of the country.

This research paper, consequently, provides a review of the nexus between women's empowerment, household food security, the nutrition transition and diet-related health in Ethiopia. The researchers aim to understand whether nutrition at workplace can address the women

wellbeing and their productivity in industrial settings in a similar manner to the way it does in most parts of the world

Keywords: food system, gender, women nutrition in industrial parks

ACKNOWLEDGMENT

My sincere gratitude goes to all who contributed to this dissertation. Special thanks to my advisor, Dr. Andrea Tomeo and Prof. Salvatore Fava, whose mentorship was invaluable. This acknowledgment extends heartfelt thanks to my spouse and three children: Mrs. Hiwot Hailu, Gabriella Asmelash, Joel Asmelash and Maya Asmelash for their constant encouragement and unwavering support. In completing this dissertation, I also humbly acknowledge the divine guidance of God.

Each contributor, whether big or small, has left an indelible mark on this academic and professional journey, and for that, I am truly thankful. This acknowledgment is therefore a token of appreciation to those who stood by me.

DEDICATION

I am dedicating this dissertation to my late father who taught me all about perseverance. Ababa Rezu whom I used to fondly call him was my inspiration to pursue this current academic and professional journey. Ababa Rezu passed away on January 2nd, 2023, and was laid to Eternal rest on January 3rd, 2023. This work is therefore in loving memory of my father who touched the hearts of many and left behind a legacy of love and kindness.

Regardless of the circumstances, my mother, Mrs. Yeshihareg Admasu, whom I affectionately refer to as Emodish, has also been a source of support to me. I want to express my sincere gratitude for everything you have done to improve my life. I pray that the Lord would bless you abundantly!

STATEMENT OF DECLARATION

By my signature below, I declare and affirm that this dissertation is my own work. I have followed all ethical principles of scholarships in preparation, data collection, analysis and completion of this thesis. All scholarly matters that are included in the dissertation have been given recognition through citation. I affirm that I have cited and referenced all sources used in this document. Every effort has been made to avoid plagiarism in the preparation of this doctoral thesis.

This thesis is submitted in fulfillment of the requirement for Doctorate by Research (PhD) of Public Health from Selinus University, College of Natural Health Sciences, and Department of Public Health. I declare that this thesis has not been submitted to any other institutions anywhere for the award of any academic degree, diploma or certificate. Brief quotations from this thesis may be used without special permission provided that accurate and complete acknowledgement of the source is made.

Requests for permission for extended quotations from, or reproduction of, this thesis in whole or in part may be granted by the Head of the Department or all advisers of the dissertation when in his or her judgment the proposed use of the material is in the interest of scholarship and publication. In all other instances, however, permission must be obtained from the author of the dissertation.

Signature: 

Date: 10/21/2024

Table of Contents

Tables and Figures

ABBREVIATIONS AND ACRONYMS

AOR	An Adjusted Odd Ratio
BMI	Body Mass Index
CEO	Chief Executive Officer
CAPI	Computer Assisted Programing for Interviews
CI	Confidence Interval
CSI	Copying Strategy Index
IPDC	Ethiopian Industrial Parks Cooperation
EBF	Exclusive Breastfeeding
FMOH	Federal Ministry of Health
FCS	Food Consumption Score
FIES	Food Insecurity Experience Scale
FAIN	Global Alliance for Improved Nutrition
GNR	Global Nutrition Report
GDP	Gross Domestic Product
GTP	Growth Through Promotion
HR	Human Resource
IP	Industrial Park
ILO	International Labor Organization
KII	Key Informant Interview
KAPB	Knowledge, attitude, practice and behavior
LQAS	Lot quality assurance sampling
MDD	Minimum Diet Diversity
PPP	Public Private Partnership
SBN	Sun Business Network
SIP	Sustainable Investment Promotion
UNICEF	United Nations Children Fund
WASH	Water, Sanitation and Hygiene
WRA	Women of reproductive age
WPN	Workplace Nutrition
WC	Workers Cooperative
WFP	World Food Program
WHO	World Health Organization

DEFINITION OF KEY TERMS

Healthy diets	A healthy diet includes the following: Fruit, vegetables, legumes (e.g. lentils and beans), nuts and whole grains (e.g. unprocessed maize, millet, oats, wheat and brown rice). At least 400 g (i.e. five portions) of fruit and vegetables per day (2), excluding potatoes, sweet potatoes, cassava and other starchy roots.
Knowledge about nutrition	refers to an individual's understanding of nutrition, including the intellectual ability to remember and recall food- and nutrition-related terminology, specific pieces of information and fact
Attitude about nutrition	Attitudes are emotional, motivational, perceptive and cognitive beliefs that positively or negatively influence the behaviour or practice of an individual.
Practice about nutrition	Practices" is defined as the observable actions of an individual that could affect his/her or others' nutrition, such as eating, feeding, washing hands, cooking and selecting foods. For this research we assess: - dietary diversity (quality of the whole diet) - food provided at canteen
Urban Toilet/sanitation use classification	
I. Safely managed	A basic sanitation facility which is not shared with other households and where excreta are safely disposed of in situ or treated off-site.
II. Basic	Flus/pour flush to piped sewer system, septic tank or pit latrine, ventilated improved pit latrine, composting toilet or pit latrine with a slab not shared with other households.
III. Shared	Sanitation facilities of an otherwise acceptable type shared between two or more households.
IV. Unimproved	Pit latrines without a slab or platform, hanging latrines and bucket latrines.
V. Open defecation	Human feces are disposed of in fields, forest, bushes, open bodies of water, beaches or other open spaces or disposed of with solid waste.
Food consumption score	Provision of infants below 6 months old with breast milk and vitamins, minerals, medicines alone, and giving children 6-23 months breast milk as well as solid, semi-solid or soft foods
Copying strategy index	Two meals (feeding 2 times) for breastfed infants 6-8 months old, 3 times for breastfed children 9-23 months old and 4 times for non-breastfed children 6-23 months old
Food Insecurity Experience Scale (FIES)	FIES Is a measure of the prevalence of food insecurity (at moderate and severe levels) in each population. It is a statistical measurement scale like other widely accepted statistical scales designed to measure unobservable traits such as aptitude/intelligence, personality, and a broad range of social, psychological and health-related conditions.
Body Mass Index (BMI)	BMI is a measure for indicating nutritional status in adults. It is defined as a person's weight in kilograms divided by the square of the person's height in metres (kg/m2). BMI was developed as a risk indicator of disease; as BMI increases, so does the risk for some diseases. Some common conditions related to overweight, and obesity include premature death, cardiovascular diseases, high blood pressure, osteoarthritis, some cancers and diabetes

1 Introduction

1.1 Background of Study

Ethiopia has achieved a remarkable economic growth rate of 11per cent per annum in the last 12 years, underpinning of which is the expansion in the agriculture and service sectors. The contribution of industry to Gross Domestic Product (GDP), on the other hand, has remained below 14per cent, which is less than half of the sub-Saharan Africa low-income country average [1, 2]. Notwithstanding remarkable economic growth, the small role played by the industrial sector in the economy calls for industrial park development and expansion as key instruments for attracting investment, promoting technology transfer, export promotion and generating employment; thereby achieving economic transformation. The positive attributes of industrial park development have led Ethiopia to consider this model as a tool to facilitate industrialization [2]. In the implementation of the recently unveiled Ethiopia's ten-year Perspective Plan Second Growth and through the industrial development strategy, there are now thirteen industrial parks and four agro industrial parks providing employment for thousands of workers, many of them will be late adolescent girls, young women and mothers. However, according to [3] there are concerns worldwide about the employment conditions of workers in industries that mass produce for export to the developing economies. One area of concern is the nutrition status of workers and access, affordability and availability of nutritious foods in their work and living place

Despite mounting recognition of the essential role of women's empowerment in household dietary and nutrition changes, the diversity of culture across African countries presents ambiguity as to whether its impact is experienced homogeneously across the continent**.**[1]. This doctoral research paper presents a systematic review of whether healthy and resilient food system,

contributes to nutrition improvement, and consequently promotes economic productivity of recently established industrial parks in Ethiopia. We find that whilst more research needs to be conducted, particularly with improved methodologies that can establish cause–effect relationships, there is consensus among the literature on the link between women's empowerment and some domains of food security and dietary improvement. [2], [3]. This exacerbates the challenge of setting production plans that aim to address those female workers wellbeing and productivity or the question of healthy diets and enabling environment.

Healthy food systems are not just about providing food but ensuring that the food is nutritious and accessible, which can significantly impact women's productivity and economic contributions, especially in industrial settings.[4], [5], [6].

1.2 Statement of the Problem

There are concerns worldwide about the employment conditions of workers in industries that produce mass for export from developing economies. One area of concern is the nutrition status of workers, and the industrial parks provide a real opportunity to address nutrition [1]in the workplace for many, including late adolescents and here is why addressing workers' nutrition is good for the workers, good for factory owners and good for the country.[7], [8] The tough living conditions of garment workers in both Hawassa and Bole Lemi Industrial Parks partly contribute to the poor productivity rates (<40%), low worker retention (approx. 30% remain after 6 months), and high daily absenteeism (10-15%) in the factories. In addition, the workers-management

[1] Health Need Assessment of Hawassa Industrial Park (USAID Private Health Project)

relation, community perception acceptance of factories and workers in the community are adversely affected[2.]

Ethiopia has one of the highest levels of chronic undernutrition in the world, despite significant progress showing a reduction in stunting from 58% in 2000, to 38% in 2016 [9] While still 22% of women are underweight, overweight is rapidly emerging and becoming a national public health issue. It is further estimated that the number of adults with diabetes in Ethiopia will double between 2011 and 2030, from 1.4 million to 2.7 million [10], [11]. The 2016 EDHS tested women aged 15-49, and men aged 15-49 for anemia. One-quarter of women aged 15-49 in Ethiopia are anemic. Comparatively, 15% of men are anemic. There is thus a widespread insufficient intake for micronutrients, while unhealthy dietary components are increasingly entering the diet, especially in the urban areas. The Tufts University Global Dietary Database largely confirms the limited intake of nutritious foods, especially fresh fruits and vegetables. The latest Global Burden of Disease data also show that malnutrition remains the number one risk factor in Ethiopia, while nutrition related factors like Dietary Risks, High Blood Pressure and High Body-Mass Index have all become higher risk factors over the period 2005-2016. Yet, nutrition in the workplace has so far been an overlooked issue in the commitment of Ethiopia to address malnutrition holistically and help implement, learn and adapt a systems' approach that link consumption, markets, processing, packaging, transport, trade and agriculture. Identifying nutrition in the workplace as a missed opportunity, GAIN Ethiopia seeks partnerships and to build strategic alliances with the

[2] Industrial Park Workers Cooperative Program (IPWC), IDH

Ministry of Industry, the Industrial Parks Development Cooperation and other stakeholders to garner the momentum to workplace nutrition agenda and its implementation in the country [3].

1.2.1 Objectives

The overall objective of this research is to understand the Knowledge, Attitude, Practice, and Behavior (KAPB) of the factory workers on nutritious and safe food consumption at the workplace and at home. The findings of this formative research will help to develop evidence-based recommendations on viable workforce nutrition interventions, based on the framework provided by the Workforce Nutrition Alliance, which may include nutrition education, improved access to healthy food at work (or in the work environment), health checks and dietary counselling and breastfeeding at work support programmes.

Specific objective:

i. Assess the food security, nutrition, and livelihoods of workers
ii. Identify risk factors for poor nutrition outcomes and potential food insecurity among workers, including dietary knowledge, attitudes and practices
iii. Identify solutions to respond to nutrition needs and potential food security issues affecting workers via their employers
iv. To assess the health services provided to workers, including diet-based health checks and nutrition counseling provided.
v. To assess the services and policies available to working mothers who may be returning to work after delivery and continuing to breastfeed their young children (maternity leave policies, breastfeeding spaces, breastfeeding breaks, breastfeeding awareness among managers and fellow workers, e.g.)

1.2.2 Key research/study questions

1) Do you have a robust health and nutrition policy or standard operating procedure?
2) Do you think that the food you provide is nutritious?

3) Do you provide culturally appropriate food for the workers?
4) Was there a time when you had to skip a meal because there was not enough money or other resources to get food
5) What are the top 5 diseases affecting most workers?
6) What are the most potentially major technical, logistical and organizational solutions (private sector driven) and the advantages and disadvantages of the various possible improvements? What are most feasible solutions for workers' nutrition considering positive impact expected ease of adoption under current conditions in Ethiopia, economic viability and operational sustainability?

1.3 Literature review

The Ethiopian Growth and Transformation Plan (GTP II) identifies the garment and textile sector as a priority sector to help transform Ethiopia into a middle-income country by 2025. GTP II also prioritizes the establishment of eco-friendly industrial parks to expansion of the programme across the Country, contributing to achieving the vision 2025 [5]. According to the report, more than 200 garment and textile factories are currently operating in the country; the industry has expanded with an average growth rate of 51 percent from 2013 to 2018. Textile and garment products represent 17 per cent of total manufacturing value, and 0.6 per cent of total GDP. According to second phase of Ethiopia's Growth and Transformation Plan (GTP II), the sector is expected to grow by around 40 per cent per year in the next few years. The top three destination countries of the exported textile and apparel products are Germany, the United States and Turkey. Presently, the garment sector employs approximately 62,000 workers nationwide, representing 17.5% of the entire manufacturing labour force. Most workers in the industry are women. For example, women make up 60% of all workers in the cutting stage of production, while 85-90% of all workers in the sewing stage of production are female [5].

According to [2], eleven government-built industrial parks are currently in operation: Mekelle, Dire Dawa, Kombolcha, Debre-birhan, Jimma, Bahirdar, Afar, Aysha, Adama, Bole Lemi, and Kilinto. They all focus on the garment and textile sector except for Adama and Kilinto Industrial Parks, which also incorporates investments in the machinery, pharmaceutical and equipment sectors. Collectively these industrial parks have created 45,000 jobs for Ethiopians primarily aged between 18 to 28 years. According to a survey conducted by [5], the sector provides formal jobs primarily for first-time and young job seekers. An additional six government-planned industrial parks are also in development covering a range of sectors including garment and textiles, heavy industry, food processing, vehicle assembly, paper, pharmaceuticals and chemicals.

Bole Lemi Phase I (covering 156 hectares) is the first IP operating under the IP development strategy. It was established in 2012 with the help of a World Bank loan and started its operations in 2014. It now consists of some 20 pre-erected factories (of 185,000 square meters of factory space) rented-out to more than 10 foreign-owned manufacturing companies producing and exporting leather and apparel goods. Currently, only eight of these companies are operational [1]. In Hawssa IP, 22 textile / apparel firms have invested in the site (19 currently in operation3) have employed approximately 30,000 workers, of which 95% are women aged between 18 and 35 years of age. Once HIP is at full capacity, it is expected to employ up to 60,000 workers and the government estimates that HIP at full capacity could generate up to USD 1 billion in exports annually. Adama Industrial Park (120 hectares) is in Adama. It is 74 km from Addis Ababa. It has started operations in October 2020, with 19 factory sheds already rented out to different Investors from Japan, China & Ethiopia. Currently, only three have resumed operations. Adama IP

[3] Principal Investigator's first sensitization field mission report compiled for Hawassa Industrial Park

specializes in Machinery, Apparel, and Garment, 100% exportable products and sheds are fully occupied [2]

Recent data from Industrial Parks Development Corporation (IPDC) referred in [5] shows that Industrial parks created employment opportunities for More than 75,000 workers, and of these 90% are women. The average monthly income of these workers is less than $35 including all incentives and bonuses. With this amount, workers struggle to cover their basic living cost including housing, nutrition and clothing. Paying for school, supporting families, and saving up for the future is very difficult for these workers. The tough living conditions of garment workers partly contribute to the poor productivity rates (<40%), low worker retention (approx. 30% remain after 6 months), and high daily absenteeism (10-15%) in the factories. In addition, the workers-management relation, community perception acceptance of factories and workers in the community is adversely affected [6].

The ILO Advancing Decent Work Baseline survey [5]stated that many employers, especially in industrial parks, resist workers' efforts to unionize at the factory level. In some factories, unionization depends almost entirely on the willingness of the owners and managers of the factory. In some cases, workers are also reluctant to join unions due to limited understanding of their role. A meeting with a company employee indicated that workers are not always fully aware of their rights. While written contracts in English and Amharic are provided to all workers, the content differs between companies, and it is not clear whether the workers fully understand the content of their contracts or their rights. Among the workers' respondents, forty-one per cent reported being a member of a trade union. This is much higher percentage than the national 10 per

cent union membership estimate of the Confederation of Ethiopian Trade Unions. It is possible that this discrepancy can be explained in part by worker respondents not differentiating between trade union memberships and membership of a worker council. A relatively high percentage of workers reported belonging to a union, but many report a difficult environment for prospective and current members of unions at the workplace. However, improving freedom of association and collective bargaining require the full engagement of the three tripartite constituents as stipulated in the labour proclamation. However, it appears that there is limited awareness of the provisions of the law related to collective bargaining as well as its applicability in Ethiopia's industrial parks.

To address the above constraints, IDH is convening and actively engaging in a Public Private Partnership (PPP) platform to coordinate technical and financial resources to support the establishment of IP workers' consumer cooperative society. The envisage workers cooperative caters to the IP worker's basic consumer goods and service needs in a sustainable and affordable manner. Ultimately, this will lead to workers' basic need and job satisfaction leading to a decline in absenteeism and improvement in productivity [6]. Cooperatives are a voluntary business entity established to solve common socio-economic problems of group of people through participating in economic activities related to the specific needs of the group. Although the industrial parks lag the cooperative business are common in Ethiopia. Industrial parks can use this approach to solve some of the workers' common socio-economic problems through supply of discounted basic goods for workers at the industry parks, Childcare service, Saving and Credit service, Additional income for workers and has some spillover effect to the economy.

Ethiopia has one of the highest levels of chronic undernutrition in the world, despite significant progress showing a reduction in stunting from 58% in 2000, to 38% in 2016 [9]. While still 22% of women are underweight, overweight is rapidly emerging and becoming a national public health issue. It is further estimated that the number of adults with diabetes in Ethiopia will double between 2011 and 2030, from 1.4 million to 2.7 million [12], [13]. The 2016 EDHS tested women aged 15-49, and men aged 15-49 for anemia. One-quarter of women aged 15-49 in Ethiopia are anemic. Comparatively, 15% of men are anemic. There is thus a widespread insufficient intake for micronutrients, while unhealthy dietary components are increasingly entering the diet, especially in the urban areas. The Tufts University Global Dietary Database largely confirms the limited intake of nutritious foods, especially fresh fruits and vegetables. The latest Global Burden of Disease data also show that malnutrition remains the number one risk factor in Ethiopia, while nutrition related factors like Dietary Risks, High Blood Pressure and High Body-Mass Index have all become higher risk factors over the period 2005-2016. Yet, nutrition in the workplace has so far been an overlooked issue in the commitment of Ethiopia to address malnutrition holistically and help implement, learn and adapt a systems' approach that link consumption, markets, processing, packaging, transport, trade and agriculture. Identifying nutrition in the workplace as a missed opportunity, GAIN Ethiopia seeks partnerships and to build strategic alliances with the Ministry of Industry, the Industrial Parks Development Cooperation and other stakeholders to garner the momentum to workplace nutrition agenda and its implementation in the country [3].

Providing proper nutrition to workers at the workplace need not be complicated or expensive and ultimately can be profitable. Simple meal plans can include fortified grains and local vegetables and must be developed with local nutritionists to optimize meals against the

national dietary guidelines. With sufficient food, workers will have the energy to be productive at work and possibly earn more money. And with a more balanced diet that includes rich micronutrient foods they will be more likely to reach their improved health status- which can reduce absenteeism, improve presenteeism and worker morale. Contributing towards healthier diets at work may also have a trickledown effect on the household level. This is a virtuous circle allowing workers to remain productive and lift themselves and their families out of the cycle of poor health and poverty. Yet without proper nutrition, governments, employers and workers will find themselves trapped in the cycle of poor nutrition and low national productivity [7].

2. Methods and Materials

The research was a cross-sectional survey utilizing quantitative and qualitative methods of data collection. The primary source of information was the quantitative survey using a structured questionnaire for the garment workers aged 15-50 years and who are located at the three Industrial Parks (Hawassa, Bole Lemi and Adama). Qualitative data through Key Informant Interviews were collected from each company participating in the research (company top managers, HR and administration, canteen staff, clinics and respective IPDC management at the three IPs). The companies surveyed were identified through a two-stage cluster sampling method where the company and then the garment workers were identified.

2.1 Research Timing

In the present research, data was collected in Hawassa Industrial Park in the months of March and April (period of the long lent season) and a period where significant drop in animal protein consumption and calorie consumption in urban areas–despite the lower prices and rises quickly once the fasting period is over. In the urban settings, the two fasting months of December and March indices the trend of a drop in the diet diversity score[4]. However, the field work for Bole Lemi and Adama were conducted in the months of May and June (right after the conclusion of the big lent season). It is worth noting that the Hawassa research and second phase of the data collection in Bole Lemi and Adama were conducted in different seasons (before and after the lent seasons). As explained in the work of [8], the dietary practice in the urban areas highly sensitive to the start and the conclusion of the leant seasons, particularly those in December and March.

[4] Seasonality and Household diet in Ethiopia (May 2015)

Therefore, some of the dietary practices and food security indicators could be affected by this seasonality and the interpretation between the two should be made with some caution.

2.2 Research Groups

The target population for this research were garment workers in the lowest pyramid (working as operators who are both male and female aged between 15-50 years). A household in this research was defined as a shelter that inhabits one or more of co-workers under one roof and where each dweller contributes to the livelihood or a dormitory that is provided by a company and that has two or more co-workers sharing same room and all their meals are provided by the same company. Key personnel of factory (top management either CEO or Deputy, HR and administration managers, first aiders or health officers working at the company's clinic, canteen staff, IPDC management at the three industrial parks who play crucial role in day-to-day management of these workers also formed part of the target study group for qualitative data collection.

2.3 Sampling Techniques

First stage sampling uses purposive sampling techniques to include three industrial parks (Hawassa, Bole Lemi and Adama) and the three parks were the universe for this formative research and was the universe. In Hawassa, out of the total twenty-one garment companies (local and international) stationed in the park, the principal investigator in close consultation with IPDC Hawassa management team identified nineteen companies as operational and prospective candidates for the research. During the data collection, two companies in Hawassa declined to participate in the research and one of the companies stopped operation so making the total

prospective companies to sixteen in number. Likewise, in Bole Lemi (BIP) and Adama (AIP), the principal investigator in close consultation with both IPDC management personnel identified eleven companies both operational and interested in being engaged in this research (eight companies in Bole Lemi and three companies in Adama Industrial Parks) making the total effective sample size from these two parks as 100% as compared to 84% in Hawassa Industrial Park (HIP). The second stage of the sampling process involves simple random sampling (SRS) to select the required garment workers from each company enrolled in this research.

2.3.1.1 Company and individual worker's selection

The formative research uses Lot quality assurance sampling (LQAS) technique to select the effective sample of workers from the three industrial parks (Hawassa, Bole Lemi and Adama). The hallmark of LQAS is the division of the target population into smaller, administratively meaningful units (lots or Supervision Areas-SAs) and the selection of small, random samples from each of those units. Experience with LQAS technique has shown that the sample size of 19 provides an acceptable level of errors for making management decisions as at least 90% of the time it correctly identifies supervision areas or facilities that have reached their data accuracy target. In other words, the chance for errors is only 10% with sample size of 19 (for 100% accuracy). Sample sizes larger than 19 have practically the same statistical precision as 19. They do not result in better information, and they cost more. Hence, selected companies from each industrial park serve as supervisory area or strata to be able to identify the required 19 respondents from each company [9]. To select and reach the 19 respondents per company, the principal investigator requested the company management to provide him with workers or operators database so to select 19 respondents randomly using lottery methods. Once the 19 respondents are

selected, the research team would either interview these workers either at their household (when workers close for work) or at the factory (during their lunch break or before the workers depart for their respective residences). If the selected respondents could not be located for different reasons during the house interview or the interview at the factory, the research teams were advised to use the snowball sampling technique to reach to the next prospective respondents and reach to the 19 respondents per company.

2.3.1.2 Sampling for qualitative data collection

In each of the selected companies where quantitative data was collected, five team leaders were also assigned to collect various qualitative data. The target group for the qualitative research included the company's top management, HR and administration officers, first aiders or clinicians working at the company's clinic, canteen staff and IPDC management. The qualitative research includes questions about the company's policy on health and nutrition, the provision for breastfeeding and nursing, types of food provided at the canteen (quality and quantity), major types of diseases affecting workers, and the quality of outpatient service provided by these clinics. In total, 135 KII were conducted simultaneously to the quantitative data collection.

2.3.1.3 Study Variables and Data Collection Techniques

Structured household questionnaire was used to collect quantitative data from garment workers between the ages of 15-50years old. The quantitative data collection tool that was developed and used for GAIN Bangladesh similar research was further contextualized and validated prior to the data collection exercise. Most of the variables have standard and international

definition and were used for this research. The primary data collection tool has ten sections (demographic, Health and WASH, knowledge and attitude related questions, Minimum Diet Diversity Score for Women(MDD-W5), Food Consumption Score(FCS)[6], [7]Copying Strategy Index(CSI), Food Insecurity Experience Scale(FIES)[8,] Monthly Food and Non-Food Expenditure as well as Body Mass Index(BMI).[9] Definitions for most of core indicators are shown (**DEFINITION OF KEY TERMS**) and are based on different international indictor definition. Even though all these indicators are collected at individual level, their analysis is at their respective company but when it is aggregated it will have population level estimates represented by their respective industrial park. For programmatic or intervention purposes, company level data analysis will not be part of this reporting but can be made available as situations demand for it.

Additionally, data on quality and quantity of the different food provided at each company's canteen were measured both through qualitative data (KII) and quantitative (measurement of the different foods and sauces using kitchen beam balance, volumetric cylinder for measuring their volume and weight) whereas disease prevalence and other policy related information were collected entirely through qualitative data collection tool. Data on knowledge level, attitudes, beliefs related to healthy diets were collected from the study area through various approaches to elucidate on the barriers and facilitators to best practices. The structured questionnaires and different discussion guides and questions for the KIIs are shown in (Appendix 1 and 2).

[5] FAO, 2021
[6] WFP, 2015
[7] CARE, 2008
[8] FAO, 2021
[9] WHO, 2021

Table 1: ***Indicators covered in the assessment***

	Indicator	Target age, sex and recall period
Demographic		
1	Sex	15-50Yr/NA
2	Job section	15-50Yr/NA
3	Education	15-50Yr/NA
4	Average monthly income	15-50Yr/NA
5	Remittance	15-50Yr/NA
6	Economical migration	15-50Yr/NA
Health and WASH		
9	Status of breastfeeding and pregnancy	Females/15-50Yr/NA
10	Scarcity of water	15-50Yr/NA
11	Illness and absenteeism	15-50Yr/NA
Nutrition		
12	Knowledge and attitude about healthy diets	15-50Yr/NA
13	Monthly food and non-food expenditure	15-50Yr/30-days prior to the research
14	MDD-W	Female/15-50Yr/24hrs prior to the research
15	BMI	Female/15-50Yr
Food security and livelihood		
16	FCS	15-50Yr/7-days prior to the research
17	FIES	15-50Yr/3-months prior to the research
18	CSI	15-50Yr/30-days prior to the research

2.4 Training and Pre-testing Tools

Three days training for team leaders and researchers were conducted in each Study location separately. The first training for Hawassa Research team took place in Hawassa town (April 3-5) followed by training (May 20-22) in Addis Ababa for the Bole Lemi and Adama Research team. The training was facilitated and conducted by the principal investigators in collaboration with the respective IPDC management team, the company's HR or administration focal person as well as research facilitator hired for Bole Lemi industrial park research. The training focused on the objectives of the survey, methodology, interviewing techniques, data collection tools, accurate

recording of responses using Computer Assisted Programing for Interviews (CAPI) using KoboTool and ethical consideration in the assessment. Role-plays and simulations on how to administer the questionnaire and record responses were completed for both quantitative and qualitative tools. Plenary sessions, group exercises and discussions, as well as brainstorming were the key training methods used. Following the training, the tools were pre-tested in Non-survey Company's. Pre-test feedback from the research teams informed final tool adjustments as well as refining response recording techniques.

2.5 Field Work Organization and Quality Control

In Hawassa, data was collected in the month of April 2021, while the data from Bole Lemi and Adama were collected in the months of May and June 2021. The principal investigator established a rapport with both management of IPDC and all visited companies in his first visit to the Hawassa IP. The visit helped to brainstorm both management on the objective of the research and an action plan was developed on how to operationalize the research. Teams of 18 people (6 team leaders/supervisors and 12 researchers) were formed for both research areas. One company (19 respondents) was visited by 12 of the researchers for the quantitative survey while the 6 team leaders collect qualitative data from the same company. In Hawassa, the house-to-house visit plan proposed and adopted at the preliminary stage (first 2-3 days of data collection) proved to be challenging so an agreement was reached with the remainder of the company's HR management to allow the research team to conduct the data collection inside the company compound and before the workers depart for their respective residence. Following the completion of data collection in Hawassa, a similar research brainstorming visit was made at Bole Lemi and Adama IPs. Once an

agreement and buy-in from the top companies' top management was obtained, the data collection in Bole Lemi and Adama was less challenging and time taking.

During field data collection, the quality of data was ensured by:

I. Spot checks by the principal instigator during data collection.
II. Field level cross-checking of the questionnaires for completeness by the principal investigator before leaving the company. Adherence to the skip pattern was also checked.
III. Overnight checking of the questionnaires to identify the errors and completeness. There are instances where companies were visited to re-ask for some questions. or get some canteen related measurement
IV. Regular debrief meetings were held to resolve the issues realized during the previous day's fieldwork.

2.6 Data Entry and Analysis

2.6.1 **Data entry and quality check**

Data was collected using tablets. Therefore, data collection and data entry were completed at the same time in the field. This has facilitated quick review with the objective of improving the quality of data and real time reporting of the results. In addition to saving the time of data entry, this method saved money that would have been spent on secondary data entry and validation process.

Galaxy tab 4 7.0" were used to collect data in the field. Collected data were automatically sent to a central server using 4G internet connections using (KoBoToolbox). And immediately analyzed in Statistical Package for Social Scientist version 20(SPSS-Vs 20) software for key quality checks. Results displayed on a purpose-built dashboard and analysis in SPSS-Vs 20 were the basis for communication between the team leaders and the rest of the research teams during the entire data collection period.

A dashboard was created to summarize the submissions and quality reports on daily basis during fieldwork to check the data that were sent using smart phone (tablets). The results in the dashboard focused on issues such as response rates, the age respondents, the level of missing values for key indicators and time of data collection. Any problems that arisen from reviewing the dashboard were discussed with the appropriate teams and where necessary teams reshuffled to prevent data quality problems from affecting the research results.

2.6.2 Data analysis

The general characteristics were computed and presented in proportion and means. The differences in the three IPs were statistically compared using Phi and Cramer's V Statistics (for categorical variables) and Analysis of Variance (ANOVA) (for the numerical variables). P-values of less than 0.05 showed significant statistical differences between the three IPs. Estimates of dietary practices, Food security and livelihood indicators were generated as per the different international indicator definitions and disaggregated by general characteristics of IPs (Hawasa, Bole Lemi and Adama), sex, marital status, income and education. For each indicator, the estimated statistically significant differences were computed using Phi and Cramer's V Statistics. P-values of less than 0.05 depicted significant statistical difference of the estimates by background characteristics. National projected Industrial Park estimates were also reported for each of the core Nutrition, food security and livelihood variables. Multivariate regression analyses for binary variables depicted the associations between the background characteristics and the Dietary related practices, food security and livelihood variables through generation of adjusted Odds Ratio (aOR) and the attendant p-values. aOR of lower values more than 1 or/and P-values of less than 0.05 depicted statistical significance in the specific estimate by the binary variable.

Qualitative data was analysed using theme categorization method to identify the opportunities and challenges for implementing a healthy environment for garment workers and their access to safe, nutritious and affordable diets at their workplace. Quantitate measurement of meals provided by these companies helped to establish whether or not garment workers had access to the minimum energy requirement to properly function their day-to-day activities 10(for an adult male the requirement ranges from 2,580-3,490 KCAL and for women considering the type of work and her physiological status ranges from 1,990-2,235 KAL). For each of the KII guide questions responses were classified into barriers and facilitators for healthy diet eatery practices and general wellbeing.

2.7 Ethical Considerations

Ethical approval was obtained from College of Medicine and Health Science (Institutional Review Board) (ethics approval number: IRB/078/13). Written approvals were issued (Appendix 3). Participation was voluntary, and informed written consent was obtained from each study participant prior to the data collection. Confidentiality of the participants was assured of all the information provided; no personal identifiers were used. All the participants' names stated in this study were pseudonyms. Informed consent was obtained from the study participants after explaining the purpose of the study. Participation of all respondents in the assessment was on a voluntary basis and respect, dignity, confidentiality, and freedom of assessment participant was maintained during and after the survey. No company names have been mentioned in this report in

[10] AO/WHO/UNU Expert Consultation, 1985

connection with the research outcome (in good or bad faith) and other documents prepared and as part of this research.

2.8 Study Strengths

The 2021 Formative health and research had some peculiarities.

i. This is the first formative research to collect a full range of health, nutrition and food security related indicators from three industrial parks and whereby the aggregated outcome can also be projected to depict a general aggregated picture or a projection of health and nutrition status of industrial parks workers located in the other part of the country.
ii. The research used both quantitative and qualitative methods of data collection, thus allowing more in-depth understanding of the local context as well as dietary practices among the garment workers employed at the three industrial parks.
iii. No previous studies have used multivariate logistic regression analysis methods to identify determinants of healthy diets practices of the garment workers working at the three industrial parks. Multivariate logistic regression analyses were done in this study.

2.9 Study Limitations

The assessment had the following limitations:

I. The study was cross-sectional and relied on garment workers recall estimating the prevalence of most of health, WASH, nutrition practices. And hence, as result of the recall biases and the 'social desirability effects', the true prevalence of health, WASH and dietary practice of the garment workers could be different than what is generated from this research.
II. The Quantitative data collection questionnaire was designed to be administered at each garment worker's house. However, administering the data collection through house-to-house visit wasn't the best effective way (in terms of time and logistic wise). And hence, garment workers were asked the question by simulating the interview exercise but at the company setting and asking for confirmation after an answer was given.

III. Seasonality difference between the two data collection exercise (the first phase of data collection in Hawassa conducted in the lent season and Bole Lemi and Adama data collection took place after the lent season) could influence dietary practices (for food cooked and consumed at home as well as food provided at the canteen) and hence the comparison between the two should be made with caution.

3. RESULTS

The information presented in this chapter is an analysis of data collected from the garment workers of 15-50 years old. An overview of the demographic and socioeconomic characteristics of the workers sampled is first presented. Subsequently, the estimates of health, WASH, nutrition, food security and livelihood related indicators as workers recalled are presented. In this research, a household was defined as an individual garment worker and/or house mates related or unrelated, who usually live together and who had common cooking arrangements or get their main course of meals at the workplace.

Table 2 depicts the numbers of companies covered by research. A total of 612(479 study participants for quantitative and 133 for qualitative) garment workers of age group 15-50 years were sampled from the three Industrials parks comprising a total of 45,000 workers. While 3 companies in Hawassa from the total sample universe defaulted from the research, none of the companies from Bole lemi & Adama defaulted from the quantitative survey (only one company in Bole Lemi didn't comply with the qualitative research). Compared to target predetermined company and garment workers numbers in none of the two groups achievement rate were less than 90%.

*Table 2**: Number of companies covered by research***

	Number of companies/respondents	
	Quantitative research	**Qualitative research**
Industrial Parks		
Hawassa	16	16
Bole lemi	8	7
Adama	3	3
Sub-total	**27**	**26**
% achievement	**96**	**93**
Number of respondents		
Hawassa	277	81

Bole lemi	152	36
Adama	50	16
Sub-total	**479**	**133**
% achievement	**93**	**98**

3.1 Demographic Characteristics

The garment workers' characteristics have the potential to determine the health and nutrition outcome of their workers'. The household definition as explained above (Research Groups) for this research is where a single or a pair of garment workers live together. In Adama, most of the workers (34%) live in singleton (renting or who lives outside of the park compound) whereas in Hawassa (40.6%) and Bole Lemi (47%) live in pairs (renting and living in dormitory but in a shared room). A follow-up question to determine the number of earners in the household revealed the same trend. Most of the garment claimed the main bread winners for the household as two persons (44.1%, 54.3% and 54% for Hawassa, Bole Lemi and Adama respectively). In terms of basic salary earning, the majority in Hawassa (56.7%) and Bole Lemi (51.7%) claimed they earned between 1,001-2,000 per month but in Adama the majority (54.0%) earned less than 1,000 birr per month. The average working hours per day and week were computed and presented as below 3.2 tables. As it stands, the working hours are almost universal across the three IPs (8-hrs per day and 50-hrs per week)

Table 3 ***Garment workers working time***

Name of the Industrial Parks	On average how many hours do you work per day?	On average how many hours do you work per week?
Adama	8.38	49.86
Bole Lemi	8.20	49.00
Hawassa	8.26	52.56
Total	8.25	51.15

Table 4 Garment workers background characteristics

Background characteristics		Adama	Bole Lemi	Hawassa	Total
		%	%	%	%
Sex	Male	0	6.6	13	9.6
	Female	100	93.4	87	90.4
What is your marital status?	Divorced	0	2.6	0	0.8
	In cohabitation	0	1.3	6.1	4
	Married	6	30.5	11.6	16.9
	single	94	65.6	82.3	78.2
While working here did you receive money or any other things from your family?	No	56	78.1	61.7	66.3
	Yes	44	21.9	38.3	33.7
Age group	15-25 years	92	82.1	92.8	89.3
	26-45 years	8	17.9	7.2	10.7
Educational status	1-12 grade	58	80.1	70.4	72.2
	TVET and above	42	19.9	29.6	27.8
Income	<1001 birr	54	17.2	26	26.2
	1001-2000 birr	40	51.7	56.7	53.3
	>2000	6	31.1	17.3	20.5
Are you pregnant?	No	100	96.7	99.3	98.5
	Yes	0	3.3	0.7	1.5

* For numerical variables, Analysis of Variance (ANOVA) at $\alpha = 0.05$. For categorical variables, Phi and Cramer's V statistics at $\alpha = 0.05$ used

$^{\Omega}$ only for those who are in married arrangements

In terms of marital status, almost all the garment workers working at the three industrial parks are single (82.3%, 65.6% and 94% in Hawassa, Bole Lemi and Adama respectively). Of the three IPs, Adama IP is employing the highest bachelorette while the case is the lowest Bole Lemi followed by Hawassa IP. The highest proportion of married garment workers work in Bole Lemi (30.5%). None of the female workers in Adama are either pregnant or breastfeeding. However, a slight proportion of female workers in Bole Lemi are breastfeeding (7.3%) and three percent of the female workers are either in second or third trimester (visual & verbal confirmation).

Table 5 Garment workers education and economic pre-occupation

General characteristics		Adama	Bole Lemi	Hawassa	Total
		%	%	%	%
Educational status	1-12 grade	58	80.1	70.4	72.2
	TVET and above	42	19.9	29.6	27.8
Your experience in the company?	1-12 months	52	31.8	35.7	36.2
	13-24 months	32	27.8	22	24.9
	More than 24 months	16	40.4	42.2	38.9
How many earners are in your household/roommates?	None	0	0	2.9	1.7
	One person	36	38.4	16.6	25.5
	Two persons	54	54.3	44.4	48.5
	Three or more	10	7.3	36.1	24.3
What is you experience by this profession?	1-12 months	52	33.8	83.4	64.4
	13-24 months	36	25.2	5.1	14.6
	More than 24 months	12	41.1	11.6	20.9
Job section	Cutting	6	7.3	10.8	9.2
	Finishing	10	7.9	15.5	12.6
	Others	42	38.4	36.8	37.9
	Quality Inspection	10	8.6	8.7	8.8
	Running/Joker	0	2.6	0	0.8
	Sewing	32	35.1	28.2	30.8

Quantitative data analysis

3.2 Health and WASH

3.2.1 **Diseases prevalence**

Among the questions that were posed for the garment workers whether workers were sick due to some illness thirty days prior to the research. Overall disease prevalence is twenty-eight per cent. The disease prevalence tends to be the highest in Adama with forty per cent (40%) followed by Bole Lemi with thirty-two (32.5%) and Hawassa with twenty-three per cent (23.1%). Upper tract related infection as well as urinary tract infection were the highest out of the top five (abdominal problems, gastritis, headache, influenza/common cold and typhoid. Refer to figure 2 and table 6 the morbidity results at the three IPs) diseases affecting the garment workers thirty days prior to this research. Out of the 5 illness, typhoid seems to be the most concerning illness for the majority at the three industrial parks. This was further confirmed from the qualitative data collected from each health clinic operated and managed by the researched companies at the three industrial parks. Hawassa and Bole Lemi. Also mention the USAID health assessment report here in the discussion section. On average, majority of the respondents from the three IPs claimed that the longest period they were sick by either of the diseases was between three to seven days. Incidence of absenteeism due to sickness is the highest in Bole Lemi(57.6%) as compared to Hawassa(28.5%) which was found to be the least among the three.

Figure 1: Disease prevalence among the garment workers

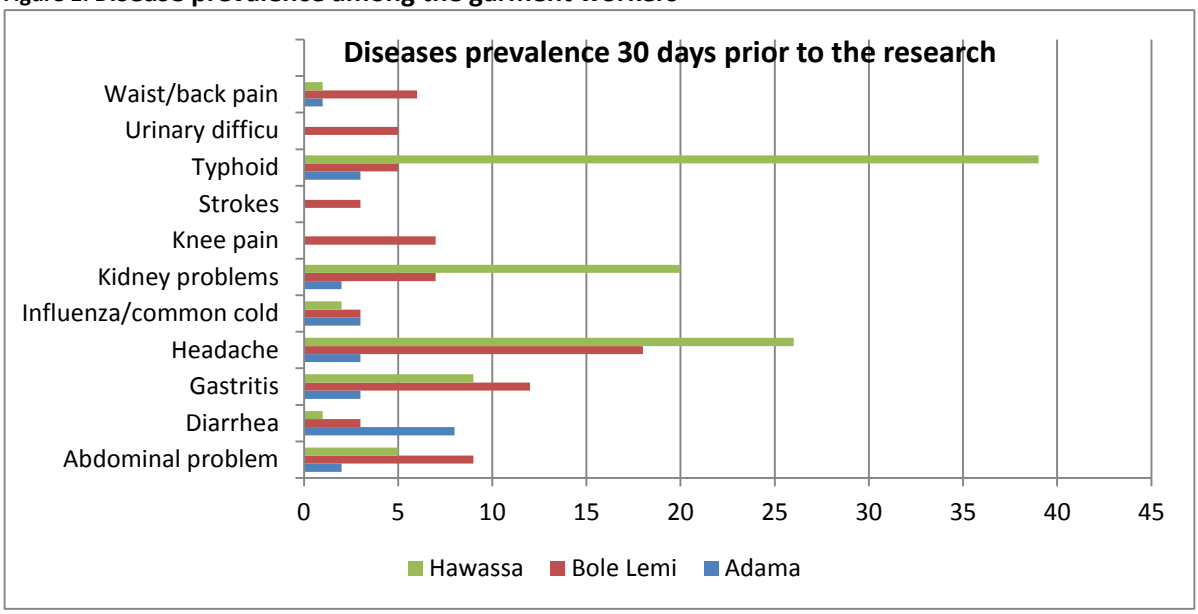


Table 6 Diseases prevalence among IPs garment workers

General characteristics	Categories	Abdominal problems	Gastritis	Headache	Influenza/common cold	Typhoid
		%	%	%	%	%
Industrial Parks	Adama	15.4	17.6	10.7	37.5	10.7
	Bole Lemi	46.2	47.1	42.9	37.5	14.3
	Hawassa	38.5	35.3	46.4	25	75
Sex	Male	0	0	25	0	10.7
	Female	100	100	75	100	89.3
Are you pregnant?	No	92.3	100	89.3	100	100
	Yes	7.7	0	7.1	0	0
Breastfeeding	No	92.3	94.1	96.4	100	96.4
	Yes	7.7	5.9	3.6	0	3.6
Educational status	1-12 grade	69.2	76.5	71.4	62.5	82.1
	TVET and Above	30.8	23.5	28.6	37.5	17.9
Income(ETB)	<1001 birr	23.1	35.3	32.1	25	25
	1001-2000	61.5	41.2	42.9	62.5	50
	>2000	15.4	23.5	25	12.5	25

A follow up questions on the cause and incidence of absenteeism from workplace after being employed at the three industrial revealed that parks was mainly due to sickness and the number of absenteeism was from six to nine days.

3.2.2 WASH

The research also discovered several WASH related indicators conducted at the factory settings, but the questions were simulated as if they were asked at the household settings. The overall potable water coverage (through tap water) is eighty-five per cent. Out of this, Hawassa IP garment workers have the highest tap water coverage with ninety per cent while Adama with the least of coverage of seventy-four per cent. Waster scarcity both for the household and at the company for bathing, cooking and drinking respectively was assessed through the one-to-one interview with sampled garment workers. The scarcity of water for drinking and cooking at home was, 71.1% in Hawassa and 69.5% in Bole lemi. In Adama about 56% of the study participants reported the scarcity of water for drinking and cooking at home. Regarding to scarcity of water for drinking and cooking at the factory, almost half of the study participants (in Bole Lemi 47% and in Hawassa 52.7%) reported the scarcity of water for drinking and cooking at the factory. But in Adama only 22% of the study subjects reported scarcity of water for drinking and cooking at the factory. the situation or availability of water for cleaning at their workplace is relatively better than drinking. However, the situation is relatively poor in Hawassa than the two IPs. One in two garment workers in Hawassa reported scarcity of water for drinking at their workplace. In terms of safe toilet usage as per the WHO definition [11]for urban setting, the coverage of safe toilet that meets the criteria and considered as Improved-safely managed is slightly better in Bole Lemi than either of the two IPs (14% of the garment workers interviewed confirmed that their current toilet

[11] **Safely managed services** include **sanitation facilities** that are not shared, where excreta are **safely** disposed of **in** situ or treated off-site, and where hand washing **facilities** with soap and water are available

met the criteria for improved safely managed toilet but there was no way to verify this as most of the interviews took place at the factory setting). The current poor improved and safe toilet coverage will undoubtedly contribute for the high illness observed among the garment workers (typhoid and urinary tract infection) are attributed by poor hygienic practices.

Table 7 Sanitation coverage for garment workers

General characteristics		What is the type of toilet facility that your household has?			
		Improved latrine		Unimproved	
		Frequency	Percent	Frequency	Percent
Industrial Parks	Adama	25	8.4	25	13.9
	Bole Lemi	87	29.2	64	35.6
	Hawassa	186	62.4	91	50.6
Sex	Male	26	8.7	20	11.1
	Female	272	91.3	160	88.9
Are you pregnant?		1	0.3	1	0.6
	No	293	98.3	176	97.8
	Yes	4	1.3	3	1.7
Are you currently breastfeeding?	No	285	95.6	175	97.2
	Yes	13	4.4	5	2.8
Educational status	1-12 grade	211	70.8	134	74.4
	TVET and Above	87	29.2	46	25.6
Income	<1001 birr	76	25.5	49	27.2
	1001-2000 birr	157	52.7	98	54.4
	>2000	65	21.8	33	18.3

Table 8 Drinking Water coverage for garment workers

Background characteristics		Yes/No	Is there any scarcity of water For your bathing at home?	Is there any scarcity of water For drinking and cooking at home?	Is there any scarcity of water For drinking at the factory?	Is there any scarcity of water For cleaning at the factory?
			Percent	Percent	Percent	Percent
Industrial Parks	Adama	No	38	44	78	78
		Yes	62	56	22	22
	Bole Lemi	No	28.5	30.5	53	68.2
		Yes	71.5	69.5	47	31.8
	Hawassa	No	27.8	28.9	47.3	52.3
		Yes	72.2	71.1	52.7	47.7
Sex	Male	No	28.3	32.6	54.3	58.7
		Yes	71.7	67.4	45.7	41.3
	Female	No	29.2	30.8	52.1	60.2
		Yes	70.8	69.2	47.9	39.8
		No	50	50	50	50

Are you pregnant?		Yes	50	50	50	50
	No	No	29	31.1	52.9	59.9
		Yes	71	68.9	47.1	40.1
	Yes	No	28.6	14.3	14.3	71.4
		Yes	71.4	85.7	85.7	28.6
Are you currently breastfeeding?	No	No	29.8	31.3	52.6	60.4
		Yes	70.2	68.7	47.4	39.6
	Yes	No	11.1	22.2	44.4	50
		Yes	88.9	77.8	55.6	50
Educational status	1-12 grade	No	27.2	29	48.1	58
		Yes	72.8	71	51.9	42
	TVET and Above	No	33.8	36.1	63.2	65.4
		Yes	66.2	63.9	36.8	34.6
Income	<1001 birr	No	26.4	24.8	48	52.8
		Yes	73.6	75.2	52	47.2
	1001-2000 birr	No	28.6	32.9	53.7	62.4
		Yes	71.4	67.1	46.3	37.6
	>2000	No	33.7	33.7	54.1	63.3
		Yes	66.3	66.3	45.9	36.7

3.3 Nutrition

This section first identifies and probes the garment workers knowledge and attitude when it comes to healthy dietary practice and what might motivate or demotivate them to pursue a healthy lifestyle both at their residential and while at work. The first sets of questions were posed to test their knowledge about what healthy diets are and from their example to the consequence of not pursuing unhealthy lifestyle including unhealthy dietary practice. As a follow up to the above knowledge and attitude section, their actual practices were measured through some open based or listing method to determine what they ate at their home and at the workplace as well as a measurement of their anthropometry was taken to assess their current nutritional status. The correlation of what they know, and their belief (right or wrong) is measured against their current dietary practices and anthropometrical measures (MDD-W and BMI) using statistical test such as t-test and Phi and Cramer's V Statistics.

3.3.1.1 Knowledge about healthy diet

Four core questions with subsets of questions were forwarded with the interviewees to test their knowledge without being too leading and a threshold was adopted (that sets the boundary between those with adequate knowledge and those with sub-optimal knowledge). As a result, the following table 9 depicts the generated knowledge test compiled from the sampled garment workers and its correlation to some of the background characteristics.

Table 9 Knowledge about healthy diets

Background characteristics	Knowledgeable					
	Poor	Good	Total	COR(95%CI)	AOR(95%CI)	P
Industrial Parks						**0.01***
Adama	17	33	50	1.82(0.97-3.42)	1.76(0.93-3.36)	0.08
Bole Lemi	53	98	151	1.73(1.15-2.61)	1.88(1.24-2.86)	0.00
Hawassa	134	143	277	1	1	
Age						**0.15**
15-19 years old	34	34	68	2.33(0.56-9.79)	2.64(0.61-11.44)	0.19
20-29 years old	163	237	400	3.39(0.86-13.31)	3.45(0.86-13.89)	0.08
30-49 years old	7	3	10	1	1	
Sex						
Female	187	245	432	0.77(0.41-1.44)	0.78(0.40-1.52)	0.47
Male	17	29	46	1	1	
Educational status						
1-12 grade	159	186	345	1	1	0.03*
TVET and Above	45	88	133	1.67(1.10-2.54)	1.62(1.04-2.52)	

Astrix(*) indicates significant variables at 5% level of confidence 1 indicates reference category

Educational status and location of Industrial parks were significantly associated with knowledge about food consumptions. Workers of Adama industrial park were 1.76 times more knowledgeable about healthy food as compared to Hawassa industrial park (AOR:1.76, 95%CI: 0.93-3.36). Similarly, workers of Bole Lemi industrial park were 1.88 times more knowledgeable about healthy food as compared to Hawassa industrial park (AOR:1.88, 95%CI: 1.24-2.86).

Workers whose educational status in TVET and above were 1.62-fold more knowledgeable (AOR: 1.62, 95%CI: 1.04-2.52) about healthy food as compared to those whose education was from grade 1-12. This shows that, as the educational status of workers increases, the chance of having knowledge about healthy diet also increases. In the current study, sex and age were not significantly associated with knowledge of healthy food.

3.3.1.2 Attitude about healthy diets

Parallel to the knowledge questions, some sets of attitude probing questions were posed to the sampled garment workers to find out their belief, perception, conception or what is right or not when it comes to practicing healthy lifestyle particularly healthy dietary practice.

Table 10 shows the proportion of garment workers who, after passing through the knowledge test, were asked about their attitude. Just like the knowledge questions, a threshold was adjusted to make some boundaries between those who have good or strong attitude about healthy diets and those who don't.

Table 10 Attitude of garment workers towards healthy diets

Background characteristics	Attitude					
	Negative	Positive	Total	COR(95%CI)	AOR(95%CI)	P
Industrial Parks						**<0.001***
Adama	18	32	50	3.00(1.60-5.62)	2.90(1.49-5.63)	<0.001*
Bole Lemi	67	84	151	2.12(1.42-3.17)	2.41(1.55-3.75)	<0.001*
Hawassa	174	103	277	1	1	
Sex						
Male	20	26	46	0.62(0.34-1.15)	1.79(0.91-3.53)	0.09
Female	239	193	432	1	1	
Age group						
15-25 years	228	199	427	1.35(0.75-2.45)	2.05(1.06-3.96)	0.03*

26-45 years	31	20	51	1	1	
Educational status						
1-12 grade	205	140	345	**1**	**1**	
TVET and Above	54	79	133	2.14(1.43-3.22)	2.05(1.31-3.20)	0.002*
Knowledge status						
Not knowledgeable	141	63	204	1	1	
Knowledgeable	118	156	274	2.96(2.02-4.33)	2.61(1.76-3.88)	<0.001

Adama industrial park workers were 2.90 times more likely to have positive attitude towards nutritious food as compared to Hawassa industrial park (AOR:2.90, 95%CI: 1.49-5.63). And workers of Bole Lemi industrial park were also 2.41 fold higher towards having positive attitude about nutritious food as compared to Hawassa industrial park(AOR:2.41, 95%CI: 1.55-3.75). Knowledge about the importance of having a nutritious diet among the garment workers tends to be higher as compared to the older or senior workers who are above twenty-five years of age. The research showed that those who are younger (15 to 25 years) and based in Hawassa IPs have a better positive attitude towards nutritious food by 2.05 times more than the rest of age group and based in either Bole Lemi or Adama IPs. (AOR:2.05, 95%CI: 1.06-3.96). Similarly, having higher educational status (TVET and above) also increases positive attitude towards nutritious food by 2.05-fold (AOR: 2.05, 95%CI: 1.31-3.20) as compared to those who have primary and secondary education. Those who had knowledge about nutritious food were 2.61 more likely to have positive attitude towards nutritious food as compared to their counter parts (AOR: 2.61, 95% CI: 1.76-3.88).

3.3.1.3 Minimum dietary diversity for Women (MDD-W)

Women of reproductive age (WRA) are often nutritionally vulnerable because of the physiological demands of pregnancy and lactation ([14], [15], [16], [17], [18]. These

vulnerabilities and gaps in micronutrient intakes have long been recognized, along with decades of appeals to improve the quality of women's diet and nutrition.

Diet quality is multidimensional, and promotion of diverse diets is one of several approaches taken to improve micronutrient nutrition for WRA and contribute to sustainable, healthy diets. Gender equality and good nutrition in women and adolescent girls are pre-requisites for the implementation and achievement of all 17 of the Sustainable Development Goals (SDG), and not only SDGs 2, 3 and 5, where their importance is explicitly stated and measured. As the first dietary diversity indicator validated to collect comparable data on WRA across countries, MDD-W provides a springboard to act in the right direction.

The 2021 Health and Nutrition formative research made use of the latest guidance on the use of the MDD-W (plus for those non-pregnant women) and used an updated MDD-W tool. Table 11 displays the list of food items consumed by the garment workers sampled and interviewed 24-hrs prior to this research.

Table 11Proportion of food consumed by garment workers

The 10 Food Groups Recommended by FAO-2021	**Proportion of foods consumed by garment workers 24-hr prior to the research [% (95% CI)]**			
	Hawassa	Bole Lemi	Adama	Aggregated proportion
Grains, white roots and tubers, and plantains	86.3	92.1	100	89.5
Pulses (beans, peas and lentils)	68.6	62.9	80	68
Nuts and seeds	63.2	49	62	58.6
Milk and milk products	9	11.9	24	11.5
Meat, poultry and fish	1.8	13.9	14	6.9
Eggs	5.8	19.2	18	11.3
Dark green leafy vegetables	59.6	37.7	40	50.6
Other vitamin A-rich fruits and vegetables	23.1	17.2	28	21.8
Other vegetables	81.6	88.1	94	84.9
Other fruits	25.6	15.2	24	22.2

A further analysis of the MDD-W and while determining the proportion of garment workers who achieved the minimum five food groups and above as set by the FAO, 2021 and disaggregated by the food types consumed 24hr- prior to the research will be presented in the following two tables.

Figure 2: Proportion of consumption of food groups by WRA, during the previous day or night

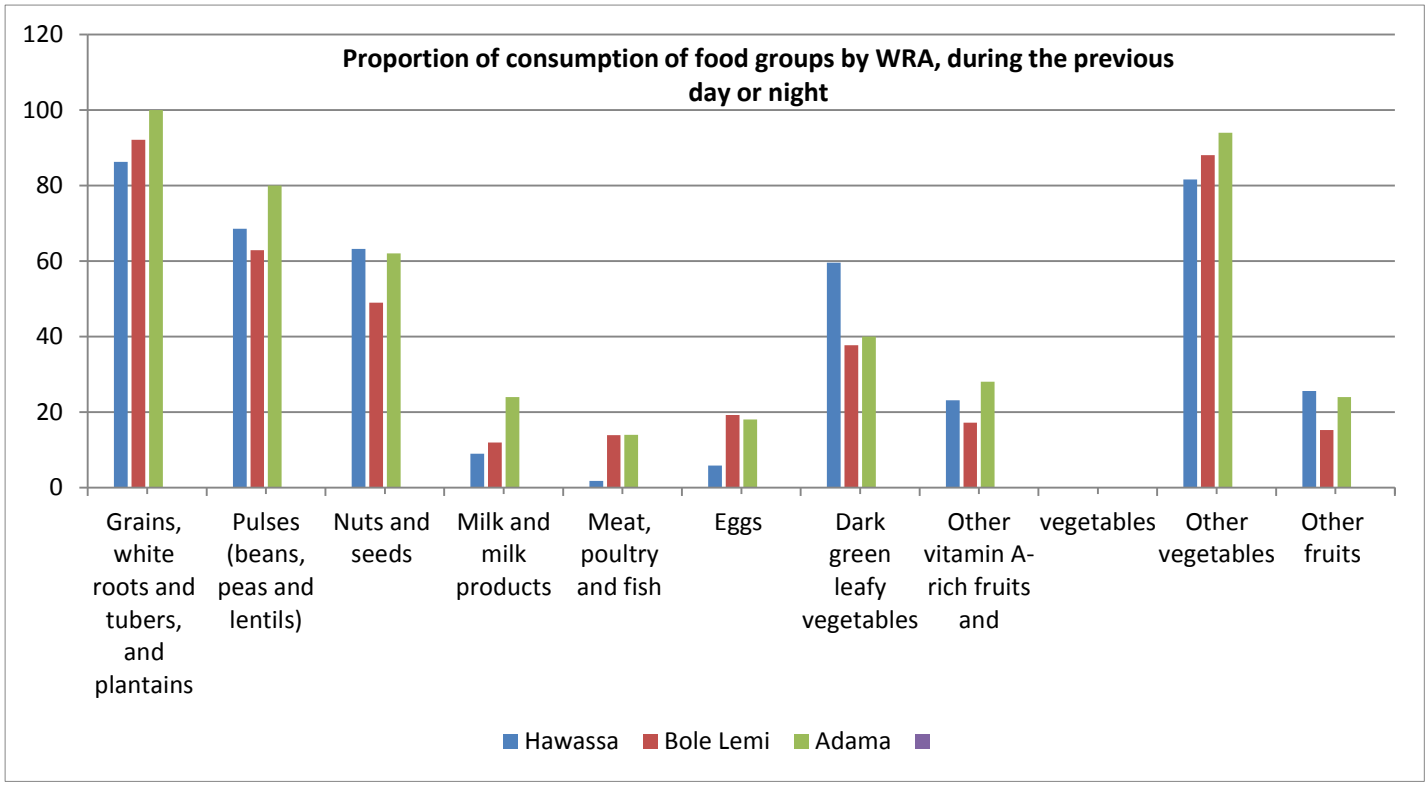
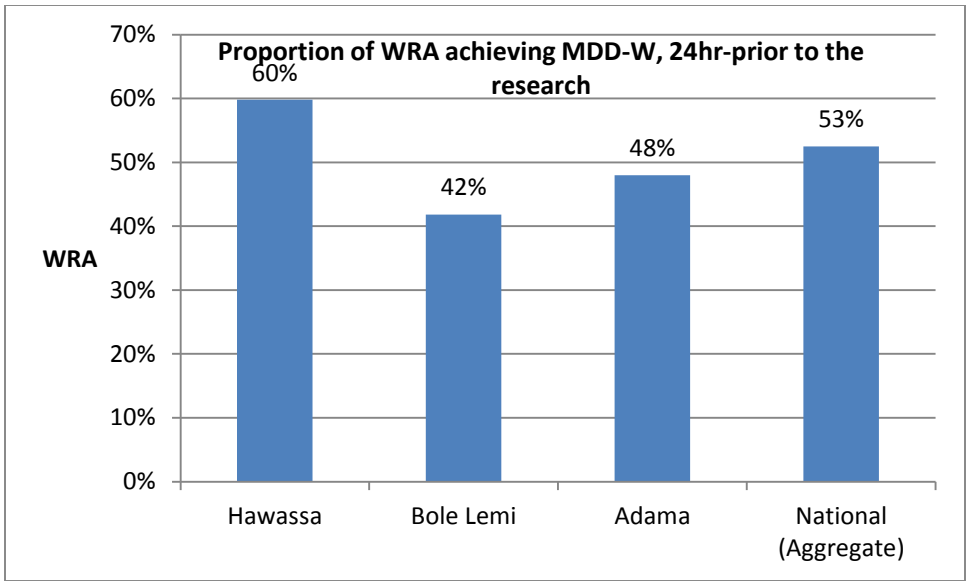


Table 12 Proportion of garment workers with MDD and those who don't

Name of the Industrial Parks	Proportion of WRA achieving the MDD-W during the day or night		Proportion of WRA who did not achieve the MDD-W during the day or night	
	N	Percent	N	Percent
Hawassa	144	59.8	97	40.2
Bole Lemi	59	41.8	82	58.2
Adama	24	48	26	52
O)	227	52.5	205	47.5



Two thirds of the garment workers in Hawassa IP had diverse food and at least had five food groups in their diet 24-hr prior to the research as compared with two thirds of the Bole Lemi IP garment workers who did not have diverse food, and their diets did not include five food groups and above a day and night before the research.

Table13 portrays the composition of the food types consumed by both WRA who met the MDD and those who didn't. Interestingly, those garment workers who consumed five or more food types the day and night before the research did not consume nor had little animal protein sources in their diet.

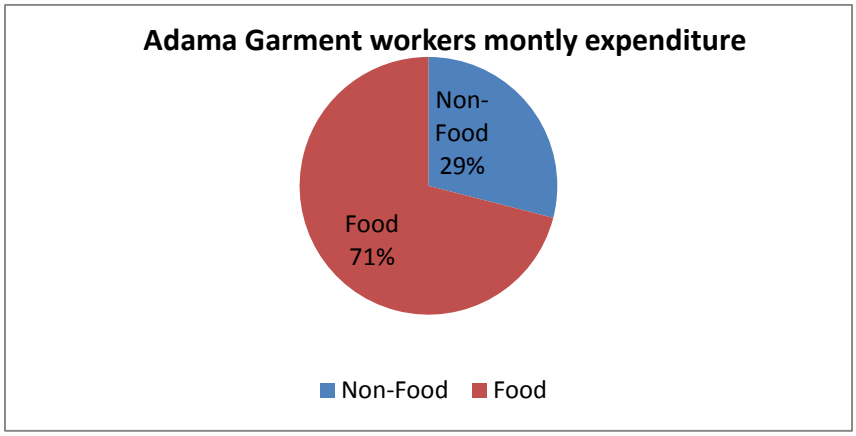
Table 13 Proportion of garment workers with MDD and those who didn't

The 10 Food Groups Recommended by FAO-2021	Percent of WRA in the three IPs where food is consumed from various food groups the day before data collection, when above or below MDD-W[% (95% CI)]					
	Hawassa		Bole lemi		Adama	
	<5 groups(n=144)	≥5groups (n=97)	<5 groups(n=59)	≥5groups (n=81)	<5 groups(24)	≥5groups (n=26)
Grains, white roots and tubers, and plantains	59.4	40.6	41.7	58.3	48	52

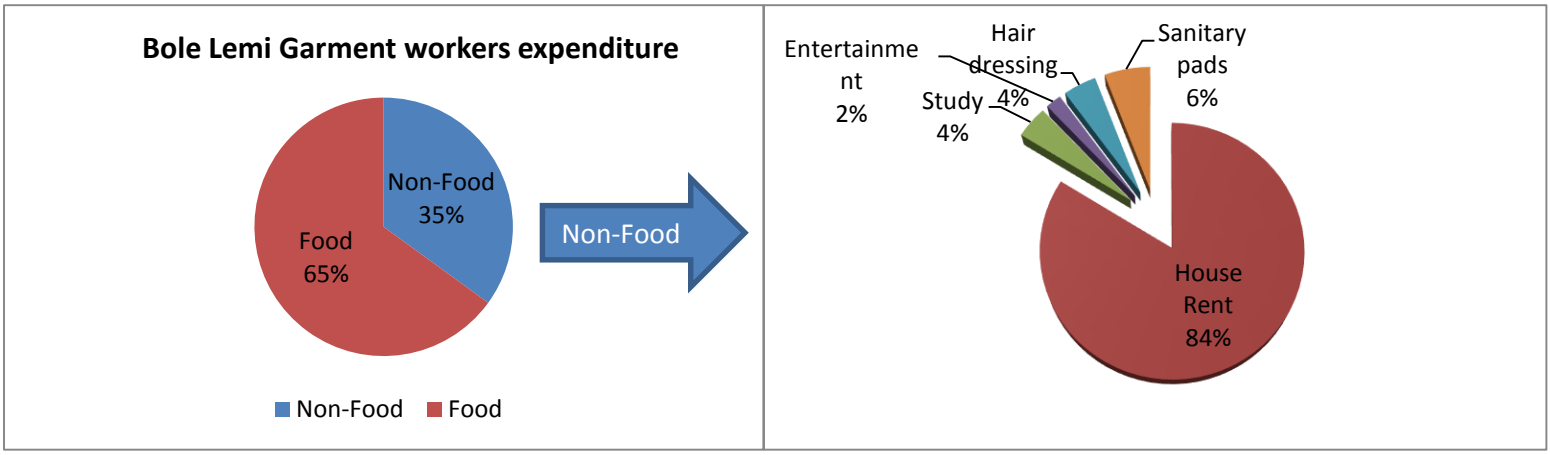
Pulses (beans, peas and lentils)	71.1	28.9	54.7	45.3	55	45
Nuts and seeds	76	24	59.5	40.5	64.5	35.5
Milk and milk products	92	8	88.9	11.1	75	25
Meat, poultry and fish	100	0	66.7	33.3	100	0
Eggs	100	0	79.3	20.7	100	0
Dark green leafy vegetables	73.9	26.1	80.7	19.3	70	30
Other vitamin A-rich fruits and vegetables	85.9	14.1	73.1	26.9	78.6	21.4
Other vegetables	62.8	37.2	44.4	55.6	48.9	51.1
Other fruits	83.1	16.9	69.6	30.4	100	0

3.3.1.4 Monthly Food and Non-Food Expenditure

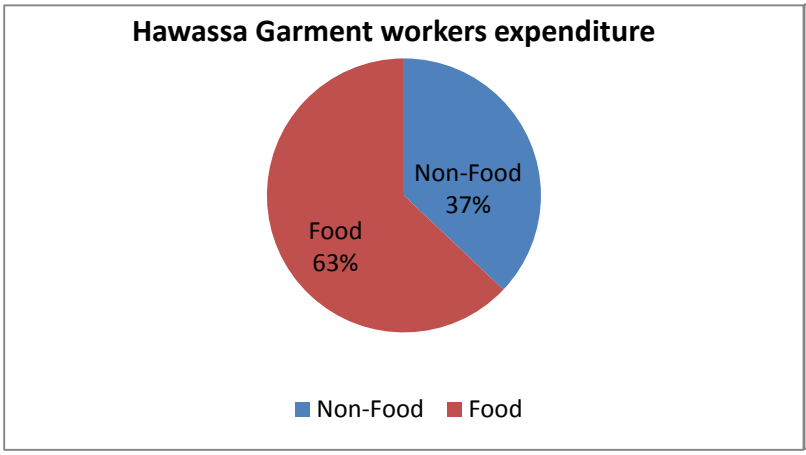
As shown in the figures 3.2, 3.3, .3.4 garment workers at the three industrial parks spend a significant amount of their monthly earnings on food-related costs as compared to non-food related costs. By comparison, garment workers working in Adama spent more on their food than non-food related expenditure. Further analysis of the food expenditure amongst the garment workers revealed that protein rich food types such as meat, eggs, dairy products and fish are significantly fewer as compared to the carbohydrate rich food groups.

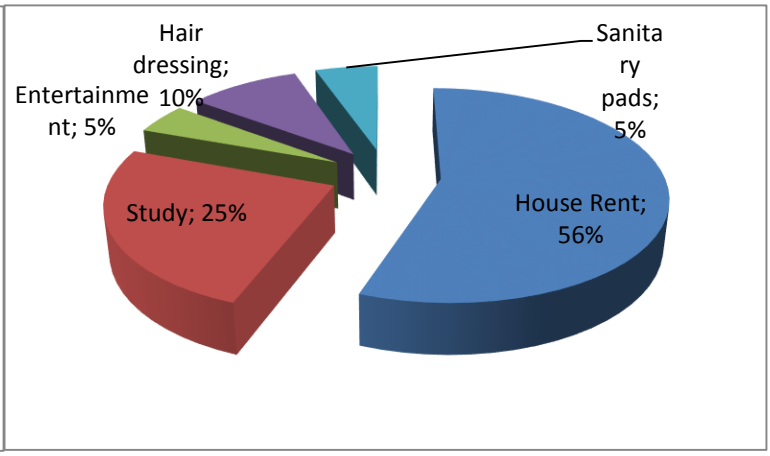


Bole Lemi IP garment workers allocated six per cent of their food expenditure on protein rich food types (by comparison the highest among the three IPs garment workers) and by contrast Hawassa IP garment workers' expenditure for protein rich foods were as little as four per cent. Bole Lemi IP garment workers seemed to have a higher proportion of expenditure for house rent as compared to the garment workers based in the two other IPs (Hawassa and Adama) and that explains the higher cost of living in Addis Ababa and the surrounding areas these workers are inhabiting as compared to the regional towns in Hawassa and Adama.



The expenditure pattern for food items amongst the Hawassa IP garment workers were found the least as compared with the two IPs (Bole Lemi and Adama) with sixty-three percent of food expenditure but highest expenditure for non-food items. The total expenditure between Adama and Hawassa (for both food and non-food items) tends to be comparable but significantly higher for Bole Lemi IP garment workers.





3.3.1.5 Body Mass Index (BMI)

Table 14 shows the nutritional status of garment workers at the three industrial parks. Female garment factory workers' nutritional status was measured with anthropometric measurements. The measurements were done by measuring weight, height and Mid Upper Arm circumference (MUAC). BMI was developed as a risk indicator of disease; as BMI increases, so does the risk for some diseases. Some common conditions related to overweight, and obesity include premature death, cardiovascular diseases, high blood pressure, osteoarthritis, some cancers and diabetes.

As it stands, one in three garment workers at the three IPs suffer from malnutrition (overweight or underweight). The situation is of great concern in Adama than the two IPs (Hawassa and Bole Lemi).

Table 14 Nutritional status of garment workers

BMI	Industrial Parks			
	Hawassa	Bole Lemi	Adama	Overall
BMI <17.0 Moderate and severe thinness	1.3	3.6	8.3	2.9

BMI Underweight	<18.5	10	10	21	12
BMI Normal weight	18.5–24.9	76	73	65	74
BMI Overweight	≥25.0	11	12	4.2	11
BMI Obesity	≥30.0	1.7	0.7	2.1	1.4

Twenty-one per cent of the sampled workers in Adama IPs are underweight while eight per cent are having moderate to severe forms of malnutrition (thinness). In terms of being overweight, the prevalence is quite higher in Bole Lemi (12%) and Adama (11%). Still, obesity is also quite on the rise at the three industrial parks with the peak prevalence registered in Adama (2.1%) and the least prevalence in Bole Lemi (0.7%).

3.4 Food security and livelihood

In this section, all sampled garment workers regardless of their sex were interviewed and asked questions related to their livelihood and how they have been copying up with stressful times in their lives.

3.4.1 Food Consumption score (FCS)

Table 15 describes the food consumption scores for the garment workers as being relatively poorer in Bole Lemi than Adama. Most of the Adama workers seem to do quite better as compared to the rest of the IPs. However, nutrient analysis of the food types consumed 7 days prior to the research showed a significant deficiency of hemoglobin iron, Vitamin A as well as protein.

Table 15 Nutritional status of garment workers

Food Consumption Score	Industrial Parks							
	Adama		Bole Lemi		Hawassa		Total	
	Count	%	Count	%	Count	%	Count	%
Poor	0	0	2	1.3	0	0	2	0.4

Border Line	0	0	15	9.9	5	1.8	20	4.2
Acceptable	50	100	134	88.7	272	98.2	456	95.4

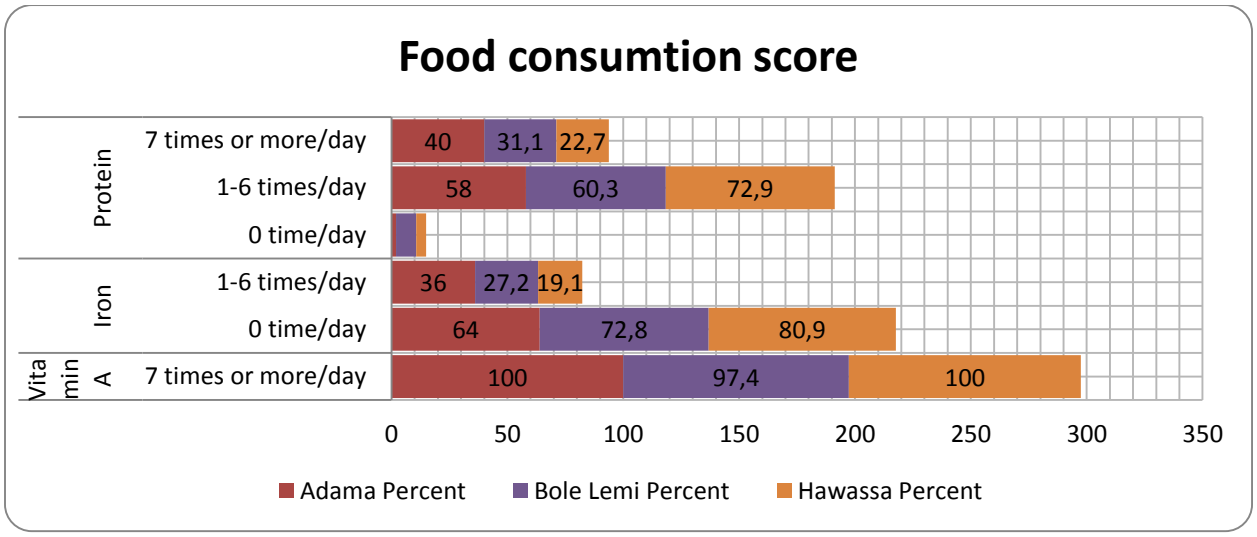


Figure 3 FCS among the garment workers & food nutrient analysis

Table 16 shows the correlation of the FCS with other background characteristics. The disparity amongst IPs in terms of FCS is statistically significant while other background did not seem to have any influence on FCS.

Table 16 Food consumption score (FCS)

Background characteristics		Food Consumption Score						Chi square	P
		Poor		Border Line		Acceptable			
		Frequency	Percent	Frequency	Percent	Frequency	Percent		
Industrial Parks	Adama	0	0	0	0	50	11	23.14	<.001
	Bole Lemi	2	100	15	75	134	29.4		
	Hawassa	0	0	5	25	272	59.6		
Sex	Male	0	0	3	15	43	9.4	0.897	0.90
	Female	2	100	17	85	413	90.6		
Are you pregnant?	No	2	100	20	100	449	98.5	0.64	0.34
	Yes	0	0	0	0	7	1.5		
Breastfeeding	No	1	50	19	95	440	96.5	12	<0.001
	Yes	1	50	1	5	16	3.5		

Educational status	1-12 grade	2	100	17	85	326	71.5	2.52	0.28
	TVET and Above	0	0	3	15	130	28.5		
Income	<1001 birr	2	100	2	10	121	26.5	8.74	0.06
	1001-2000 birr	0	0	14	70	241	52.9		
	>2000	0	0	4	20	94	20.6		

3.4.2 Food Insecurity Experience scale (FIES)

Garment workers were asked if there has been or faced any challenges to secure food for themselves and for their households, The situation was tough for Hawassa IP garment workers (27% had severe food insecurity problems) than for Adama (8% had severe food insecurity problems).

Table 17 Food Insecurity Experience Scale (FIES)

Food insecurity experience scale	Industrial Parks							
	Adama		Bole Lemi		Hawassa		Total	
	Count	%	Count	%	Count	%	Count	%
Mild	29	58	78	51.7	74	26.7	181	37.9
Moderate	17	34	45	29.8	127	45.8	189	39.5
Severe	4	8	28	18.5	76	27.4	108	22.6

Both industrial parks and income were significantly associated with food insecurity experience scale. The study shows that there was no significant association between food insecurity experience scale and sex, pregnancy status, breast feeding and educational status.

Table 18 Association of Food Insecurity Experience Scale (FIES)

Background characteristics		Food insecurity experience scale						Chi square	P
		Mild		Moderate		Severe			
		Count	Percent	Count	Percent	Count	Percent		
Industrial Parks	Adama	29	16	17	9	4	3.7	37.515	<0.001
	Bole Lemi	78	43.1	45	23.8	28	25.9		
	Hawassa	74	40.9	127	67.2	76	70.4		
Sex	Male	18	9.9	17	9	11	10.2	1.13	0.93
	Female	163	90.1	172	91	97	89.8		

Are you pregnant?	No	177	97.8	187	98.9	107	99.1	1.13	0.57
	Yes	4	2.2	2	1.1	1	0.9		
Are you breastfeeding?	No	173	95.6	184	97.4	103	95.4	1.09	0.58
	Yes	8	4.4	5	2.6	5	4.6		
Educational status	1-12 grade	122	67.4	145	76.7	78	72.2	4	0.14
	TVET and Above	59	32.6	44	23.3	30	27.8		
Income	<1001 birr	36	19.9	59	31.2	30	27.8	21.58	<0.001
	1001-2000 birr	89	49.2	102	54	64	59.3		
	>2000	56	30.9	28	14.8	14	13		

Note: P<0.05 indicates

3.4.3 Copying strategy Index (CSI)

Previous research has shown that the CSI is a good proxy for food intake (caloric adequacy), as well as food budget shares (the proportion of income that households devote to food purchase), food frequency, income status, and the presence or absence of a malnourished child in the household

The CSI is clearly negatively correlated with caloric intake, that is, lower caloric intake correlates strongly with higher reported levels of coping.

Table 19 Coping Strategy Index (CSI)

Copying strategy index	Industrial Parks							
	Adama		Bole Lemi		Hawassa		Total	
	N	%	N	%	N	%	N	%
Poor	27	54	57	37.7	60	21.7	144	30.1
Border Line	4	8	23	15.2	74	26.7	101	21.1
Acceptable	19	38	71	47	143	51.6	233	48.7

Industrial parks, educational status and income were significantly associated with copying strategy index. But sex, pregnancy status and breastfeeding were not significantly associated with copying strategy index.

Table 20 Association of Coping Strategy Index (CSI)

Background characteristics		Copying Strategy Index						Chi square	P
		Poor		Border Line		Acceptable			
		Count	Percent	Count	Percent	Count	Percent		
Industrial Parks	Adama	27	18.8	4	4	19	8.2	31.36	<0.001
	Bole Lemi	57	39.6	23	22.8	71	30.5		
	Hawassa	60	41.7	74	73.3	143	61.4		
Sex	Male	13	9	10	9.9	23	9.9	0.08	0.96
	Female	131	91	91	90.1	210	90.1		
Are you pregnant?	No	141	97.9	99	98	231	99.1	1.16	0.56
	Yes	3	2.1	2	2	2	0.9		
Breastfeeding?	No	137	95.1	98	97	225	96.6	0.72	0.07
	Yes	7	4.9	3	3	8	3.4		
Educational status	1-12 grade	97	67.4	76	75.2	172	73.8	2.45	0.03
	TVET and Above	47	32.6	25	24.8	61	26.2		
Income	<1001 birr	32	22.2	24	23.8	69	29.6	16.19	0.003
	1001-2000 birr	67	46.5	58	57.4	130	55.8		
	>2000	45	31.3	19	18.8	34	14.6		

Canteen food profile

A canteen that provides low quality meals and does not demonstrate health or productivity improvements for factories may have a negative impact on providers in the canteen services sector. Seeking creative ways to be thrifty with money, whether pooling resources to purchase collectively, or having a meal plan that is robust enough to meet the nutritional requirement of a healthy and productive workforce, is a reality and necessity. For the employee, often being thrifty comes at a cost of foregoing personal health such as skipping meals, or eating less, as this research has shown.

Table 21, 22 and 23 portray the current food provision at sampled companies and their nutritional values and analysis.

Analysis of caloric intake per meal: The energy requirement of an individual is the level of energy intake from food that will balance energy expenditure based on the individual's body size

and composition, and level of physical activity, consistent with long-term good health; and that will allow for the maintenance of economically necessary and socially desirable activity. In children and pregnant or lactating women the energy requirement includes the energy needs associated with the deposition of tissues or the secretion of milk at rates consistent with good health [10].

Energy needs for occupational activities: the occupations of men and women have been classified into those which involve light, moderate, and heavy physical activity. This has facilitated the broad assessment of the energy requirements of populations and has been helpful when the energy needs of a particular occupational group have not been specifically studied. As per the [10], the energy requirement of a subsistence farmer (moderate activity work) is 2,780kcal or for an office clerk is 2,580kcal.

Table 21 Food profile sampled company operating in Hawassa IP

Hawassa Sampled Company: Canteen Profile

==========

Analysis of the food record

==========

Food	Amount	energy	carbohydrate
Lentil stew Ethiopian	280 g	121.1 kcal	175.8 g
Ater kiki alcha wot	105 g	27.9 kcal	9.8 g
white bread Ethiopian	85 g	45.1 kcal	39.9 g
Rice boiled Ethiopian	119.9 g	31.8 kcal	30.5 g
Kale + onion+ oil + salt	25 g	4.7 kcal	2.0 g
Macaroni with tomato sauce (R)	100 g	153.2 kcal	18.6 g
Carrot boiled Ethiopian	15 g	1.0 kcal	0.9 g

Meal analysis: energy 384.8 kcal (100 %), carbohydrate 277.4 g (100 %)

==========

Result

==========

Nutrient content	analysed value	recommended value/day	percentage fulfillment

energy	384.8 kcal	2036.3 kcal	19 %
water	68.7 g	2700.0 g	3 %
protein	27.3 g(7%)	60.1 g(12 %)	45 %
fat	37.6 g(21%)	69.1 g(< 30 %)	54 %
carbohydr.	277.4 g(72%)	290.7 g(> 55 %)	95 %
dietary fiber	9.4 g	30.0 g	31 %
alcohol	0.0 g	-	-
PUFA	1.0 g	10.0 g	10 %
cholesterol	34.0 mg	-	-
Vit. A	43.0 µg	800.0 µg	5 %
carotene	0.1 mg	-	-
Vit. E (eq.)	0.4 mg	12.0 mg	4 %
Vit. B1	0.0 mg	1.0 mg	4 %
Vit. B2	0.0 mg	1.2 mg	4 %
Vit. B6	0.0 mg	1.2 mg	4 %
tot. fol.acid	6.0 µg	400.0 µg	1 %
Vit. C	2.5 mg	100.0 mg	2 %
sodium	24.0 mg	2000.0 mg	1 %
potassium	121.0 mg	3500.0 mg	3 %
calcium	242.6 mg	1000.0 mg	24 %
magnesium	18.0 mg	310.0 mg	6 %
phosphorus	730.2 mg	700.0 mg	104 %
iron	22.8 mg	15.0 mg	152 %
zinc	0.5 mg	7.0 mg	7 %

In Hawassa IP, the food provided showed a significant deficit in macronutrient energy or general kcal (around 80%) and 50% deficit in protein. The micronutrient also showed an overwhelming deficit in providing the daily requirement.

Table 22 Food profile sampled company operating in Bole Lemi IP

Bole Lemi Sampled Company: Canteen Profile

==========

Analysis of the food record

==========

Food	Amount	energy	carbohydrate
Teff white Injera	233 g	199.9 kcal	174.8 g
Lentil stew key Ethiopian	200 g	48.3 kcal	29.8 g
Lentil stew Ethiopian	110 g	47.6 kcal	69.1 g
Rice boiled Ethiopian	130 g	34.5 kcal	33.0 g
Tomato sauce (R)	10 g	7.8 kcal	0.7 g

Meal analysis: energy 338.1 kcal (100 %), carbohydrate 307.3 g (100 %)

==========

Result

==========

Nutrient content	analysed value	recommended value/day	percentage fulfillment
energy	338.1 kcal	2036.3 kcal	17 %
water	8.2 g	2700.0 g	0 %
protein	39.9 g(10%)	60.1 g(12 %)	66 %
fat	20.2 g(11%)	69.1 g(< 30 %)	29 %
carbohydr.	307.3 g(79%)	290.7 g(> 55 %)	106 %
dietary fiber	8.7 g	30.0 g	29 %
alcohol	0.0 g	-	-
PUFA	0.3 g	10.0 g	3 %
cholesterol	0.0 mg	-	-
Vit. A	13.8 µg	800.0 µg	2 %
carotene	0.1 mg	-	-
Vit. E (eq.)	0.4 mg	12.0 mg	4 %
Vit. B1	0.0 mg	1.0 mg	1 %
Vit. B2	0.0 mg	1.2 mg	0 %
Vit. B6	0.0 mg	1.2 mg	1 %
tot. fol.acid	2.2 µg	400.0 µg	1 %
Vit. C	1.7 mg	100.0 mg	2 %
sodium	49.5 mg	2000.0 mg	2 %
potassium	33.0 mg	3500.0 mg	1 %
calcium	392.0 mg	1000.0 mg	39 %
magnesium	2.4 mg	310.0 mg	1 %
phosphorus	1127.4 mg	700.0 mg	161 %
iron	76.8 mg	15.0 mg	512 %
zinc	0.0 mg	7.0 mg	1 %

In Bole Lemi IP, the food provided showed a significant deficit in macronutrient energy or general kcal (around 80%) and 30% deficit in protein. The micronutrient, however, showed an overwhelming deficit in providing the daily requirement.

Table 23 Food profile sampled company operating in Adama IP

Adama Sampled Company: Canteen Profile

==========

Analysis of the food record

==========

Food	Amount	energy	carbohydrate

Teff white Injera	247 g	211.9 kcal	185.3 g
Ater kiki alcha wot	200 g	53.1 kcal	18.6 g
white bread Ethiopian	81 g	43.0 kcal	38.0 g

Meal analysis: energy 308.0 kcal (100 %), carbohydrate 241.8 g (100 %)

==========

Result

==========

Nutrient content	analysed value	recommended value/day	percentage fulfillment
energy	308.0 kcal	2036.3 kcal	15 %
water	0.0 g	2700.0 g	0 %
protein	34.1 g(11%)	60.1 g(12 %)	57 %
fat	18.2 g(13%)	69.1 g(< 30 %)	26 %
carbohydr.	241.8 g(77%)	290.7 g(> 55 %)	83 %
dietary fiber	8.3 g	30.0 g	28 %
alcohol	0.0 g	-	-
PUFA	0.0 g	10.0 g	0 %
cholesterol	0.0 mg	-	-
Vit. A	0.0 µg	800.0 µg	0 %
carotene	0.0 mg	-	-
Vit. E (eq.)	0.0 mg	12.0 mg	0 %
Vit. B1	0.0 mg	1.0 mg	0 %
Vit. B2	0.0 mg	1.2 mg	0 %
Vit. B6	0.0 mg	1.2 mg	0 %
tot. fol.acid	0.0 µg	400.0 µg	0 %
Vit. C	0.0 mg	100.0 mg	0 %
sodium	0.0 mg	2000.0 mg	0 %
potassium	0.0 mg	3500.0 mg	0 %
calcium	465.0 mg	1000.0 mg	46 %
magnesium	0.0 mg	310.0 mg	0 %
phosphorus	1426.9 mg	700.0 mg	204 %
iron	73.6 mg	15.0 mg	491 %
zinc	0.0 mg	7.0 mg	0 %

In Adama IP, the food provided showed a significant deficit in macronutrient energy or general kcal (around 80%) and 30% deficit in protein. The micronutrient, however, showed an overwhelming deficit in providing the daily requirement.

Qualitative result

This chapter highlights the findings of the qualitative research and identifies their interfaces and contribution to the wellbeing and promotion of healthy diets at the workplace. This chapter also explores the barriers and facilitators for promotion of healthy diet practice both at home and at their respective workplace. The information presented in this chapter was collected from the KIIs conducted as part of the qualitative research and as well as quantitative food measurements taken from sampled company's canteen. In some instances, however, quantitative data of the garment worker survey has been presented for triangulations.

3.5 Health check-ups and breastfeeding

Even if factory work in IPs may theoretically afford women opportunities to gain financial, social, and personal autonomy, formal employment does not relieve them of household responsibilities or caregiving obligations, which require temporal flexibility. The manufacturing labor market is not designed to accommodate such cultural norms and gender dynamics and operates solely on the incentive created by rewarding individuals who work stipulated hours. The qualitative team were therefore tasked to explore the friendliness of the garment workplace and the different policies available to support and nurture female workers particularly maternal, breastfeeding policies and nursing rooms.

Most of the garment companies visited operating at the three industrial parks do not seem to have regular and robust employee health check-ups. When an employee is recruited, most companies visited confirmed that the employee benefited from medical screening or checkup.

However, once the employee is recruited as a staff, health check-ups are scheduled once in a year. Despite the benefits of breastfeeding, employed women face numerous barriers to Exclusive breastfeeding (EBF) including insufficient time to breastfeed or express breast milk (There are also work-related factors such as long inflexible work schedule and absence of appropriate physical facilities which can have detrimental effect on the duration of EBF. Cost-effective workplace interventions such as preparation of rooms and breastfeeding breaks for breastfeeding play an important role in promoting breastfeeding among employed mothers. Such interventions have been shown to reduce absenteeism and improve workforce performance, commitment and retention ([19], [20], [21], [22].

The specific nature of the woman's work emerged as an important factor that affects the continuation of EBF. In some workplaces, with no space and heavy workloads, it was difficult for the mothers to continue breastfeeding. For example, an employee in Bole Lemi IP explained:

"*The position of work matters. For example, on my side I am the line supervisor, there are also mothers working in the inspection department. Our work did not have any break. We are always busy ...I cannot take care of my baby while I am on duty, the work itself does not allow you"*

Another issue raised by participants was how difficult it was for them to fully concentrate on their work when they had a young baby. This in turn could affect the mother's individual work performance. An employee of Adama IP expressed this concern:" when the mother stayed at work the whole day, the mother could not fully concentrate on her work ...even though I am at work physically; all my attention is at home with my baby".

In almost all the workplaces, there was not any specific space designated for breastfeeding mothers. However, most participants agreed on the importance of having such a room in their workplaces; some were even prepared to share some of the associated costs. An interview held with Hawassa IPDC Investment Relation Manager confirmed the following statement about the importance of facilities including childcare to support breastfeeding. “There is no room prepared for this purpose; it was good, if such room is prepared in a central location. The manager also explained that IPDC received a significant amount of donation from development partners (UNIDO, UNDP) to operationalize a nursing room and that the management is in discussion to cover the hardware requirement for this facility and soon make it available for both nursing and as childcare for use by all female employees.

Even though participants appreciated the recent additional month of support, many of them think that it should be further increased to 6 months. An HR officer working in one of the companies located in Hawassa stated that “now it [maternal leave] became four months, it will be good if the maternal leave is six months. Because there is a recommendation from health professionals about breastfeeding for six months ...when the mothers started work at four months, how could they breastfeed their kids at work” According to the employment regulations, the maternal leave is expected to be 1 month before birth and 3 months after birth. However, many prefer to use the whole 4 months after birth, and almost all the organizations allow them to work until they give birth, to have 4-month leave after birth. The HR officer's comments represent the views of women who valued such arrangement.

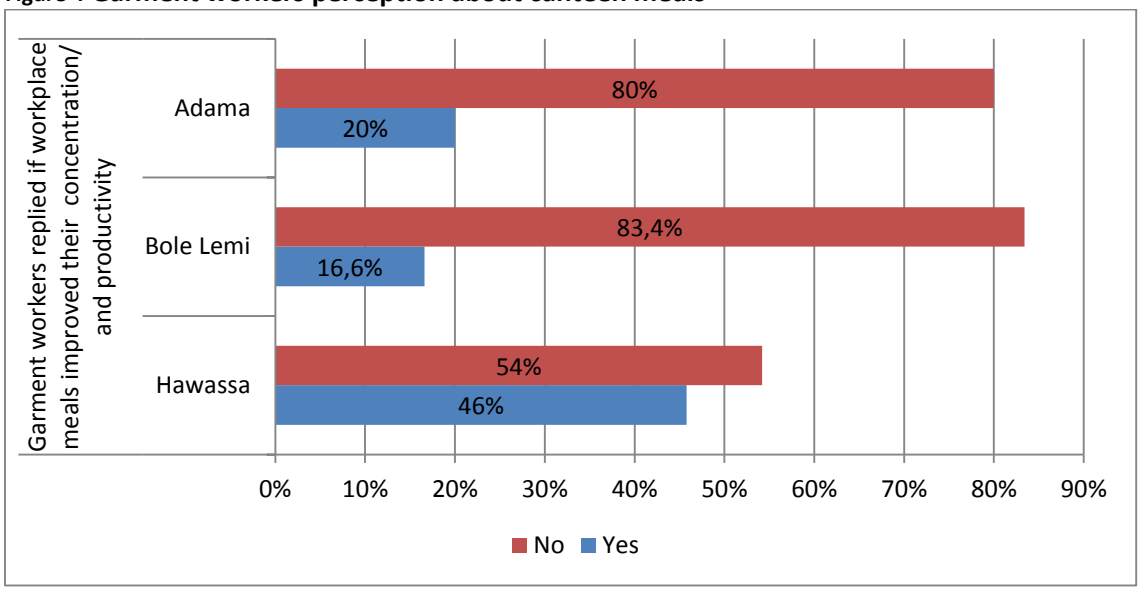
3.6 Food and drinking water at the workplace/the canteen

The qualitative data analysis shows that most of the sampled companies for this research had canteens. The management of these companies provides lunch (through subsidy) but the fee is deducted when the employee collects his/her salary.

3.7 Barriers and facilitators for healthy diets & productivity

Garment workers at the three industrial parks were asked some follow-up questions to identify factors or conditions that would either motivate them to eat healthy diets either at home or at their workplace. As per the figure 3.4below, about 83.4% and 80% of Bole Lemi and Adama industrial park workers stated that the company meal does not increase the productivity of the workers respectively.

Figure 4 Garment workers perception about canteen meals



Does nutrition impact productivity? Yes! Although skills remain the key concern in relation to productivity levels in factories, nutrition does play an important role and is recognized by factories as a key constraint to productivity. It is encouraging that factories recognize the importance and the impact that nutrition has in improving productivity levels and potentially for

less turnover of workers levels in the factory. There are numerous studies on this subject, indicating the consequences of lack of nutrition, with regards to reduction in productivity: "Worldwide, billions of people suffer from micronutrient malnutrition: a "hidden hunger" resulting from a lack of vitamins and minerals that can increase vulnerabilities to sickness, disease and even death. These deficiencies, which most people are unaware of, hamper physical and cognitive development and reduce productivity of entire populations"[12]

Workers, nutrition and responsibility: The qualitative findings revealed that workers send too much money home; therefore, they are unable to buy healthy food and support themselves. The challenges related to workers migrating to the industrial parks and employment reasons particularly in the Hawassa & Bole Lemi context are important to keep in mind, however. Workers are not only looking after their own well-being, most also need to support their extended family and as such, and the challenges back home also have a real impact on their life and their wellbeing in the city. Respondents are also in agreement that nutrition impacts productivity and that nutrition is one of the main constraints to better productivity (and potentially less turnover of workers) levels in the factory.

[12] Source: www.phnompenhpost.com/index.php/2011042948802/Special-Reports/ultra-rice-slips-nutrients-in-via-one-special-grain-for-every-100-ordinary-grains-of-rice.htm Source: www.phnompenhpost.com/index.php/2011042948802/Special-Reports/ultra-rice-slips-nutrients-in-via-one-special-grain-for-every-100-ordinary-grains-of-rice.htm

4. DISCUSSIONS

4.1 Background and Context

The current health and nutrition research is the first of its kind. The results herein thus provide the latest data for benchmarking and guiding WPN programming and policy formulation. Key stakeholders both bilateral or multilateral donors and implementing partners identified during this formative research (SBN Ethiopia, GAIN, IDH, Plan International, GIZ, UNIDO, ILO, UNDP, UN habitat, World Bank, African Development Bank, USAID Wellness Program, Master Card Foundation) can make use of this findings to promote and advocate for an increased social investment and advancement of sustainable investment with the focus on Social sustainability while promoting industrialization in the country.

The average working hours per day and week were computed and presented as below 3.2 tables. As it stands, the working hours are almost universal across the three IPs (8-hrs per day and 50-hrs per week). This is slightly higher than the normal working hours for non-factory workers (8-hrs per day and 48-hrs per week). In terms of educational merit or level of literacy, two thirds of the garment workers are between class 1 to 12. In terms of career experience, Adama workers have less working experience than Hawassa and Bole Lemi. And that explained the operational history of the parks as Adama began or resumed in full operation only last year (currently only three are operational). Out of the total garment workers that currently being employed at the three industrial parks, the sampled garment workers provided an insight into their job characteristics. Most of the garment workers job section was not classified as cutting, finishing or quality inspection rather as ‘go-getters’. The company management explained go-getters as those who fulfil any job function whenever an employee is absent from work. Adama IPs seems to have more

of these workers than the two IPs (42per cent 'go-getters'). In terms of salary grade, most of the workers' monthly earnings are within the 1000 to 2,000 ETB range. Monthly expenditure on food and non-food items has a similar outlook (on average paying from 1,000 to 2,000ETB) to cover their daily living cost and this systematically makes them vulnerable to any shocks as these workers may not be able save any decent wage to cater for any miscellaneous expenditure. Furthermore, the research also found that amongst the female workers are either as bachelor's and non-pregnant or not breastfeeding in terms of physiological state.

It is with this above background and context that the health and nutritional findings of this research were made as dependent variables to measure the statistical difference and correlation among some of the selected background characteristics (independent variables) across the three IPs.

4.2 Health and WASH

Among the questions that were posed for the garment workers whether workers were sick due to some illness thirty days prior to the research. Overall, the disease prevalence is. Thirty days prior to the research, twenty-eight percent of the garment workers were ill. Out of the top 5 diseases registered 13as the most prevailing illness (from the qualitative and quantitative research), morbidity due to urinary tract infection and upper tract infection were found to be the highest. An illness that is categorized and is responsible for causing urinary tract infection has more significance to this research than the latter. This could be explained by the poor WASH-related indicators that were observed from this research. The scarcity of water for drinking and cooking at home was 71.1% in Hawassa and 69.5% in Bole lemi. Regarding the scarcity of water for

[13] Top five disease affecting garments workers at the three industrial parks (Hawassa, Bole Lemi and Adama) are Abdominal problems, Gastritis, headache, Influenza/common cold and Typhoid)

drinking and cooking at the factory, almost half of the study participants (in Bole Lemi 47% and in Hawassa 52.7%) reported the scarcity of water for drinking and cooking at the factory. But in Adama only 22% of the study subjects reported scarcity of water for drinking and cooking at the factory. For urban setting, the coverage of safe toilet that meets the criteria and considered as Improved-safely managed is slightly better in Bole Lemi than either of the two IPs (14% of the garment workers interviewed confirmed that their current toilet met the criteria for improved safely managed. The overall safely managed toilet coverage for urban settings is 19% and hence the current coverage in Bole Lemi IP is below the aggregated coverage.

The current health and WASH findings augment the findings of USAID. Fifty-eight per cent were injured by accident, fifty-five per cent had headaches, twenty-seven per cent had fatigue, seven per cent had coughing, four per cent eye irritation, and fifty-two had muscle or skeletal pain.

4.3 Nutritional outcome and their programmatic implication (WPN/WC)

The mean BMI for female is 21.0 [20.0-22.0].[9] And the national obesity prevalence is as 0.4 [0.2-0.8]14. The current underweight prevalence of Adama of 21 per cent while comparable to the national figure, the prevalence of obesity with 1.4 per cent is way above the national threshold and warrants an immediate intervention that promotes healthy lifestyle including healthy dietary practices among the garment workers.

Binary logistic regression analysis was done to significant factors for MDDW. The finding of the current study indicated that both salary and location of industrial parks were the most significant ($P<0.05$) factor for MDD. In the current study the location of industrial parks and salary

[14] DHS, 2005

has been significantly affecting MDDW. Workers of Hawassa industrial park was 1.28 times more likely to meet MDD as compared to Adama industrial park (AOR: 1.28, 95CI:0.66-2.46). On the contrary, workers of Bole lemi industrial park were 0.61 less likely to meet MDD as compared to Adama industrial park (AOR: 0.61, 95CI:0.30-1.22). The result shows that, by comparing the three industrial parks, workers of Bole lemi industrial park were facing the difficulty to meet MDD but workers of Hawassa industrial park were relatively good. Similarly, salary was the other significant factor of MDD. The result of the study shows that, as the salary increases, the chance to meet MDD also increases. Those workers whose salary was more than 2000 birr were 2.5 times more likely to meet MDD. The result of the study shows that family size and working hours were not significant factors for MDD.

Table 24 Multivariate analysis of factors affecting MDD-W by using binary logistic regression

Background characteristics	AOR(95 CI)	P-Value
Industrial Parks		**0.01**
Adama	1	
Bole Lemi	0.61(0.30-1.20)	0.15
Hawassa	1.28(0.66-2.46)	0.45
Salary		**0.02**
<1001 birr	1	
1001-2000 birr	1.12(0.70-1.77)	0.64
>2000 birr	2.50(1.29-4.82)	0.01
Working hour		
8 hours	1.13(0.68-1.90)	0.67
More than 8 hours	1	
Family size		**0.16**
One	0.56(0.28-1.13)	0.10
Two	0.93(0.53-1.63)	0.80
Three	1.17(0.63-2.19)	0.64
Four and above	1	

The challenges around nutrition and health need to be addressed more broadly than simply asking for more from the companies employing these workers. Given a common starting point and

shared concerns, the issues around nutrition and health can be a topic that parties (buyers, cooperatives, government, and employers) should tackle together. They require education from very early on in life, family support and more broadly, government, cooperatives and buyer involvement and participation.

A need to address the issues around nutrition and health in a strategic and coordinated manner bringing cooperatives, government, employers and buyers to the table is imperative.

4.4 Food security and livelihood outcome and its programmatic implication (WPN/WC)

To know the real effect individual factor, by controlling the effect of other factors (to control confounding) multivariate binary logistic regression was conducted by including all potential factors which are related with production. In the current study FIES, attitude and MDD-W were found to be significantly affecting the productivity of the factories. The result of the study shows that the severity of FIES has significant contribution for less production. Those respondents who were in moderate FIES were 0.29% times less on production reduction as compared to those who were on severe category (AOR:0.29, 95%CI:0.17-0.50). The impact of workers who have positive attitude towards health nutrition on less production was 45% less as compared to those who have negative attitude (AOR: 0.55, 95%CI: 0.35-0.87). Those who have not met MDD-W were 1.62 times more likely to contribute to the reduction of productivity as compared to their counterparts (AOR: 1.62, 95%CI: 1.04-2.50).

Table 25 Multivariate analysis of factors affecting productivity decrease by using binary logistic regression

Factors	Category	Frequency	Decrease production	P value
			AOR(95% CI)	
FIES	Normal	58	0.53(0.23-1.25)	0.15
	Mild	46	0.95(0.39-2.31)	0.91

	Moderate	134	0.29(0.17-0.50)	0.00**
	Severe	194	1	
Protein rich	0 time/day	22	2.06(0.60-7.04)	0.18
	1-6 times/day	291	0.77(0.45-1.34)	0.25
	7 times or more/day	119	1	0.36
Attitude Status	Negative attitude	239	1	
	Positive Attitude	193	0.55(0.35-0.87)	0.01**
Hemoglobin Iron	0 time/day	332	0.64(0.36-1.17)	0.15
	1-6 times/day	100	1	
Did you suffer from any disease	No	310	0.77(0.47-1.25)	0.29
	Yes	122	1	
MDDW	No	205	1.62(1.04-2.50)	0.03**
	Yes	227	1	
Knowledge status	Not knowledgeable	187	1	
	Knowledgeable	245	0.72(0.46-1.13)	0.16
CSI score			0.99(0.97-1.00)	0.14

1 is reference category,
**-statistically significant category at 5% level of significance

5. CONCLUSIONS AND RECCOMENDATIONS

5.1 Conclusions

The research was conducted during April (lent season) and May/June (after lent seasons) of 2021. In total, 27 factories participated in the research employing approximately 40,000 workers, approximately ten per cent of the total workforce of the garment sector. 90% or more of workers are female. The garment sector where the current research conducted is at the three of the industrial parks of the country is an important sector both socially and economically. It generates a significant amount of formal employment, over 45,000 jobs per year amongst approximately 12 factories. It accounts for a significant proportion of GDP.

The current formative health and nutrition research as the first of its kind in the country identified critical health and nutrition situation of the garment workers, the gaps and opportunities that can be harnessed to sustainably improve the livelihood of the garment workers particularly among the female workers working in the industry. The current research identified twelve per cent female garment workers are underweight or thin. The situation is quite worrisome in Adama where twenty-one per cent of the female garment workers are underweight. On the contrary, the prevalence of overweight and obesity (the opposite of thinness) is 11% and 1.4% respectively is quite alarming and one that has passed the current aggregated prevalence for overweight and obesity as 21.0 [20.0-22.0] 0.4 [0.2-0.8] respectably. Furthermore, analysis of the meals provided at the workplace (poor calorie and micronutrient content), an overwhelming micronutrient deficiency as observed from the MDD-W findings, the scarcity of drinking water both at home and at workplace, unhygienic sanitary practices will further expose them for anemic, other

micronutrient deficiency bouts of fentsism [15] or hypoglycemic, recurrent illness such as typhoid, urinary tract infection. All the before and afteer factors or conditions will in turn cause the likelihood of absenteeism due to many or confounding factors, finally resulting for high staff turnover and weaker company's productivity and the economy of the sector and that of the country.

5.2 Recommendations

Based on the finding of this formative research, the following recommendations have been provided for programmatic, policy and research & innovations considerations.

Recommendations

Programmatic and Investment considerations

	Key findings/Challenges	Recommendations/Opportunities
A	Health and WASH	
1	The overall disease prevalence is twenty-eight percent. The high morbidity of communicable diseases and potentially aggravating factors for non-communicable diseases (blood pressure, cardiovascular risk factors and diabetes) has public health significance poses several health risks amongst the garment workers	Providing Fortified food (cereals), fortified salt and oil would Boost the health and productivity of these garment workers Put in place regular health checkups (blood pressure, diabetes, BMI) at the workplace and design different workers wellness activities to boost the health and morale of the employee
2	Water scarcity at the workplace and at household. One in two garment workers in Hawassa reported scarcity of water for drinking at their workplace.	Company management needs to ensure adequate supply of water for drinking (if possible while on duty for those workers with long demanding hours (Ex. operators)) of course during regular mealtimes. Furthermore, company management also ensures all toiletries have constant running water (for washing & toilet flushing)
3	Poor sanitation and unavailability of running water for bathing and cleaning (at household)	IPDC management in collaboration with the Investor Association needs to find ways to bring in WASH development actors in the country and find sustainable solutions to the WASH challenges of industrial workers (safe and hygienic sanitation as well as potable water coverage)
B	Nutrition	
4	Double burden of malnutrition is prevalent among the industrial workers (garment). Both nutrition and over nutrition signal an already poor health and nutrition status of the garment workers with potential consequence of irreversible damage to their health (mortality in worst case scenario) and an economical loss both for the company and for the country in general.	The current situation warrants a holistic system approach from policy design to program implementation (such as Workplace Nutrition) that caters for the need and nutritional requirement of the garment workers. The introduction of workplace nutrition programing can leverage company specific data generated from this research while advocating the different milestones the program would bring to the company (direct impact) as well as for Government stakeholders (IPDC, EIC, MOH)-indirect impact One dollar investment in nutrition has fifteen-dollar return on investment. Furthermore, additional nutrition-related investment lets the company, or the host country achieve SDG 2, 3 and 8[16]. The Investor Association should be oriented with this well researched evidence and should plan to have a comprehensive

[15] PI field observation

[16] SDG2: Zero Hunger, SDG3: Good health and wellbeing, SDG8: Decent work and economic growth

	Key findings/Challenges	Recommendations/Opportunities
		social development plan and CSR that meets their employees, buyer and the host country needs.
5	There seems to be a disparity of knowledge and attitude among the three IP workers when it comes to healthy diets and their implication towards health and productivity. While education seems to be the facilitator for induced strong perception and knowledge about healthy diets, this has not translated into concrete actions (**Evidence:** most of the Adama IP workers were quite knowledgeable & have strong perception about healthy diets but their current nutritional status is poorer compared to the other two IP workers Unavailability of nursing rooms close to the company or centrally located inside the park could likely discourage female workers(breastfeeding) to practice breastfeeding (including EBF)	Messaging around healthy diets (source, hygiene and variety), hand washing and other recommended hygienic practices, exclusive breastfeeding should be developed and consistently delivered as part of the regular SBCC and campaigns (an initial step & if possible is to commemorate the World Breastfeeding Week at the three parks this coming August 1-7) Nutrition partners such as SBN Ethiopia, GAIN, UNICEF, FMOH and Regional Health bureaus can support in financial and technical support in this regard The Regional IPDC management must take concrete steps to realize the establishment & operation of safe nursing rooms/day care to support nursing and working mothers.
C.	**Social security investment & Sustainable investment promotion (SIP) considerations**	
6	Literature review: A relatively high percentage of workers reported belonging to a union, but many report a difficult environment for prospective and as a member of any unions at the workplace or elsewhere	IDH proposed Workers Cooperative model will be quite helpful to alleviate most of their socio-economic as well as nutrition related issues of the industry workers. However, the modus of operandi to actualize the nutrition related investment requires the active involvement of key nutrition players (SBN Ethiopia, ESCN, GAIN, IPDC, MOH, etc.) through operational research.
7	Garment workers budget for food and non-food is quite limited and tight, leaving no space to promote saving and for them to live a decent life Literature review: -the workers-management relation, community perception or acceptance of factories and their workers in the community is lopsided.	In the interim until the proposed WC is fully operational, IPDC consults with other governments can design social security investment funds that is able to cater for pressing needs of the industry workers (loan for housing, soft loans and the likes) Put in place a strong social policy framework, standards, institutional setups and implementation practices to promote social sustainability Provide capacity building training to management and workers on the developed policies, procedures, roles, responsibilities, checklists etc.... to make sure all factory personnel have understood and ready for implementation
D.	**Multi-sectorial approaches & coordination linked to WPN**	
8	Sampled nutrient analysis of the canteen food and what garment a worker ate the night and day before the research shows significant deficiency of both macro and micronutrient. A deficit of energy (around 80%) and 50% deficit in protein. The micronutrient also showed an overwhelming deficit in providing the daily requirement. This is not any near to meeting the daily calorie and nutrient requirements of productive factory worker, a breastfeeding working mother or that of pregnant working mother (who are yet to take maternity leave).	Through PPP partnership involving the WC, the private sector, government and investor association, a WPN agenda can easily be established to improve on the canteen management as well as provide other health related service(health checkups, iron supplementation, workers wellness program(games and other group fun activities) The WPN programing would design and implement Health and Nutrition SOPs, monitoring checklist to be used and implemented by each company management (for the start the 27 companies which showed willingness to be part of the research) A coordination platform needs to be established that oversees the implementation of the WPN and progress of the program(

E. Policy considerations

	Key findings/challenges	Recommendations/opportunities
9	In most visited companies, there are no breastfeeding policies that encourage working moms to breastfeed their children when they are in duty.	Companies would benefit more from productivity of their workers when they put in place women and child centered policy and a friendlier environment that meets the social and nutritional requirement of their employees. Another missing opportunity is also having social security policies that can feed to their Corporate Social Responsibility (CSR) strategy will be a win-win opportunity for the company, its buyers, their employee, the community and the host government.
10	No clear-cut policy supporting or promoting national WPN to be implemented in settings what is known as traditional nutrition intervention nexus.	The SBN Ethiopia has greater leverage to advocate and lobby among the key stakeholders in the country for the introduction and enactment of WPN policy and strategies that will be helpful for successful implementation of the program at scale
11	Anecdotal evidence: Industry workers don't seem to benefit from any community based social safety net programs or other privileges such as price subsidy for food related and non-food items	IPDC is best placed to lobby for the introduction of several incentives that support the livelihood of the workers (saving, health insurance, voucher payment system by subsidizing major food and non-food items)

F. Research & Innovation

	Key findings	Recommendations
12	Absence of robust monitoring and evaluation tools and framework to gauge health and nutritional status of the garment workers and its impact to company's productivity	Factories are advised to have a Research and Development (R&D) unit or put in place an open-door policy for research and development. On top of the many compliances that they have signed up for, the health and nutrition data should be collected rigorously and reported through the appropriate channel to generate national health and nutrition data
13	The current research deduced micronutrient deficiency (iron, Vitamin A) from the nutrient analysis of canteen meals as well as the FCS.	It's good soon to conduct an anemia survey in order to affirm the actual prevalence of using blood samples. Moreover, the current research identified malnutrition as a key barrier, but the research has not established the cost of malnutrition in economics scale both for the company and the host country. So any research that wants to capitalize on the gains of these findings would benefit a lot.
14	A dysfunctional food system at the three IPs	To this end establishing a sustainable food supply chain system from the production area (farmers/farmers association) to companies is fundamental step to go ahead. This helps to improve nutrient and energy intakes of operators. Introduction of culturally acceptable, low cost and locally available foods such as kocho and kocho based food products (e.g. Omolocho), protein rich legumes such as haricot bean, nutrient dense vegetables such as kale and high carb foods such as sweet potato which are among the widely growing food crops in area into the menu is indispensable.

Bibliography

[1] Xiaodi Zhang, Dejene Tezera and et al, "Industrial park development in Ethiopia Case study report," UNIDO, Vienna, 2018.

[2] Ethiopian Industrial Parks Cooperation(IPDC), 11 May 2018. [Online]. Available: https://www.ipdc.gov.et. [Accessed 22 March 2021].

[3] T. Haverkort, "Proof of Concept for Improving Workplace Diets of Garment Workers in Ethiopia," GAIN Ethiopia, Addis Ababa, 2018.

[5] International Labour Organization(ILO), "Improving workers wellbeing in Ethiopia's Garment Industry through the Model of Shared Responsiblity," Zero Vision Fund , Geneva, 2019.

[6] Anon, "Industrial Park Workers Cooperative Program (IPWC)," IDH, Addis Ababa, 2020.

[7] Christina Nyhus Dhillon, "www.gainhealth.org/impact/programmes/workforce-nutritio," 2020. [Online]. Available: https://www.gainhealth.org/impact/programmes/workforce-nutrition. [Accessed 17 March 2021].

[8] A. S. T. a. I. W. Kalle Hirvonen, "Synopsis: Seasonality and household diets in Ethiopia," *ESSP RESEARCH NOTE 42*, pp. 1-2, 2015.

[9] MEASURE EVALUATION, "Lot Quality Assurance Sampling Measures Performance," [Online]. Available: www.measureevaluation.org. [Accessed 10 June 2021].

[10] FAO/WHO Ad Hoc Expert Committee, Joint FAO/WHO/UNU Expert Consultation on Energy and Protein Requirements, Rome : FAO, 1973.

[11] . WHO and UNICEF, "Global Breastfeeding Scorecard, 2023," 2023.

[12] K. Sherif, "BOARD OF GOVERNORS (BGOV) BOARD OF DIRECTORS (BDIR)".

[13] M. Shekar, J. Kakietek, J. Dayton Eberwein and D. Walters, An Investment Framework for Nutrition: Reaching the Global Targets for Stunting, Anemia, Breastfeeding, and Wasting, Washington, DC: World Bank, 2017.

[14] N. A. Mota, M. Aparicio Gómez, M. Marco Ibáñez, V. Sanjuán Sánchez and N. Angulo Mota, "Nutrition at the Workplace and Health Promotion Activities: Systematic Review," 2018.

[15] J. Garrett and B. International, "Volume II Resources Isabel de la Peña, IFAD Nutrition-sensitive value chains A guide for project design".

[16] P. Drummond, V. Thakoor and S. Yu, "Multi-Sectoral Nutrition Action Plan," 2018.

[17] H. Dr. Rukhsana, "General Adolescent Nutrition: A Review of the Situation in Selected South-East Asian Countries," 2006.

[18] I. De La Peña and J. Garrett, "Nutrition-sensitive value chains A guide for project design Volume I".

[19] K. Beesabathuni, "INNOVATIVE FINANCING FOR NUTRITION," 2016.

[20] P. :. Bartay, "EMPOWERING WOMEN THROUGH NUTRITION-SENSITIVE AGRICULTURE".

[21] N. Ahmed, I. Barnett, R. Longhurst and A. Khan University, "DETERMINANTS OF CHILD UNDERNUTRITION IN BANGLADESH LITERATURE REVIEW MQSUN REPORT MQSUN partners are," 2015.

[22] S. Adelman and D. Gilligan, "How effective are food for education programs?: A critical assessment of the evidence from developing countries," 2008.

[34] "We shall strive to create food and nutrition self-reliant Ethiopia 01 Food and Nutrition Policy Federal Democratic Republic of Ethiopia," 2018.

[48] "The Banking on Nutrition Partnership Progress Report 2015-2020 Investing in Grey Matter Infrastructure with $2.3 billion in nutrition-smart projects," 2021.

[50] "Strengthening the Humanitarian-Development Nexus for Nutrition in Ethiopia".

[52] "STANDARD OPERATING PROCEDURE: PROGRAMME".

[55] "SEA-NUT-163 Distribution: General Adolescent Nutrition: A Review of the Situation in Selected South-East Asian Countries ii Adolescent Nutrition: A Review of the Situation in Selected South-East Asian Countries".

[61] "PROGRAMMING FOR ADOLESCENTS Why should WFP do more?".

[66] "Nutrition Sensitive Agriculture Strategy Ministry of Agriculture and Natural Resource (MoANR) And Ministry of Livestock and Fisheries (MoLF)," 2016.

[70] "Nutrition Capacity Assessment Guidance Package-Part II Tools and Resources," 2016.

[72] "NATIONAL ADOLESCENT AND YOUTH HEALTH STRATEGY □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□ Federal Democratic Republic of Ethiopia Ministry of Health FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA MINISTRY OF HEALTH," 2016.

[73] "Malabo Declaration on Accelerated AGRICULTURAL GROWTH and Transformation for Shared Prosperity and Improved Livelihoods".

[76] "KEY RECOMMENDATIONS FOR IMPROVING NUTRITION THROUGH AGRICULTURE AND FOOD SYSTEMS".

[77] "Institutional Capacity Assessment on Nutrition in Indonesia".

[92] "GUIDANCE NOTE ON INTEGRATION OF NUTRITION IN THE UNITED NATIONS DEVELOPMENT ASSISTANCE FRAMEWORK A Guidance Note for United Nations Country Teams United Nations System Standing Committee on Nutrition UNSCN," 2017.

[93] "Guidance Note," 2016.

[94] "GtN GENDER STRATEGY 1".

[95] Global capacity needs assessment methodology, FAO, 2020.

[100] "Gender in Multisectoral Nutrition Action Plans Developing and reviewing nutrition plans through a gender lens Why consider gender in nutrition action plans?," 2019.

[101] "Foreword Acknowledgments".

[103] "Feed Africa Strategy for agricultural transformation in Africa 2016-2025," 2016.

[104] "FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA NATIONAL NUTRITION PROGRAM," 2016.

[109] "Ethiopia Demographic and Health Survey," 2016.

[110] "Ethiopia".

[120] "Developing gender-sensitive value chains Guidelines for practitioners".

[121] "Current progress and looking ahead ADOLESCENT NUTRITION".

[122] "Comprehensive and Integrated Nutrition Services Delivery Guideline for the Pastoral and Agro-pastoral Communities of Ethiopia (PCINS) Federal Ministry of Health," 2020.

[123] "Catalyzing youth opportunity across Africa Jobs for Youth in Africa".

[124] "Capacity needs assessment for nutrition monitoring, evaluation and policy research in Ethiopia," 2020.

[141] "adolescent nutrition Policy and programming in SUN+ countries," 2015.

[147] "4th Report − The World Nutrition Situation: Nutrition throughout the Life Cycle".

Appendix 1: Household Questionnaire

Informed Consent for Industrial Park Workers

Selam/Good day, my name is _____. I work for a local consulting firm based in Addis Ababa. At present we are conducting a baseline survey of Knowledge, Attitude, Practice, Behavior (KAPB), and Food Supply System around nutritious and safe food consumption among Hawassa, Adama and Bole Lemi Industrial Park Workers to identify the nutrient gap in the existing diet of the workers in each individual factory. Based on the assessment, standard dietary guidelines for the individual factory considering the cost and availability of food served will be developed and shared to address the dietary gap.

Confidentiality of your information will be maintained strictly. Your name and identity will never be disclosed anywhere by any means and all the information will be used for research purpose only. Participation in this survey is voluntary and you can choose not to answer any individual question or all of the questions at any point of survey even after your consent. It will take 30-45 minutes to complete the interview.

Now, if you agree to participate, I would like to ask you some questions about your perception, knowledge and practice related nutritious diet and safe food.

RESPONDENT AGREES TO BE INTERVIEWED 1 ↓ RESPONDENT DOES NOT AGREE TO BE INTERVIEWED → 2 END

Respondent's Signature: _____

Interviewer's/ Facilitator's Name: _____

Date _____/_____/_____

A. General Information

Name of the Industrial Park (Hawassa/Bole Lemi)		Name of the Factory/Industry	
		Shade number #_____	
Name of the Respondent			
Name of Interviewer		Signature of interviewer	
Date of interview	d d m m y y	Start Time of interview	____/____ AM/ PM
GPS location			

B: SOCIO-DEMOGRAPHIC CHARACTERISTICS

No.	Questions & Filters	Coding Categories	Code	Skip
1	Respondent's age (Years)	**_____Years**		
2	Sex	Male Female	1 2	
4.	Job section	Cutting	1	
		Sewing	2	
		Finishing	3	
		Quality Inspection	4	
		Others_____		
5.	How many years are you in this job/factory?	_____ Years		
6	How many years are you in this profession?	_____ Months		
7	What is your marital status?	Married	1	
		single	2	
		Divorced	3	
		In cohabitation	4	
		Temporality separated	5	
8	Have you ever been to school?	Yes	1	
		No	2	
9	Which is the highest class that you have passed?	……..(class)		
10	What religion do you follow?	Orthodox	1	
		Protestant	2	
		Islam	3	
		Others (specify…)	97	
11	How many members are in your household/roommates?	_____		
12	How many earners are in your household/roommates?	_____		
13	What is your average monthly income?	Main Salary(Net) _____Birr Overtime _____Birr Bonus _____Birr Food allowance		

		_____Birr Other income _____Birr		
14	What is your household's /dorm mates average monthly income?	_____ (Birr)		
14.1	On an average how many hours do you work per day, per week?	_____(hour)Per day _____(hour)Per week		
15	While working here did you send money or any other things to your home?	Yes No	1 2	
15.1	If yes, on an average how much money/things did you send in a month?	_____(Birr) (Things)		
16	While working here did you receive money or any other things from your family?	Yes No	1 2	
16.1	If yes, on an average how much money/things did you receive in a month?	_____(Birr) (Things)		
17	Current address:	Kebele: Special location:		
18	What is your original address?	Kebele: Woreda: Region:		

Section C: Health and WASH Characteristics

No.	Questions & Filters	Coding Categories	Code	Skip
1	Are you currently breastfeeding?	**Yes** **No**	1 2	
2	Are you pregnant?	**Yes** **No**	1 2	If No skip to Q 10
2.1	If yes, which trimester do you belong to or number of months of your pregnancy?	First trimester Second trimester Third trimester	1 2 3	
3	What is the main source of drinking water in your household?	Tap water/ Supply Water	1	
		Filter	2	
		Pond/river	3	
		Tube well	4	
		Well	5	

No.	Questions & Filters	Coding Categories	Code	Skip
		Others (specify...)	97	
4	Scarcity of water:			
	For your bathing at home?	Yes, always Yes, sometimes Yes rarely No	1 2 3 4	
	For cooking at home?	Yes, always Yes, sometimes Yes rarely No	1 2 3 4	
	For drinking at the factory?	Yes, always Yes, sometimes Yes rarely No	1 2 3 4	
	For cleaning at the factory?	Yes, always Yes, sometimes Yes rarely No	1 2 3 4	
5	What is the type of toilet facility that your household has? **Check the structure of the toilet, how it is being shared and the management of safe disposal of feces	Improved-Safely managed	1	
		Improved- basic	2	
		Improved- limited	3	
		Unimproved latrine	4	
		Open defecation	5	

No.	Questions & Filters	Coding Categories	Code	Skip
6	Did you suffer from any disease **in the last 30 days**? (if the answer is no, move to question no 38.1)	Yes No	01 02 →	

6.1	6.2	6.3

What are the diseases you suffered? (code-1) Start with the latest disease	When was the last time you fell sick?	For each disease how many days did you suffer from it?

Code-1: Types of Diseases

Abdominal problems
Accident related problems
Allergies
Asthma
Backbone difficulties
Breathing problems
Chikungunya
Covid-19
Dengue
Diabetes
Diarrhea
Epilepsy
Eye disease(glaucoma)
Gastritis
Headache
Influenza/common cold
Jaundice
Kidney problems
Knee pain
Migraine
Nasal diseases
Nutritional deficiencies
Paralysis
Sexual diseases
Sinusitis
Strokes
Typhoid
Urinary difficulties

Waist/back pain

No.	Questions & Filters	Coding Categories	Code	Skip
7.	Were you absent from work **since your employment with this company d**ue to sickness/weakness?	Yes No	01 02	
7.1	If the answer is yes, how many days?	_____no. of days		

6.

7.

8. Section D. Knowledge

I am going to ask you now some questions regarding Your Knowledge about food and your dietary habits.

No.	Questions & Filters	Coding Categories	Code	Skip
8	Do you think that the food we eat affects our health? (Ask question and wait for answer. If it is difficult for respondent to respond read the given options)	Yes No Have not thought about it I don't care I don't know Others (specify)	1 2 3 4 5 6	
9	What do you consider to be a healthy dietary habit for you? (yes/ no response for each) (Read each option to the respondent and ask him/her to answer yes/no. Put "Yes=1" and "No=2" according to the answer in the box)	1. Large quantity of food		
		2. Lots of fresh food		
		3. Large variety of food		
		4. Eating hygienic food irrespective of the content		
		5. Eating main meals regularly and not snacking in between		
		6. Less sugar/sugary foods		
		7. Lots of vegetables		
		8. Eating smaller portions		
		9. Using less fat in cooking		
		10. Lots of fruit/ fresh juice		
10	I will give you some examples of foods. What do you think is healthy food and what is not? (yes/ no response for each) (Read each option to the respondent and ask her/him to answer yes/no.	1. Salad and leafy vegetables		
		2. All food which is available (& affordable?)		
		3. Brown Enjera(mixed with different cereal such as sorghum and		

No.	Questions & Filters	Coding Categories	Code	Skip
	Put "Yes=1" and "No=2" according to the answer in the box)	cassava)		
		4. Rice and farinaceous(starchy		
		5. Raw meat/fatty(if taken frequently)		
		6. Sweetened soft drinks (Seven up, coca-cola, pepsi etc)		
		7. Fruits		
		8. Biscuits, cookies, cake		
		9. Palm cooking oil		
		10. Ethiopian vegan dish(fasting food)		
		11. Burger with chips/ Pizza		
		12. Atemite, kinche, Genfo		
		13. Dairy products and fish		
		14. Street foods (fried samosa, chornonke, Bombolino) 15. Chuka/Bursa / Koctho(Omotho) 16. Kocho with kale or served with meat sauce		
11	I will mention some diseases or conditions now. Do you think developing of these conditions is associated with unhealthy diet? (Ask question and wait for answer. If it is difficult for respondent to respond read the given options)	1. Diabetes		
		2. Bone diseases		
		3. Heart diseases		
		4. High blood pressure		
		5. Obesity		
		6. Night blindness		
		7. Dental diseases		
		8. Cancer		
		9. Anemia		
		10. Gastrointestinal disorder		
12	Do you think you and/or dorm mates consumes healthy food at home?	Yes- Very healthy	1	
		Yes- Quite healthy	2	
		No- Not very healthy	3	
		No- Very unhealthy	4	

No.	Questions & Filters	Coding Categories	Code	Skip
		Don't know	98	
13	what about the foods you eat at workplace or canteen?	Very healthy	1	
		Quite healthy	2	
		Not very healthy	3	
		Very unhealthy	4	
		Don't know	98	

14. Healthy diet should contain:

Items	High content	B. Low content	C. Amount is not important for health	D. Don't know	Code
14.1 Salt					
14.2 Sugar					
14.3 Processed food(fruits juice, peanut butter)					
14.4 Fruits & vegetables					
14.5 Fat & cooking oils(palm oil, Sheno Kibe)					

15	Do you think that factory meals are contributing to your improved health and wellbeing (Lunch and/or snacks)?	Yes No	01 02	
15.1	If the answer is yes, evaluate your health improvements according to your perception……	Very much improved improved not so much Not improved Not improved at all	01 02 03 04 05	
15.2	Do you think that factory meals have increased your concentration/ productivity?	Yes No	01 02	
15.3	If the answer is yes, evaluate how much your concentration/productivity on work has increased……	increased very much increased slightly increased not increased Not Increased at all	01 02 03 04 05	

9. Section E: Attitude of Industrial Parks Workers

I am going to ask you now some questions regarding Your Attitude about food and your dietary habits.

1. I will read you some statements. Please, give your opinion regarding those statements. Say if you "strongly agree", "agree," disagree", "strongly disagree" or "neutral".

Give your opinion regarding statements given below:
Put tick (√) in the appropriate box. The answer can be only one for each statement.

	Statements	A. Strongly Agree	B Agree	C. Disagree	D. Strongly disagree	E. DK	Code
1.1	Healthy food is important.						
1.2	I really care about what I eat.						
1.3	Healthy food is for sick people.						
1.4	Healthy food is more costly than regular food.						
1.5	If you have any malnutrition symptoms like anemia you need to eat more organ meat, beans, seafood, whole grains, etc.						
1.6	Green leafy vegetables, carrots, eggs and nuts help to prevent night blindness.						
1.7	Intake of fresh fruits and vegetables, low-fat milk, fish, nuts, whole grains helps to reduce heart diseases.						
1.8	I always think of the calories in what I eat.						
1.9	Soft drinks are good to boost energy and productivity at the workplace.						
1.10	When I become ill it's a matter of fate.						
1.11	I can stay healthy by eating nutritious food and taking care of myself.						
1.12	Nutritious food is only for rich people.						

No.	Questions & Filters	Coding Categories	Code	Skip
2	Where do you get your nutrition information? (Multiple answers question) (Ask question and wait for answer. If it is difficult for respondent to	1. Own mother, mother in law, other relatives		
		2. Friends, neighbors		
		3. Co-worker or follower		

	respond read the given options) (Put "Yes=1" and "No=2" according to the answer in the box)	4. TV, newspapers, Radio		
		5. Books		
		6. Internet & social media		
		7. Others (specify)		
		8. I do not have nutrition information		
		9. Don't know		
3	If you feel you have inadequate knowledge regarding which foods are good or bad for your health, what do you do? (Ask question and wait for answer. If it is difficult for respondent to respond read the given options) (Yes=1, 2 =No; Don't know=98)	1. I will ask someone who knows		
		2. I will try to read it somewhere		
		3. If the doctor hasn't told me anything it means it is not important		
		4. I don't know where to search and whom to ask		
		5. I can manage my food habits and nutrition without such knowledge		
		6. Never thought about it before		
		7. Others(specify)		
		8. Don't know		
4	What factors might hinder from not eating healthier food? (Barriers) (Multiple answers question) (Ask question and wait for answer. If it is difficult for respondent to respond read the given options)	1. No difficulty trying to eat healthier		
		2. Cooking skills		
		3. Don't know enough about healthy eating		
		4. Busy lifestyle		
		5. Taste preferences of household members		
		6. I don't want to give up foods that I like		
		7. Price of healthy foods		
		8. Market location		
		9. Lack of will power		
		10. Others (specify)		
		11. Don't know		
5	Which factors could support you to eat healthier food? (Booster) **(Multiple answers question)** *(Ask question and wait for answer. If*	1. Own ill health		
		2. Advice from a doctor or nurse		
		3. Disease or death of a close relative		
		4. More money and/or increased availability of healthier food		

	it is difficult for respondent to respond read the given options)	5. being less expensive		
		6. Less busy lifestyles/more time to cook		
		7. Family members eating healthier food		
		8. Market location		
		9. Better information about food/ healthy eating		
		10. knowledge on purchasing nutritious food with limited money		
		11. Availability of health food at workplace		
		12. Better cooking skills		
		13. Something else(specify)		

Section F: Food and Non-food Expenditure/ Practice

Food & nonfood Expenditure (Last 1-month expenditure of the RESPONDENT)

1	Food Expenditure	Total Expense	Purchase from: Gulit (1=Yes; 2=NO)		1	Non-food Expenditure	Total Expense
1.1	Rice/macaroni/pasta				1.1	House Rent	
1.2	Wheat				1.2	Transport	
1.3	Teff				1.3	Study	
	Maize, sorghum etc					Cosmetics	
1.4	Pulses & legumes				1.4	Entertainment	
1.4	Cooking oil				1.5	Medical expense	
1.5	Leafy vegetables (Kale, cabbage, etc)				1.6	Hair dressing	
					1.7	Cloths	
1.6	Roots and tubers				1.8	Sanitary pads	
1.7	Meat/Egg/Milk & dairy (i.e. yoghurt, cheese)				1.9	Others	
1.8	Fruits						
1.9	Fish						
1.10	Spices						
1.11	Sugar						
1.12	Coffee						
1.13	Sweets						
1.14	Biscuits, cakes and pastries(samosa, bombolino, etc)						
1.15	Tea-leaves						
1.16	Soft drinks						
1.17	Bottled juice						
1.18	Bread						
1.19	Enjera						

1.20	Salt						
1.21	Others (specify)…						
	Total=	Total=				Total=	Total=

Section G: Minimum Dietary Diversity for Women(MDDW)- 24-h Recall/Practice

	No.	Questions	Ate yesterday? (1= yes; 2=No)
2.1	**Grains, white roots and tubers, and plantains**	Teff, maize, rice, wheat, sorghum, millet, breads, pasta, noodles, porridges White potatoes, white yam, white cassava, or other foods made from roots	
2.2	**Pulses (beans, peas and lentils)**	Dried beans, dried peas, lentils, soybeans, or foods made from these	
2.3	**Nuts and seeds**	Dried beans, dried peas, lentils, soybeans, or foods made from these	
51.4	**Milk and milk products**	Milk, cheese, yogurt or other dairy products	
51.5	**Meat, poultry and fish**	Beef, pork, lamb, goat, chicken and fish	
51.7	**Eggs**	Eggs from chicken, duck, guinea fowl or other animal	
51.8	**Dark green leafy vegetables**	Habesha gommen, spinach	
51.9	**Other vitamin A-rich fruits and vegetables**	Mango, papaya and Pumpkin, carrot, squash, or sweet potato that are orange inside	
51.10	**Other vegetables**	Tomato, onion, eggplant, broccolli	
51.11	**Other fruits**	Avocado, banana, apple	

Section H: FCS

Over the last 7 days, how many days did your household consume the following foods?

	No.	Questions	# of days	Where did you buy the foods from?
3.1	**Grains, white roots and tubers, and plantains**	Teff, maize, rice, wheat, sorghum, millet, breads, pasta, noodles, porridges White potatoes, white yam, white cassava, or other foods made from roots		
3.2	**Pulses (beans, peas and lentils)**	Dried beans, dried peas, lentils, soybeans, or foods made from these		
3.3	**Nuts and seeds**	Dried beans, dried peas, lentils, soybeans, or foods made from these		
3.4	**Milk and milk products**	Milk, cheese, yogurt or other dairy products		
3.5	**Meat, poultry and fish**	Beef, pork, lamb, goat, chicken and fish		
3.7	**Eggs**	Eggs from chicken, duck, guinea fowl or other animal		
3.8	**Dark green leafy vegetables**	Habesha gommen, spinach		
3.9	**Other vitamin A-rich fruits and vegetables**	Mango, papaya and Pumpkin, carrot, squash, or sweet potato that are orange inside		
3.10	**Other vegetables**	Tomato, onion, eggplant, broccolli		
3.11	**Other fruits**	Avocado, banana, apple		
3.12	**Oils and fats**	Oils, fats or butter added to food or used for cooking		

3.13	**Sweets and confectionery**	Sugar, honey, and sugary foods such as chocolates, candies, cookies and cakes or pastries		
3.14	**Salty snacks & fried foods**	Crisps, chips, cheese puffs, crackers, pretzels or other savory snacks not included elsewhere		

Section I: Food Insecurity Experience Scale (FIES)

Now I would like to ask you some questions about your challenging experience/time to put food on table

No.	Questions & Filters	Coding Categories	10. Code
1	During the last 3 MONTHS, was there a time when you were worried you would not have enough food to eat because of a lack of money or other resources? (WORRIED)	Yes No Don't Know Refused	1 2 98 99
2	Still thinking about the last 3 MONTHS, was there a time when you were unable to eat healthy and nutritious food because of a lack of money or other resources? (HEALTHY)	Yes No Don't Know Refused	1 2 98 99
3	Was there a time when you ate only a few kinds of foods because of a lack of money or other resources? (FEW FOODS ex. Kita or raw enjera without no sauce)	Yes No Don't Know Refused	1 2 98 99
4	Was there a time when you had to skip a meal because there was not enough money or other resources to get food? (SKIPPED)	Yes No Don't Know Refused	1 2 98 99
5	Still thinking about the last 3 MONTHS, was there a time when you ate less than you thought you should because of a lack of money or other resources? (ATE LESS)	Yes No Don't Know Refused	1 2 98 99

6	Was there a time when your household ran out of food because of a lack of money or other resources? (RAN OUT)	Yes No Don't Know Refused	1 2 98 99
7	Was there a time when you were hungry but did not eat because there was not enough money or other resources for food? (HUNGRY)	Yes No Don't Know Refused	1 2 98 99
8	During the last 3 MONTHS, was there a time when you went without eating for a whole day because of a lack of money or other resources? (WHOLE DAY)	Yes No Don't Know Refused	1 2 98 99

Section J: Copying Strategy Index (CSI)

1. In the past 30 days, if there have been times when you don't have enough food or money to buy food, how often has your household had to

Coping options	Frequencies				
	Every day	3-6 times/per week	Once or twice	Less than 1	Never
1.1 Rely on less preferred and less expensive foods?					
1.2Consume less variety of food?					
1.3Borrow food from a friend or relative?					
1.4Purchase food on credit?					
1.5Depend on aid from outside the household?					
1.6Use part of savings to buy food?					
1.7Sell assets to buy food?					
1.8 Reduce health or education expenditure to buy food?					
1.9 Skip a loan payment?					
1.10 Find other income generating options					

including begging and prostitutions?					
1.11 Limit portion size at mealtimes?					
1.12 Reduce number of meals eaten in a day?					
1.13 Skip entire days without eating					

Section H: Anthropometry

No	Height (cm)	Weight (Kg)	Weight status 1=Empty Stomach 2= After food	Measurement of Mid Upper Arm Circumference (MUAC) (mm) [If the worker is pregnant]	Measurement status? 1=Yes 2=No 3= Sick 4= not willing 5=Other
1					
2					
3					
Average					

Appendix 2: Key Informants Interview Guides

KII Questionnaire	Company Management(Admin Head, CEO/GM)
Name of the Park	
Name of the company	
NO. OF PARTICIPANTS	
DATE OF INTERVIEW	

Interview Block	Construct	Question	Follow-up Probes
Food provision & Recruitment policy	Staffing	**1. How many staff do you have?**	Management staff? Operators?
	Canteen management	**2. Are the logistics of food provision and distribution, and establish canteen rules considered to maximize efficiency?**	a) Who buys food? b) Do you buy foods from local market? c) Do the same team that prepares food involve in the clean-up tasks?
		3. What is your opinion on investments in proper equipment?	Do proper equipment and procedures used in cooking? Do you use same utensils to proper more than one food item?
	Kitchen facility	**4. Do you have any on-site food preparation facility (kitchen) and canteen or do you outsource food?**	Is the caterer from where you outsource food is located nearby? Is the food being outsourced nutritious, reasonable, and hygienic?
	Canteen	**5. Can your canteen serve food all workers at the same time or do you serve food on batches?**	Are the foods prepared the same for all the employees?
	Snack	**6. Do you provide any snack item in the afternoon or mid-morning?**	What do you provide as snacks? What do you provide as lunch?
	Vendor selection	**7. How do you select/get food vendors?**	Whole sellers? Retailers? Farmers?
Food Quality and Safety	Food Quality	**8. Do you think that the food you provide is nutritious?**	What do you understand by nutritious and healthy diet?
	Dietary Diversity	**9. Do you provide a balanced diet containing all food groups?**	a) Is the diet monotonous or sufficiently diverse food choices are offered? b) Do you serve seasonal fruits and vegetables?

	Food Quality	**10. Do you provide fresh foods?**	Do you provide fresh vegetables? Do you provide fresh fish and poultry?
	Safety of drinking water	**11. Do you provide clean and safe drinking water?**	Where movement restricted for female workers, how this affects water consumption
Food Distribution and Management	Food Distribution	**12. Is the choice of location appropriate (where food is prepared and served)?** **13. Do the eating area have comforting environment??**	Is the place where food is served is near or within the factory? Is the canteen eating area clean, well lit, and ventilated with enough tables, chairs and benches for workers
		14. How the food is being served?	Do you serve all workers at the same time or in small groups? Are there any shifts maintain to serve in all beneficiaries?
	Time allowed for food Consumption	**15. Do all the beneficiaries have sufficient time to receive and eat the food?**	
	Eating time	**16. Is enough time to eat is allowed to the workers?**	Can all workers finish eating within the time allowed?
		17. Do the eating area have comfortable environment??	Is the canteen eating area clean, well lit, and ventilated with enough tables, chairs and benches for workers
	Leftovers	**18. How do you manage leftovers?**	Do you keep leftovers or get rid of it? How the left overs are being used?
	Interest to Invest	**19. Will you be interested to invest more to improve the meal quality?**	What will be the amount you are willing to pay for the meal? Will you pay for more than one meal? Will you pay for snacks during the overtime?
Health policy	Health checkups and Breastfeeding/lactation room & child care	**20. Do you have a robust health and nutrition policy or standard operating procedure?**	Do you allow or provide maternity leave for workers? Do you have a breastfeeding/nursing rooms or day care centers? Are you willing to invest more on health and nutrition for your workers?
COVID-19 pandemic	Food Quality	**21. Food that you provided during pandemic is fresh?**	Do you provide fresh vegetable to the workers during pandemic? Do you provide fresh meat and fish during the pandemic?
	Disinfect the Food	**22. Do you disinfect the food properly after purchasing from the market?**	Does the person involve in food preparation wash and clean their hands properly?
	Food Cost and Availability	**23. Do you face any difficulties to purchase the food?**	Do you have to spend more money to purchase the food during COVID-19 pandemic?

			Do you have to store food because of the unavailability of food supply and high price?
	Other Ideas	**24. What else do you feel you want to mention now?**	
Closing questions			

KII Questionnaire	**Human resource Management(HR and Admin)**
Name of the Park	
Name of the company	
NO. OF PARTICIPANTS	
DATE OF INTERVIEW	

Interview Block	Construct	Question	Follow-up Probes
Introductory Icebreaker questions	Role and experience	**1. Please describe to me your professional role.**	What has interested you in this role? What roles have led you to this point? What has your educational path been like?
HR policy and investment plans	Sick Leave	**2. Are there any specific seasons when you see a rise in sick leave?**	Do staffs get reasonable sick leave? What is the procedure? How do you ensure the work continues when one is on sick leave?
	Salary scale	**3. How much do operators earn on average?**	What is the gross and net income on average for operators? How much does the company deduct as food allowance?

			Do the company also provide transportation allowance?
	Absenteeism &/or staff turn over	**4. Do you face any absenteeism or staff turnover?**	What is the percentage of staff turnover? What are the causes and remedy the company has come up with?
	Maternity Breastfeeding/nursing room Child care	**5. Does your company provide and support workers with healthy environment?**	Do your company policy allow female workers to breastfeed onsite?
			Are you willing in the future to invest in providing nursing rooms, child care centers for both breastfeeding and expectant female workers?
			What about providing regular health checkup for all employees? Ex. Blood pressure, diabetes
	Other Ideas	**6. What else do you feel you want to mention now?**	

Thank you for your time and information

KII Questionnaire	Company Clinic(nurse and office in charge)
Name of the Park	
Name of the company	
NO. OF PARTICIPANTS	
DATE OF INTERVIEW	

Interview Block	Construct	Question	Follow-up Probes
Introductory Icebreaker questions	Role and experience	**1. Please describe to me your professional role.**	What has interested you in this role? What roles have led you to this point? What has your educational path been like?
Morbidity	Disease prevalence	**2. What are the top 10 diseases affecting most workers?**	Are there any seasonality differences? Are there any difference by gender? Roles?
		3. What kind of service does your clinic provide?	In patient? Outpatient?
	Occupational health and safety	**4. Are there any reported occupational accidents reported in this clinic since your employment?**	What are those incidents?
Mortality		**5. Have there been a time when there has**	At facility level? At community level?

		been incidence of death reported?	
	Other Ideas	**6. What else do you feel you want to mention now?**	

Food Supply KII

KII Questionnaire	**Canteen Management(outsourced and serving person in charge)**
Name of the Park	
Name of the company	
NO. OF PARTICIPANTS	
DATE OF INTERVIEW	

Interview Block	Construct	Question	Follow-up Probes
Introductory Icebreaker questions	Role and experience	**1. Please describe to me your professional role.**	What has interested you in this role? What roles have led you to this point? What has your educational path been like?
Food Provision	Culturally appropriate menu	**2. Do you provide culturally appropriate foods to the workers?**	What is the alternative to beef provided to the Hindu workers or workers who do not consume beef?
	Kitchen facility & storage	**3. How do you supply meals to the factory?**	Where do you prepare the meals? Is it in the in-house kitchen of the factory? Do you cook meals in your own external kitchen and supply it to the factory? How do you store foods? Do you use cold chains for perishable food products?
	food choice	**4. Who selects what food to be cooked, is it you or the management?**	Do you have the freedom to select menus? Are you satisfied with menus selected by the management? Do you consider workers' food preferences when planning the menu? What factors influence menu planning?
		5. Is the choice of food appropriate to the	Are the workers satisfied by the menu you provide?

		workers?	Are the workers satisfied by the taste of the food you cook?
	Food purchase , preparation and clean-ups	**6. Is there any effective planning of food purchase, preparation and clean-up?**	d) Who buys food? e) Do you buy foods from local markets? f) Who buys kitchen equipment? g) Do the same team that prepare food involve in the clean-up tasks?
	Kitchen equipment, areas and meal preparation time	**7. Do you have enough kitchen equipment?** **8. Do you get enough time to cook the meals?** **9. Is the kitchen area spacious?**	Do you have enough utensils to prepare food? Do you use the same utensils to prepare different food items? Do you follow proper food handling & cooking procedures? Do you get enough space to prepare and cook meals?
	Serving food	**10. Who serves meals to the workers?**	Do you serve meals directly to the workers or does the factory have its own arrangements? Are you satisfied with the size, environment and sitting arrangement of the area where food is being served? Is the serving area and kitchen distance convenient for you? How do you serve snacks in the factory (cafeteria/vending machines…)?
	Canteen	**11. Do you manage a canteen?**	Are your canteen staffs trained on catering? Can your canteen serve food to all workers at the same time or do you serve food in batches? Do you serve any snack items in your canteen? Is there any diversity in snacks? If yes, which snacks do the workers prefer the most? Who pays for the snacks, workers or the management?
Food Quality and Safety	Food Quality	**12. What do you think about the quality of the meals you cook?** **13. Do you think the meals you prepare contribute to a balanced diet?** **14. Do you provide fresh foods?** **15. What do the workers think about your cooking quality?**	Is the meal nutritionally rich? What do you understand by nutritious and healthy diet? Can you give me an examples of these healthy foods? What about unhealthy foods? Do you think the menu provided is a balanced diet? Is the menu sufficiently diverse? Do you serve seasonal fruits, how often? Do you provide fresh vegetables? Do you provide fresh fish and poultry? Eggs, milk & dairy? Are the workers satisfied with the taste and VARIETY of the food you provide?
	Status of Cooking	**16. Do you follow proper cooking methods while preparing meals?**	Do you use proper temperatures and cooking methods while cooking?

			Is all food cooked thoroughly? Ask for examples: how do they cook meat & fish?
		17. Are appropriate condiments/spices used in cooking foods? Are they used in proper amounts?	Do you use proper amounts of spices/condiments and others ingredients in the meals cooked? What about fats and oils?
	Safety of drinking water	**18. Do you provide clean and safe drinking water?**	How do you purify water? Do you boil water properly before serving?
	Hygiene	**19. Are proper hygienic conditions maintained when food is prepared & SERVED?**	a) Do you wash your hands properly before preparing and cooking meals? b) Do you cover your head while cooking? Masks and gloves? c) Do you use clean and safe water to wash and cook food)? d) Are raw and cooked foods kept separately both during storage and preparation?
Food Distribution and Management	Food Distribution	**20. Is the choice of location appropriate (where food is prepared and served)?**	Is the place where food is served is near or within the factory?
		21. How is the food being served?	Do you serve all workers at the same time or in small groups? Are there any shifts maintain to serve in all beneficiaries? Rephrase
		22. Do the eating areas have comforting environment??	Is the canteen eating area clean, well lit, and ventilated, with enough tables, chairs and benches for workers
		23. How do you manage leftovers?	Do you keep leftovers or get rid of it? How are the left overs being used?
	Willingness to improve/change the menu	**24. Are you interested to improve/change the meals provided/ menu?**	What factors need to be considered to improve meals?
COVID-19 pandemic	Food Quality	**25. Is fresh food being provided during the pandemic?**	Do you provide fresh vegetables/fruits to the workers during pandemic? Do you provide fresh meat and fish during the pandemic? Eggs, milk & dairy
	Disinfect the Food	**26. Do you disinfect the food properly after purchasing from the market?**	Does the person involved in food preparation wash and clean their hands properly? Do they use head covering and hand gloves while cooking? & MASKS Do they boil or cook food properly? Are raw and cooked foods kept separately from each other? Are cooking and distribution surfaces being cleaned regularly?

	Food Cost and Availability	**27. Do you face any difficulties to purchase the food?**	Do you have to spend more money to purchase the food during COVID-19 pandemic? Do you have to store food because of the dysfunctional food supply and high price?
Closing questions	Other Ideas	**28. What else do you feel you want to mention now?**	
Thank you for your time and information			

. ASSESSMENT OF LUNCH MENU AT FACTORY

Composition of regular lunch meals served at readymade garment factories by factory

Food Name	**Serving size**	**Servings/ week**	**Cost/Unit (Birr)**
Whole meal (Cost)			

D. ASSESSMENT OF SNACKS AT FACTORY

Food Name	**Serving size**	**Servings/ week**	**Cost/unit (Birr)**

KII Questionnaire	IPDC(Federal and Regional Management and office in charge)
Name of the Park	
Name of the company	
NO. OF PARTICIPANTS	
DATE OF INTERVIEW	

Interview Block	Construct	Question	Follow-up Probes
Introductory Icebreaker questions	Role and experience	**1. Please describe to me your professional role.**	What has interested you in this role? What roles have led you to this point? What has your educational path been like?
Cooperative model for park workers?	Park management	**2. How many companies are currently working?**	National versus multinationals? Which companies provide/has canteen?
		3. What are the current produces by these companies?	Stakeholders involved apart from IPDC and tenants? Goods/volume of trade and investments
	I	**4. What is the current cooperative workers model for parkers?**	Main actors involved? IPDC plans, timeline and resource needed to implement
Health and nutrition investment		**5. Is IPDC willing to invest more on activities that would ensure staff wellbeing(health and nutrition) and women-child friendly work space?**	What are the socioeconomic investment or suitability framework of the park? Any plans for have one centralized canteen providing ready-made meals for all companies? Any plans to invest on nursing rooms, child care centers for the female workers and their infants?
	Other ideas	**6. What else do you feel you want to mention now?**	

ASSESSMENT OF FOOD SALE BY SHOPS NEAR OPERATORS RESIDENCE

Food Name	Unit Name	Price in Plan International supported Shop	Price in Local Market	Price Variation	Quantity/Units stocked	Sold/day	How often the product is re-stocked (1= Weekly, 2= Fortnightly, 3= Monthly)

Appendix 3: Ethical clearance letter

ሀዋሳ ዩኒቨርሲቲ
ህክምናና ጤና ሳይንስ ኮሌጅ
የምርምር ስነ-ምግባር ገምጋሚ ቦርድ

HAWASSA UNIVERSITY
COLLEGE OF MEDICINE AND HEALTH SCIENCES
Institutional Review Board

Ref. No: IRB/078/13
Date: 08/03/2021

Meeting No: 08/2013

Name of Researcher(s): **Asmelash Rezene, Abinet Tekle**

Topic of Proposal: ***Baseline survey of knowledge, attitude, practice, behavior (KAPB) and food supply system around nutritious and safe food consumption among Hawassa and Bole Lemi Industrial Park Garment Workers***

Dear researcher(s),

The Institutional Review Board (IRB) at the College of Medicine and Health Sciences of Hawassa University has reviewed the aforementioned research protocol with special emphasis on the following points:

1. Are all principles considered?
   - 1.1. Respect for persons: Yes ☑ No ☐
   - 1.2. Beneficence: Yes ☑ No ☐
   - 1.3. Justice: Yes ☑ No ☐
2. Are the objectives of the study ethically achievable? Yes ☑ No ☐
3. Are the proposed research methods ethically sound? Yes ☑ No ☐

Based on the aforementioned ethical assessment, the IRB has:

- **A.** Approved the proposal for implementation ☑ -Approval period from **Mar 8/ 2021** to **Jul 7 /2021**
- B. Conditionally Approved ☐ -Element Approved: **Protocol Version No.** 1
- **C.** Not Approved ☐ -Follow up report expected in **6 months**

Obligation of the PI:

1. Should comply with the standard international and national scientific and ethical guidelines
2. All amendment and changes made in protocol and consent form needs IRB approval
3. The PI should report SAE within 3 days of the event
4. End of study, including manuscript should be reported to the IRB

Yours faithfully,

Dawit Jember (Asst. Prof.)
Institutional Review Board Chairperson.

☎ +046 820 92 90 Fax: +046 2208755 ✉ 1560
Hawassa