# Reaping the sustainable benefits of agricultural value chains

August 2021









# Message from UNGCNI

Agriculture has been the primary occupation of various Indian communities for the longest time. Rapid changes in technology, innovation and the global markets in the last few years have enabled the agriculture sector to be a part of the global supply chain and develop a market for its products. In fact, agricultural supply chains and networks play an important role in providing producers access to markets and fair remuneration. They also affect economic, social and environmental sustainability of farmingintensive communities.

Today agricultural supply chains worldwide have been exposed to unprecedented risks following COVID-19 and the increasing threats of food insecurity. It is necessary to understand and mitigate the impact of such risks, and create resilient supply chains to ensure food security for all while sustaining the livelihoods of farmers. Aligning our efforts with the United Nation's Sustainable Development Goals (SDGs) and the United Nations Global Compact's (UNGC) Ten Principles can help in developing a sustainable agricultural supply chain that benefits people and the planet, and ensures profit at the same time.

The virtual Agri Supply Chain Summit being organised by the UNGC Network India (UNGCNI) on 27 and 28 August 2021 will see practitioners, academicians and civil society members gather together on one platform to discuss potential practical solutions for these highly pertinent challenges of developing a sustainable agricultural supply chain in this Decade of Action.

My best wishes to all for the success of this summit.

Dr Bhaskar Chatterjee Chairman, APRC Committee, UNGCNI



# Message from UNGCNI

Agriculture is the backbone of human life. India is one of the most prominent agriculture-based economies in the world. While we have been making commendable improvements in technology, farm equipment and highly efficient and productive agri supply chains, the progress on human and social aspects of the sector has been slow.

It is time to focus on ethical and transparent processes, good health and well-being of farmers, their families and other participants in the value chain. We must work towards providing decent work conditions and fair compensation, and protecting human rights, including those of agricultural labourers, women and children. UNGCNI, as the custodian of SDGs and Ten UN Principles, is organising this unique virtual summit on 27 and 28 August 2021 to discuss the challenges faced by agri supply chains as well as suggest actionable practical solutions.

I am confident that this initiative would be a trailblazer, creating a strong impact and encouraging collective action in the agri supplychain domain.

My very best wishes to all for the success of this summit.

Shabnam Siddiqui Executive Director, UNGCNI



# Message from ECHO

Over 60% of India's working population is employed in the agriculture sector.<sup>1</sup> It provides livelihood opportunities to millions of workers yet many of them experience decent work deficit. The issues related to child labour and non-payment of minimum wages in particular have been widely reported and documented. Various initiatives have been undertaken by different stakeholders in recent years to address these issues. Enabling Child and Human Rights with Seed Organisations (ECHO) is one such initiative jointly started by the seed industry and NGOs to address the decent work issues in the seed supply chain. ECHO has undertaken various activities related to preventing child labour and ensuring minimum wages since 2015, and helped seed companies to strengthen their efforts in addressing these issues to some extent in their supply chains. Seed production accounts for only less than 2% of the total agricultural production in India.<sup>2</sup>

Recent studies show that despite improvements in working conditions, decent work deficiencies still prevail in India's

agriculture sector. This calls for all the stakeholders to review the current situation, identify the challenges and address them.

ECHO was established with a clear mandate to promote decent work standards in agricultural supply chains and is very happy to collaborate with the UNGCNI in organising this virtual summit on 27 and 28 August 2021 where detailed discussions would be held on relevant issues, and participants would look forward to developing practical solutions.

I am confident that this summit will provide all the stakeholders with an opportunity to share their learnings and discuss what collective action could be taken to promote decent work standards in agricultural supply chains.

I wish you all the best for the summit.

Suhas R Joshi President, ECHO

<sup>1</sup> http://www.fao.org/india/fao-in-india/india-at-a-glance/en/

<sup>2</sup> https://agricoop.nic.in/sites/default/files/pocketbook\_0.pdf



# Message from PwC

Agriculture has always been a mainstream sector in India with close to 50% of the country's population involved in agricultural and allied activities for their livelihoods and the sector contributing significantly to the country's gross domestic product (GDP). Nearly 700 million people in India live in rural areas and are directly dependent on sectors like agriculture, forestry and fisheries, and biodiversity. At present, the Government is focusing on improving the country's agricultural value chains (AVCs). The agriculture sector is at the cusp of a transformation with the launch of the One District One Product (ODOP) scheme, the Central Sector Scheme of Formation and Promotion of 10,000 Farmer Produce Organisations (FPOs) and the PM Formalisation of Micro Food Processing Enterprises Scheme.

However, while such efforts shall drive linkages and fair renumeration, their impact can be further strengthened by addressing the overall sustainability of value chains. Sustainability in agriculture is going to be a key focus area for future generations as it will ensure the availability of sufficient resources. Hence, stakeholders in the agriculture sector should prioritise balancing the present needs with appropriate and sustainable measures for future generations. This report focuses on the vulnerable groups and the need for decent work practices to ensure that sustainability is ingrained in the overall value-chain operations.

In the Indian context, there are lacunae in extending equal benefits to all the agricultural stakeholders as women, children and adolescents are largely at a disadvantage due to limited resources and knowledge. Despite access to limited opportunities, the vulnerable groups can play the role of important stakeholders in strengthening agriculture and promoting sustainability across the value chain. These actors are already playing important roles as smallholders, workers and leaders. With millions of women and young people entering the agriculture sector every year, it is essential to understand and alleviate the concerns of these vulnerable groups.

Hence, it is imperative to develop policies and initiatives that can act as empowering tools for them. This report approaches the issues faced by the vulnerable groups from the socioeconomic and environmental perspectives in an attempt to identify and ensure balanced, decent and sustainable agricultural work opportunities for all.

**Ajay Kakra** Leader, Food and Agriculture, PwC India

3 http://www.fao.org/india/fao-in-india/india-at-a-glance/en/

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## **Executive summary**

The agricultural value chain (AVC) is an evolving concept across the globe as economies worldwide tackle emergencies like the COVID-19 pandemic and threats of food insecurity and malnutrition. In light of the same, sustainability has found a unique platform as a tool to drive long-term benefits that do not hamper human and natural resources. The value added by AVCs can be measured by different parameters such as renumeration, return on assets, food security and net impact on the environment. Considering the different stakeholders involved in AVCs, it becomes important to assess the value generated for all of them.

There are multiple challenges that currently prevent equality and equity in AVCs, such as limited access to resources, unsustainable agricultural practices, threats to biodiversity and lack of knowledge. This report focuses on the vulnerable groups (especially women workers/farmers), the roles played by them across AVCs and the solutions developed to ensure their well-being and empowerment through socioeconomic and environmental sustainability. Women play crucial roles in agricultural and food value chains, and account for close to over 40%<sup>4</sup> of the global agricultural labour force. The participation of women in agricultural labour forces differs across geographies and varies from close to 20% in Latin America to up to 50% in parts of Africa and Asia.<sup>5</sup> Their involvement and successful participation are critical to the sector's competitiveness.<sup>6</sup> However, women farmers are still vulnerable to gender inequalities and climate change, and thus continue to face specific constraints that limit their contributions to AVCs.

**Socioeconomic impact:** Currently, due to existing social norms as well as limited opportunities, the vulnerable groups face certain social hindrances that need to be challenged. In order to identify the right solutions, it would be important to ascertain deep-rooted causes as well as external factors that aggravate social inequality. The overall financial viability of the value chain will not increase as long as vulnerable groups do not benefit economically. This can be done if farmers have access to the right resources and linkages at the right time that could help generate more income for them.

**Environmental impact:** Agricultural practices have a direct impact on the environment and considering the high level of human involvement, environmental safety and health form a crucial part of the overall functioning. In order to ensure that the value chain is aligned with the overall environmental and safety objectives, sustainable environmental practices along with the use of appropriate health and safety tools are required.



4 http://www.fao.org/3/i6030e/i6030e.pdf

5 Ibid

6 https://www.ifc.org/wps/wcm/connect/publications\_ext\_content/ifc\_external\_publication\_site/publications\_listing\_page/ar2016



#### Source: PwC analysis

While each of the concepts and solutions has to be approached separately with a focused mechanism, it would be equally important to integrate them for overall sustainable growth.



3 http://www.fao.org/india/fao-in-india/india-at-a-glance/en/



## Introduction

#### Agri supply chains in developing countries

Agricultural supply chains in developing countries are highly complex. They comprise interacting networks linking multiple players such as producers, farm workers, input providers, processors, logistics service providers, wholesale and retail shops, industries, governments and other organisations. These supply chains impact both the present and future growth of countries. Over the years, developing nations have strengthened their presence in agri supply chains by driving global exports. The figure below depicts the increasing global share of agro-based exports from developing countries (including China's). In 2019, these exports accounted for 35% of global exports.

Developing countries' share of agro-based exports (five-year average)



Source: United Nations Conference on Trade and Development

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The importance of AVCs in a country like India can be further understood by assessing the numbers carefully. The agriculture sector contributes 18.3% to India's gross domestic product (GDP)<sup>7</sup> and employs 42.6% of the country's population.<sup>8</sup> The Indian agri supply chain involves close to 150 million farmers and revolves around institutions, resources, service chain and service delivery, and technology mechanisms. These four components include stakeholders, ranging from Government authorities to farm workers who are responsible for agricultural production, speedy transportation of produce, certification and sales. This ecosystem is undergoing transformation over time, hence making same-day packaging and delivery of supplies possible. Various efficient digital platforms have enabled this transformation by connecting stakeholders across the value chain. For example, the Kisan Rath app launched by the Government of India (Gol) has connected various value-chain stakeholders, 500,000 trucks and 20,000 tractors through transport aggregators.<sup>9</sup> The Aajeevika Farm Fresh app launched by the Jharkhand State Livelihood Promotion Society is helping farmers to sell fruits and vegetables. In Maharashtra, various self-help groups (SHGs) are connecting with end consumers using a cross-platform messaging app. Across India, various farmer producer companies (FPCs) are producing, marketing and selling produce through the support of their member farmers.

The figure below depicts an overview of the agri supply chain ecosystem.



Agri supply chain ecosystem in India

Source: National Programme on Technology Enhanced Learning (NPTEL)

The agricultural supply chain in India faces various challenges such as high post-harvest food wastages, smaller landholdings, low availability of quality inputs, information asymmetry with respect to sales and purchase prices, limited cold chains and storage infrastructure, limited value chain, non-uniformity of food produce, low productivity, limited compliance with the standards of food safety and frequent price fluctuations.

7 https://www.statista.com/statistics/271329/distribution-of-gross-domestic-product-gdp-across-economic-sectors-in-india/

8 https://www.statista.com/statistics/271320/distribution-of-the-workforce-across-economic-sectors-in-india/

9 https://economictimes.indiatimes.com/news/economy/agriculture/narendra-singh-tomar-launches-kisan-rath-app/articleshow/75198534.cms?from=mdr



#### Context and problem statement

The agriculture sector is one of the most crucial sectors that has the potential to become a growth lever for the Indian economy. The progressive growth of the agriculture sector is linked to the array of activities encompassing agri supply chains, ranging from production to processing and distribution to retailing. Agriculture and allied sectors in rural India are the largest source of employment and livelihoods. Rural women are crucial contributors to agriculture and other rural enterprises in India as farmers, labourers and entrepreneurs. Their role spreads across the entire value chain and becomes more important as they support various primary on-farm activities, thus contributing to the rural economy. Despite the crucial roles played by them in the rural sector, barriers such as gender stereotypes, unavailability of accessible work opportunities and absence of decision-making power prohibit them from achieving economic empowerment and self-sufficiency. Globally, agricultural supply chains have been significantly impacted by the COVID-19 pandemic and have further jeopardised food insecurity. It has caused serious implications on the agriculture sector and thus, it becomes inevitable to create a resilient supply chain which ensures food availability, food accessibility and affordability for all while sustaining the livelihoods of the farming community.

Sustainable AVCs are thus critical to uplift the livelihoods of many and have great potential to address many global challenges along the lines of food security and safety, providing alternative sources of energy, revitalising rural and urban economies, and delivering inclusive domestic and national growth.

The United Nations (UN) has identified the current decade as the 'Decade of Action' and all countries, including India, are working to achieve the Sustainable Development Goals (SDGs) by 2030.10 It is critical that India emphasises on making its agricultural supply chains more sustainable, transparent, traceable and innovative to prevent any kind of exploitation while working towards guaranteeing food security. Thus, there needs to be an imperative focus towards conceiving a strategy through dialogue and discussion for establishing and modelling a sustainable AVC framework to improve productivity, profitability and environmental outcomes, leading to robust and resilient agricultural supply chains.

To advance the progressive impact that businesses can have in this space, the UNGCNI and the ECHO Forum are partnering to initiate conversations with various stakeholders across AVCs to understand how to address concerns and issues holistically to develop efficient and fair agricultural supply chains. The collaboration would focus on ensuring decent work for women in AVCs, with adequate emphasis on environmental sustainability, health, safety and social protection of workers, and complete elimination of child labour in any form.

10 https://www.un.org/sustainabledevelopment/decade-of-action/

## Theoretical framework of interdependencies around socioeconomic and environmental aspects

The theoretical framework depicted below highlights the interdependencies and linkages between the various aspects of an AVC with reference to the respective SDGs. The framework has been assessed in the following sections to identify gaps and solutions.



Source: PwC analysis



# Socioeconomic sustainability of AVCs

#### The role of women in Indian AVCs

It is imperative for an AVC to be socially, economically and environmentally sustainable with the growing population. AVCs are undergoing profound transformations and facing various types of challenges, including those concerning people and communities. Lower involvement or participation of a section of society in the supply chain affect the overall outcome of an AVC. Stakeholders should assess whether agricultural and food markets can play a role in maintaining the equilibrium between economic goals and non-economic outcomes. For example, improving nutrition, preserving natural resources and promoting the overall social well-being of people involved in AVCs should be areas of focus to complement the economic benefits. Consequently, it is important for all the stakeholders involved in an AVC to intensify efforts for providing sustainable growth opportunities that benefit all people. Some critical social factors that should be taken into consideration include gender equality, gaps in educational qualifications, age and sizes of households. Additionally, some of the farm characteristics or economic factors include farm size, type and scale of enterprise, number of small farmers or labourers involved, income levels and overall experience in AVCs. Lastly, land tenure, access to training and information, and market distance are some of the institutional factors that should be considered.

Given this background, it is crucial to consider how AVCs can be made more inclusive to minimise negative social externalities. It is essential to intensify efforts towards improving social outcomes and see how policymakers, new schemes and initiatives, and other stakeholders in AVCs could sustainably improve agricultural supply chains. These efforts also need to be aligned with the SDGs 2 (Zero Hunger), 5 (Gender Equality), 9 (Industry, Innovation and Infrastructure) and 10 (Reducing Inequality).





Source: International Finance Corporation

The figure in the previous page shows that despite the rapidly changing nature of the global agricultural economy, women famers continue to face challenges at various levels of AVCs in terms of gross underrepresentation in sales and marketing activities. They also lack opportunities and access to basic rights in the earlier stages of AVCs, thereby affecting overall sectoral productivity. They play an important role in setting up an AVC, from preproduction to post-harvesting processes that are often key determinants of prices and sizes of final agricultural produces. Despite this, they are underrepresented across the value chain, most notably in post-harvest activities such as marketing, transportation and sales which could result in insufficient and fragmented markets. Women farmers also face difficulties in accessing land rights, resources, information, services and markets, which visibly contribute to the gender gap and affect their participation rates.

Women play a fundamental role in AVCs in India. As farm workers, they support sowing, production and harvesting of crops. They also act as skilled supervisors and managers, supporting loading and unloading operations at warehouses/fields and facilitating sales and marketing of produce. The role of women is further detailed with respect to each aspect of AVCs.

**Input provision and use:** Women play a variety of roles in agriculture such as those of small-scale farmers who sell their produce to input players, extension workers, daily-wage workers, agri-input retailers and dealers. Their presence across the rural landscape and role in agriculture make them important stakeholders for input players as they can help corporates extend their reach. This not only benefits corporates but also enhances awareness and effective usage of inputs at the farm level.

Though women farmers are involved in input-application processes, they may not have sufficient knowledge pertaining to the processes themselves and direct access to high-quality inputs or knowledge of best practices. Hence, involving women in such processes could be an area of focus for other value-chain actors as it will help in generating demand for quality inputs and enhancing crop yields in the longer run. **Production and related activities:** Women work as farmers, entrepreneurs and labourers, and contribute significantly to agri supply chains. In addition to their roles on large commercial farms and manufacturing units, the perspectives of women as small-scale farmers bring sustainability in value chains. Their activities in agricultural production vary greatly across commodities and regions. For example, Indonesian women constitute the majority of the labour force in rice farming, but less than one-third of the labour force for rubber cultivation.<sup>12</sup> Moreover, women are often paid less than men for the same work, and are overrepresented in informal, unpaid, part-time and seasonal work.

**Post-harvest processing and storage:** While women are responsible for key processing activities, specific roles in post-harvest processing and storage are highly variable across regions and value chains. However, a few cross-cutting lessons have emerged through past studies. As per an IFC report, women are more likely to participate in processing activities as employees of larger firms rather than as individual entrepreneurs.<sup>13</sup> It also suggests that non-mechanised post-harvesting activities are more likely to be carried out by women.

Variations in the roles played by women in post-harvest processing can be understood by assessing the examples of Bangladesh and India. In Bangladesh, women constitute 5% of the labour force in harvesting and threshing of rice, while in Assam, India, the number is around 60%. For other post-harvest activities, Bangladeshi women provide 51% of the labour while women in Assam account for 90%.<sup>14</sup>

**Transportation, marketing and sales:** While women continue to be major contributors in the production of agriculture commodities in India, their roles in marketing-, sales- and transportation-related activities continue to be limited. Though the number of women working in supervisory and managerial roles has increased over the past decades, there is still a long way to go in terms of strengthening their representation and encouraging diversity in such roles.

<sup>12</sup> https://www.ifc.org/wps/wcm/connect/publications\_ext\_content/ifc\_external\_publication\_site/publications\_listing\_page/ar2016

<sup>13</sup> Ibid.

<sup>14</sup> Ibid.



## Economic/financial status of women farmers

Women play numerous roles ranging from subsistence farmers and paid/unpaid workers on family owned land to small entrepreneurs, thereby providing strong support to the agriculture sector.<sup>15</sup> Owing to the increasing migration of men to urban areas for better work opportunities, the number of women getting involved in agricultural activities has been increasing rapidly. As per the 2011 Census of India, women account for 75% of the workforce in rural India and carry out the majority of domestic and farm work. However, they own only 13.96% of the land.<sup>16</sup> Low ownership of land deprives women of productive resources and makes them vulnerable to inequalities at both home and community levels.

Despite the crucial roles played by women in the rural economy, gender stereotypes, unavailability of accessible work opportunities, lack of land ownership, insufficient access to formal credit, absence of decision-making authority, etc., prohibit them from achieving economic empowerment and self-sufficiency. These challenges contribute to the ever-increasing disparity between men and women in accessing productive resources, services and opportunities, further leading to underperformance in the agriculture sector and staggering economic growth and overall development. These inequalities are costly and undermine the effectiveness of development efforts and the impact of initiatives undertaken for the rural youth.<sup>17</sup>

The sociocultural norms in India have resulted in the bifurcation of tasks based on gender. Most of the household work and simple agricultural processes are undertaken by women and young girls, and these have very low visibility in the value chain. Men are designated to perform all the machinery- and market-related tasks in agriculture. Hence, men continue to take major financial decisions and women are underrepresented in decision making at both the home and community levels. As per the Time Use Survey (TUS), 2019, women spend eight times (four hours) more hours on unpaid domestic services for household members every day compared to men (0.5 hours).<sup>18</sup>

Children belonging to poor families are also put to work to earn extra income. Thus, poverty is both the cause and consequence of child labour. There are 10.1 million working children in India aged between 5–14 years, accounting for 3.9% of the country's

total child population.<sup>19</sup> Child labour has deprived many children from receiving education and living their childhood, and they often become victims of violence and abuse. Gender stereotypes and social norms about the course and type of work that should be undertaken by men and women are deeply entrenched in the Indian society which hinder work opportunities for the latter.

Women are engaged in odd working conditions which lack basic occupational safety measures, putting their health and wellbeing at risk. Furthermore, women face labour underutilisation in rural areas which most often takes the form of time-related underemployment. They are engaged in unskilled and menial-wage jobs that have a high prevalence of seasonality and offer low health and financial security. Women face further challenges due to the seasonal nature of work, lack of formal education or inadequate technical/financial knowledge and lack of information regarding formal job availability.

#### **Constraints faced by women in AVCs**

#### **Difficulty in accessing education**

Higher literacy levels and skill development are critical in determining the quality of one's personal and professional life. As per a recent National Sample Survey (NSS), the rural female literacy rate in 2017–18 stood at 65.0%, which was 16.5% less than the rural male literacy rate.<sup>20</sup> Gender-based inequalities contribute to this difference in accessing formal education.

The improvement in mechanisation and digitisation of farming practices increases the potential for high returns. Using advanced technologies like sensors, smart irrigation and precision agriculture are making agricultural practices more prudent and profitable. However, cultural and social barriers prevent the economic liberalisation of rural women and directly impacts their usage of modern technologies. As per the 75th NSS, 16.6% of females aged between 3–35 years have never been enrolled in school. Of these, 11.7% couldn't enrol due to their prior engagement in domestic activities.<sup>21</sup> This lack of secondary education prevents them from participating in financial transactions, banking services, etc., and they eventually find it cumbersome to avail credit facilities.

- 15 http://www.fao.org/rural-employment/work-areas/women-and-decent-work/en/
- 16 http://censusindia.gov.in/census\_and\_you/economic\_activity.aspx
- 17 http://www.fao.org/3/i3153e/i3153e.pdf
- 18 http://mospi.nic.in/sites/default/files/reports\_and\_publication/statistical\_publication/Women\_Men/mw20/latestmen.pdf
- 19 https://www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/---sro-new\_delhi/documents/publication/wcms\_557089.pdf
- 20 http://mospi.nic.in/sites/default/files/publication\_reports/KI\_Education\_75th\_Final.pdf
- 21 http://mospi.nic.in/sites/default/files/reports\_and\_publication/statistical\_publication/Women\_Men/mw20/latestmen.pdf



#### **Difficulty in owning land**

Women seldom own the land that they cultivate. It is usually owned by their husbands or other male family members, which restricts women from availing institutional credit. Financial institutions consider women as individuals with high credit risks owing to their inability to produce land records as collaterals. As per an Oxfam International study on the status of women farmers in Uttar Pradesh, only 6% of women own land, less than 1% have participated in government training programmes, 4% have access to institutional credit and only 8% have control over agricultural income.<sup>22</sup>

#### Gender pay gap

Wage disparity is widespread in India and both socioeconomic and structural reasons are responsible for the discrepancy. As per the latest data from the Ministry of Statistics and Programme Implementation (MoSPI), rural women earn an average of INR 201.56 per day compared to INR 322.28 earned by rural men for the same tasks.<sup>23</sup>

The constraints faced by women in AVCs result in them being engaged in more labour-intensive tasks as described below:<sup>24</sup>

- The tedious process of manually transplanting rice is largely undertaken by women. This activity is practised in an uprightbend posture which is arduous and physically tiresome.
- Women from farming families also participate in the unskilled and time-consuming work of manually sowing seeds behind the plough.
- Women farmers are also engaged in cutting, digging and uprooting weed from agricultural land. Such tasks are labour intensive and don't add value in monetary terms.
- Women farmers are largely engaged in the laborious, timeconsuming and manually intensive activity of threshing before handing over the harvest for sale.
- Besides primary agricultural practices, farming families indulge in other allied activities such as poultry, livestock rearing and

dairy as they provide food security and nutrition to the family. Tasks such as cleaning the stables, caring for animals and collecting dung, food and fodder for animals are primarily undertaken by women.

Though women actively participate in AVCs, their roles are mostly restricted to cultivation, production and post-harvest tasks. They are mostly employed for laborious and manually intensive work.

#### **Child labour in AVCs**

Agriculture is one of the three most unsafe sectors in terms of occupation-related fatal and non-fatal accidents, and work-related diseases. Inadequate access to basic education, high risks and conventional attitudes pertaining to child participation in farm activities are the primary reasons why child labour is predominant in AVCs in India. Globally, 60% of the total number of children in the age group of 5–17 years work in the agriculture and allied sectors.<sup>25</sup> A large number of children start working at an early age in the agriculture sector.

Children work in fields for extended hours, facing violence and abuse. Many girls manage household chores along with farm activities, viz. livestock management, ploughing and sowing, harvesting and post harvesting, thereby working for longer hours compared to boys who are mostly made to do labour-intensive work that exposes them to amputations, cuts, burns and other injuries. Girls are also mostly engaged in activities such as carrying water and collecting wood. These cause muscular injuries, exhaustion, and often result in them becoming victims of abuse. Child labour is also responsible for school dropouts and discontinuity of education amongst both boys and girls.

However, not all agricultural activities are harmful for children. Participation of children in some activities could be positive as it contributes towards transferring of skills and ensures their food security. It is important to acknowledge agricultural activities that do not harm children and interfere with their education.

We have discussed the persistent issues of gender inequality and child labour in India's AVCs. Some probable solutions to address these issues have been suggested in the subsequent sections.

- 22 https://www.oxfam.org/en/india-women-farmers-persevere
- 23 http://microdata.gov.in/nada43/index.php/catalog/127
- 24 https://anthrosource.onlinelibrary.wiley.com/doi/abs/10.1111/napa.12112
- 25 https://www.ilo.org/ipec/areas/Agriculture/lang--en/index.htm
- 26 https://www.ilo.org/ipec/areas/Agriculture/WCMS\_172261/lang--en/index.htm

#### **Empowerment and socioeconomic** improvement

Women play an irreplaceable role in agriculture and it is imperative to pay more attention towards their empowerment and upliftment. Access to education and information is of utmost importance for tackling the challenges in agriculture and beyond.

Formal education, basic numeracy, reading and writing can aid in better involvement and understanding of the various financial and non-financial activities in AVCs. Women can be equipped to take up more roles across the value chain with adequate focus on enhancing agricultural education amongst them to improve their understanding of good agricultural practices. Capacity building and training in scientific farming, precision agriculture, market-oriented agriculture, etc., can prove to be immensely beneficial for women farmers.

Women farmers could also be trained to take up entrepreneurial initiatives in the agriculture and allied sectors. They could utilise resources better and more efficiently while focusing on improving their livelihoods and social stature. They can be further empowered through technology transfer which is currently at very low levels.

Further, there is a need to develop mechanisms for diversifying livelihood opportunities for women farmers. Participating in government schemes, building partnerships with NGOs, forming SHGs and federations could become platforms for promoting their socioeconomic development. Such community initiatives can help in improving the market linkages as well as promoting aggregation that can be leveraged for better income generation across AVCs.

It is important to note that the improvement of women farmers' economic status is directly proportional to the reduction in child labour. The extra income earned by women is likely to be used for household improvement and education of children.

Therefore, there is a dire need to intensify the efforts towards bringing in gender equality and minimising the involvement of children in AVCs through developing improved technologies and providing access to them, thereby ensuring social sustainability. Sustainable agriculture cannot be achieved without addressing gender inequality and food and social insecurity. Gender equality is a human right that should be protected. Moreover, it is an effective strategy for economic growth and poverty reduction as there is high potential for women farmers to increase their productivity. Gender equality is itself a standalone SDG and a cross-cutting issue without which the overarching aims of the other SDGs cannot be realised.





#### Solutions to ensure economic sustainability

Women's economic empowerment is defined as a state in which women have the required skills, knowledge, capacity, and willingness to work and benefit from that work economically, socially, and culturally. It also improves their access to productive resources, including better opportunities for remunerative activities, financial services and market information leading to a prosperous future. However, in rural India, due to lack of recognition given to women as farmers, their economic sustainability is not defined which is hindering their economic growth and development. For rural women, the increased responsibility of managing farms is not accompanied by a reduction of household and community duties, which has an impact on their physical and emotional strength. This makes it significantly more important for policymakers to create a favourable environment by ensuring greater availability, accessibility, and affordability to physical and financial resources for women engaged in agricultural activities.<sup>27</sup> The SDGs are a framework for achieving the social, economic, and environmental dimensions of development at global level. These goals intend to incorporate all aspects of development, including biodiversity and environmental. SDG 5 aims to end all forms of discrimination against women and provide them with access to basic human rights. SDG 8 promotes sustained economic growth and productive employment for both men and women. SDG 10 is committed towards reducing inequalities based on age, gender, disability, religion and economic or other status within the country. Thus, for uniform progress and equitable development along with a better and sustainable future for all, we need to ensure the following practices:



#### Reducing gender-biased practices through better employment opportunities

The lack of presence of women in the formal sector and organisations further leads to lack in representations in policymaking and development

programmes for women's growth. In both rural and urban areas, the worker population ratio (WPR) for females was considerably lower than that for males in 2018–19. The female WPR was 19% in the rural sector and 14.5% in the urban sector, while the corresponding figures for males were 52.1% and 52.7% respectively.<sup>28</sup> To increase the representation of women and promote social dialogue in the rural economy, laws, policies, and regulations need to be strengthened to reduce the impact of gender-biased practices. Achieving gender equality and curbing discrimination against women require a shift in focus and enhancing availability of decent work opportunities for women. Empowerment of rural women through provision of adequate and decent work opportunities also implies a focus on small and marginal farmers who dominated the agricultural sector in India with an 86.1% share in operational landholding in the country in 2015–16.<sup>29</sup>

27 https://www.thehindubusinessline.com/opinion/women-farmers-need-policy-attention/article9968781.ece

- 28 http://mospi.nic.in/sites/default/files/reports\_and\_publication/statistical\_publication/Women\_Men/mw20/latestmen.pdf
- 29 https://agcensus.nic.in/document/agcen1516/ac\_1516\_report\_final-220221.pdf



30 https://www.nabard.org/content1.aspx?id=518&catid=8&mid=489



## Empowering women in the economy

Empowering women through decent work opportunities entails investment in education, training, and capacity building to promote women's entrepreneurship and productive employment. Women should

be provided access to vocational training and education which would play a pivotal role in enhancing their socioeconomic status in the society and will help them lift themselves out of the vicious cycle poverty and discrimination. To promote and enhance skill-training facilities for women, the Gol has established National Skill Training Institutes for Women across the country. Such initiatives strive to ensure gender equality and prevent the perpetuation of gender discrimination.



## Leveraging collective platforms for women empowerment

Devising effective cooperative models can play a key role in building women's economic empowerment, while also providing a source of employment which aids in skill enhancement. Cooperatives

work as collective organisations which directly contribute to community poverty alleviation. Promoting federations, cooperatives, and SHGs as platforms for women empowerment at the grass-roots level would help women achieve sustainable growth in the long-term. Emphasis on smallholder women, landless women, and indigenous and tribal women through engagement in productive green jobs and enterprises can have intangible benefits at the individual and community levels. Under the Self-Help Group - Bank Linkage Programme (SHG-BLP), SHG groups have been sanctioned an additional amount as credit which is based on a certain percentage of their total corpus. No collateral is insisted upon by financial institutions, making it a suitable credit model for rural women. In India, NABARD, through its Micro Credit Department, has facilitated and mentored 102.43 lakh SHG savings account linked with banks, of which 86.22% are women SHGs. SHG-BLP is now the world's largest microfinancing programme in terms of client base and outreach.30



#### Prevention of child labour

Strengthening efforts towards elimination of gender discrimination among children by reviewing and implementing national policies against child labour would aid in ending child labour in all its forms. To ensure access to elementary education

for all children in India, parents and families must be made aware of the developmental benefits, importance, and empowerment of education for all.



#### Gender-disaggregated data and soft target setting for percentage lending to women farmers

Current data reporting at the financial institution level does not distinguish between male and female farmers

and thus, there is no separate focus on the low representation of women amongst beneficiaries. The need of the hour is to develop a basic format to disaggregate data based on gender as women's challenges often get overlooked in the overall achievement of financial targets by banks. This could help in shifting the focus to women's access to credit. At the same time, based on the data on women's financial access, their contribution to agriculture and their operational landholdings, soft targets could be set for financial institutions for coverage of women beneficiaries.

#### Solutions to ensure social sustainability

Promoting gender-inclusive approaches not only strengthens the AVC but also improves the well-being of women and families. There is evidence that traditional approaches to increasing women's social and economic empowerment have not been as successful as expected. More needs to be done, and differently, to improve women's quality of life and improve their retention in the workforce. Although many development initiatives have ensured greater economic and social representation of women in decision making. these productivity gains have only been short-term. For holistic development of women, they should feel not only more productive but also empowered to spend the generated income in whichever way they intend to, for themselves as well as their families. Furthermore, men should participate equally in unpaid domestic care work to increase the amount of time which women can put to more productive use elsewhere. Also, to improve the quality of life of women, they should be free from gender-based violence and sexual harassment. Therefore, developmental and policy-level approaches should treat not only the symptoms but also the deep-rooted causes of inequalities, gender norms, social behaviours and power relations.



## Promoting rights and justice to bridge gender gaps

To better understand the differences in basic rights, decision making choices made by men and women, and vulnerable/marginalised people, it is necessary to observe household

decision-making patterns. Moreover, it is important to analyse women's education and literacy levels and their access to basic rights such as land, training, equal opportunities, control over information sources and public spaces, which are often very different from those of men. Though these social issues are peripheral to agriculture systems, they are essential to increasing the participation of women as well as vulnerable and marginalised people. Further, even if women are equitably included in training, it is important to address the existing gaps education gaps which can sometimes make it difficult for them to grasp and utilise relevant information in an actionable way. It is thus essential that women should feel included in the agricultural value chain right from the entry levels and are aware of their basic rights such as land ownership, participation in decision making, access to credit and right to financial earnings. Furthermore, greater awareness of legal provisions related to land tenure and domestic violence will enable women to know and exercise their rights at the right time. Along with improving adult literacy, training on improved farming activities can also be provided through farmer field schools (FFS).



#### Improving regulatory frameworks

It is essential to (a) buy and sell directly from women farmers, (b) incorporate information and communication technology (ICT) to address transformation and transparency

challenges, (c) build on women's strengths in the cultivation of high-value, indigenous and organic crops, and (d) enable market investments in gender-smart solutions. These solutions would not only address constraints on access and financial freedom at various levels, but also benefit businesses by providing concentrated supplier networks (without building individual linkages), transparent and reliable supply chains, and new or strengthened markets for agricultural goods.<sup>31</sup>



#### Elimination of child labour

Concentrated efforts towards prevention and eradication of child labour are required by designing and implementing appropriate policies. Access to free elementary education for all the children in India must be made compulsory.

Additionally, the overall capacity of government and agricultural ministries should be developed so that they are better equipped to tackle the multi-faceted problem of child labour. One of the main causes of child labour is poverty and destitution, thus providing adequate income-generating opportunities will aid is addressing the issue of child labour. Along with this, awareness programmes will also go a long way in the eradication of child labour. Promoting the adoption of safer agriculture practices can also limit the various hazardous accidents that children are exposed to in the sector.

31 https://www.ifc.org/wps/wcm/connect/topics\_ext\_content/ifc\_external\_corporate\_site/gender+at+ifc/priorities/entrepreneurship/investing+in+women+alo ng+agribusines s+value+chains

At present, the Gol has various policies/schemes/programmes that focus on achieving the goal of women and children's development. Some of these initiatives include:

#### Sarva Shiksha Abhiyan (SSA)

SSA is the GoI's flagship programme which aims at universalisation of elementary education (UEE) in a timebound manner for all children in the age group 6–14 years across India. SSA is being implemented in partnership with state governments to cover the most remote locations in our country. SSA seeks to provide quality elementary education, including life skills and computer skills. SSA also focuses on girl's education and children with special needs.

Source: PM Welfare Scheme

Kishori Shakti Yojana (KSY)

#### The objective of KSY is to empower adolescent girls aged between 11-18 years, so as to enable them to take charge of their lives. It is a holistic programme which aims at bringing about a difference in the lives of adolescent girls through increased access to nutrition, health, hygiene, and to provide them with the opportunity to attend school.

Source: Ministry of Women and Child Development

#### Stand-Up India

The Stand-Up India programme was launched by the Gol to support and promote entrepreneurship amongst women and scheduled caste (SC) and scheduled tribe (ST) communities by financing loans ranging from INR 10 lakh to INR 1 crore. The enterprise initiative covers a range of sectors such as the agri-allied sector, manufacturing, service and trading. This initiative aims to bring about a radical change in the employment opportunities for women and marginalised communities.

Source: Stand-Up India

#### Pradhan Mantri Ujjwala Yojana (PMUY)

PMUY aims to safeguard the health of women and children by providing them access to clean cooking fuel, i.e. LPG. This is because many households in India still depend upon firewood, coal, dung cakes, etc., as the primary source of cooking fuel. Therefore, in order to reduce the drudgery of domestic work for women and ensure access to efficient cooking fuel, the Gol has launched this scheme.

Source: India.gov.in





# Environmental sustainability of AVCs

#### Analysis of regulatory framework for AVCs

Natural resources are fundamental for the functioning of any agricultural system. This makes the sustainable utilisation of such resources essential for environmental stability. With the increase in population and need to ensure food security, agricultural development has focused on increasing productivity rather than natural resource management. It is of utmost importance to adapt a holistic approach towards ensuring food security, nutrition management and sustainable agricultural practices/natural resource management.

The need for sustainable use of natural resources is well reflected in the constitutional, legislative and policy framework of the Gol. The Ministry of Environment Forest and Climate Change (MoEF&CC) and the pollution control boards together form the apex body for the formulation and administration of these regulatory requirements.

#### Regulatory requirements for management of water

Water is the most common resource used across the AVC – from pre-production processes in the seed, fertiliser and pesticide industries and plants manufacturing agricultural machinery to farming processes such as irrigation, livestock management, cleaning and maintenance of farm equipment, and to the postproduction/food-processing industries such as grain processing, vegetable and fruit processing, milk and milk products, meat and poultry, baking industry, fish industry, etc.

Agricultural processes and uncontrolled abstraction of water across the AVC have had a huge impact on water quality and the environment. Raw material, water and energy are the basic inputs required in the food-processing industry, which result in the generation of waste water and solid waste. The waste water released from food-processing units is considered to be rich in organic content, nitrogen concentration and suspended particles, and thus requires treatment prior to discharge. Similarly, the surface run-off water from farm fields and livestock farms is also rich in organic matter, chemical content (from chemical fertilisers/ pesticides), etc.

The Water (Prevention and Control of Pollution) Act, 1974, and amendments have been enacted to maintain and restore the wholesomeness of water, and the governing agencies are the Central Pollution Control Board and state pollution control boards. Under the provisions of this act, effluent discharge from industries (food processing, fertiliser manufacturing, etc.) is directly governed by the pollution control board. Further, under the law, establishment



#### Farm processes

- Usage of water for irrigation
- · Cleaning and drinking in livestock farming
- Cleaning and maintainance of machinery



## Pre- and post-production and industrial processes

- Cleaning and sterilisation of equipment and processing plants
- Processing operations in chemical pesticide, fertiliser and food production (carrying agents, dispersants, solvents and diluents)
- Storage, retorting and pasteurising processes (heating, cooling and power generation)



and operation of any pre-production unit (fertilisers, pesticides, agriculture machinery production units), food-processing units (grading, cleaning, blending, storage warehouses, milling, etc.) requires permission from the board, which helps in managing utilisation of natural resources during industrial processes. On the other hand, curbing of water pollution due to core farming practices (agricultural run-off) is not covered under the provisions of this law due to non-requirement of any Consent to Establish (CTE) and Consent to Operate (CTO) for farming activities.

The Central Ground Water Authority (CGWA) and irrigation department are the main organisations directly involved in management of water resources (groundwater and surface water respectively) for farming practices.

The abstraction and use of groundwater is regulated by the CGWA, while the irrigation department regulates the use and grant of permission for surface body water/water from irrigation canals.

On 24 September 2020,<sup>32</sup> guidelines for regulation and control of groundwater extraction were issued by the Gol. These guidelines state that farmers are exempted from obtaining clearance for abstraction of groundwater as their livelihood is wholly dependent on agriculture, which in turn is dependent on water. The guidelines direct the relevant state departments to take or implement measures for ensuring sustainability of groundwater sources.

#### Regulatory requirements for management of soil health

Soil health is fundamental to agricultural sustainability and soil biodiversity. Soils not only form the basis of agricultural production but also filter and buffer pollutants from entering the ground aquifers. Curbing soil erosion, ensuring soil organic matter and maintaining soil structure can be achieved with good soil management practices. Good soil management also plays a significant role in minimising diffuse pollution.

Out of all the activities across the AVC, farming activities and livestock farming are the major contributors towards soil contamination. Soil erosion resulting from agricultural runoff reduces the productivity of the natural ecosystem and soil microorganisms. The unregulated application of fertilisers, chemicals and manure further impacts the natural composition of soil and contaminates the soil.

To regulate the excessive use of fertilisers (chemical) and pesticides, the Gol enacted the Insecticides Act, 1968, and Insecticides Rules, 1971. These acts and rules regulate the import, registration process, manufacture, sale, transport, distribution and use of insecticides (pesticides) with a view to prevent risks to human beings or animals and for all connected matters throughout India. In this context, the Union Cabinet has recently approved the Pesticides Management Bill, 2020.

32 http://jalshakti-dowr.gov.in/sites/default/files/CGWA\_GWExtraction\_Notification\_24-09-2020.pdf

#### Regulatory requirements for biodiversity management

Soil biodiversity is the main component of agriculture sustainability. The diversity and activity of microorganisms in the soil are essential for crop production. The projected increase of the world population to 8.9 billion people by 2050 will lead to higher demand for agricultural products.<sup>33</sup> Thus, increasing crop productivity alongside ensuring the management of agroecosystems is an essential goal of sustainable agriculture.

Agricultural sustainability is the ability to maintain continuous food production from a crop production system without causing environmental degradation. The Insecticides Act, 1968, and Insecticides Rules, 1971, indirectly govern the nutrition capacity of soil. Further, the Biological diversity Act (2002), through the National Biodiversity Authority (NBA), focuses on the conservation of biodiversity, sustainable use thereof, and equitability in sharing the benefits derived from such use.

#### Regulatory requirements for air quality management

The sources of air pollution from AVCs range from point and non-point sources from farm operations, food processing units, fertilisers/pesticide manufacturing units and livestock farming. Multiple farming practices contribute towards the emission of greenhouse gases, resulting in global-level impact. Furthermore, the usage of pesticides and other chemical sprays results in the release of a substantial number of aerosols into the atmosphere, impacting local air quality. The regular farming practices in India such as jhum cultivation and slash and burning are potential sources of particulate matter related pollution from agricultural lands which not only impact local air quality but also affect regional air quality.

The Factories Act of 1948 and its amendment in 1987 are concerned with the working environment of workers. The amendment of 1987 has a sharper focus on the environment and has been expanded to hazardous processes. In 1981, the Air (Prevention and Control of Pollution) Act was enacted to control and prevent air pollution and maintain air quality in India.. The act empowers the Central and state pollution control boards to deal with emergencies related to air pollution. In 1982, the Air (Prevention and Control of Pollution) Rules were introduced, which defined the procedures of the meetings of the boards and the powers entrusted to them.

These acts and rules have direct applicability to factories, processing units and manufacturing units involved in the production of fertilisers and pesticides as well as the storage, processing and distribution of foodgrains. Further, food processing and fertiliser/ pesticide manufacturing units are required to obtain consent to establish (CTE) and consent to operate (CTO) under the provisions of the Air (Prevention and Control of Pollution) Act, 1987.

Section 9 of the Air (Prevention and Control of Pollution) Act, 1981, states that burning of material which is not a fuel source and is likely to cause pollution should be prohibited. The Environment Protection Act, 1986, prohibits activities that may emit pollutants in excess of prescribed limits/standards. Any person violating the act shall be deemed guilty. However, the manner in which power may be exercised has not been detailed.

A discussion paper published by the Energy and Resources Institute (TERI) in 2019 estimates that 627 kt of PM10 and 4677 kt of carbon monoxide are released to the atmosphere annually due to burning of crop residue in situ. To prevent residue burning, the Ministry of Agriculture developed a national policy for management of crop residue, which has the following major objectives:

- promote technology to optimise utilisation and in situ management of crop residues
- · promote the use of appropriate machinery for farming
- use satellite-based technologies to monitor the management of crop residue with the National Remote Sensing Agency and the Central Pollution Control Board
- provide financial support and take a multidisciplinary approach towards accomplishing these objectives.



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## Impact of AVCs on the environment and health

The rapid population growth and increased requirement for food have influenced the utilisation of natural resources. The increased intensity of agriculture has contributed towards changes in land use patterns as well as utilisation of other natural resources. Conversion of natural/forest land into agricultural land has resulted in loss of natural buffer areas and the ecosystem. Current agricultural practices such as exposure to agrochemicals/ pesticides have further affected species interactions and the composition of local ecological communities.

The genetically engineered crops are known to consume less water than traditional crop varieties to produce a regular yield. They indirectly promote water conservation and reduce soil erosion from agricultural runoff, whereas, these improved crop varieties lead to long-term ecosystem damage by dominating the indigenous species. One direct impact includes loss of indigenous crops through gene flow/migration from transgenic crops as a result of crossing with indigenous varieties. This migration can happen due to open pollination. Pesticides may also affect biodiversity by killing weeds and insects, leading to a negative impact on the food chain.

#### Impact on water resources

India accounts for about 17% of the world's population but only 4% of the world's freshwater resources and they are unevenly distributed across the vast expanse of the country.35 Water is a critical input in an AVC and is a key determinant of the overall yield. Availability of adequate water supply is equally important in the case of agricultural activities such as animal husbandry, food processing and fisheries. As per the OECD Environmental Outlook to 2050.36 India would face severe water constraints by 2050. Additionally, the quality of available water resources is another concern. It is estimated that Indian agriculture accounts for 90% of water use due tofast-tracked groundwater depletion and poor irrigation systems. The majority of agricultural land in India is under cultivation of high water consuming crops such as rice, wheat and sugarcane. Sugarcane is an important export crop for India and consumes as much as 3,500 litres of water for a kilogram of grain produced, thus resulting in exploitation of an already scarce resource.

The use of agrochemicals potentially contaminates the aquifers in the ground by seepage and surface water resources by run-off. Large amount of residues from inorganic fertilisers /pesticides and other agrochemicals, agricultural runoff into surface water bodies and seepage into ground water are the primary causes of water contamination from AVCs.



35 https://www.oav.de/fileadmin/user\_upload/5\_Publikationen/5\_Studien/170118\_Study\_Water\_Agriculture\_India.pdf

36 https://www.oecd.org/policy-briefs/India-Improving-Water-Security.pdf



Organic matter, excess nutrients and pathogen contamination are other prospective pollutants that have emerged from the livestock industry. Zoonotic waterborne pathogens are another major concern.<sup>37</sup> If used properly, livestock manure can improve soil fertility and tilth, increase the soil's water holding capacity, and reduce wind and water erosion. However, surface and groundwater pollution can occur if manure application is mismanaged.

Water pollution from agriculture has a direct negative impact on human health. For example, the well-known blue baby syndrome – a possibly fatal disease in infants – is caused by excess nitrates in the water. Pesticide accumulation in water and the food chain, with demonstrated ill effects on humans, led to the widespread banning of certain broad-spectrum and persistent pesticides (such as DDT and many organophosphates), but some of these are still used in poorer countries, causing acute and likely chronic health effects. Side effects of agriculture-related pollutants like eutrophication can adversely impact aquatic ecosystems, biodiversity and fisheries.

Highly saline water alters the geochemical cycles of major elements – such as carbon, iron, nitrogen, phosphorus, silicon and sulphur <sup>38</sup> – with overall effects on ecosystems. Salinisation can affect freshwater biota by causing changes within species and in community composition, and can ultimately lead to biodiversity loss and migration. In general, when salinity increases, the biodiversity of microorganisms, algae, plants and animals declines.

#### Impact on soil quality

Further, unsuitable agricultural practices can impact the quality of soil by altering its physiochemical properties and degrading soil fertility. Such practices can range from farming activities such as extensive mechanical tillage to use of inappropriate machinery. Alteration of the physiochemical properties due to extensive use and overuse of agrochemicals contributes to disruption of soil microorganisms which play an essential role in decomposing organic matter, cycling nutrients and fertilising the soil. Soil erosion and generation of sediments can be significant pollutants depending on the physical and chemical properties. In addition, nutrient management strategies aimed at maintaining and/or improving soil fertility to optimise crop yield could have off-site environmental impact (e.g. contamination of groundwater resources and eutrophication of surface water resources from surface runoff and leaching of nutrients).

Primarily, nitrogen and phosphorus present in inorganic and organic fertilisers, and animal excreta are normally found in water in the form of nitrate, ammonia or phosphate. Poor crop residue management, i.e. export/burning vs retention of residue, results in depletion of soil organic matter and promotes soil erosion and overall loss of nutrients. These have an adverse impact on crop performance, soil quality, micro fauna and overall soil health.

37 https://www.who.int/water\_sanitation\_health/publications/2012/ch2.pdf

38 https://esajournals.onlinelibrary.wiley.com/doi/pdf/10.1890/ES14-00534.1

#### Impact on health (occupational health)

Occupational health hazards (OHHs) are on the rise in not only the organised sector but also the unorganised sector such as agriculture, fishery and horticulture. The increase in OHHs in the unorganised sector is an emerging threat in the area of occupational and environmental health in India.<sup>39</sup>

As per the Ministry of Labour and Employment, agricultural hazards can be classified into four broad categories<sup>40</sup> as described below:

Farm machinery	Chemical agents	Agricultural tools and implements	Climate and other agents
<ul><li>Tractors</li><li>Threshers</li><li>Fodder machines</li><li>Chopping machines</li></ul>	<ul><li>Pesticides</li><li>Fertilisers</li><li>Strong weedkillers</li></ul>	<ul> <li>Pick</li> <li>Axe</li> <li>Spade</li> <li>Sickle</li> </ul>	<ul> <li>Electricity</li> <li>Animal/snake bites</li> <li>Dust</li> <li>Solar radiation</li> <li>Psychological stress due to socioeconomic problems</li> </ul>

Based on the agricultural accident survey<sup>41</sup> carried out in 2004–07 and 2012–13 by the Indian Agricultural Statistics Research Institute, hand tools and farm machinery collectively contribute to about 65% of total reported accidents in the agriculture sector, while other sources such as snake bites, drowning in wells/ponds, animal bites and lightning account for the remaining 35%. Under farm machinery, tractors (22%) contribute towards the maximum incidents, followed by animal-drawn equipment, threshers (14%), electric motor/pump sets (12%), chaff cutters (9%), power tillers (6%), sprayers (4%) and other machines (2%).

Type of occupational hazards in the agriculture sector	Sources
Physical exposure	Exposure to heat and humidity, solar rays, cold, noise, vibration; poor illumination; long hours of continuous work; repetitive motion for work; forceful motions; postural changes; bending posture; immersion of hands and feet continuously in water; slips and falls due to wet fields; continuous movement; carrying heavy load of materials; contact with soil, mud, dust, water and manure; contact with insects; contact with scorpions, snakes and other poisonous animals; contact with wild mammals; felling of trees
Chemical exposure	Use of insecticides, herbicides, rodenticides, bactericides, fungicides, larvicides; use of chemicals for treating land
Mechanical hazards	Poorly maintained equipment – spades, sickles, axes; noise of vehicles – tractors, vibration and noise of farm equipment; fall from a tractor; electric water pumps – electric shocks, fire hazards, earthing and wiring issues
Biological hazards	Infections due to bacteria, virus, parasite, fungus and working with cattle
Psychosocial hazards	Occupational stress, lack of job satisfaction, insecurity, relationship problems, emotional tension, unemployment, lack of an alternative job, low payment for work, poverty, etc.

Improper sanitation facilities, poor accessibility to potable water, non-availability/limited health facilities and limited commuting/ transportation facilities are some key concerns for farm labour in agricultural fields, thus resulting in inadequate workplace conditions and raising risk towards occupational health safety provisions.

Since agriculture is primarily a decentralised activity, it is often difficult to set and implement work safety norms and standards.

While standards can be set for equipment manufactured in large factories, it is not easy to monitor their implementation. For equipment fabricated in small workshops or by farmers themselves, it becomes very difficult to ensure that design standards are adhered to, especially when the users of equipment are hired daily wage labourers.

41 https://aicrp.icar.gov.in/esa/survey-of-accidents-in-indian-agriculture/

<sup>39</sup> GOA Declaration. The Report of 18th Congress of the International Association of Rural Health and Medicine (IARM) in Goa, India. Available from: https://www.jstage.jst.go.jp/article/jrm/8/1/8\_7/\_pdf. [Last accessed on 2017 Feb 28]

<sup>40</sup> Nayak, J. Occupational Health Hazard of farm Women Director National Research Centre for Women in Agriculture. 2013

## Solutions to ensure environmental sustainability

The concept of sustainable agricultural practices includes ensuring food security with parallel management of natural resource utilisation. This can be achieved by developing technologies and improving agricultural practices to curb the impact on the environment, ensuring social protection and maintaining the health and safety of farmers and farm workers.

Currently, the agriculture sector is strongly driven by the requirements of food security and the usage of genetically modified crops, fertilisers, overuse of water resources, pesticides and lands to meet agricultural produce demands and obtain high productivity.<sup>42</sup> To ensure sustainable agricultural practices, it is essential to dissuade the use of non-renewable and synthetic resources that ultimately harm the environment, farmers and the end consumer.

As part of SDG 2: Zero Hunger, the Gol aims to end all forms of hunger and malnutrition by 2030 and ensure that all people,

especially those in vulnerable situations, have sufficient nutritious food. This goal also aims to double agricultural productivity by 2030 and generate decent incomes while supporting people-centred development in rural areas and protecting the environment. Measures such as promoting agricultural sustainability, supporting marginal farmers and creating accessible technologies and agricultural market places with easy and equal access are fundamental to the eradication of hunger and poverty.<sup>43</sup> SDG 9: Industry, Innovation and Infrastructure and SDG 12: Responsible Consumption and Production are interlinked in terms of developing sustainable infrastructure across the AVC and limiting the use of synthetic fertilisers and pesticides to improve the quality of food products and make the AVC sustainable as a whole. The strategy/solutions adopted by the Gol towards achieving these goals include: <sup>44</sup>

#### Promoting an integrated farming system

- Reduces dependency on external highenergy inputs, thus conserving natural and scarce resources
- Multiple uses of resources water for households, irrigation, dairy, poultry, etc., reducing cost and making farming sustainable
- Soil health improvement through recycling – residue recycling is an integral part of an integrated farming system

#### Agro-forestry

#### Improving farm water-use efficiency

- · Reducing wastage of water
- Enhancing adaptation of precision irrigation, micro irrigation (drip irrigation and sprinkling) and other water-saving technologies
- Enhancing recharge of aquifers and introducing sustainable water usage practices

Conserving and using indigenous crop varieties/resources

#### Integrated nutrition management

- Use of bio-fertilisers
- Organic farming
- · Mechanisation and technology

#### Integrated pest management

Source: Gol

42 https://royalsocietypublishing.org/doi/full/10.1098/rstb.2007.2163

- 43 http://mospi.nic.in/sites/default/files/publication\_reports/SDG-NIF-Progress2021\_March%2031.pdf
- 44 https://nmsa.dac.gov.in/pdfDoc/SDGVisionDocumentFinal.pdf

At present, the Gol has various policies/sch initiatives connected to sustainable agriculti	emes/programmes that are aimed at achieving t ure include:	he goal of food security. Some of the
Pradhan Mantri Krishi Sinchayee Yojana (PMKSY)	National Mission on Sustainable Agriculture (NMSA)	Rashtriya Krishi Vikas Yojana (RKVY)
The objective of PMKSY is to improve farm water-use efficiency, reduce wastage of water, enhance the adoption of precision irrigation, micro irrigation (drip irrigation and sprinkling) and other water saving technologies, enhance recharge of aquifers and introduce sustainable water usage practices. Source: PMKSY	NMSA aims to address issues related to sustainable agriculture in the context of risks associated with climate change by devising appropriate adaptation and mitigation strategies. Source: NMSA	The areas of focus under RKVY include integrated development of food crops, agriculture mechanisation, soil health and productivity, development of rain- fed farming systems, integrated pest management, promoting extension services, horticulture, animal husbandry, dairy and fisheries, sericulture, study tours of farmers, organic and bio- fertilisers and innovative schemes. Source: RKVY
Climate Change and Sustainable Agriculture: Monitoring, Modeling and Networking (CCSAMMN)	Rainfed Area Development (RAD)	Sub-Mission on Agroforestry (SMAF)
The objective of CCSAMMN is to initiate the creation and bidirectional dissemination of climate change related information and knowledge by way of piloting climate change adaptation/ mitigation research/model projects in the domain of climate-smart sustainable management practices and integrated farming systems suitable to local agro- climatic conditions.	The objective of RAD is adopting an area-based approach for development and conservation of natural resources along with farming systems. This component has been formulated in a 'watershed plus framework', i.e. to explore potential utilisation of natural resource base/assets available that are created through watershed development and soil conservation activities/ interventions.	SMAF aimes to provide additional income opportunities to farmers, boost carbon sequestration by increasing tree cover, complement the national initiatives on climate change adaptation and mitigation, and enrich soil organic matter by growing trees on farm land.
Source: NMSA	Source: RKVY	Source: NMSA
Soil Health Management (SHM)	National Mission on Agricultural Extension and Technology	
The objective of SHM is to promote location as well as crop-specific sustainable soil health management, including residue management and organic farming practices by creating and linking soil fertility maps with macro/micro nutrient management, appropriate land use based on land capability, judicious application of fertilisers and minimising	This scheme aims to make the extension system farmer-driven and farmer-accountable by way of new institutional arrangements for technology dissemination. It aims to restructure and strengthen agricultural extension to enable delivery of appropriate technology and improved agronomic practices to farmers.	
soil erosion/degradation.		and the state of the
soil erosion/degradation.	Source: NMAET	

![](_page_30_Picture_0.jpeg)

# Conclusion

The AVC in India is highly complex and fragmented, comprising various players and multiple decision makers. AVCs are undergoing a profound transformation and are facing economic, environmental, social, and various other types of challenges. Women play a pivotal role in the AVCs in India and hence their development is central to the overall development of the sector. Despite the crucial role played by them in the rural economy, gender stereotypes, unavailability of decent work opportunities, lack of land ownership, lack of access to formal credit, absence of decision-making power, etc., prevent women from achieving economic empowerment and self-sufficiency. These challenges contribute to the ever-increasing disparity between men and women with respect to access to productive resources, services and opportunities, leading to underperformance in the agriculture sector and weak economic growth and overall development. Hence, it is imperative to pay more attention to the upliftment of women. Providing access to basic education, reducing gender-biased practices through better employment opportunities and creating entrepreneurship activities are some of the initiatives for increasing gender equality. Further, efforts need to be made towards eliminating gender discrimination among children and ending child labour. Sustainable agriculture cannot be achieved without addressing the issues of gender inequality and food and social insecurity. Nutrition management and adequate food availability are indispensable for maintaining national food security. High productivity and better yield of plants can be achieved through sustainable utilisation of natural resources. Water and soil health management, biodiversity management and air quality management are the main drivers of agricultural sustainability. Thus, the concept of sustainable agricultural practices includes ensuring food security with parallel management of utilisation of natural resources. A holistic approach that connects the three (economic, environmental, social) aspects of the AVC needs to be adopted, as presented in this report. Such an approach would need to be aligned with the SDGs. Understanding and leveraging these SDGs would lead to gender mainstreaming in agriculture and rural development. It would also help in protecting, restoring, and promoting the sustainable use of natural resources for equitable development in the AVC.

# About UN GCNI

UN Global Compact Network India (UNGCNI), the Indian Local Network of the United Nations Global Compact (UNGC), New York is the first Local Network globally to be established with full legal recognition. As the UNGC local arm, UNGCNI has been acting as a country level platform in providing a robust platform for Indian businesses, academic institutions and civil society organizations to join hands for strengthening responsible business practices. Our '10 Principles in areas of Human Rights, Labour, Environment & Anti-Corruption' provide a common ethical and practical Framework for Corporate Responsibility. The 17 Sustainable Development Goals (SDGs), adopted by all 195 Member States of the United Nations, including India, are understood and implemented by businesses around the world, regardless of size, complexity or location.

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