International Labour Organization

A case study of drivers and constraints for occupational safety and health improvement in the ginger global value chain from Myanmar

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Acronyms

AFFM-IUF	Agriculture and Farmer Federation of Myanmar (Food Allied Workers)
AMD	Agriculture Mechanization Department
BSC	Broker Sales Centre
CBI	Centre for the Promotion of Imports from Developing Countries
CEPA	Cambridge Economic Policy Associates
CTUM	Confederation of Trade Unions of Myanmar
DoA	Department of Agriculture
EU	European Union
FAO	Food and Agriculture Organization
FGD	Focus Group Discussion
FGLLID	Factories and General Labour Laws Inspection Department
G7	The Group of Seven
G20	The Group of Twenty
GLOBALG.A.P.	Standard for Good Agricultural Practices
GMP	Good Manufacturing Practices
GRASP	GlobalG.A.P. Risk Assessment on Social Practices
GSCs	Global Supply Chains
HACCP	Hazard Analysis and Critical Control Points
ICCO	Interchurch Organization for Development Cooperation
ILO	The International Labour Organization
ITC	International Trade Centre
KIT	The Royal Tropical Institute
LIFT	Livelihoods and Food Security Trust Fund
MFSPEA	Myanmar Fertilizer, Seed and Pesticides Entrepreneurs Association
MoALI	Ministry of Agriculture, Livestock and Irrigation
MOLIP	Myanmar's Ministry of Labour, Immigration and Population
MT	Metric ton
OSH	Occupational Safety and Health
OSH-GAP	Global Action for Prevention on Occupational Safety and Health
PAH	Polycyclic aromatic hydrocarbon
PCI	Private compliance initiative
PPD	Plant Protection Division of the Ministry of Agriculture, Livestock and Irrigation
PPE	Personal Protective Equipment
PST	Pesticide Selection Tool
SSB	Social security board
SSI	Sustainable Spices Initiative
SSP	Sustainable Spices Programmes
USAID	United States Agency for International Development
VC-RD	Value Chains for Rural Development project
VZF	Vision Zero Fund
WASH	Water sanitation and hygiene
WHO	World Health Organization

Executive summary

Worldwide consumption of ginger is increasing. Data suggest that Myanmar is the seventh largest producer of ginger in the world and that it has a high potential to expand its exports. Cultivation of ginger represents a major cash crop for many smallholders and a source of income for a large number of individuals in rural areas, such as in South Shan, where the majority of Myanmar's ginger is grown. Production of ginger for export also provides work to people who are tasked with transporting, cleaning, sorting and processing of ginger. The work is mostly seasonal and informal. It is estimated that, in South Shan, the ginger supply chain provides seasonal work to about 18,396 individuals.

Drivers and constraints for Occupational Safety and Health (OSH) improvement

A set of factors drives and constraints the improvement of OSH in Myanmar ginger value chain:

- **Prospects for growth in new markets with OSH requirements**: There is a growing demand for ginger in European countries and the United States where buyers are paying attention to compliance with organic, food safety, quality, social, and environmental standards. Access to these markets represent an incentive for the ginger industry to invest in upgrading practices related to OSH improvement across all functions within the value chain. The oversea export of dried and ground ginger is the most regulated value chain for compliance with such standards. A shift to organic farming can also help in accessing premium markets as well as reduce or eliminate hazards associated with agrochemical exposure. A growth in the dried ginger processing sector of Myanmar and the cultivation of organic ginger could underpin the long term sustainability of the Myanmar ginger industry. Therefore, it could provide a viable pathway for the promotion of better working conditions, including OSH and social protection. However, farmers currently lack the capacity, resources and infrastructures to upgrade their practices and comply with the multiple requirements of such standards. Availability and accessibility of good quality inputs is also an important challenge.
- **Support to rural development and upgrading of farming practices**: Ginger farmers lack access to the facilities, resources, and knowledge that would enable them to upgrade their practices. They have limited access to financial services. Few investors are willing to partner or engage with farming communities. Farmers also face insecurity of land tenure which restrains them from investing in new technologies and practices. In response to some of these challenges, the USAID funded, *Value Chains for Rural Development project*, which is being implemented by Winrock International, has been supporting ginger farmers in improving their practices. The project has been raising awareness about the

proper use of pesticides and the elimination of chemical inputs through the promotion of GLOBALG.A.P. and organic farming. It conducted training on compost application as a substitute for current fertilizers. Although an increasing number of farmers have adopted compost, many still do not have appropriate tools and facilities to produce this organic input, neither can they afford to buy it.

- **Growing demand for safer use of agrochemical inputs**: Poor use of low quality fertilizers, herbicides and pesticides for ginger production is a widespread problem. The laws governing the registration and sale of agrochemical inputs are poorly enforced and is especially problematic when agrochemicals enter the country via border trade. In addition, farmers are unable to determine if the fertilizers they purchase are adulterated or diluted. The Ministry of Agriculture is currently working to improve the pesticides and fertilizers registration procedures and to develop assistance to farmers and retailers. For example, the Ministry developed a mobile application on effective and safer pesticide usage. Retailers are also considered to be an important source of information. However, conducting awareness campaigns at the retail level is constrained by a lack of staff and resources. Intermediaries, particularly brokers, could also potentially influence the type of inputs used by farmers.
- **Lack of formal organization and cooperatives**: Ginger farmers are not formally organized. They do not have legal personality and, thus, are not eligible to become holders of certifications (GlobalG.A.P., organic, etc.). Besides accessing new markets, formally organizing would allow farmers to make economies of scale and improve their bargaining position. It would facilitate investments in infrastructures, technologies, and knowledge-based assets necessary to improve working conditions, productivity, and quality. The existing social relationships between farmers can potentially be harnessed to get them to work together. Many farmers, however, do not yet understand cooperatives structures or how these structures could benefit their business models. A key challenge is to overcome negative impressions that, for historical reasons, some farmers still hold about the role of associations and cooperatives.
- **The new OSH law and its scope**: A new OSH law that covers most sectors including agriculture is pending enactment by Parliament. Compliance with the proposed OSH law would help ginger processors to align with the requirements of export markets. To do so, enterprises in the ginger value chain should benefit from assistance. As of now, even where existing OSH regulation applies, lack of know-how is observed among processor-exporters to develop and implement OSH management systems. The fact that smallholders and self-employed workers are not registered as enterprises can also pose challenges in the implementation of the upcoming OSH law.
- **Limited resources and capacities of institutions with a mandate on OSH**: Entities responsible for enforcing occupational safety and health rules mainly through inspections and training have limited capacities and human and financial resources. In addition, there is no appropriate monitoring system on occupational injuries and diseases that would contribute to OSH improvement. Understanding of OSH issues in specific value chains as well as the development of tailored-made messages and awareness raising is limited.

Opportunities to improve competitiveness and OSH

Ginger cultivation is performed by farmers, households, unpaid family members, and self-employed, casual and daily agricultural workers. Production steps consist mainly of land preparation, sowing, hand weeding, treatment of disease, pests and weeds, and harvesting. During these tasks, farmers and farm workers are exposed to multiple occupational hazards and risks associated with: posture, heavy loads and repetitive movements; lack of access to clean water and sanitary facilities; mosquito bites; snake bites; manual handling of cow dung; ultraviolet radiation; exposition to chemicals; and heavy workloads; the use of knifes; and slipping in sloping areas. Musculoskeletal disorders are the most common work-related health problems reported. Farming is vulnerable to a number of external factors that farmers and workers have little control over, such as price volatile of commodities produced. Financial insecurity can increase exposure to occupational risks and its consequences. Indeed, farmers often sacrifice rest and safety to focus on productivity. Division of work remains gender based and women are more likely to have longer working hours than men. It can be difficult for farmers, their families and agricultural workers to cope with the physical and financial consequences of work-related injuries or diseases. For instance, they do not currently have access to social security and are not covered by work injury compensation schemes. Farmers generally have knowledge on ill-effects of certain practices and generally have a good appreciation of occupational hazards and risks, but lack knowledge on how to prevent and eliminate them. Measures to eliminate hazards imply upgrading farming practices and elimination or safer use of chemicals.

Further to harvest, transporting ginger is performed by porters who manually transport, load and unload baskets or sacks of ginger and other fruits and vegetables from trucks to warehouses. Porters are self-employed workers who sell their services to traders or intermediaries. They usually rely on informal affiliation to a specific intermediary. Demand for their services is affected by daily, weekly, seasonal and cyclical variations of the region's vegetable supply. On a daily basis, porters face exposure to high-level risks, such as ergonomic hazards related to the heavy workloads they carry manually, and often with poor body positioning and over long distances; biological hazards associated with unsanitary conditions; and risk of falling from tripping or slipping. Their precarious working conditions, including their lack of access to social protection, increase the impact of exposure to occupational hazards. They have no access to work injury compensation schemes and bear the costs of work-related injuries or diseases. Porters and intermediaries would benefit from the introduction of technologies and practices that would help improve productivity and food safety parallel to improving safety and health conditions in the workplace.

In warehouses or outside warehouses, workers consisting mainly of women, are hired by traders to sort and clean ginger. In doing so, they are exposed to various biological hazards and risks; poor working postures that may result in musculoskeletal disorders; and tripping and slipping hazards. Cleaners and sorters jobs are seasonal. However, some trading enterprises keep a few sorters throughout the year. It appears that both employers and workers are not aware of the OSH related legislation and inspections are not regularly conducted. Basic OSH preventive and protective measures are generally absent. Cleaners and sorters do not have access to social security benefits. In case of occupational diseases or injuries, assistance either in kind or cash to help defray expenses is voluntarily provided to them by traders.

Further operations to process fresh ginger for export is done in factories by processors-exporters. In their factories they employ (i) cleaners, sorters and washers – mostly women who are daily or seasonal workers; (ii) machine slicer operators – mostly men who are permanent workers. Poor ventilation in factories exacerbates exposure of workers to soil and airborne dust. Machine operators are exposed to hand-arm and whole body vibrations and loud noise for continuous periods of time. They do not use personal protective equipment. As for cleaners and sorters, they sometimes operate in high temperatures and can potentially suffer from heat exhaustion. The factories are covered by an OSH related law, the Factories Act (1951) amended in 2016. Although companies generally provide first aid kits and basic sanitary facilities accessible to all workers, certain hazards and risks are still not identified or managed. The authority responsible for enforcing OSH rules through factory inspections and training, the Factories and General Labour Laws Inspection Department (FGLLID) of the Ministry of Labour, Immigration and Population (MOLIP), has limited resources and capacity to conduct OSH orientation, training and inspections. Companies maintain a core group of ten to 15 permanent workers with formal employment contracts and social security benefits, but other workers do not have access to the same benefits. The precarious working conditions of seasonal and daily workers increase their vulnerability. As for permanent workers, in case of injuries or disease, they can claim compensation. Though, a great percentage of healthcare costs is still borne by workers.

Based on drivers and constraints for OSH improvement as well as vulnerability profiles in the ginger value chain, efforts to improve the competitiveness of the value chain and OSH outcomes could be centered on achieving compliance with the future OSH law as well as required food safety, organic, social, and environmental standards. Possible interventions could be undertaken to strengthen local awareness and capacity on OSH and to provide advice on the appropriate use of agrochemicals, organic inputs, and farming tools. Institutional capacity to support input companies in providing advisory services on OSH could also be strengthened. The building of local capacity to conduct awareness raising campaigns and training on OSH would be advisable to ensure replication and sustainability. The development of local capacity to provide OSH services could be linked with GLOBALG.A.P. and organic certifications. Support could also be given for the creation of cooperatives. Other interventions could focus on the development of a safety culture among intermediaries and workers of the trade sector to improve productivity and compliance with food safety requirements. At the farm level, promoting the establishment of postharvest facilities would also enable farmers to comply with standards and improve working conditions. To a greater extent, Myanmar ginger would benefit from two parallel strategies for OSH improvements: i) a strategy aiming at improving compliance with organic, food safety, quality, social, and environmental standards required by the European and United States premium markets; ii) a national strategy to strengthen institutions with a mandate on OSH in the ginger value chain so that they can better cater to those actors.

Introduction

This case study was conducted as part of the Vision Zero Fund (VZF) Myanmar project, one of the initial countries selected through the VZF initiative. The VZF aims to prevent work-related deaths, injuries and diseases in sectors operating in or aspiring to join global supply chains (GSCs). Initiated by the Group of Seven (G7) countries and endorsed by the Group of Twenty (G20) countries, VZF is a multi-donor trust fund. The International Labour Organization (ILO) administers and implements the Fund's projects. The VZF projects contribute to the Global Action for Prevention on Occupational Safety and Health (OSH-GAP) Flagship Programme and the ILO Programme of Action 2017-2021 on Decent Work in Global Supply Chains. The main objective of the VZF is to increase collective public and private action aimed at fostering and enhancing concrete occupational safety and health (OSH) prevention activities in businesses operating in low and middle-income countries. The initial focus of VZF projects is on the garment and agri-food value chains. In each selected value chain, a case study is conducted to identify drivers and constraints for OSH improvement and opportunities for interventions.

For the supply chain selection, mapping and analysis, and for the formulation of intervention models, the method adopted is the one developed under the *Joint ILO-EU project to improve knowledge base and safety and health in global supply chains to support G20 work on safer workplaces*, which was adapted from the Market Systems for Decent Work approach.

Among other criteria, Myanmar ginger global value chain[1] was selected for: its high potential to enter new markets rewarding OSH investments, its particularly hazardous work processes along the entire value chain, its high potential for transferability to other crops and its synergy with ongoing development projects. Once selected, a mapping of the supply chain was conducted to provide a detailed typology of actors and their institutional and market environment. This mapping was followed by an in-depth qualitative analysis to understand the root causes contributing to drivers and constraints for OSH improvement. This assessment is based on the experience of different types of actors and on the study of the market and institutional environment. The methodology used identified vulnerability profiles at each stages of production, including the identification of occupational hazards and risks, and their association with factors such as social protection coverage and employment status. Based on the results of the analysis, stakeholders' consultations were undertaken to develop intervention models.

The study and intervention design were carried out using a participatory process. The process involved the following:

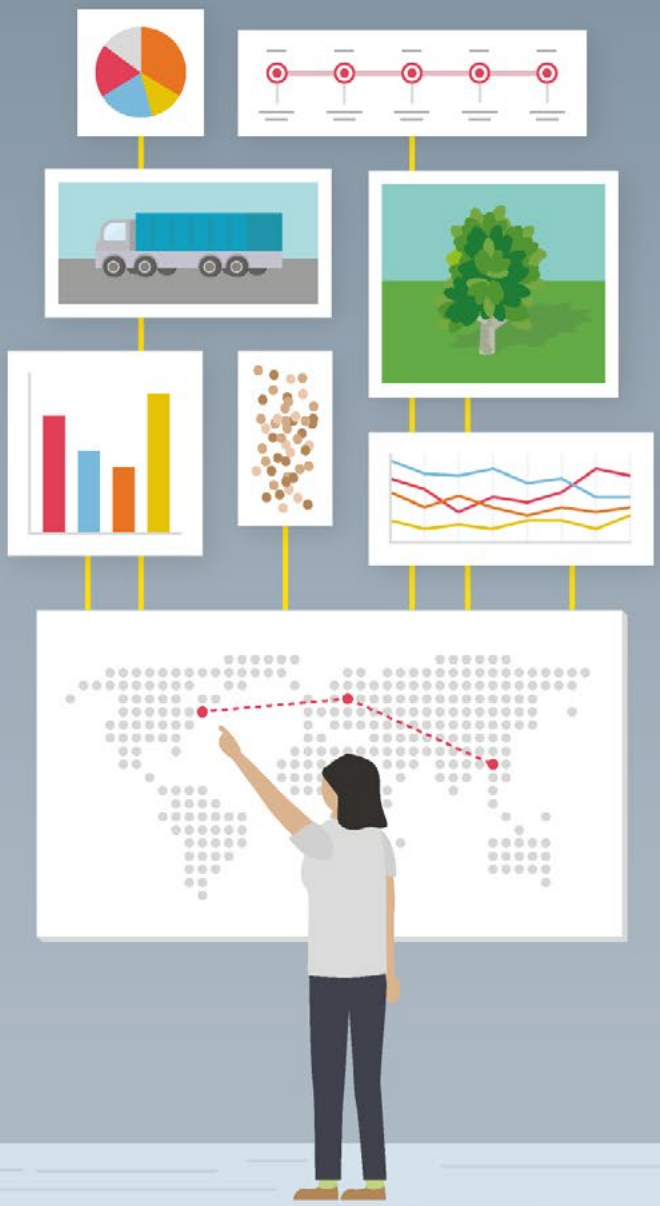
- A preliminary literature review included scientific and technical publications, current legislation and relevant policies in the country of production, trade statistics, and data on working conditions, including OSH data, as well as local and international press articles and selected websites.
- Field research based on qualitative interviews and focus group discussions (FGDs) with a sample representative of all types of actors in the value chain and the institutional and market environment. Key informants and participants to FGDs consisted of market actors, workers, providers of support and health services, monasteries, and representatives of relevant government agencies (Department of Agriculture, Ministry of Commerce, Social Security Board, Factories and General Labour Laws Inspection Department, etc.), development programmes, employers association, exporter-processors associations, and trade union. In addition, a Dot Survey followed by discussions was conducted with farmers and farm workers. Direct observations at the workplace were also conducted.
- A stakeholders' consultation with key actors in the supply chain and the institutional and market environment. On the basis of the field research results, stakeholders developed a strategy for improving OSH and competitiveness.

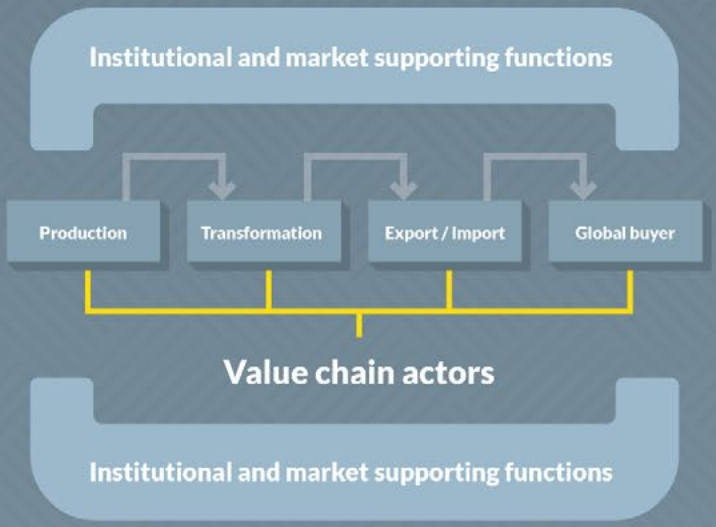
1 The ILO has not yet adopted a set definition for the terms "global supply chains" and "global value chains". In its recent report on "World Employment and Social Outlook," the ILO (2015a) published an estimate of the number of jobs included in GVCs from 1995-2013 for 40 countries. To make this estimate, the definition of GVC used by the research team was "demand-supply relationships that arise from the fragmentation of production across borders, where different tasks of a production process are performed in two or more countries" (Krugman, 1995; Antras & Chor, 2013). The ILO has also used the following definition of value chain: The term value chain "describes the full range of activities that are required to bring a product or service from conception, through the intermediary phases of production and delivery to final consumers, and final disposal after use" (Kaplinsky & Morris, 2002). The range of activities required may include design, production, marketing, distribution and support services. The activities that comprise a value chain can be performed "within a single firm or divided among different firms, within a single geographical location or spread over wider areas" (ILO, 2015a). A World Trade Organization publication further asserts that "[t]he idiom might vary – referring to trade in value-added, production sharing, supply chains, outsourcing, offshoring, vertical integration, or fragmented production instead of GVCs – but the core notion of internationally joined-up production is the same." For purposes of the methodology, the two terms are used interchangeably.

This case study presents the results of the above mentioned research steps. It provides an overview and analysis of the ginger supply chain, the drivers and constraints for OSH improvement across all functions of the chain and the opportunities to improve OSH as well as competitiveness.

Step 1: Selection

Step 2: Mapping






Step 3: Analysis
Step 4: Intervention design
Supermarket
Interventions for sustainable improvement of occupational safety and health outcomes

1 The ginger value chain from Myanmar

1.1 Product and market

Product

Ginger is an herbaceous perennial which is grown as an annual plant for its spicy underground rhizomes. Ginger is used as a spice in cooking and as ingredient in candies, beverages, liqueurs, ice cream, baked goods, curry powder blends, sauces, and various condiments. It is also used in herbal medicine. From 2004 to 2014, there were 27,447 products launched globally that contain ginger as an ingredient.[2] Ginger is consumed in numerous forms, including fresh, dried, oil, pickled, preserved, crystallized, candied, and powdered or ground. Dried ginger is sold in both whole fingers and slices either with the root skin left on or with the skin peeled off. Five to seven kilos of fresh rhizomes are needed to produce one kilo of dried ginger. Ground or powdered ginger is the buff-coloured, ground spice made from dried rhizome. In the retail market, ground and powdered ginger are usually sold as branded products.

Figure 1. Ginger rhizome.

Source: Picture taken by the Vision Zero Fund team in Myanmar

2 Colmar Brunton. 2014. *Global Ginger Market Assessment Trends*. PowerPoint presentation available at: http://www.australianginger.org.au/wp-content/uploads/2016/08/8.2.7-Global-Ginger-Market-Assessment-Trends-by-Colmar-Brunton-2014.pdf [Accessed 30 Sept 2017].

There are many varieties of ginger. The most sought-after varieties generally have a light-brown skin, with creamy yellow to light green bluish flesh. Dark ginger has more heat and is preferred for extraction purposes. In Myanmar, the "Rangoon variety", which has low fibre and water content, and medium pungency, is preferred by dried ginger processors. Rhizomes of the "Rangoon variety" are medium in size and usually with well spread fingers. In comparison, the "Chinese variety", which has less pungency and high water content, is sold primarily in the fresh market. Its rhizomes are generally large and flesh is pale yellow in colour. The "pink ginger," which is a wild ginger is used mainly as traditional medicine and in beverages.

From interviews with different stakeholders, it appears that the industry has not yet fully established its unique selling proposition and product identity, including inherent characteristics of the common ginger varieties in Myanmar. The country of origin is only important to the extent that it is linked with certain qualities (product attributes such as taste, appearance, pungency, etc.; social and environmental footprints, etc.) that are known to trading companies.

In Myanmar, ginger is primarily exported in fresh and dried forms. In the border trade, fresh ginger is generally classified under three different grades, namely: large, medium or small. In general, the larger the size, the longer is the shelf life, provided that proper storage and packaging are observed. In the overseas market, rhizomes with low fibre content, medium to large size, equal fingers, and a clean and waxy appearance are considered as the features of high quality fresh ginger. For dried ginger, the appearance, the content of volatile oil and fibre, the pungency level and a subjective assessment of aroma and flavour are important. Ginger with medium-sized rhizomes and high curing percentage is preferred for dried ginger production.

The timing to harvest ginger rhizomes should be decided based on their intended use. The content of essential oil and the pungency of the rhizomes reach the maximum at about nine months after which it starts to decline. The fibre content of the crop, on the other hand, continues to increase with age. Ginger harvested at five months is not yet mature and is best used in fresh or preserved forms. It has a very thin skin and the rhizomes are tender with a mild flavour. For dried ginger, mature rhizomes that have developed a full aroma, flavour, and pungency are used.

In Myanmar, farmers who supply export markets and receive a premium price of about 50 kyats per kilo are more conscientious in observing a proper harvesting schedule based on the intended use of the ginger crop. Among the majority of farmers though, the decision on when to harvest is generally influenced by prevailing market price and the need for cash. Most of the farmers are not really conscious of markets outside of Aung Ban, Kalaw Township, which is the main trading centre in South Shan State and the most important region for the production of ginger in Myanmar.

Cultivation of ginger in Myanmar is concentrated in four regions, namely: South Shan, Chin, Mandalay, and Ayeyarwady.

Figure 2. Breakdown of ginger production in Myanmar by key producing areas.

Region	Area Planted (acre)	Volume (in MT)	Average Yield (MT/acre)	% Share to Volume
Chin	3 260	5 192	1.59	9%
Mandalay	704	2 409	3.42	4%
South Shan	7 764	50 535	6.51	84%
Ayeyarwady	590	1 754	2.97	3%
Total	**12 318**	**59 889**	**4.86**	**100%**

Source: Ministry of Commerce – Research Study on Ginger, 2017

Figure 3. Map of Myanmar and localization of Shan State (south).

Source: Myanmar Information Management Unit (MIMU). 2016.

Market

Worldwide consumption of ginger is increasing. In Europe, between 2012 and 2016, imports of whole/sliced ginger (comprised of fresh and dried ginger) and ground/crushed ginger (powder and similar forms) increased respectively at a rate of 35 per cent and 77 per cent per year.[3] During the period of 2012 to 2016, United States imports of whole/sliced ginger increased at a rate of 10 per cent per year.[4] The increasing demand for ginger in European countries and the United States is attributed to the a) Consumers' search for healthier ingredients. Ginger is recognized for its beneficial health effects and promoted as a healthy alternative to other food ingredients such as salt, sugar and synthetic additives; b) Growing popularity for ethnic or exotic cuisines where ginger is commonly used. This trend can be related to increased multicultural populations and access to online shopping.

The 2016 ginger import data from the International Trade Centre (ITC) Trade Map shows that Bangladesh (12 per cent), United States (11 per cent), and European countries (22 per cent) are the world first ginger importers of whole or sliced ginger. Top importing countries for crushed and/or ground ginger are Malaysia (33 per cent), European countries (30 per cent), Japan (11 per cent), Oman (6 per cent) and the United States (6 per cent).

In Europe, the demand is generally inelastic to price changes. To export dried ginger to Europe the exporter must comply with food safety and quality requirements. The United States and Japan also impose strict product quality standards. Additionally, buyers in countries such as the United States and European countries are paying more attention to social and environmental responsibility. Import volume of organic ginger in the United States is also increasing and its main suppliers are China and Peru. Although China remains the largest producer of organic ginger, there seems to be an increasing preference among US buyers for Peruvian organic ginger where the production is considered by some to be more socially responsible.[5]

Data suggest that Myanmar is the seventh largest producer of ginger in the world and accounts for about 3 per cent of the world production.[6] China and India lead the world fresh ginger production with a global share of about 49 per cent, followed by Indonesia, Nepal, Thailand and Bangladesh. According to available data, average yield per hectare in Myanmar and Shan State, specifically, is higher than most of the major ginger producing and exporting countries. This suggests that Myanmar has good potential to be price competitive in the world market.

3 ITC Trade MAP, Products 091011 and 091012. Available at: https://www.trademap.org/Index.aspx [Accessed 30 Sept. 2017].

4 ITC Trade MAP, Product 091011. Available at: https://www.trademap.org/Index.aspx [Accessed 30 Sept 2017].

5 *The Fresh Plaza*. 2017. "The US prefers Peruvian ginger", 19 May. Available at: http://www.freshplaza.com/ [Accessed 18 Sept. 2017].

6 Based on a research conducted by the Ministry of Commerce Office in Taunggyi (2017), annual production of ginger in Myanmar is about 59,889 MT. Triangulation of this data with the FAOSTAT database suggests that Myanmar is the seventh largest producer of ginger in the world and accounts for about 3 per cent of the world production.

The value chain study conducted by Winrock International in 2016 indicated that 60 per cent of Myanmar's ginger production is exported and the remaining 40 per cent is absorbed in the domestic market.[7] A study conducted by the Ministry of Commerce in Taunggyi showed that in 2016-2017 fresh and dried ginger exports reached 1,610 MT (Metric ton) with a value of US$ 1.502 million.[8] About 61 per cent of the total volume of fresh and dried ginger exported by the country in 2016-2017 was done via border trade. According to interviews with traders in Aung Ban, the main border trade markets for ginger are Bangladesh, India, Pakistan, and China. Export sales through border trade consist primarily of fresh ginger. In these markets, price is the main purchasing criteria. On the other hand, overseas exports consist mainly of dried ginger. Data suggests that ginger sold via the overseas trade channel generally commanded higher value than those sold through border trade. In Europe, Germany appears to be the main market for Myanmar dried ginger.[9] Myanmar ginger exporters reported that they also sell to importers in Sri Lanka, Singapore, Malaysia, and India who re-export the products to their buyers in Europe. There is an ongoing promotion and development of overseas export market.

1.2 Structure of the value chain

In Myanmar, ginger is primarily commercialized for export in two main forms:

- Fresh ginger (whole or sliced)
- Dried ginger (whole or sliced)

The supply chain structure is complex and differs according to a wide range of factors. Figure 4 provides a schematic overview of the ginger market system in Myanmar. There are three main market channels:

a. Farmers to village agents, who in turn sell to brokers in Aung Ban.

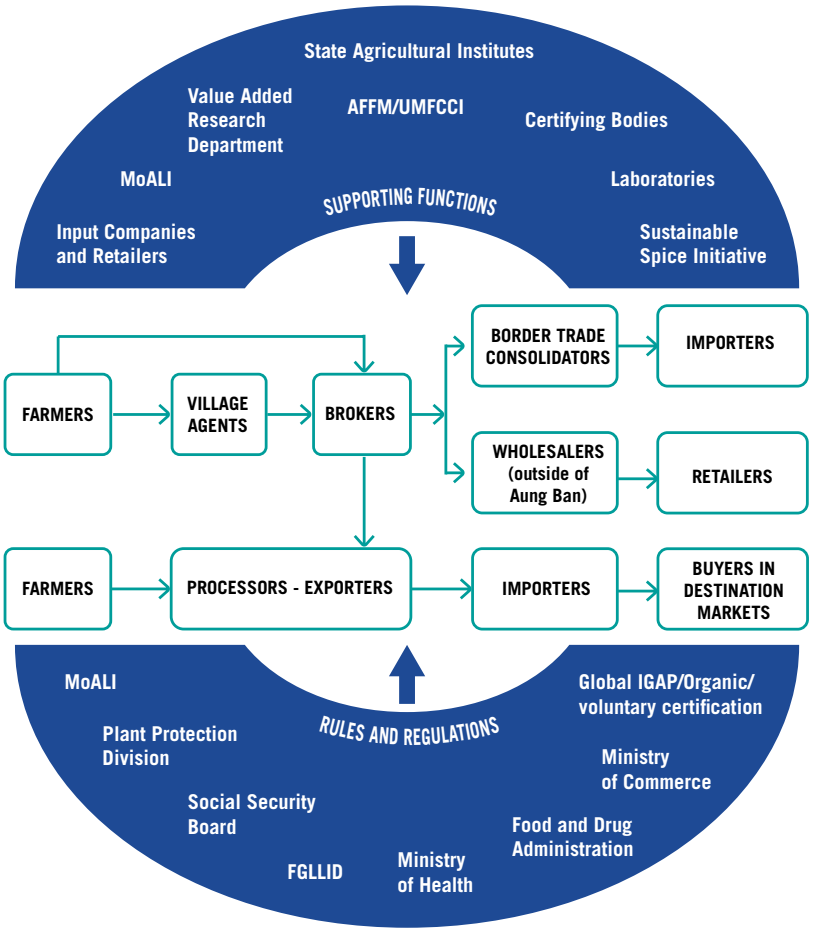
b. Farmers to brokers in Aung Ban who sell to processors-exporters, border trade consolidators, and key wholesale markets in Myanmar.

c. Farmers to processor-exporters, under loosely defined contract farming agreements.

Currently, border trade is the main and most accessible export channel for fresh ginger. As mentioned, overseas exports consist mainly of dried ginger.

7 Winrock International. 2016. *Ginger Value Chain Assessment Summary.*
8 Ministry of Commerce. 2017. *Research Study on Ginger* (Taunggyi).
9 ITC Trade MAP. Available at: https://www.trademap.org/Index.aspx?lang=fr [Accessed 30 September 2017]

Figure 4. Schematic overview of the ginger market system in Myanmar.



Source: Author, Marian Boquiren

Input Suppliers

Seeds. Ginger is propagated by planting pieces or portions of rhizomes. The ginger planting materials are usually selected and sourced on-farm from the previous crop. About 4 per cent of total annual production of ginger is used as planting materials. Sourcing planting material from previous crops reduces the risk of introducing pests and diseases from infected farms. However, this may contribute to disease build up within the farm if effective rhizomes treatments are not employed to ensure clean planting materials.

Fertilizers. Urea and cow dung are the most extensively used fertilizer among ginger farmers. Although Myanmar produces urea, annual production of the three government owned urea plants operated by the Myanmar Petrochemical Enterprise is only 100,000 MT compared to yearly requirements of 800,000 MT.[10] Most fertilizers sold by retailers are Chinese brands. A key issue in the use of chemical fertilizers is groundwater contamination. Nitrogen fertilizers break down into nitrates and travel easily through the soil. Because it is water-solu-

10 World Bank. 2016. *Global Agriculture and Food Security Program (GAFSP): private sector window: Agribusiness country diagnostic – Myanmar.* Washington, D.C.: World Bank Group. Available at: http://documents.worldbank.org/curated/en/541101490092426376/Agribusiness-country-diagnostic-Myanmar [Accessed 8 Oct. 2017].

ble and can remain in groundwater for decades, the addition of more nitrogen over the years has an accumulative effect. Urea is the most commonly used nitrogenous fertilizer among ginger farmers. Given the relatively small amount of urea used by ginger farmers as per their own account, the hazard of fertilizers on human health and environment can be attributed more to the weak capacity of the government to conduct regular checks on the quality of fertilizer sold in the market. Due to prevalence of low quality or adulterated/diluted fertilizer and/or the lack of knowledge among farmers on proper fertilizer management and application, farmers indiscriminately increase the dosage without the aid of soil analysis when they feel that fertilizers are not producing the expected results. Most farmers do not read the labels. In most cases, the labels are written in Chinese.

Herbicides/pesticides. Farmers increasingly use herbicides to stop weed growth especially during the pre-emergence and emergence phases. Herbicides commonly used by farmers cost about 60 per cent to 70 per cent more than labour costs of manually weeding. Imported pesticides from China, Thailand, and elsewhere are readily available in Aung Ban and villages, where they are sold at lower prices, typically 30 to 50 per cent of the price of registered domestic brands. The price difference between the pesticides imported via border trade and the registered brands can be as high as 400 per cent. Imported pesticides rarely have instructions in local languages and are of mixed quality. The most preferred herbicide among farmers is Paraquat.[11] It is cheap and proven effective in killing weeds. Although Paraquat has been banned in many countries including European Union (EU) countries, it does not appear among the banned pesticides in Myanmar. In China where many of the Paraquat manufacturers are located, the use of herbicide has been banned by the Ministry of Agriculture. The production of Paraquat though is still allowed provided it is intended for export.[12] It appears that China will prohibit the use and sales of any Paraquat formulation in China by September 2020.[13]

Producers

Annual production of ginger in Myanmar is estimated at about 59,889 MT.[14] Among the four major ginger producing regions, South Shan has the highest yield per acre at 6.51 MT. Ginger constitutes a major cash crop for many of the smallholders in South Shan State. It is usually grown in rotation with rice and other crops. Top producers of ginger in South Shan are the townships of Kalaw, Pindaya, and Pin Laug.

Legally, the government owns all land in the country and has authority to determine how it is used, based on an elaborate land classification system designed to maximize appropriate land usage.[15] In 2012, the Farmland Law and the Vacant, Fallow and Virgin Land Management Law (VFV Law) were passed, which offered more secure long-term land leasing arrangements, new land registration procedures and detailed processes for addressing land disputes. These laws seek to formalize land tenure by recognizing individual rights to occupy,

11 The International Chemical Safety Card for Paraquat is available in the ICSC database at: https://www.ilo.org/dyn/icsc/showcard.homesafework/info/publications/WCMS_113134/lang--en/index.htm

12 Multiwatch, et al. 2016. *Open Letter to Mr. Han Chang Fu: Stop export of Paraquat produced by Syngenta and others to China!* Available at https://www.grain.org/bulletinboard/ exportof- [Accessed 8 Oct. 2017].

13 *CCM Data & Business Intelligence.* 2017. "China about to ban all sales and use of paraquat by 2020", 31 July. Available at: http://www.cnchemicals.com/ [Accessed 30 Sept. 2017].

14 Ministry of Commerce. 2017. *Research Study on Ginger* (Taunggyi).

15 *Guidance Note on Land Issues – Myanmar* (UNHCR, UN HABITAT, Norwegian Ministry of Foreign Affairs). Available at: http://www.burmalibrary.org/docs12/Guidance_Note_on_Land_Issues-Myanmar.pdf [Accessed 30 Sept. 2017].

buy, sell and mortgage land and by clarifying the different land-use classifications.[16] It seems though that farmers still have a vague understanding of the laws and their implementation measures.

Farmers typically have four to six plots planted of different crops. They prefer to have plots on different topographic locations (lowland, sloping, and upland) to mitigate risks. Ginger production in South Shan is undertaken by about 15,000 smallholders with average plot areas of 0.5 acres. The size of plots allocated to ginger is, to some extent, influenced by price received during the previous season. Farmers adopt the shifting cultivation system. A fallow period is observed so that ginger is only grown in the same plot once every three years. Many of the newly cultivated fields in sloping areas are not laid out in terraces making it prone to soil erosion. Likewise, the relatively long fallow period practiced in hilly areas can also increase risk of soil erosion.

Climate change with more sporadic rainfall and higher temperatures is making farming conditions more challenging. Ginger can be generally grown in more diverse soil conditions and topography than most other spices. The crop, however, requires a well distributed annual rainfall of 1500 to 3000 millimetres during the growing season and dry spells before land preparation and harvesting are required for good growth and yield. Warmer temperatures are expected to lead to more extreme rainfall, with erosion and soil degradation more likely to occur, especially if Shan farmers don't change their land preparation practices accordingly.

The cultivation of ginger generally consists of the following stages. Land preparation is done using a hand tractor and/or oxen/cattle. After ploughing and harrowing, cow manure is applied to the soil in preparation for planting. The soil may be left for a few weeks to allow the manure to decompose before turning again to ensure the soil is fine and loose. Growers may also apply urea at planting time. Farmers in Shan State generally have a high urea usage rate compared to other growers in other regions.

When the soil is ready, portion of rhizomes are planted. Herbicides and pesticides are further applied to treat pest, disease and weeds. Knapsack sprayers are most commonly used by Shan farmers and farm workers to apply agrochemicals. Weeds may also be pulled manually. Finally, ginger rhizomes are harvested by hand. Rhizomes are vulnerable to a number of postharvest diseases.

Decay can be kept to a minimum by following careful harvesting and handling practices, sanitizing the wash water, and curing the bulbs after washing to promote wound healing. Based on the ginger deliveries seen at the Aung Ban trading centre, cleaning and washing of ginger at the farm level are seldom practiced. Farmers do not have the necessary facilities to perform these tasks.

Access to water is also a constraint in many areas. Farmers receive deductions to their ginger deliveries to traders based on visual assessment of soil content. According to a 2017 study[17] conducted by Mercy Corps among vegetable farming communities in South Shan, majority of farmers rely on rainfall and natural springs for drinking and irrigation water, either directly at the source or downstream from the streams that they form. Only a few of the communities

16 Gurung, S.; Muench, S., Wattman, J. 2014. *Visibility versus Vulnerability: Understanding instability and opportunity in Myanmar* (Mercy Corps). Available at: https://www.mercycorps.org/sites/default/files/Mercy%20Corps%20Visibility%20vs%20Vulnerability%20in%20Myanmar%20-%20Full%20Report.pdf [Accessed 30 Sept. 2017].

17 Snoad, C. 2017. *Water Access Analysis: South Shan, Myanmar* (Mercy Corps, Freeway associates).

have access to springs, streams, ground water, retaining ponds, or other sources. They often have to walk two to five miles to source water for domestic use.[18]

Farmers who supply export markets and receive a premium price of about 50 kyats per kilo are more conscientious in observing a proper harvesting schedule based on the intended use of the ginger crop. Among the majority of farmers though, the decision on when to harvest is generally influenced by prevailing market price and the need for cash. Most of the farmers are not really conscious of markets outside of Aung Ban, Kalaw Township, which is the main trading centre in South Shan State.

The majority of the farmers sell their ginger in fresh form directly to brokers in Aung Ban. Farmers in remote areas sell to agents within the village who, in turn, deliver the ginger to Aung Ban. Farmers have low bargaining power and are not formally organized. Ginger is generally a buyer driven supply chain in which farmers absorb most of the economic risks. The high prices paid in the previous season motivate many growers to grow ginger. The price of ginger varies between months within a year. As with most agricultural products, the price of fresh ginger is high during the off season (April to July) and low in the harvesting season (December to February). Seasonal variation in prices shows that if the farmers manage to stock their produce for three to four months, they achieve significantly higher prices during the off-season.

The processes involved in the postharvest handling of fresh ginger can be done at the farm level provided that farmers have access to clean water and facilities compliant with Good Manufacturing Practices (GMP). Some farmers in Southern Shan dry their ginger to extend shelf life, which enables them to store ginger and sell it at a time when price is more favourable (after peak harvest season). On-farm intermediate processing is usually performed in makeshift areas or in their homes. In order to dry ginger, farmers boil it over a wood fire to kill the rhizome. It is then laid out on tarps to dry in the sun.[19] In the production of split dried ginger at the farm, splitting is done manually using a sharp knife. This technique is associated with a lot of problems ranging from low output, high human labour and production of uneven thickness in the split rhizomes. It results in poor quality products. Plus, farmers store the dried ginger near their homes. The microbiological, organoleptic and chemical properties of the dried ginger they produce do not meet exporters' specifications.

Employment. Most of the farm work is done by farmers with the assistance of household members. Farmers hire workers mainly during husbandry operations (treatment of pest, disease and weeds, hilling, etc.) and harvesting. In ginger farms, harvesting accounts for 40 per cent of labour use followed by husbandry operations at 34 per cent, planting at 17 per cent, and land preparation at 9 per cent. Ginger farmers and farm workers are self-employed. Another group of labourers at the farm are unpaid family workers. Wage of farm workers in ginger farms range from 3,500 to 5,000 kyats (US$ 2.6 -3.7) per day, depending on the task. Land preparation and husbandry operations command the highest wage at 5,000 kyats. These activities are traditionally performed by men. Manual weeding and harvesting are traditionally done by women. A strategy of farmers to smooth out income include farmers combining working on their own farms with seasonal work in other farms, and informal systems of labour exchange.

18 As per farmer groups who participated in the Winrock's Launching the new ginger season: Linking Ginger Farmer Groups and Buyers event conducted 25 October 2017.

19 Keesecker. J. 2017. *Value Chain Assessment: Ginger, Turmeric and Garlic - In Pa-O SAZ and Southern Shan State* (Myanmar Institute for Integrated Development).

Distributors and other intermediaries

Aung Ban is the major trading centre in South Shan where most of the ginger is consolidated prior to distribution to Yangon, Mandalay, and the border trade. The different types of trade intermediaries involved are: village collectors, broker sales centre, brokers, wholesalers and retailers. An intermediary may be involved in two or all of the various distribution functions. Trade intermediaries perform the tasks of negotiating, collecting, cleaning, sorting, packing and transporting ginger. Transactions between farmers and intermediaries are based on mutual trust and agreement. Relationship consists primarily of spot transactions. Traders provide advances and credit to farmers especially with regards to purchasing inputs.

Village collectors. They are the main buyers from farmers located far from Aung Ban and buyers from those farmers who sell small volumes. Village collectors sell to Broker Sales Centre (BSC) and other intermediaries in Aung Ban. Cost of unloading or the payment to porters is borne by the farmer or the village agent. The baskets are unloaded manually from the truck by porters affiliated with the intermediary. Deliveries are paid outright by brokers based on total weight less discount for the soil and other debris. A discount is based on a visual assessment of soil and debris content. Large size rhizomes with equally spread fingers receive the highest price. Rhizomes meeting minimum standards are generally purchased at the same price regardless of quality or safety characteristics. Farmers thus have no incentive to improve quality beyond the minimum necessary to make a sale.

Figure 5. Basket full of ginger being weighed in a trading centre.

Source: Picture taken by Vision Zero Fund team in Myanmar.

Broker Sales Centre (BSC). This intermediary arranges the sale of ginger brought by farmers and village collectors. It sets ginger prices based on an assessment of supply and demand, and on government price monitoring information. In Myanmar, the domestic price of ginger appears to be strongly influenced by the supply and demand situation in Bangladesh, India, Pakistan, and China. A commission of 7 per cent is charged and BSC usually buys on behalf of brokers. BSC undertakes cleaning, sorting, and transportation of the product. BSC may provide inputs to farmers on credit and charges interest rate of at the minimum 3 per cent per month. Experiences, to date, indicate that farmers with input loans are generally loyal and deliver their product to the trader.

Brokers. The broker buys from farmers or other type of intermediaries and undertakes grading and sorting. Ginger is distributed based on standards required by buyers consisting primarily of wholesalers and processors. The largest ginger broker, who trades at the minimum 5,000 MT of ginger annually, sells to all channels including export oriented processors.

Aung Ban, the trading area, is used for various purposes without any segregation of activities: receiving, stocking/warehouse, sorting, cleaning, and packing. Sorting is done by daily workers within the warehouse or by the roadside. Given the high cost of transportation, intermediaries in Aung Ban deliver ginger only when a buyer has confirmed orders. At that point, costs of transportation and logistics including loading fees (payment to porters) are borne by buyers. With the advent of mobile phones, buyers in Yangon and other regions almost always request photos of the ginger before confirming orders. In a similar manner, when there are discrepancies on agreed qualities, the buyer sends a photo to the supplier to show condition of the product upon arrival. There appears to be four major traders in Aung Ban who more or less control the trading and distribution of ginger in South Shan.

Employment. Ginger trading activities start in August and peak in January and February. Based on an estimated volume of 35,375 MT of fresh ginger in South Shan traded annually, about 403 fulltime jobs are created along the different layers of intermediaries spread over 1,612 part time workers. Intermediaries employ three to five permanent workers in-charge of receiving, checking, weighing, and payment of goods received as well as all outbound function. Employment in trading enterprises is generally not governed by employment contracts although there is a semblance of formal employment relationship between companies and the financial/administrative staff. Depending on projected inbound volume of ginger and other vegetables, workers, consisting mainly of women, are hired to perform sorting and cleaning tasks. The sorters are paid daily at 4,000 to 5,000 kyats per day (higher than the current minimum wage of 3,600 kyats). Workers interviewed indicated that they have been working with the enterprise as daily wage workers for more than five years. Another group of workers in the Aung Ban trading centres are the porters. These are self-employed workers but are affiliated with specific enterprises. Intermediaries rely on an unregulated pool of porters, which guarantees a swift execution of unloading and loading, while they have no obligation whatsoever to remunerate casual workers during periods of inactivity. The porters are paid by the customers (suppliers and buyers) at a rate of 4 kyats per viss (1 viss = 1,63 kg). All of the work is done manually.

Processors and Exporters

Production of dried ginger in Myanmar is carried out mainly by processors and geared for the export market. Postharvest operations of fresh ginger carried by processors for overseas export include the following processes: manual sorting, washing using high pressure water, trimming with a sharp knife, dipping and treatment with chemicals, drying and packing. Another method used by processors-exporters is to scrape, peel, or slice rhizomes prior to drying. In most cases, buyers prefer to leave the skin on because peeling tends to remove some of the oil content, as they are more concentrated in the peel, and therefore reduces some of the pungency. Some buyers require the sliced ginger to be bleached prior to drying to improve appearance.

There are currently three known overseas exporters of ginger. These processor-exporters and their fresh ginger suppliers have received organic certification.

There are two other companies that are planning to engage in ginger processing for the export market. One company is based in Mandalay and used to export pickled ginger to Japan. The company stopped its operations and is now planning to revive its business. The other company used to trade fresh ginger in the domestic market and has now started to export fresh ginger.

Employment. With about 30 per cent of the annual production from South Shan processed into dried sliced ginger, it is estimated that processors provide 407 direct fulltime jobs spread over 1,627 part-time workers. Companies maintain a core group of ten to 15 permanent workers with formal employment contracts and social security benefits. Permanent workers consist of machine operators, senior staff in-charge of sorting, washing, packing, and quality control, and administrative staff. Cleaners and sorters are hired for a period of one to three months during the peak harvest season or as daily workers. As mentioned previously, most of the cleaners and sorters are women. These workers earn about 4,000 to 5,000 kyats per day.

Importers

Dried ginger is usually imported in the United States and European countries in large pieces (whole or sliced) which are then ground. Slices are preferred because it is easier to grind and the yield per bag is better compared to whole dry ginger. Import of powdered ginger is generally minimal due to concerns regarding purity and compliance with EU regulations. The bulk of the trade enters Europe through a small number of major brokers, traders, and importers. After importation, the dry ginger is cleaned mechanically by the importer to remove impurities, and thereafter treated with steam sterilization to eliminate bacteria and spores. Large importers also grind spices before exporting them to other EU and North American markets. Smaller traders import spices directly, but they also buy from larger traders who can offer them better conditions and delivery terms on small quantities of more specialized items. These smaller traders distribute spices and herbs to blenders, packers and end users in the food trade and non-food channels.

As mentioned, in Europe, Germany appears to be the main market for Myanmar dried ginger. Myanmar ginger exporters reported that they also sell to importers in Sri Lanka, Singapore, Malaysia, and India who re-export the products to their buyers in Europe. End users off dried ginger include the following:[20] (i) meat processing (mostly in Germany); (ii) food processing (ready-to-eat food manufacturers); (iii) catering; (iv) baking industry; and (v) spice blenders (that sell both to processing industries or manufacture retail packs).

In regards to Myanmar fresh ginger, Bangladesh, India, Pakistan, and China appear to be the main importers. End users of the fresh ginger are the retailers, food service establishments, and food processors. Fresh rhizomes are shipped in importing countries in a chilled container. Many processes are performed in importing countries. Preserved ginger or stem ginger is made from fresh young rhizome, peeled and sliced, then cooked in a heavy sugar–salt mixture. It is used both in confection and desserts. China is the leading producer of preserved ginger. To produce candied Ginger, ginger is cooked in sugar syrup, then air dried and coated in sugar. Australia is one of the leading exporters of candied rhizomes. Ginger oil is extracted by steam distillation. Main producers are India, China, Indonesia, and Nepal. Lastly, pickled ginger is the sweet, thinly sliced young ginger that has been marinated in a solution of sugar and vinegar.

Institutional environment of the value chain in Myanmar

The institutional environment of the value chain in Myanmar is composed of the following authorities:

- **Ministry of Labour, Immigration, and Population** (MOLIP). MOLIP is the main body responsible for labour and social security affairs. Key agencies under MOLIP involved in the promotion and implementation of OSH related laws[21] are the Factories and General Labour Laws Inspection Department (FGLLID) and the Social Security Board (SSB).
  - **FGLLID** is responsible for enforcing OSH rules mainly through factory inspections and training. The activities of FGLLID are guided by two laws: the Factories Act (1951) amended in 2016 and the Shops and Establishments Law (1951) amended in 2016.
  - **SSB** administers the social security programmes, including benefits and contributions. The 2012 Social Security Law provides for health and social care insurance system in order to protect workers in case of sickness, maternity, death or work injury. Additionally, the law provides for other guarantees that are not yet implemented, such as those related to unemployment and pension, for example. All companies with five workers or more must register with the Social Security Township Office of the SSB within 30 days of the start of business, and must pay regular contributions calculated at 5 per cent of the employee's monthly salary. Employers shoulder 3 per cent of the contribution with the remaining 2 per cent borne by workers. Workers whose employers are not required to register can register on a voluntary basis.[22] There are three Worker's Hospitals and 92 clinics in the country under SSB to provide health care services to insured workers. As of 2013, Shan State had 15 SSB clinics.[23]

20 Peneva T.; Vancura, L. 2014. *Opportunities for Nepalese Ginger and Derivative Products to Access the EU (A Study of The Netherlands) – a report for Samarth-Nepal* (Promar Consulting).

21 An overarching OSH law has been under preparation since 2013. Meanwhile various pieces of legislation relate to OSH.

22 ILO. 2017. *ILO Guide to Myanmar Labour Law 2017* (Yangon, ILO Liaison Office in Myanmar).

23 Tessier, L.; Thidar, M. W. 2014. *Evaluation of the operations of the Social Security Board, Ministry of Labour, Employment and Social Security of Myanmar, ILO-MDRI technical report* (Geneva, ILO).

- **Ministry of Industry**. Boiler Inspection Department of the Directorate of Industrial Supervision and Inspection is under this Ministry. Its key functions are to: (i) conduct annual inspection of boilers; (ii) issue licenses for use of boilers; and (iii) conduct of boiler operator training courses and advanced courses. The Electrical Inspection Department under the same ministry supervises electrical safety in manufacturing establishments. The Fire Services Department has responsibility for fire safety and prevention.
- **Ministry of Agriculture, Livestock, and Irrigation** (MoALI). Under the MoALI, the Department of Agriculture (DoA) is responsible for conducting training and giving technical advice specific for the farming sector. In MoALI, the Plant Protection Division (PPD) of the Myanmar Agriculture Service oversees the implementation of the Pesticide Law through the Pesticide Registration Board. The Myanmar Agriculture Service conducts training on farm workers' safety and health, integrated pest management, and Good Agricultural Practices.
- **Ministry of Health**. The Occupational and Environmental Health Division of the Ministry of health main functions are to prevent work-related injuries and diseases and to promote workers' health in various sectors. The division conducts workplace hazard and risks assessment, monitors ambient air quality, and conducts medical check-ups for workers in industrial plants.

2 Drivers and constraints for OSH improvement

2.1 Prospects for growth in new markets with OSH requirements

Along with the growing demand for ginger in European countries and the United States where buyers are paying greater attention to quality and compliance with organic, food safety, quality, social, and environmental standards, importers are also increasingly requiring suppliers to conform to decent work conditions. As such, the various standards requested by buyers and final users of ginger can potentially be leveraged to promote workers' safety and health. Compliance to different private compliance initiatives (PCIs) and certifications could help Myanmar enter and increase its presence in new and premium markets. Access to these markets represent an incentive for the ginger industry to invest in OSH improvement across all functions in the value chain.

The overseas export through importers in Asia and Germany is the main sales channel for dried and ground ginger. This channel is the most regulated in terms of quality and sanitary standards and other supplier requirements. The ongoing promotion and development of the overseas export market can help improve overall production standards in the ginger industry. The continued, incremental growth in the dried ginger processing sector of Myanmar could underpin the long term sustainability of the Myanmar ginger industry as well as provide a viable pathway for the promotion of better working conditions, including social protection and OSH.

There are opportunities for Myanmar's ginger to enter or increase presence in markets where OSH forms part of buyers' requirements. However, these opportunities have not been realized due to a) limited access to information on overseas export markets for ginger by the Ministry of Commerce and other actors and; b) limited resources invested on marketing campaigns. The weak branding, the lack of unified vision, and limited collaboration and coordination among producers-processor-exporters may act as bottlenecks.

Pressure for stronger sustainability

Sustainability is currently high on the agenda of the entire spice sector. The most important European players are collectively working on making the spices and herbs supply chain more sustainable. Buyers from the EU and the United States are pushing for stronger sustainability criteria which include OSH. The most important social issues European buyers are concerned with include: (i) child labour; (ii) safety and health; (iii) respecting labour laws; (iv) paying minimum wage; and (v) correct use of pesticides.[24]

Many of the processed ginger products and by-products in the world market are branded. Companies selling branded products are vulnerable to reputational risks and, as such, are more likely to take action to promote sustainable production including better worker safety and health among their suppliers. Major brand owners like McCormick, Olam and Unilever are promoting sustainable practices[25] throughout their entire supply chain, and linking their brand and quality directly to sustainability.[26]

Another example is the Sustainable Spice Initiative (SSI),[27] a sector-wide consortium founded in 2012 by four prominent players in the Dutch spices market – Euroma, Intertaste, Verstegen and Unispices. Together with civil society organizations,[28] these companies have made a commitment to sourcing their products sustainably and to making a positive impact on their supply chains. The SSI is focused on promoting good practices related to use of agrochemicals, building climate change resilience, improving socio-economic conditions of smallholders, and promoting good working conditions.

Peru is an example for successfully positioning itself in a market where sustainability is an important criteria. In fact, Peru's branding of its ginger is anchored on flavour and sustainable production. In the organic market, Peruvian ginger is increasingly preferred by buyers especially in the United States even though the price is higher than Chinese organic ginger.[29]

Growing demand for certified organic ginger

Total import volume of organic ginger in the United States increased from 6,947.61 MT in 2013 to 7,597.79 MT in 2016.[30] During the first half of 2017, Myanmar exported 18 MT of organic ginger to the United-States.[31] Demand for organic ginger in Europe is more

24 Centre for Promotion of Imports from developing countries (CBI) Ministry of Foreign Affairs. 2017. "Which trends offer opportunities on the European spices and herbs market?", 31 January. Available at: https://www.cbi.eu/market-information/spices-herbs/trends/ [Accessed 16 Sept 2017].

25 For example, The Sustainable Spices Programmes (SSP) of Olam is focused on sourcing and marketing spices that are traceable and farmed in a sustainable manner with strong integrated pest management and proper post harvest practices. Olam works with farmers to educate them on the correct usage of chemicals and preventive techniques for pest control and mycotoxins. This training enhances farm productivity and safety as well as ensures that the crops produced meet pesticide limits set by USA, EU and Codex standards.

26 Centre of Promotion of Imports from developing Countries (CBI), Ministry of Foreign Affairs. 2015. CBI Product Factsheet: "Sustainable Spices and Herbs in Europe, Hague – Netherlands", 15 Oct. Available at: https://www.cbi.eu/ [Accessed 16 Sept 2017]

27 Major buyers are members of the SSI: McCormick, Unilever, Intersnack, Kerry, Olam, Kutas, Intersnack, Intertaste, Nedspice, ITC India, Jayanti, Griffith Foods, etc.

28 Civil society organizations such as the Royal Tropical Institute (KIT), ICCO, and SNV.

29 According to the United States Department of Agriculture Foreign Agricultural Service's Global Agricultural Trade System, during the 1st semester of 2017, US importers paid an average price of US$ 2.2/kg for Peruvian organic ginger and US$ 1.1 /kg for Chinese organic ginger. Available online at: https://apps.fas.usda.gov/Gats/ [Accessed 30 Sept 2017].

30 United States Department of Agriculture (USDA) Foreign Agricultural Service: *United States Import Volume of Organic Ginger, 2013 to 2017 (1st Semester),* Compounded Annual Growth Rate (Global Agricultural Trade System). Available online at: https://apps.fas.usda.gov/Gats/ [Accessed 30 Sept 2017].

31 Ibid, United States Department of Agriculture (USDA) Foreign Agricultural Service.

concentrated on whole ginger sold directly to consumers. Other users of organic ginger are the pharmaceutical companies. Statistics on organic spices and herbs imports by countries in Europe are not readily available. International customs classifications do not distinguish between organic and conventionally grown products. As per the Centre for Promotion of Imports report, the most interesting markets for certified organic ginger are Germany and the Netherlands. Still, according to the study conducted by Promar Consulting,[32] large industrial end users of dried ginger such as the meat processing industry and spice mixers do not have a strong interest in organic ginger. For the industrial users, more important than organic certification are pesticide residue levels, food safety, and sustainable production.

A shift to organic farming can help reduce or eliminate risks associated with exposure to chemicals among workers and the farming community in Myanmar. Farmers currently lack the capacity to comply with organic farming protocols. The Department of Agriculture has limited resources, both human and financial, and also capacity to conduct trainings on organic farming specific to ginger. Individual farmers are unable to become holders of organic certificates, so formally organizing could be a move towards obtaining certification.

Existing production loan portfolio of microfinance institutions is focused on major crops. Farmers do not have other sources of income that can compensate for yield loss during the transition period from traditional to organic farming.[33]

In contrast, the relatively long fallow period practiced in hilly areas could be an advantage specific to those farmers. It implies that if they are seeking organic certification they may not need to undergo the three years conversion or transition period if said land has been fallowed for at least three years or the plot is a newly opened area (virgin land recently planted to ginger). Current certification processes in Myanmar do not strictly enforce transition periods, opting to certify plots deemed "organic by default" meaning there is a presumption that farmers have not used agrochemicals in previous years.

Another constraint is the lack of local supply of certified organic fertilizer and inputs specific for ginger. Availability, accessibility, and use of good quality organic inputs could contribute to productivity improvement and the elimination of the use of chemical inputs. Existing manufacturers of organic inputs are doubtful of financial viability given that effective demand is still small and target clients are located in upland areas. Production of organic inputs outside of farming villages would significantly increase prices way above the prevailing market price of synthetic inputs. Farmers do not have access to facilities and resources to scale up organic input production.

There are about 100 to 150 farmers whose farms have passed the organic certification audit. Estimated annual production of these farms is about 500 MT. The buyer, who holds the organic certification, is only able to buy 100 to 150 MT due to limitations in processing capacity. The buyer pays a premium price of about 50 kyats per viss (1 viss = 1.63 kg) above the prevailing market price. The farmers sell the remaining stocks to the conventional market. Since farmers do not hold the certification, they are not able to claim that their ginger is organically certified to any other buyer than the one holding the certificate. Organization of farmers into legal entities such as cooperatives would make them eligible to hold organic certification.

32 Peneva T.; Vancura, L. 2014. *Opportunities for Nepalese Ginger and Derivative Products to Access the EU (A Study of The Netherlands) – a report for Samarth-Nepal* (Promar Consulting).

33 A transition period of three years free from chemical inputs has to be observed in order to comply with organic certification requirements.

Food safety requirements

Compliance to food safety is a basic requirement to access export markets particularly in European countries and the United States. Food safety is of capital importance for global buyers. To export dried ginger to Europe, for example, the exporter must comply with the following legal requirements:[34]

a. Food safety – traceability, hygiene, and control measures;

b. Mycotoxins contamination - maximum level of aflatoxin and ochratoxin;

c. Maximum residue levels of pesticides;

d. Microbiological contamination – no salmonella;

e. Food additives and adulteration – should not contain undeclared, unauthorized, or excessive presence of extraneous materials;

f. Maximum levels of polycyclic aromatic hydrocarbons (PAHs) – contamination with PAHs is the result of bad drying practices.

Alignment of industry practices to Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP), and Hazard Analysis and Critical Control Points (HACCP) can facilitate compliance with the above legal requirements. Of the 218 GlobalG.A.P. standard control points for fruits and vegetables, 28 are focused on workers' safety and health. Many of the buyers and retailers in the European Union, United States, and other developed economies require GlobalG.A.P. certification. European and German buyers are also increasingly asking for GlobalG.A.P. Risk Assessment on Social Practices (GRASP) certification, a supplementary module of the GlobalG.A.P. standard, which is focused on social practices on the farm and workers' health, safety and welfare.[35]

Many of the productivity and health and safety issues at the farm level can be addressed through adoption of Good Agricultural Practices, but farmers still lack the capacity to comply with GLOBALG.A.P. They face the same constraints as when it comes to complying with organic certification. They do not have capacity to pay the high cost of private sector providers. Existing production loan portfolio of microfinance institutions, as mentioned, focus on major crops. Farmers are not formally organized and are ineligible to become holders of GLOBALG.A.P. certification. The DoA and State Agricultural Institutes have limited human and financial resources and therefore, limited capacity to conduct GLOBALG.A.P. training specific to ginger.

An upgrading of farming practices could allow for better compliance with safety requirements. On-farm, intermediate processing facilities could facilitate this compliance as well as lower cost of logistics and add value to the product. Currently farmers lack access to clean water and to common service facilities necessary for on-farm postharvest processing. As mentioned the microbiological, organoleptic and chemical properties of the dried ginger currently produced by farmers do not meet exporters' specifications. To accomplish further processing operations, farmers need to improve their knowledge on GMP and OSH.

34 Centre for Promotion of Imports from developing countries (CBI) Ministry of Foreign Affairs. 2017. "Exporting Dried Ginger to Europe", June. Available at: https://www.cbi.eu/market-information/spices-herbs/dried-ginger/europe/ [Accessed 28 Aug 2017].

35 Centre of Promotion of Imports from developing Countries (CBI), Ministry of Foreign Affairs. 2014. CBI Product Factsheet: "Avocado in Germany 'Practical market insights for your product' ". Available at: https://www.cbi.eu/ [Accessed 28 Aug 2017].

Among existing processor-exporters there is low adoption of GMP, HACCP, and other voluntary standards. This could be explained by the limited capacity of existing providers to provide guidance on cost effective and practical implementation measures appropriate for small enterprises. There is a lack of proof of concept and demonstration to showcase benefits of compliance with GMP, HACCP, and voluntary standards.

It is also important to note that while the United States and European countries require strict compliance to sanitary standards, at the border trade, China's stringent sanitary measures are loosely applied to Myanmar. China's imports from Myanmar by land border are exempt from the otherwise-required sanitary certificates.

2.2 Support to rural development and upgrading of farming practices

Most of the upgraded farming practices that took place over the last two years were facilitated by the USAID funded, Value Chains for Rural Development project (VC-RD), which was implemented by the non-profit organization, Winrock International. The community-based delivery of training tailored to local facilitators, lead farmers, and monastery (pilot) proved to be effective in improving the depth and breadth of outreach. The USAID project has limited focus on OSH in ginger farming, although it has been increasingly promoting the proper use of pesticides and the elimination of chemical inputs through the promotion of GLOBALG.A.P. and organic farming.

The use of clean planting materials to eliminate disease build up risks within the farm is among the interventions of the project. The project VC-RD has also conducted training on Bokashi (compost) application as a substitute for current fertilizer practices. Bokashi has the advantages to be rapid, cheaper than commercial fertilizers and effective during the transition from conventional to organic agriculture. Although an increasing number of farmers have adopted Bokashi, many farmers still find it laborious given the lack of appropriate tools for shredding and mixing as well as difficulty collecting the materials individually. A village level common service facility could accelerate adoption of Bokashi as well as provide a more enabling and better working conditions for the production of organic fertilizer.

In general, farmers still face challenges when it comes to upgrading their practices. They lack access to facilities, resources, and knowledge that would enable them to adopt measures to manage and mitigate risks. Ginger farmers have limited access to financial services, to include both savings and credit services. There is also a lack of investors willing to partner or engage with farming communities. Farmers also face insecurity of land tenure. The lack of land registration and similar proofs of land ownership undermines the security and permanence of work premises. Due to uncertainties about future landownership, investing in new technologies and practices remains tentative. Without such security, there is little incentive for farmers to invest in bettering practices. Similarly, without land registration, farmers do not have collaterals that can facilitate their access to financial services.

2.3 Growing demand for safer use of agrochemical inputs

Poor use of low quality fertilizers, herbicides and pesticides in ginger production have negative impacts on the environment and health. This problem can be related to the lack of availability of good quality inputs and a need for greater practical knowledge of agrochemical options and use.

According to the Agribusiness Diagnostic Report prepared by the Cambridge Economic Policy Associates (CEPA) for the International Finance Corporation, one of the key constraints to fertilizer use is the proliferation of adulterated and diluted fertilizer in the market. Farmers are unable to determine whether the fertilizer purchased (either imported or purchased domestically) is adulterated, with the exception of some brands selling at a 50-100 per cent premium.[36] This issue was also raised in the study conducted by the Livelihoods and Food Security Trust Fund (LIFT). Repacking of fertilizer at the border allows for the re-packers to mix together low and high quality fertilizer.[37] Although the Fertilizer Law of 1 October 2002 stipulates that active ingredients and safety measures for application must be clearly described in Myanmar language, compliance is not closely and consistently monitored. A revised fertilizer law[38] was approved by the parliament in 2015 to regulate quality and reduce environmental risks through registration and licensing, but enforcement of the law is weak. There are only a few accredited laboratories to conduct sample testing of fertilizers sold in the market.

As for pesticides, the overarching legislation that governs registration, production and distribution, is the Pesticide Law,[39] which was enacted on 20 January 2016. The Law established the general system on pesticide registration and business licensing. Pesticide registration procedures stipulate that labels must be in Burmese and should include the following: (i) active ingredients; (ii) trade name; (iii) manufacturer/distributor; (iv) directions for use; (v) precautions; (vi) hazardous classification; (vii) safety (handling, disposal, storage); (viii) first aid; and (ix) antidote. Information on Pre-Harvest interval is not mandatory under the existing law.

Main weakness of the current laws governing the production and sale of agrochemical inputs is the lack of enforcement. This is especially true for fertilizers and pesticides that enter the country via border trade. The supply of unregistered, low quality fertilizers is in large part due to lack of registration and inspection of fertilizers imported through cross-border trade with China. To date, only 20 per cent of fertilizers are imported through the seaport. It can be related to the lack of a bilateral agreement with China on imported fertilizer quality control. Further, there is a general absence of a systematic, risk-based inspection process, with inspection of fertilizers on the retail and wholesale market – by the Land Use Division – often reactive in nature, to address complaints.[40]

36 World Bank. 2016. *Global Agriculture and Food Security Program (GAFSP): private sector window: Agribusiness country diagnostic – Myanmar*. Washington, D.C.: World Bank Group. Available at: http://documents.worldbank.org/curated/en/541101490092426376/Agribusiness-country-diagnostic-Myanmar [Accessed 8 Oct. 2017].

37 Roelofsen, P. et al. 2015. *Chemical and organic fertilizer market in relation to the interests of small farmers in Myanmar* (Food and Security Working Group, Livelihoods and Food Security Trust Fund (LIFT)).

38 The Law amending the fertilizer Law, 23th March, 2015

39 Pesticide Law (Pyidaungsu Hluttaw Law No. 14/2016)

40 World Bank. 2016. *Myanmar - Analysis of farm production economics* (Washington, D.C., World Bank Group). Available at: http://documents.worldbank.org/curated/en/509581468181132091/Myanmar-Analysis-of-farm-production-economics [Accessed 4 Oct 2017].

The Plant Protection Division (PPD) of the Ministry of Agriculture, Livestock and Irrigation (MoALI) is in charge of the registration of agrochemicals. The PPD is responsible for providing guidance on the registered status of agrochemicals and inspections to ensure the government pesticide policy is followed. At the state, district, and township levels, and especially in the townships, plant protection officers are required to educate the public about this policy. However, conducting awareness campaigns at the wholesale and retail levels is constrained by lack of staff and resources.

The PPD is currently working with Wageningen University & Research, Environmental Research (Alterra) to improve the pesticide registration procedure such that evaluations are conducted in a standard manner and decisions are taken in a transparent way. One of the planned interventions of this project is to establish a link between pesticide registration and extension services via the Pesticide Selection Tool (PST) of Wageningen Plant Research. The PST has the potential to assist farmers and sector professionals to make the right choices and to select products that will provide the best result at the most favourable price. Main activities in the project in 2017 were i) scanning the present package of pesticide products registered in Myanmar to identify so-called Highly Hazardous Pesticides using FAO/WHO guidance, ii) discussing and establishing a flow chart for the pesticide registration process in Myanmar, and iii) further developing registration guidance and assisting the PPD staff to apply the developed guidance.[41]

The Plant Protection Division under the MoALI launched last July 2017 a mobile application to promote the effective and safer usage of pesticides. The "Plant Protection Mobile Application" (PP-Verion-1.0), which is available for android phones, allows users to cross reference any brand of pesticides to see if it has been registered with the Ministry and is in fact safe to use. The application was launched to address the need for education on the safer usage of pesticides and language barriers on labels. The Myanmar Fertilizer, Seed and Pesticides Entrepreneurs Association (MFSPEA) is urging the MoALI to create short, educational videos on pesticide usage to be broadcasted on the app or in local media.[42] The mobile application has been downloaded more than 10,000 times since it was launched two months ago. Based on a sample survey conducted by the World Bank, about 56 per cent of farming households in Shan State own a cell phone.[43] Existing mobile application on safer use and handling of pesticides and crop production of MoALI and other organizations can be potential channels for dissemination of OSH information.

Retailers appear to be important sources of information, particularly with regards to type of pesticides appropriate for a crop, quantity of use, and general instruction on how to use inputs. There seems to be a tendency among salespersons to equate popularity of brand among farmers with effectiveness of product. Under Myanmar laws, retailers are granted license only after they have successfully completed training on proper handling of agrochemical inputs. Retailers though are not obliged to provide training and advice to their customers. Most of the input retailers visited by the research team displayed a poster indicating risks associated with pesticides, the need for safety precautions or the use of personal protective equipment (PPE). The poster was provided by the DoA. Packaging of knapsack sprayers

41 *Hortidaily*. 2017. "Netherlands & Myanmar partner on pesticide registration", 22 Feb. Available at: http://www.hortidaily.com/article/32505/Netherlands-&-Myanmar-partner-on-pesticide-registration [Accessed 4 Oct 2017].

42 *Myanmar Business Today*. 2017. "Ministry Launches Mobile App For Crop & Consumer Safety", 4 Sept. Available at: https://www.mmbiztoday.com/articles/ministry-launches-mobile-app-crop-consumer-safety [Accessed 4 Oct 2017].

43 World Bank. 2016. *Myanmar - Analysis of farm production economics* (Washington, D.C., World Bank Group). Available at: http://documents.worldbank.org/curated/en/509581468181132091/Myanmar-Analysis-of-farm-production-economics [Accessed 4 Oct 2017].

also contained instructions on proper use and handling. Most shops had PPE for sale, but according to the salespersons, these are slow moving items.

Intermediaries, particularly brokers, could also potentially influence the type of inputs used by farmers and their farming system. Intermediaries provide advances and credit to farmers especially with regards to purchase of inputs. There is a fertilizer dealer that is also engaged in trading of ginger and other crops. The outlet offers credit to farmers, specially their suppliers and regular clients, at an interest rate of 3 per cent per month. If the farmer is able to pay the fertilizer within one month, no interest is charged. Ginger is bought at prevailing market price. Interviews with farmers and retail outlets indicate that the provision of credit is a common practice primarily as a means of retaining customer loyalty given the proliferation of input retailers in South Shan. The practice is, in a way, favourable to farmers, given the lack of alternative credit. To encourage farmers to use better and safer fertilizer, it is important that access to credit is considered or for supplier to be able to offer credit terms. It is also a warning sign that eliminating traders in the value chain may be a dangerous strategy if alternative credit lines are not in place.

The major input manufacturers and distributors in Myanmar also deploy agents to villages. These agents provide technical advice to farmers and information on use of products of their companies. Myanmar Awba, which is the largest distributor and importer of agricultural inputs, has about 500 agents deployed across the whole country. During the meeting with the research team, the company expressed the need to upgrade the general knowledge of their agents and personnel on OSH.

2.4 Lack of formal organization and cooperatives

Until 2011, groups and associations not established by the state were illegal. As such, ginger farmers are not formally organized and, as mentioned previously, without group status, farmers cannot hold certifications such as GlobalG.A.P or organic certification. However, farmers in the same village know each other quite well. Farmers regularly exchange labour with neighbours and share technologies. These personal and social relationships can potentially be harnessed to get farmers to work together. The cooperative business model embodies the hope of building market systems that truly serves people and communities by supporting economy of scales and bettering bargaining position. Given the size of farms, strong horizontal collaboration is important to buffer key investments aimed at upgrading infrastructure, technology, and knowledge-based assets necessary to improve working conditions, productivity, and quality. Organization of farmers into cooperatives can facilitate access to resources and knowledge to improve OSH performance and reach bigger and more lucrative markets. Porters could also benefit from organizing into collective enterprises or cooperatives.

Currently, farmers and porters lack knowledge on cooperatives structures and the benefits for their business model. They lack know-how to manage and run cooperatives. These constraints can be explained by the lack of organizational development providers and cooperative development modules appropriate to the context of ginger farmers. Another key

challenge is to overcome farmer's generally negative impression associated with associations and cooperatives.[44]

It is also important to note that the Labour Organization Law of 2011[45] allowed the formation of trade unions after more than five decades of prohibition. Workers only have the right to join a labour organization according to their relevant activity. Trade unions in Myanmar such as the Agriculture and Farmer Federation of Myanmar (AFFM-IUF), and the Confederation of Trade Unions of Myanmar (CTUM) have been conducting orientations on OSH, advocacy on proper pesticide use, and formation of farmers groups, though the reach remains limited.

2.5 The new OSH law and its scope

The current OSH legislative framework in Myanmar is primarily embodied in the Factories Act (1951) amended in 2016 and the Shops and Establishments Law (1951) that was amended in 2016. The provisions of the Factories Act apply to all manufacturing companies with (i) five workers with the use of power, or (ii) ten workers without the use of power. The Factories Act would be relevant to the export oriented processing companies only. The Factories Act has detailed provisions regarding workplace safety, covering building and machinery, machines and industrial processes, lifts and hoists, and other considerations such as hazardous substances.

As for the Shops and Establishments Law 2016, it contains regulations on working hours, payment of wages and work place safety and health. Based on the scope of this law, it seems that ginger trading enterprises (brokers, wholesalers) are covered. Therefore, in practice, the current OSH legislation appears to apply only to export oriented processing companies and trading enterprises. The farming sector is not covered within existing OSH legislations and regulations.

A new OSH law covering all sectors including agriculture is still pending enactment by parliament. It has been drafted by the MOLIP with the participation of representatives from various regulatory agencies and with the assistance of ILO since 2013. The new law will integrate existing OSH standards provided in the Factories Act, the Shops and Establishments Law, and other sector specific laws. Under the new and comprehensive OSH Law, an OSH Council would be formed to coordinate various OSH activities which are currently performed by a number of different regulating agencies. The proposed new law is intended to implement workplace safety and health regulations for all industries. It will stipulate obligations of the relevant stakeholders to reduce and eliminate work-related injuries and diseases, ensure the early prevention of occupational hazards and risks arising from Myanmar's economic development, raise productivity, and establish safe and healthy workplaces in accordance with regional and international standards. Under the proposed law, companies are required to put in place an OSH management system and a committee.[46]

Compliance with the proposed OSH law would help producers and other actors within the value chain to align with requirements of export markets. Compliance with provisions would

44 Farmers have history of failed initiatives related to the creation of associations. They perceive that such structure is aimed at controlling people's movements rather than empowering them.

45 Labour Organization Law (No. 7 of 2011)

46 ILO. Forthcoming. *Myanmar – National Occupational Safety and Health Profile – 2018* (Geneva, ILO).

also contribute to productivity improvement. To do so, enterprises in the ginger value chain would benefit from assistance in preparing for the new law, particularly in establishing an operational OSH management system. As of now, even where the OSH related laws apply, lack of know-how is observed among processor-exporters to develop and implement OSH management systems. At the farm, aside from "intuitive" risk management measures employed by farmers and the orientation on OSH received by some farmers from the DoA, there are no formal mechanisms to systematically promote OSH. The reliance on "employers" for the enforcement of OSH, as embedded in the regulatory mechanisms and in the upcoming OSH law, excludes protection of self-employed workers such as farmers. Smallholder farms in Myanmar are apparently not registered as enterprises which can pose challenges in the implementation of the upcoming OSH law. Likewise, the limitations on outreach and depth of labour inspections will be further magnified when the new OSH law is enacted and implemented.

2.6 Limited resources and capacities of institutions with a mandate on OSH

FGLLID is responsible for enforcing occupational safety and health rules mainly through factory inspections and training. The activities of FGLLID are guided by two laws: the Factories Act (1951) amended in 2016 and the Shops and Establishments Law (1951) amended in 2016. During the interviews conducted, FGLLID recognized the need for a greater number of trained labour inspectors for worksites. Likewise, it has been reported that factory inspections are always announced and, in some cases, factory owners had to provide accommodation and transportation. To some extent, dependence on factory owners for logistical arrangements can erode impartiality and the credibility of the inspections. FGLLID also has limited human and financial resources and capacity to conduct OSH orientation and training.

The DoA and rural health centres also have limited resources and capacity to conduct OSH training specific for the farming sector and health surveillance. The lack of competencies on OSH is recognized by staff of rural health centres. Rural health centres in key ginger producing areas in South Shan are generally willing to include OSH in their awareness campaigns and regular surveillance. They require necessary training, information, education, and communication materials that are easy to understand and are tailored to the needs of farming communities.

FGLLID and SSB do not monitor work related injuries and disease. Rural health centres have weak monitoring systems on occupational injuries and disease at farm level, which hinders the development of proactive solutions to recurring injuries and early detection of occupational diseases. For those who have statistics, these are not disaggregated into type or nature of injury or their cause, which limit its usefulness. There is also no data on occupational diseases or investigation of occupational accidents. SSB also has weak information system dissemination and outreach of information campaign on social security system is limited to formal workers.

3 Opportunities to improve competitiveness and OSH

3.1 Vulnerability profiles

It is necessary to assess OSH practices and outcomes in context and further understand what drives them in order to tailor interventions that can effectively improve OSH. Identifying vulnerability profiles can support setting priority interventions and / or better tailoring interventions.

Vulnerability profiles are defined as the characteristics of specific groups of workers putting in relation exposure to occupational hazards and risks with factors that make workers more likely to be exposed to such hazards and risks and / or with low capacity to cope with the consequences of such exposure.

Depending on the size and complexity of the business or enterprise, vulnerability profiles can correspond to the level of:

- The enterprise, covering all activities or processes and all the workers.
- A specific section of the workplace, e.g. a machine repair shop, covering a specific group or number of workers.
- A specific high-risk activity or process, e.g. problems with handling heavy loads, which may pose a danger to specific group, groups or numbers of workers.

The following dimensions are explored in order to identify vulnerability profiles:

- **Risk exposure**: identifies occupational hazards by activity and provides an assessment of their severity and probability of occurrence.
- **Sensitivity**: identifies the specific characteristics of the employment situation of workers which are linked to their exposure to specific hazards and influence OSH outcomes. In particular, the following factors are identified and analyzed: access to a workplace OSH risk management system; access to and information on control measures; status in employment if it is linked to differential access to OSH prevention, protection and promotion services; company or holding status if it is linked to a differential access to compliance checks by relevant institutions (labour inspection, social security inspection, etc.).
- **Coping capacity**: identifies the strategies and resources that workers have at their disposal to cope with the consequences of exposure to occupational hazards. In particular, it is a matter of assessing access to care and compensation services in the event of an occupational injury or disease.

Vulnerability profiles are a holistic way of looking at both the occupational hazards and risks themselves, but also at the people exposed to them and the underlying factors that influence them.[47]

3.1.1 Farmers and agricultural workers

Production process

Occupational hazards and risks are linked to the type of tasks performed by workers and farmers in the production process of ginger. Main steps for ginger production are the following:

- **Land preparation**. Ploughing is done using hand tractors, power tillers, and/or oxen or cattle after which cow manure is applied to the soil in preparation for planting. Growers may also apply urea at planting time. Land preparation is traditionally performed by men. There is a growing preference among ginger farmers in Shan State to use hand tractors and power tillers. It can be explained by the phenomenon of extreme and harsh climatic events, shorter time for completing critical agricultural activities and labour shortages due to migration. Hand tractors and power tillers are made accessible to farmers via rental services, which provide the service of equipment operators.
- **Sowing**. Sowing requires the use of hoe to drill the soil and bending to plant rhizomes and compact the soil. Sowing is done by both women and men, although planting is typically done by women.
- **Weeding.** Manual weeding of ginger consists of activities such as pulling the weeds, chipping with a hoe, and cutting the roots with a knife. Weeding is traditionally done by women.
- **Treatment of disease, pests and weeds**. Knapsack sprayers are most commonly used to apply agrochemicals. More men than women perform spraying of agrochemicals.
- **Harvest**. Ginger is harvested by hand. The initial step in harvesting is to remove a significant portion of the senescent foliage with a machete to make the rhizomes more accessible. It then involves digging each hill with a spading fork or a hoe, pulling the entire plant, shaking off the soil, and cutting off the stem without breaking the rhizomes. The process should be done carefully to avoid damage. Harvesting is traditionally done by women.

47 ILO. 2018. *Occupational Safety and Health in Global Value Chains Starterkit, Assessment of drivers and constraints for OSH improvement in global value chains and intervention design - Guide for Implementers* (Geneva, ILO).

Figure 6. Workers using knapsack to spray herbicide.

Excerpts taken from the video "Myanmar: ILO makes ginger farming safer and more productive". Available at: https://www.ilo.org/yangon/multimedia/WCMS_633299/lang--en/index.htm

Figure 7. Worker using a hoe to harvest ginger.

Excerpt taken from the video "Myanmar: ILO makes ginger farming safer and more productive". Available at: https://www.ilo.org/yangon/multimedia/WCMS_633299/lang--en/index.htm

Exposure

Main occupational hazards and risks identified in the production process of ginger are classified by risk factors and nature of risk, taking in account severity of occurrence:

Ergonomic risks: Farmers and farm workers are exposed to multiple ergonomic risk factors for developing musculoskeletal disorders. Consequences are intensified when farmers do not take adequate rest and perform the same activities for long periods even when experiencing pain and discomfort. Posture, heavy loads and repetitive movements are risk factors identified in multiple work operations, including the following:

- Some farmers till the soil more than what is necessary, which increases the number of repetitive manual tillage operations.
- The use of poorly designed and maintained hand tools to plough the soil, cut weeds, and harvest rhizomes.
- Many farmers do not follow proper crop spacing, density and adopt strenuous postures which increase the likelihood of risks associated with bending over for extended periods and other repetitive actions, especially during planting.
- Transporting heavy loads while using bad lifting techniques and carrying these loads for extensive periods and over long distances. Most farms are located in sloping areas and far from homes.

Figure 8. Woman carrying basket of harvested ginger.

Excerpt taken from the video "Myanmar: ILO makes ginger farming safer and more productive". Available at: https://www.ilo.org/yangon/multimedia/WCMS_633299/lang--en/index.htm

Biological risks:

- **Lack of access to clean water and sanitary facilities** is a problem for many households in most areas. Majority of farmers rely on rainfall and natural springs for drinking and irrigation water, either directly at the source or downstream from the streams that they form. Only a few of the communities have access to springs, streams, ground water, retaining ponds, or other sources. They often have to walk long distance to get water. The most common illnesses in rural villages in South Shan are diarrhoea, typhoid and skin infections due to a lack of clean water and personal hygiene.[48] Extreme weather conditions can potentially increase incidences of pests and diseases.
- **Mosquito bites** are frequent. As of 19 August 2017, the total cases of dengue had already reached 21,288 compared to just over 5,400 infections during the same period in 2016 in Myanmar. In 2017, Shan State had 716 reported cases of dengue.[49] Lack of sanitation and unhygienic water storage are among the main causes of dengue fever outbreaks. Changes in temperatures also affect mosquito populations by increasing their numbers, extending their transmission seasons, and expanding their distribution seasonally and geographically. This means that we can expect farm workers will be at an increased risk for mosquito-borne diseases, including dengue fever, which is transmitted during the day.
- **Snake bites** while working on the land have also been reported.[50]
- **Cow dung** used for land preparation may contain pathogens that could cause diseases. Hand washing after handling manure is important but, in many cases, farmers do not readily have access to clean water.

Radiation. Farmers, by nature of working outside, are exposed for long periods to the sun and ultraviolet radiation, especially during the land clearing and plantation activities, which are generally performed during the hottest days of the year. News reports indicate that ultraviolet index in Shan State during the months of March and April can reach more than 12. Regular exposure to ultraviolet radiation at high levels without adequate protection can damage the skin and eyes over time. An added hazard for farmers is that pesticides are absorbed more quickly through hot, sweaty skin.

Psychosocial risks. Heavy workloads and financial insecurity contribute to the farmer's anxiety, which in turn may be linked to the lack of sleep, tiredness, bodily aches, and pain that workers experience. Farmers, especially women, reported feeling pressure from worries about money which are related to concerns about yield and price fluctuations. Erratic weather conditions, disease outbreak (e.g. soft rhizome rot), and price fluctuation (especially of fresh ginger) are some examples of factors that pose challenges for many farmers to control and predict; which, in turn, can be a source of stress.

Chemical hazards. Workers and farmers are exposed to various chemical products (fertilizers, pesticides and herbicides). The most preferred herbicide among farmers is Paraquat which is banned in many countries. Paraquat is classified as T+/very toxic under the Globally Harmonized System of Classification and Labelling of Chemicals. When used under poor conditions and without proper personal protective equipment (PPE), exposure to paraquat

48 *Relief Web*. 2016. "In Shan State, New Water Sources Combat an Old Scourge", 9 May. Available at: https://reliefweb.int/report/myanmar/shan-state-new-water-sources-combat-old-scourge [Accessed 4 Oct 2017].

49 *Coconuts Yangon*. 2017. "Dengue fever: Myanmar infections quadruple since 2016 ", 29 Aug. Available at: https://coconuts.co/yangon/news/dengue-fever-myanmar-infections-quadruple-since-2016/ [Accessed 4 Oct 2017].

50 According to the Global Burden of Disease study (Institute for Health Metrics and Evaluation, 2015), snake bites where among the majors causes of death in Myanmar. The Global Burden of Disease 2015 study provides a comprehensive assessment of all-cause and cause-specific mortality from 1980 to 2015.

can cause a range of symptoms, including: localized skin damage (dermatitis and burns), eye injuries, finger and toenail damage, nose bleeds, excessive sweating, nausea and vomiting. Even with PPEs, some categories of workers such as women of reproductive age, need not to be exposed. The mode of action of Paraquat toxicity and lack of an antidote leads to many cases of acute poisoning. Damage to the lungs may occur if Paraquat is absorbed over time, and long-term exposure is associated with Parkinson's disease.[51]

The skin is the most exposed organ while spraying herbicides on ginger plots. If farmers are unprotected while spraying herbicides, it may result in skin contact, especially on the hands and face, leading to hand dermatitis, pigmentation and thickening of the skin on hands, and fungal infections of the skin. Ill-effects that farmers associated with the use of herbicides include skin and eye irritation and headaches.

Knapsack sprayers are most commonly used by Shan farmers and farm workers to apply herbicides. When not maintained properly, leakage from the sprayers can result in loss of herbicides. Preparation of herbicide mixture for spraying is done by the sprayer himself/herself. The spray formulation is generally based on a combination of recommendations from peers and retailers as well as own experiences of sprayers and farm owners. Sprayers and farmers seldom rely on instructions provided in the container since in most cases these are in languages other than Burmese.

Figure 9. Worker preparing herbicide mixture for spraying.

Excerpt taken from the video "Myanmar: ILO makes ginger farming safer and more productive". Available at: https://www.ilo.org/yangon/multimedia/WCMS_633299/lang--en/index.htm

Physical: In addition to the above mentioned hazards and risks, the use of cutting tools, like a knife used to cut the roots, may result in injuries. It is also important to mention slipping and falling since most farms are located in sloping areas and farmers do not use suitable footwear. The risk of falling from slipping is magnified during the rainy season when grounds are wet and muddy.

Overall, according to the dot survey conducted among farmers and farm workers,[52] musculoskeletal disorders are the most common work-related health problems reported by both men and women. A higher percentage of women (92 per cent) than men (78 per cent) reported a very high likelihood of occurrence. Skin injuries or irritation were issues for 96 per cent

51 Watts, M. 2012. *Highly Hazardous pesticides – Paraquat*, A PAN AP Factsheet Series (Penang, Pesticide Action Network Asia and the Pacific).

52 A dot survey covering more than 20 questions was conducted by the research team. Respondents in four villages participated in the survey for a total of 80 respondents of which 41 per cent were female.

of female respondents with plant irritants, pesticide spraying, and insect bites as the main culprits. According to 40 per cent to 50 per cent of the respondents, occurrence of slips and falls, injuries from tools, insect/mosquito bites, and consequences associated with unsanitary conditions are unlikely to happen. The relatively low degree of likelihood attributed to these hazards and risks by such a significant number of participants may be associated with their perception that these risks are already commonplace in rural areas.

Sensitivity

Ginger farming is performed by farmers, households, unpaid family members, and self-employed, casual and daily agricultural workers. Self-employment, while a highly valued aspect by farmers in terms of the autonomy it gave them to organize their own work, also comes with the burden of worrying about the next meal and the immediate future. In the ginger value chain, farmers absorb most of the economic risks with low return. Farming is vulnerable to a number of external factors that farmers and workers have little control over. This insecurity increases exposure to some occupational hazards and their consequences. Farmers often sacrifice rest and safety to focus on productivity. Measures to eliminate many of the above mentioned hazards imply upgrading farming practices and eliminating or using safer chemicals. Farmers have difficulty accessing financial services that would be necessary for investing in safer practices. They lack resources, knowledge and support to do so.

Farm work is informal and falls largely outside the reach of enforcement and OSH support functions. The farming sector is not covered in existing OSH legislations and regulations. Although a new legislation covering agriculture is pending approval, in its current draft it is unlikely to cover farmers since they are not registered as enterprises.

As of now, there are few measures applied to eliminate hazards and control the risks described. Farmers generally have knowledge on ill-effects of certain practices and generally have a good appreciation of occupational hazards and risks, but lack knowledge on how to prevent and eliminate them. A minority of 18 per cent of male respondents, in the dot survey, perceived ginger farming as not hazardous. The social and cultural expectations of men being tough and strong may negatively impact perception of hazards and risks. Moreover, about 33 per cent of the male respondents compared to 19 per cent of female, agreed with the statement that they can skip safety steps owing to their years of experience doing the job.

Older farmers face increased vulnerability. They frequently continue to work beyond the standard retirement age, especially considering that they do not benefit from an old age pension.[53] Thus, at a time of physical diminishment, older farmers may face increased vulnerability to injuries and diseases and may continue to perform tasks beyond their physical ability or what is required to safely accomplish their work.

Regarding protection against chemical hazards, there seems to be a positive attitude towards the use of PPE, but this is not necessarily reflected in practice. Although an overwhelming majority of participants of the dot survey agreed that farmers should wear PPE, field observations indicated that use of prescribed PPEs, especially during herbicide spraying was not common. The discrepancy between belief and practice could be attributed to factors such as discomfort of wear, not being aware that even routine simple tasks require protection, and the unavailability of PPEs appropriate to working conditions. Aside from cost constraints, most farmers find the PPE (especially the overall design) to be impractical because their

53 Tessier, L. 2015. *Social protection assessment based national dialogue: Towards a nationally defined social protection floor in Myanmar* (Yangon, ILO Liaison Office for Myanmar).

preferred clothing is the *longyi*.[54] Respondents who participated in the dot survey said that they washed their hands and changed their clothes after spraying. Farmers though do not observe a minimum time delay for re-entry into treated fields.

Entire families may also be at risk of pesticide exposure because of the drift from nearby areas, the lack of sanitary facilities to wash hands and shower, and the fact that they bring home clothes that have been contaminated. Many of the participants also seem unable to recognise the signs and symptoms of pesticide poisoning. Farmers have not sought professional medical diagnosis of possible long term effects of herbicide exposure and use.

As for the use of mechanized tools for land preparation, the lack of know-how on safe use and handling of machine increases risk of injuries among operators, farmers and people within the proximity of where the work is being performed. With the growth of equipment rental services, providers tend to field untrained operators of hand tractors and power tillers. The equipment rental services are provided by private companies and the Agriculture Mechanization Department (AMD). Farmers and operators lack proper training to operate the equipment.

Gender pattern

Gendered patterns of awareness and knowledge on OSH have been identified. Male farmers seem more knowledgeable of risk factors and their consequences than women. This is more likely because male farmers generally receive more training than women, especially technical training. These trainings cover topics such as hazards and risks associated with pesticide use and other farming practices. Purchase of pesticides is generally done by men. Likewise, training and orientation conducted by agents of input companies target male farmers. In return, there is a broad distrust by farmers of the safety information provided by rural health officers and pesticide suppliers. It is also reported that more women than men have attended orientation on health issues provided by rural health centres.

The workload of tasks historically performed by women, such as tilling, sowing, weeding, and harvesting is slightly higher than the workload performed by males due to the fact that the latter are usually assisted by mechanical means during land preparation. Women are more likely to have longer working hours than men. Part-time farming, which is common among women, can result in long working hours and inadequate rest, especially during the harvesting season. Although male farmers also take off-farm jobs or work as labourers in other farms, women often have the added burden of household responsibilities. Women attempt to balance home, employment away from the farm, and farm work which can lead to role overload and increased stress and fatigue. A significant portion of women's time is spent walking great distances to collect water and firewood. In fact, they often have to walk two to five miles to source water.[55] In many cases, women have to collect at least ten gallons per day for cooking and drinking. Women are also expected to be able to take care of injuries sustained by family members or arrange for medical care whenever needed.

Women appear to be more exposed as well as more conscious than men to high level of sun exposure. Concern of women on the effect of the ultraviolet rays appears to emanate mainly from aesthetic concerns rather than from health perspectives. During focus group discus-

54 Traditional cloth worn by both men and women in Myanmar, wrapped around the waist and reaching ankle-level at the bottom.

55 As per farmer groups who participated in the Winrock's Launching the new ginger season: Linking Ginger Farmer Groups and Buyers event conducted last 25 October 2017.

sions, women farmers mentioned that they use long sleeves and a hat and apply *thanaka*[56] as protection.

Figure 10. Woman wearing *thanaka* to harvest ginger under the sun.

Excerpt taken from the video "Myanmar: ILO makes ginger farming safer and more productive". Available at: https://www.ilo.org/yangon/multimedia/WCMS_633299/lang--en/index.htm

Coping

It is particularly difficult for farmers, their families and agricultural workers to cope with the physical and financial consequences of work-related injuries or diseases. They face challenges accessing health services and have no access to work injury compensation schemes. They mostly rely on home-based treatment, traditional healers and drugstores. Farmers and farm workers are own account workers. They do not have access to social security benefits unless they voluntary sign up. Without a clear understanding on how the social security system works, it is unlikely for farmers to voluntarily register. None of the farmers interviewed indicated that he or she had voluntarily signed up with SSB or availed a private insurance.[57]

Out-of-pocket payment is primarily how ginger farmers and farm workers access health services. This places many farming households at risk of incurring catastrophic expenditure in meeting healthcare costs. To attend medical clinics or hospitals is expensive. It is often considered as a last resort and consequently not seen as preventative or part of regular health surveillance. While the motivations to delay care are diverse, the financial cost constitutes a major factor for many community members. The costs of lost time, travel expenses, and missed work also form part of the barrier.

Ginger farming households generally do not have savings and have very limited access to formal financial services. As such, in times of emergency such as illness, they have to borrow from informal landers and/or sell productive assets. To pay off debt, some households resort

56 *Thanaka* is a yellowish paste made from ground tree bark used as sunblock.

57 Farmers and farm workers are not eligible to claim benefits under the Workmen's Compensation Act 1923, which does not cover wage workers in the agricultural sector.

to reducing household food consumption, taking children out of school and putting them to work, and diversifying sources of income (off-farm labour, working in other farms, etc.) which translates to longer working hours. Village-based and monastery-based support mechanisms are also available to cope with injuries, disease, and death. In close-knit villages, households give donations to help families cope with adverse conditions. Based on interviews with farmers, injuries and disease, especially those that are serious and fatal, almost always result in distressed sales of productive assets (e.g., livestock), premature harvesting of crops, and additional debts to traders and other informal sources of credit.

3.1.2 Porters

Exposure

Porters in Aung ban Market perform the task of manually transporting and loading and unloading of ginger and other fruits and vegetables. These tasks take place in settings that are both unhealthy and unsafe. Such work environments include improper work area layout, unsanitary conditions, poor loading and unloading systems, and so on. Porters have high risk level exposure to ergonomic and biological hazards. They face these risks on a daily basis.

Ergonomic risks. The porters carry baskets or sacks of ginger above their heads or on their backs from the trucks to the warehouse and vice versa. They have to walk long distance in unappropriated postures carrying heavy weight. Baskets or sacks weigh between 60 to 80 kg. It was observed that some porters found different ways (improvised trolleys, straps or ramps to cushion weight when loading or unloading, for example) to make their work less strenuous and to improve productivity.

Figure 11. Porter transporting a sack of ginger.

Source: Picture taken by Vision Zero Fund team in Myanmar.

Slip, trip and fall. The use of makeshift ladders or ramps to facilitate loading and unloading of ginger present risks of falling from slipping or tripping. Ramps and ladders often have, among other factors, no handrails or guardrails and uneven risers or steps. Unsecured portable ladders or ramps and the presence of grease or trash at a site can also present risk.

Biological risks factors. The Aung Ban trading centre generally lacks basic hand washing and sanitary facilities. A large part of the sanitary problem is due to poor waste management system in the market. Clogged gutters and piles of uncovered trash can become breeding places for disease vectors (malaria, dengue and others) and give off strong smells. Poor sanitation affects not only human health but also food safety and shelf life of fruits and vegetables traded in the market.

Sensitivity

Porters are self-employed workers who sell their services both to suppliers and buyers. Informally, porters appear to be associated with a specific trader or intermediary. This informal affiliation, in a way, establishes their "work territory". Demand for their services is affected by daily, weekly, seasonal and cyclical variations of vegetable supply. Although porters are affiliated with certain traders and brokers, they do not have any contractual relationships with these enterprises. Porters are not registered with the SSB. Even if, theoretically, porters are eligible to voluntary register with the social security programme of the government, they have not been covered by orientation and awareness programmes. Their precarious working conditions (contract, remuneration, working hours, access to social protection, among other considerations) increase exposure to occupational hazards and their consequences.

Porters in Aung Ban are not organized. It was observed though that porters affiliated with the same intermediary tend to help and work closely with each other. In a way, they behave like a work unit with their own informal code of conduct.

Porters have not been recipients of any training from the government and development organizations. Protection against occupational hazards and risks is primarily based on instinct and experience gained through the years. Porters do not use PPE or collective protective equipment. The lifting, carrying, or lowering of the load are done manually without the aid of mechanical equipment. Porters and intermediaries would benefit from the introduction of technologies and practices that would help improve productivity and food safety parallel to improving safety and health conditions in the workplace.

Coping

Porters have no access to compensation in case of occupational injury, disease or death. They bear the costs of work-related injuries or diseases. The intermediary that they are affiliated with may also voluntarily provide some assistance when they fall ill. For minor ailments, they may visit the rural health centres. Similar to farm workers, they rely on home based treatment and/or consult with traditional healers and drugstores. Some porters have the tendency to downplay health issues. Some injured porters just keep on working since they economically depend on their work.

3.1.3 Cleaners and sorters

In trading centres, intermediaries hire workers consisting mainly of women to perform sorting and cleaning tasks, before ginger is sold to processors-exporters, border trade consolidators or key wholesale markets in Myanmar.

Figure 12. Workers sorting ginger in a warehouse.

Source: Picture taken by Vision Zero Fund team in Myanmar.

Exposure

Workers are hired depending on projected inbound volume of ginger and other vegetables. Their main tasks are to clean, sort according to size and maturity, and pack the ginger. Cleaning primarily involves removing soil and portions of the ginger that have been injured, bruised, and diseased with the use of a knife. They work amidst piles or sacks of ginger either inside the warehouse in small spaces or, in some cases, outside the warehouse, beside roads. They work an average of eight hours a day. Main occupational hazards and risks identified are the following:

Biological/Chemical risks. Sources of pollutants include: (i) cigarette smoke; (ii) dust; (iii) moulds, spores, fungus and bacteria that accumulate in standing water or in dirt/soil; and (iv) gases and particles from truck exhaust as well as other pollutants. These pollutants can cause severe respiratory ailments. Most warehouses visited do not have adequate windows and ventilation systems.

Ergonomic risks. Workers use the floor as their working "table". Work is performed in squatting or sitting position. The poor working positions may result in musculoskeletal disorders, especially back disorders.

Slip and trip. The workplace is cluttered with ginger and other produces on the floor which presents tripping and slipping hazards. There are no clear pathways for workers. In many cases, workers are not using appropriate footwear.

Cutting tools: The use of knives to cut ginger may result in injuries.

Sensitivity

Cleaner and sorter jobs are seasonal and hiring coincides with the harvest season. However, some trading enterprises keep a few sorters throughout the year. Although many of the workers have been working with one company for many years, they still do not have permanent status and are paid on a daily basis. In fact, some workers indicated that they have been working with the same company as daily wage workers for more than five years. If they do not report for work, they do not receive any wage. Workers said that owners of the companies may provide assistance when they get sick, during pregnancy/child delivery, and other emergency needs. It was reported that when women are pregnant, they quit their jobs for two to three months prior to delivery. They usually are able to go back to the same employer if they had good performance and relations.

Theoretically, trading enterprises are among the businesses covered by the amended Shops and Establishments Law which contains regulations on working hours, payment of wages and OSH. It appears though that both owners and workers are not aware of the Act or its provisions. Cleaners and sorters precarious working conditions increase exposure to occupational hazards and its consequences.

Basic preventive and protective measures against occupational hazards and risks are generally absent. No conscious initiatives to prevent work related injuries and diseases have been undertaken. The intermediaries and the workers lack the basic knowledge on hazards, risks, preventive healthcare, collective protection and personal protection.

Coping

Cleaners and sorters are not registered with SSB. Wage workers not covered by the Social Security Law can claim for cash compensation in the case of occupational disease or work injury under the Workmen's Compensation Act 1923. Likewise, workers generally find it difficult to file claims under the Workmen's Compensation Act. In essence, the vast majority of workers in the ginger supply chain do not benefit from social security.

In case of diseases or injuries, assistance either in kind or cash to help defray expenses is voluntarily provided by traders to cleaners and sorters. In most cases though, cleaners exhaust all possible home-based remedies known by the family and/or traditional healers.

3.1.4 Factory Workers

Postharvest operations for overseas export of ginger is carried by processors in factories.

Exposure

Postharvest operations of fresh ginger in processors-exporters' factories include the following processes: manual sorting, washing using high pressure water, trimming with a sharp knife, mechanical slicing, dipping and treating with chemicals, drying and packing. To prepare dried skinless ginger, the roots can be boiled in water. Peeling or scraping is also done to remove the skin. There are two main categories of factory workers, namely: (i) cleaners/sorters/washers – mostly women who are daily or seasonal workers; (ii) machine (e.g. slicer) operators – mostly men who are permanent workers. Main occupational hazards and risks identified are classified by risk factors and nature of risk:

Biological risks. Poor ventilation exacerbates exposure of workers to soil (while cleaning ginger) and airborne dust (from slicing machine operations).

Physical risks. Machine operators are exposed to hand-arm/whole body vibrations. Slicing machines do not seem to have vibration dampening pads installed. During peak harvest season of ginger, operators work continuously and, at times, for more than 8 hours. They are also exposed to loud noise which can result in hearing impairment. Operators do not use personal protective equipment. As for cleaners and sorters, high temperatures in the workplace increase the likelihood of heat exhaustion.

Other hazards linked to industrial workplaces may also need to be closely looked at (i.e. fire safety, machine handling, load handling, management of chemicals, etc.).

Sensitivity

Factories are covered by the amended Factories Act and subject to annual inspection. The health provisions of the Act include, among others, adequate ventilation and lighting of workplaces; removal of dusts and fumes harmful to health from workplace; avoiding overcrowding; provision of safe drinking water; provision of adequate number of latrines for the workers, and proper waste disposal. The welfare provisions include first aid facilities, washing facilities, and a clean place for taking meals. The Factories Act further provides that factories should provide health and safety training for their supervising staff. The Factories Act also establishes provisions on labour inspection. Violation of any of the provisions by the owner or manager of the factory can lead to a fine, and, depending on the offense, to imprisonment for a term up to six months. As mentioned, FGLLID is responsible for enforcing OSH

rules mainly through factory inspections and training, but has limited resources and capacity to conduct OSH orientation, training and inspections. Although companies generally provide first aid kits and basic sanitary facilities accessible to all workers, other hazards and risks are still not managed. There is a lack of collective and personal protective equipment provided to protect workers from above mentioned occupational hazards and risks. Factories have yet to develop OSH management systems which would be compulsory under the upcoming OSH Law.

The precarious working conditions of workers also increase their vulnerability. Companies maintain a core group of ten to 15 permanent workers with formal employment contracts and social security benefits, but other workers do not have access to these same benefits. Cleaners, sorters and washers are hired for a period of one to three months during the peak harvest season or on a daily basis. They do not receive any form of social security, holidays with pay, sickness or maternity leave.

Coping

Permanent workers, in case of injuries or disease, can claim compensation. Though, a greater percentage of healthcare costs is still borne by employees. Companies may also voluntarily contribute to help employees defray medical expenses. Other seasonal workers, however, are not covered by social security benefits. Financial assistance in times of occupational disease and injury from companies depend on the generosity of company owners.

3.2 Possible intervention models

Considering drivers and constraints for OSH improvement as well as vulnerability profiles in the ginger value chain, several objectives can be set to improve the competitiveness of the value chain OSH outcomes. Myanmar ginger industry hopes to be able to establish a strong market presence in European countries, the United States, Middle East, and Canada for both fresh and processed ginger by 2020. The integration of OSH across all functions of the value chain can contribute to improving compliance with required food safety, organic, social, and environmental standards. Therefore, an integral component of the industry's competitiveness vision is the sustainable creation of safe and healthy workplaces by:

i. Mainstreaming OSH in core practices and in ways that increases value addition as well as facilitate the gainful participation of the South Shan Myanmar ginger industry in global value chains; and

ii. Facilitating workers' access to occupational health services, preventive, promotive and curative healthcare services, as well as social protection.

In this section, proposed intervention strategies are presented along with approaches to improve OSH performance in the ginger value chain, which could enhance competitiveness in overseas export markets.

Strengthen local capacity to produce organic inputs and provide advice on their appropriate use

Availability, accessibility, and affordability are important motivation factors for farmers to use organic inputs. The proposed set of interventions outlined below are aimed at developing a competitive supply of good quality fertilizer at affordable prices parallel to promoting proper and effective use of inputs.

a. Support the establishment of a village-based processing plant for organic inputs, in order to:

- Produce premium quality organic fertilizer at an affordable cost to smallholders in order to eliminate use of hazardous chemical inputs and to lay the foundations needed to shift to organic farming;
- Contribute to solid waste management and the reduction of greenhouse gases through composting farm wastes;
- Provide new income opportunities for farming households through participation in the venture as co-owners of the business, waste collectors and workers; and
- Provide opportunities for farmers and farm workers to enter into formal employment.

b. Stimulate effective demand for organic inputs. Even if some farmers decide to adopt organic pest control strategies, they would be affected by pesticide use from neighbouring farms.[58] It is, therefore, important to encourage farmers to act simultaneously in the switching process, not only for the financial viability of the processing plant, but also to protect the livelihoods of those that have opted to adopt organic farming protocols.

58 Wilson, C.; Tisdell, C. 2001. "Why farmers continue to use pesticides despite environmental, health and sustainability costs", in *Ecological Economics*, Vol. 39. No. 3, pp.449–462; doi:10.1016/S0921-8009(01)00238-5.

c. Promote effective and efficient use of inputs and safe handling including use of soil analysis as basis for input application. Promotion of the use of organic inputs must be complemented with extension services to ensure that inputs have the correct formulation to meet local soil needs, are applied in the correct amount and at the optimal point in the planting cycle, and that safety protocols are observed by farmers and farm workers.

Strengthen institutional capacity to support input companies in providing advisory services on OSH

Input retailers and extension agents of input manufacturers can be potential agents of change by advising workers on safe and healthy work practices particularly on the use of chemicals. Knowledge and information is a precondition for action in addressing occupational hazards and risks. National government agencies, particularly MoALI, and input companies can potentially guide input retailers in the delivery of OSH information, but they have limited capacity and knowledge on workers safety and health. The aim of the interventions outlined below is to build the capacity of national government agencies and the association of input manufacturers to provide cost effective, practical information on OSH in forms that can be disseminated to farmers:

a. Support MoALI in the development and piloting of OSH training modules for input retailers and extension agents. The module may be incorporated in training required for renewal of business licenses. The module should, at minimum, cover topics on understanding material safety data sheets, banned pesticides, safe handling of pesticide from mixing to re-entry, antidotes and first aid.

b. Support MoALI in updating and expanding OSH information, education, and communication materials disseminated to input retailers. Current posters focus on safe handling of pesticides. It may be possible to also include other occupational hazards and risks such as ergonomics and high levels of sun exposure.

c. Support the development of OSH information in various formats to be disseminated via existing mobile applications. Although only about 40 per cent to 50 per cent of the ginger farmers in South Shan State have cell phones/mobile services, this intervention can facilitate the scaling up of the project's outreach to ginger farmers outside of the Shan and to other agricultural workers.

d. Strengthen capacity of FGLLID and other relevant agencies to monitor work-related injuries and diseases. A good monitoring system with capacity to provide characterized and segregated information on workplace injuries and diseases will help government as well as the ginger sector in formulating prevention measures. Timely and regular analysis of the injuries and diseases in the ginger sector will help FGLLID and MoALI to tailor and customize OSH information campaigns.

Build local capacity to conduct awareness raising campaigns and training on OSH

As indicated in the case study, farmers are generally aware of work hazards, but lack knowledge on prevention measures. Similarly, government agencies mandated to provide training on OSH lack the practical knowledge and experience in OSH in the farming sector given that existing OSH laws are focused on the manufacturing sector. Participatory steps, built on local good practices, can lead to many workplace improvements when the focus is on locally feasible low-cost options. The design and use of locally adjusted action toolkits play a key role in facilitating these improvements in each local situation.[59] Through a participatory process, it is more likely for farmers and other industry stakeholders to develop a sense of ownership of risk management and prevention measures. This ownership would help remove a sense of outwardly imposed requirements and reduce differences in understanding and interpretation of OSH requirements.

To facilitate the participatory development of Good OSH Practices that are practical, low-cost, and which can potentially contribute to farm productivity improvement, the following actions are proposed:

- Participatory development of Good OSH Practices in Ginger Farming/Customization of ILO's Work Improvement in Neighbourhood Development (WIND) in context to ginger/ Myanmar farmers;
- OSH orientation for a core group in Shan State: The core group may consist of lead farmers/progressive farmers in key ginger producing townships, staff from FGLLID, MoALI, and rural health centres, local facilitators, and representatives from AFFM and monasteries;
- Workshop with core group to formulate Good OSH Practices specific to ginger farming;
- Technical support in the customization of WIND toolkits.

Further to the participatory adaptation and adoption of WIND supporting functions, additional interventions could include:

- Development of information, education, and communication (IEC) materials on OSH and social security that monasteries, rural health centres, MoALI, FGLID, and other interested organizations could use and integrate into their OSH awareness campaigns. While WIND implementation is primarily aimed at facilitating access to resources and skills that would enable farmers to implement measures to improve OSH outcomes and productivity with the ultimate aim of building a preventative culture, the IEC materials should be oriented towards motivating and providing the triggers for farmers to adopt safe behaviours.
- Development of low-cost toolkits to track behavioural change and adoption of safety practices could be used by government agencies mandated to promote OSH. The purpose of the toolkit is to help government agencies to identify behavioural deficits, safe and unsafe behaviours, and the frequency with which different behaviours occur in various situations. This would allow relevant government agencies to examine trends and gather insights as to which interventions are effective in bringing about the desired change which may then be replicated to other regions and crops.

59 Kazutaka, K. 2012. "Roles of Participatory Action-Oriented Programs in Promoting Safety and Health at Work", in *Safety and Health at Work*, Vol. 3, No. 3, pp. 155–165 ; doi:10.5491/SHAW.2012.3.3.155.

Link the development of local capacity to provide OSH services with GLOBALG.A.P. and organic certification

Farmers are generally knowledgeable on the basic rudiments of ginger farming but lack the skills and resources to comply with GLOBALG.A.P. and sustainable farming practices. Both of which are paramount to prevention and to controlling occupational hazards in ginger production and increasingly important to ensuring access to markets. With the majority of farms located in remote areas and given that DoA has limited human resources to provide extension services, it is recommended that a community-based capacity to deliver and provide services be built-up. This capacity building would enable farms to comply with GLOBALG.A.P. and organic farming practices in line with the schemes Winrock is putting in place.

There is a lack of on-site extension services from the government to help ginger farmers and workers improve their practices. Diversity of extension provision, from government extension officers to community-based providers, will give farmers a greater choice of sources of information, knowledge, and skills to support the long-term sustainability of their farm enterprise. Interventions may include the following:

a. Work with Winrock, lead farmers, and DoA in the customization of GLOBALG.A.P. and organic farming modules within the context of Myanmar ginger farmers. Bringing together government and lead farmers can be a good way to develop consensus-based norms and low-cost measures which can have higher probabilities of being adopted by farmers.

b. Develop a pool of community-based providers and cost-effective delivery of extension services anchored to ingenious learning structures, farmer groups, and the peer-to-peer learning approach. Development of community-based trainers can help DoA extend the reach of their field staff. This will require the creation of learning hubs. Trainers may consist of community members or lead farmers with leadership ability and influence within their community. They can be provided with incentives such as fertilizer and other inputs to create demonstration plots, for example.

c. Support knowledge transfer events such as farmer/worker-led video-mediated learning and contests. Video-mediated learning has the advantage of being more cost-effective than farmer-to-farmer extension. It also allows unsupervised learning and offers a better means of explaining underlying biological or physical processes. An added benefit of video-mediated learning is that this can be viewed by entire communities and, thus, improve social inclusion, young people, and women. Watching a video also generates discussion afterwards. A key element of the video-mediated learning is to involve local farmers/workers in generating and validating the content. Video-mediated learning may be viable in areas with access to off-grid and on-grid energy.

   Conducting friendly contests is also a way to make learning fun. For example, a contest can provide incentives to farmers and workers to adopt improved practices, while simultaneously demonstrating the effects of good practices. Good practices and innovative solutions that emerge from the contest could be incorporated into the training modules, helping to capture and further disseminate new learning.

d. Support the certification process of export oriented ginger farmers. As most of the ginger farmers are smallholders, the certification fees and related expenses including annual renewal are beyond their earning capacity, even if they were to apply as a group/association. It is, therefore, proposed that a subsidy is provided for the first two years, with renewal options, so farmers can build their markets and strengthen their financial position. The project may also provide competitive grants, perhaps through the proposed contests, to facilitate the set-up of sanitary and first aid facilities on small farms. In addition,

re-designing PPEs and small tools necessary for promoting workers safety and health and compliance to GLOBALG.A.P. control points could be furthered. Farmers who have been extended certification subsidy may extend the global assistance to another group after a period of two to three years.

Support the creation of cooperatives

In the South Shan ginger value chain, the establishment of cooperatives is an important strategy for farmers to access social security benefits, to be covered by OSH legislative framework, to become eligible to GLOBALG.A.P. and organic certifications, and to buffer key investments aimed at upgrading infrastructure, technology, and knowledge-based assets. The cooperative business model embodies the hope of building market systems that truly serves people and communities. It is also a valid channel for dissemination of knowledge and information on OSH.

Develop a safety culture among intermediaries and workers which contributes to productivity and food safety improvement

To lay the groundwork for including self-employed, casual and daily workers of the trade sector under the forthcoming OSH Law, the following interventions are proposed:

a. Facilitating the creation of a collective enterprise of porters (self-employed workers). The collective group could be in the form of a trade union, a cooperative, a self-help group and/or an association. A cooperative or similar form of formal association may be a better option though as it can potentially provide the base for workers to be engaged in formal employment and, thus, have access to basic OSH services and social protection in line with the Shops and Establishments Law and the new OSH law. The cooperative model is also well suited for the implementation of a community based health insurance for workers and their families. It can also provide the base for promotion of Good OSH practices and upgrading processes and technologies.

b. Training of FGLLID in delivery of primary prevention services such as risk assessments and practical low-cost improvements with participatory approaches for the trading and logistics sector. This will involve providing technical guidance to FGLLID in facilitating the participatory development of Good OSH Practices for porters that could also contribute to improve food safety compliance and productivity improvement. Parallel to this, it may be possible to support the development, prototyping, and commercialization of low-cost tools that eliminate or reduce ergonomic risks faced by porters. This may be done in the form of design competitions participated by local manufacturers in partnership with porters and traders and with guidelines and orientation provided by VZF.

c. Conducting awareness campaigns to jointly improve OSH outcomes, food safety compliance, product quality and productivity. Given that traders generally have little awareness and interest on OSH, there is a need to first sensitize and make them more receptive to future capacity building programmes. To make OSH an interesting proposition for traders, awareness campaigns on OSH should be combined with other priority issues such as productivity improvement to enhance price competitiveness and reduction of postharvest losses. The awareness campaign may be framed to motivate and prompt enterprises to implement small steps.

Promote the establishment of postharvest facilities

The establishment of postharvest facilities could enhance the viability of collective enterprise initiatives, which could facilitate access of farmers/farm workers to social security, provide incentives to maintain sanitary conditions in the farms, ensure compliance to food safety standards, and minimize postharvest losses. Interventions may include the following:

a. Support the design and piloting of financially and technically adapted domestic and productive water supply systems. Given that most of the ginger areas are not yet connected to the grid, a solar generator AC-DC water pumping system supported by rainwater harvesting may be the more viable integrated water system.

Improved access to water sanitation and hygiene (WASH) can be transformational for the communities. It can help improve their incomes, reduce healthcare costs, and prevent illness especially diarrhoea, malaria, and dengue.

b. Build capacity of FGLLID and other relevant institutions to assist exporter-processors and, in the future, farmer collective enterprises (cooperatives) to develop and implement simple OSH management systems in tandem with Good Manufacturing Practices and Hazard Analysis and Critical Control Points (HACCP).

Figure 13. Ginger washing station. VZF supported ginger processors in the building of their factories by simulating production processes and mainstream OSH into factory design and layout.

Source: Picture taken by Vision Zero Fund team in Myanmar.

Improve Myanmar ginger visibility in the European and United States markets which requires social and environmental responsibility and provides premium prices

This objective aims at creating incentives for the Myanmar ginger industry to pursue and sustain OSH improvements across all functions in the value chain. It would require:

a. Exploring possible partnership with European companies such as NED Spice, Catz International, and other members of the Sustainable Spices Initiative (SSI) that would be interested in supporting supply side developments in Myanmar. SSI also conducts various projects and programmes aimed at supporting local spice farmers and exporters.

b. Supporting participation of the Myanmar ginger industry in international trade fairs (e.g., BioFach, Anuga, etc.)

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