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# Wheat Production and Consumption Trends and Prospects in Ethiopia

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## Abstract

*National wheat research and development efforts mainly focus on enhancement of production and productivity to ensure wheat food security and self-sufficiency. Wheat production and productivity growth can be achieved using irrigation, adoption of improved agricultural technologies and farm mechanization. Currently, federal and regional governments have extensively focused on increasing wheat production and productivity to achieve wheat self-sufficiency and further generate exportable production. These entail policy and production decisions based on the analyses of historical wheat production and consumption growth rates and trends as well as their future prospects in relation to current production practices. To examine issues on policy and production decision, this article provides information on wheat production and consumption trends, and future prospects in line with the current wheat production interventions. Historical wheat production and consumption data were used to achieve the objective of the study. The study finds out that wheat production increases, on average, by 6.2% per annum while annual wheat consumption increases on average by 261,120 tons if past production and consumption practices continue with no major and continuous production and productivity enhancement interventions. Production and consumption gap, and price increase if there are no major yield and production improvements. To offset the gap, national average wheat yield need to increase annually by 1.58 quintals per hectare with current wheat production area. Ensuring wheat self-sufficiency and import substitution need continuous and sustainable current wheat production interventions in lowland areas using irrigation, and focus on yield increment of major food commodities. Private sector involvement and investment in wheat production, processing, and marketing is decisive for the success of interventions to ensure wheat self-sufficiency and export need.*

**Keywords**: Wheat, production & consumption, growth rates, irrigated wheat, wheat prospects

## Introduction

Global climatic changes, agricultural productivity vis-à-vis population growth, rising demand for food as well as soaring food prices have given rise to concerns for ensuring food security. To address these concerns, the Second United Nations Sustainable Development Goal (SDG) of 2030 aims at mitigating hunger, food insecurity, and malnutrition (FAO, 2018). The same report indicates that though great efforts have been carried out to address the challenge of food insecurity, still billions of world population are in extreme poverty and food insecurity. World food demand projections indicate that global food demand may increase by 70 percent by 2050 (Alexandratos and Bruinsma, 2012; FAO, 2019). This will be a

major challenge unless productivity of major food crops is increased to feed the increasing urban and rural population of the world.

Wheat is one of the major food crops that has potential impact on food security. It is the second most produced grain after maize in the world (FAOSTAT, 2022). In developing countries, especially Sub Saharan African countries, wheat has low productivity with rising demand and prices. Increasing wheat production and productivity is crucial for meeting global wheat food demand, and thereby mitigate the impacts of food shortage and rising food prices.

In view of this, since last few years, Ethiopia has given a high priority to wheat production to achieve food self-sufficiency and generate exportable wheat surplus. To achieve this goal, Ethiopian government has supported and promoted irrigated wheat production in lowland areas in addition to wheat production in the main rainy season. Moreover, offseason wheat production has become a common practice in highland and midland agro-ecologies where irrigation facilities are available.

The national development plan in wheat production is to ensure wheat food self-sufficiency, import substitution, and mitigate increasing wheat prices, and enhance export earnings. However, formulating short- and long-term plans and strategies require assessment of current wheat production and demand situations as well as its future outlook. The development of the wheat sector will depend on underlying long-run trends in production and demand that will continue to determine national wheat food status. Therefore, this article is intended to assess the current wheat production, productivity, and consumption to determine the future prospects of national wheat production and consumption at the times of population growth and increased demand, climatic changes, natural resource degradations, and soaring food prices.

The objective of this article is to provide information on the current national wheat production, consumption and future prospects as well as its implications on national wheat self-sufficiency in the course of promoting new domestic wheat production interventions.

# Materials and Methods

## Data sources

This article is mainly based on secondary data and information collected from several sources including FAOSTAT, USDA, Ethiopian Statistical Service (CSA/ESS), NBE, EGT, Ethiopian Custom Authority and various published and unpublished documents of government and non-government organizations. To adequately address the objective of the study, blends of techniques and approaches were employed that included extensive desk reviews of secondary data/information, multidisciplinary team reflection sessions, and key informant

interviews (wheat researchers, extension workers, wheat processors and traders). In general, time series aggregated data were collected on national wheat production, yield, supply and demand, imports and prices. Time series data were used for analyzing historical growth rates and trends, and making forecast to see changes over years. For this purpose, minimum of 20 years production and consumption data were used.

## Data analysis

Data analysis involved both descriptive statistics (means, percentages) and log-linear trend models. Time series data were analyzed using log-linear trend models to estimate annual growth rates and project future prospects of wheat production and consumption in Ethiopia The trend models generally assume that the same underlying causal relationship that existed in the past will remain unchanged in the future. Following Gujarati (2004), forecasting was made using historical data on wheat production and consumption, yield and price. The base year for estimating the trend of wheat production and consumption in Ethiopia was set at 2020/2021 while projection was made to the year of 2030/2031.

## Measuring trends of wheat production and consumption

A log-linear trend model is commonly used in econometrics to estimate growth rates and analyze trends in some economic variables such as GDP, inflation, trade, agricultural and food production, etc. In this model, the dependent variable is assumed to follow a log-linear trend over time which indicates that the percentage change in the dependent variable remains constant over time. Therefore, the growth rates and trends of wheat production and consumption were estimated using the following log-linear model.

Let $Y_t$ denotes real wheat production or consumption at time t, and $Y_0$ the initial value of production or consumption in the base year. Based on Gujarati (2004), we can have compound interest formula:

$$Y_t = Y_0 (1 + r)^t \quad (1)$$

Where r is the compound growth rate of Y over time. Taking the natural logarithms of equation (1),

$$ln\ Y_t = ln\ Y_0 + t\ ln\ (1+r) \quad (2)$$

Letting $\beta_1 = ln\ Y_0$ and $\beta_2 = ln\ (1+r)$

Equation (2) can be written as

$$ln\ Y_t = \beta_1 + \beta_2 t \quad (3)$$

Adding disturbance term to equation (3), we get

$$ln\ Y_t = \beta_1 + \beta_2 t + U_t \quad (4)$$

The model becomes a log-linear regression model with parameters $\beta_1$and $\beta_2$. The dependent variable is the log values of Y and the independent variable is time "t" which takes the values 1, 2, 3 … t.

The slope coefficient in the log-linear model, $\beta_2$, measures the average growth rate of the dependent variable, Y, over time "t".

In addition to model (4), a linear trend model can be used to estimate absolute change in wheat production or consumption:

$$Y_t = \beta_1 + \beta_2 t + U_t \quad (5)$$

Model in equation (5) is called linear trend model and the time variable t is called trend variable. The slope coefficient, $\beta_2$, determines the upward or downward trend in Y depending on the sign of $\beta_2$ i.e. positive or negative value of $\beta_2$. However, the choice between growth rate (log-linear) model and linear trend model depends up on whether the interest is in the relative or absolute change in Y (wheat production or consumption). But for comparative purposes, relative change is generally more relevant (Gujarati, 2004).

Generally, both growth rate and linear trend models were used to find out the relative and absolute changes in wheat production and consumption over the time period considered for the analysis. Historical data of wheat production and consumption for the time period 1999-2021 were used for measuring growth rate and projections.

# Results and Discussion

## Wheat Production and Consumption

Wheat is one of the major food and cash crops in Ethiopia. It is produced by over 4.8 million smallholders on about 1.89 million hectares of land with annual volume of production of over 5.78 million tons and yield of 30.46 quintals per hectare (CSA, 2022). Wheat production and productivity have been improved over the last couples of decades in Ethiopia, grew, on average, 6.21% per annum during the period between 1999 and 2021 which is equivalent to an average annual increment of 190.31 thousands metric tons (Figure 1).

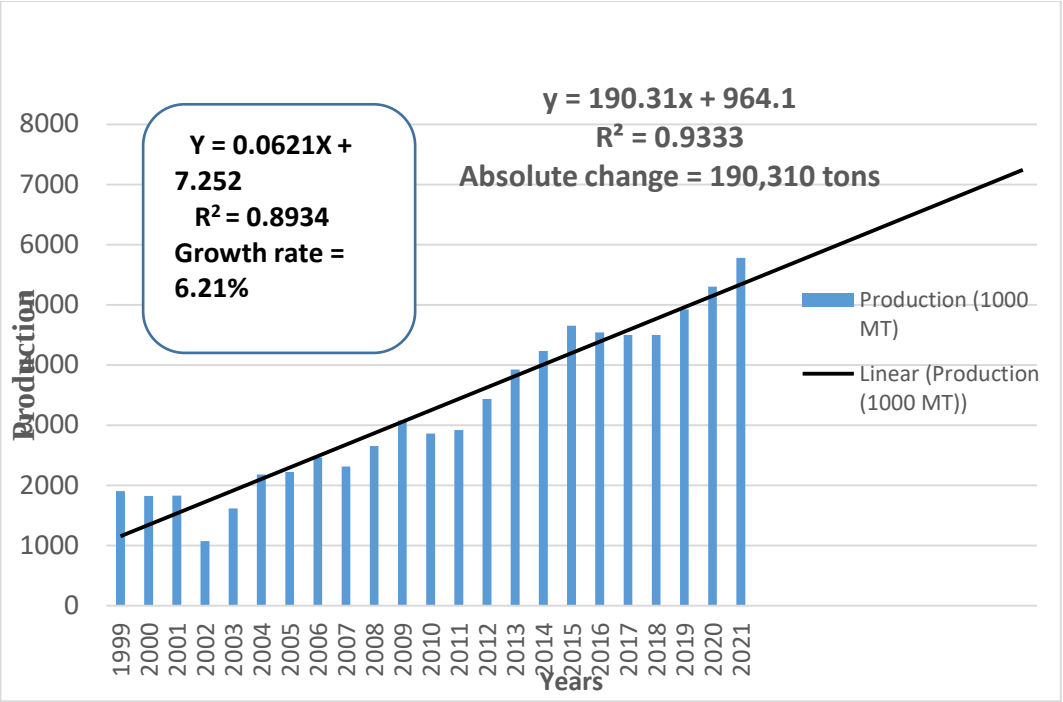


Figure 1 Wheat production in Ethiopia in 1000 MT
Source: CSA/ESS, 2020/21

Government reports, e.g. Ministry of agriculture, indicate that the total wheat area in Ethiopia has been expanded to 2.3 million hectares in 2022/23 which is 18 percent higher than in 2021/22 resulting in growth in domestic wheat production amounted to 7.0 MMT. The increment by 1.3 million metric tons was reported, and it was mainly due to the focus on wheat production in lowland areas and off-season using irrigation.

Wheat productivity has been increasing over the past couple of decades. Model results showed that national wheat yield has increased, on average, by 0.114 ton/ha annually from 2010 to 2021 (Figure 2).

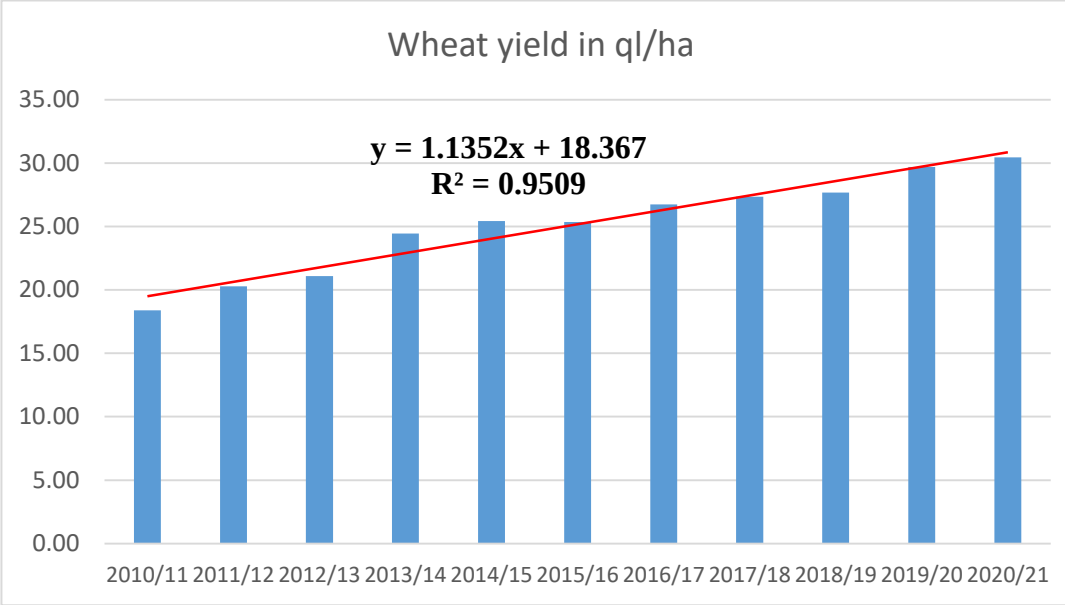


Figure 2 Wheat Yield trends in quintal per hectare from 2010/11 to 2020/21 cropping years.
Source: CSA report of 2011 to 2022.

The major regional states that produce wheat are Oromia, Amhara, South regional state, and Tigray. Larger wheat producing administrative zones in the country include Arsi, West Arsi, Bale, the whole Shewa zones, Gojam, South wollo, and Hadiya zones (CSA, 2021). Figure 3 shows the distribution of wheat production area among Regions during the 2020/21 cropping season.

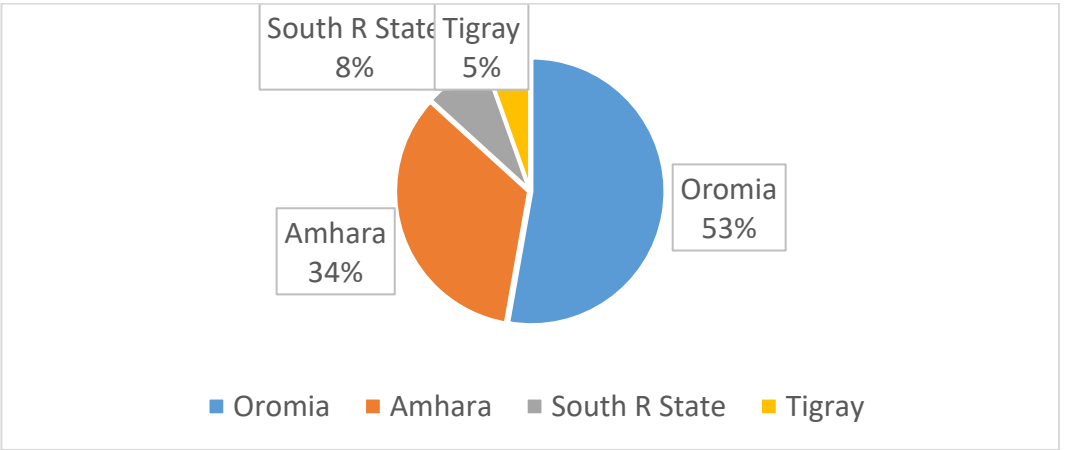


Figure 3. Percentage share of wheat area (ha) among Regions during 2020/21 cropping season
Source: Computed from CSA 2022 report.

Regional states comparison of wheat volume of production shows that Oromia regional state accounts for 57% of the total volume of wheat production. Similarly, Amhara regional state comprise 32% of wheat output in 2020/21 production year. The two regional states produced 89% of the total wheat output in the same year indicating that the two regional states are the major and larger wheat producing states in the country.

Evidences show that there has been an increasing trend in the gap between wheat production and consumption during 1999-2021 (Figure 4). Consumption data were calculated by adding annual domestic wheat production and import from abroad. The increasing wheat production and consumption gap indicates the need for more efforts in improving domestic production and productivity of wheat in Ethiopia.

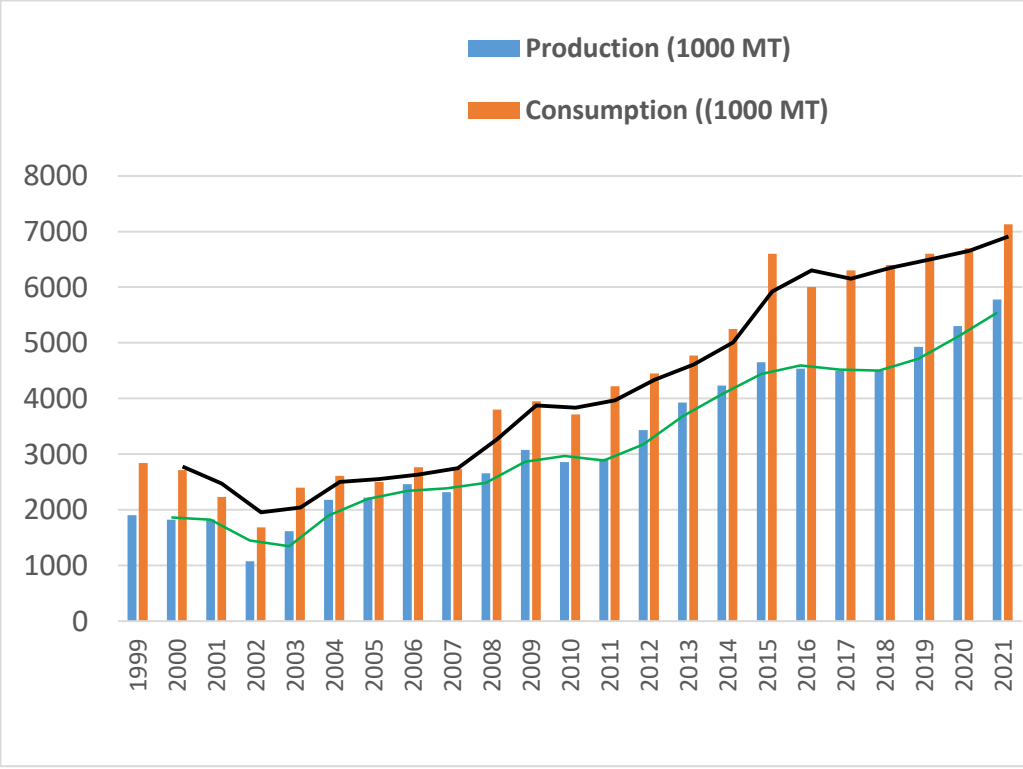


Figure 4 Wheat production and consumption trends in Ethiopia
Source: Data of CSA, FAOSTAT, and Ethiopian Customs Commission (ECC)

The demand for wheat has been increasing (Figure 4). The increasing demand for wheat and low domestic production has forced the country to import wheat every year or every other year from abroad. This challenge has forced the government to give due attention on wheat self-sufficiency through improving production and productivity of wheat. To achieve this, government plan and strategies focus on

wheat production in lowland areas using irrigation, clustering wheat farming, enhancing agricultural mechanization, and improving farm input supply and crop management practices.

## Wheat Import and prices

There is a gap between the level of wheat production and consumption in the country. This gap has been bridged through imports. Figure 5 shows wheat production, consumption, and import trends during 2000-2021.

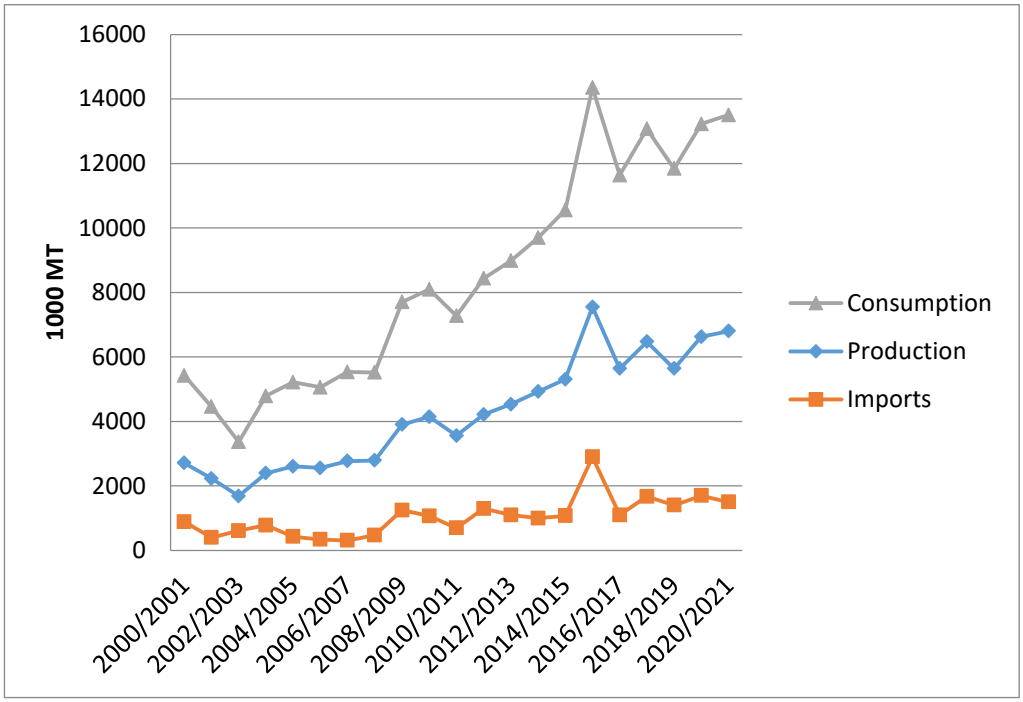


Figure 5 Trends of Wheat production, consumption and import, Ethiopia (2000/01- 2020/21)
Source: CSA, ECC, and FAOSTAT data

Generally, there have been soaring prices on food grains in Ethiopia since recent years due to the apparent inflation. Inflation, low domestic wheat production, and higher demand caused a high wheat price. Figure 6 depicts wheat price situations over the last 16 years. It can be seen that the nominal domestic producer and wholesale prices have been increasing despite the distribution of imported wheat to urban consumers at subsidized prices. A sharp rise in wheat price was observed during the period 2018 and 2023.

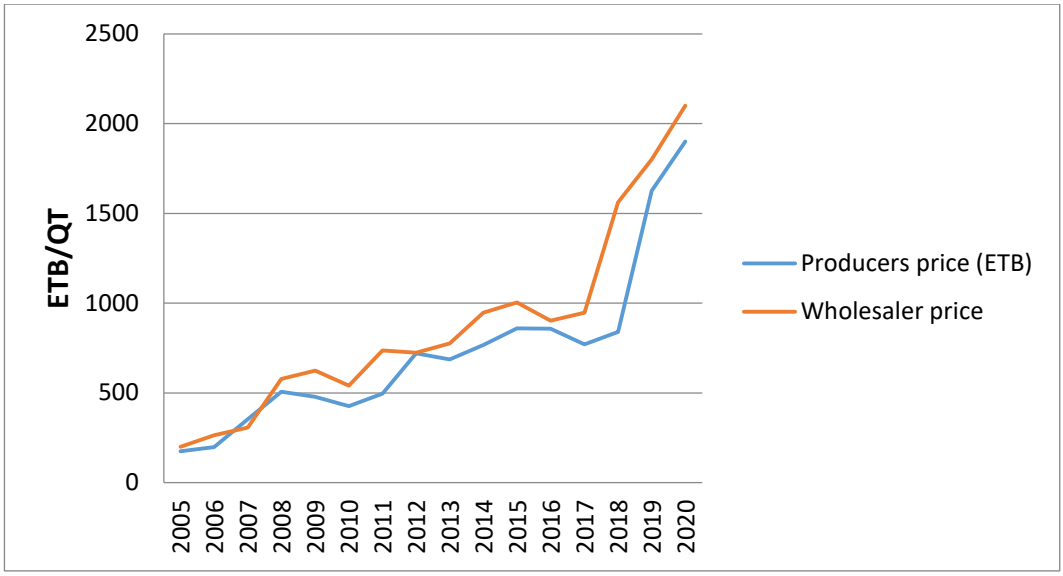


Figure 6 Trend of Wheat Price (2005-2020)
Source: Based on data of CSA and FAOSTAT data

## Future prospects in wheat production

Projections on wheat production and consumption were made based on historical data on current situations. The projection shows that wheat production has to reach 8.2 million tons to meet local consumption in 2022 in the absence of imported wheat. But if the past trends on wheat production remain unchanged, total wheat production is projected to reach 6.06 million tons in 2024 and 7.32 million tons in 2030. Likewise if the current wheat import trend continues, total consumption i.e. production plus import reaches 7.99 million tons in 2024 and 9.75 million tons in 2030. Figure 7 shows projections of wheat production and consumption based on the current trends on wheat production and import. The projections are based on linear forecast of production and consumption of past 20 years. This implies that there will be gap of 2.43 million tons between domestic production and consumption in 2030 if the past 20 years production and consumption trends continue till 2030. However, major continuous interventions by regional states and federal government to enhance wheat production and productivity in different agro-ecologies using irrigation and adoption of technologies may shift the forecasted production trend and offset the gap between production and consumption.

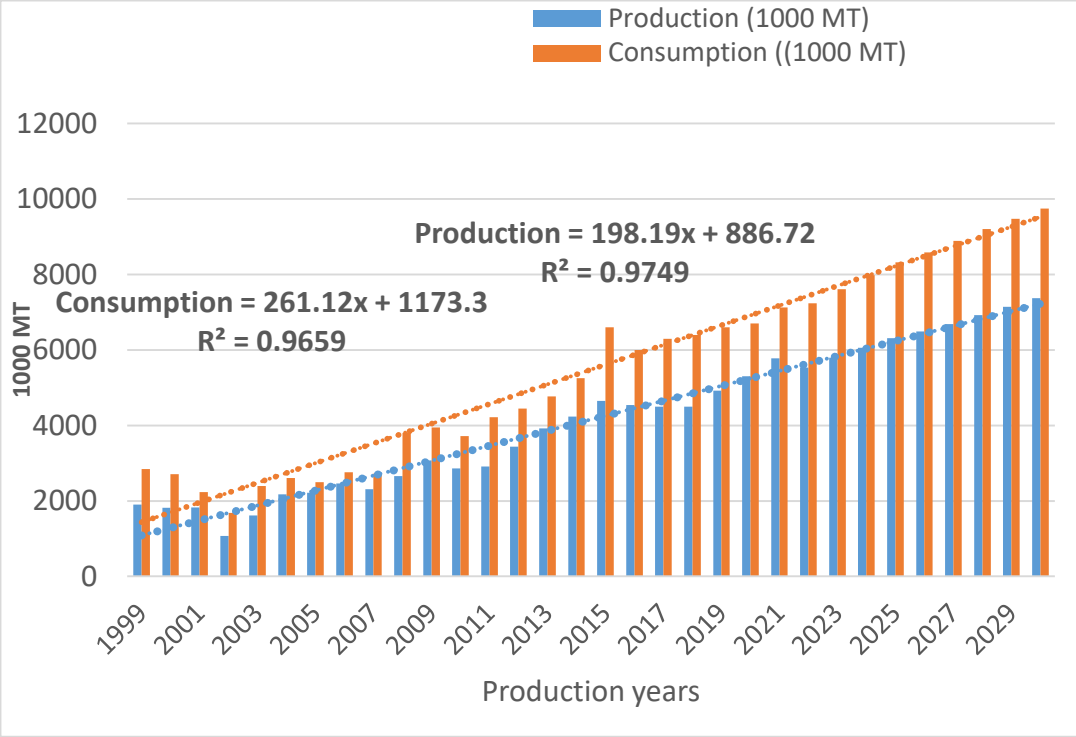


Figure 7 Linear trend projection of wheat production & consumption (2022 to 2030)
Source: Based on data of CSA, ECC, and FAOSTAT.

Figure 8 shows projected yield to offset the gap between wheat production and consumption given the current wheat cultivated land of 1.89 million hectares of 2021 (CSA, 2022) remains constant. To offset production and consumption gap of 2023, the national average yield of wheat needs to be 4.03 tons/ha. Likewise, the current trend of production and consumption gap can be avoided if average national yield will reach 4.4 tons/ha in 2025, and 5.16 tons/ha in 2030 provided that the 2021 wheat area coverage of 1.89 million hectares is maintained constant. However, as per the reports of government, wheat area coverage has been increased due to expansion of wheat cultivation in lowland areas and in off seasons using irrigation. This could affect the trend of domestic production and consumption gaps that has been based on historical data. Therefore, it has to be noted that government intervention strategies to enhance wheat production and productivity could change the forecasted production, consumption and yield values of future years.

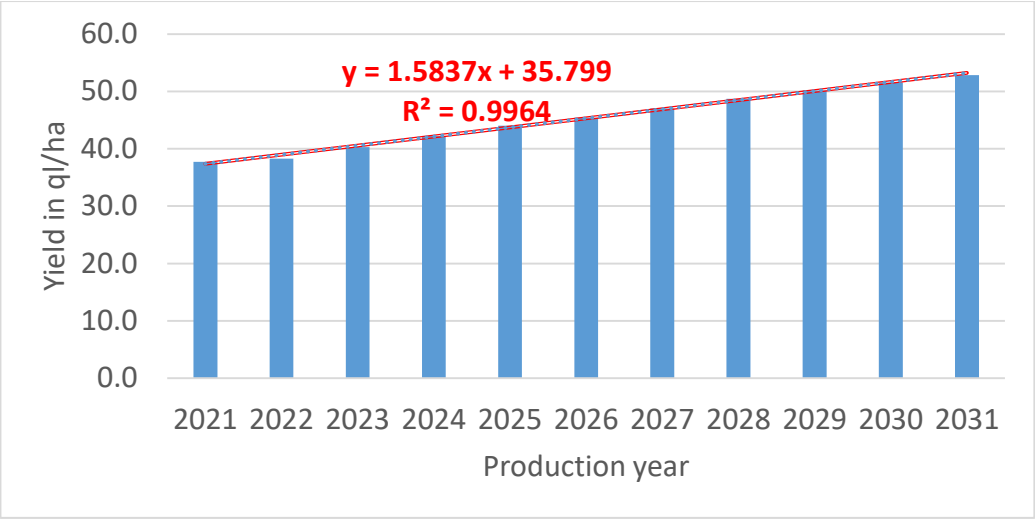


Figure 8 Yield (ql/ha) trend to offset production & consumption gap
Source: Computed from CSA data of various years

## Investment options

Wheat production has been given due attention by federal and regional governments of Ethiopia. The government encourages both small and large wheat producers to increase production and productivity to ensure wheat food self-sufficiency and stop wheat imports. Smallholders' land consolidation in the form of cluster and contract farming, and expansion of irrigated wheat production in the lowland areas are the key government strategies and focus areas to enhance wheat production and productivity. Farm input provisions, extension services, and credit provision for irrigated and mechanized wheat production are some of government support areas to increase wheat production.

Moreover, the government has agricultural sector policy and investment, and development plan that ranges from 2021 to 2030. Development policy, strategy and plan focus on rural commercialization, and improvement of productivity and competitiveness through involvement of private sectors. As stated in government's 10 year plan, the government "Creates conducive investment climate and incentivize domestic investors in key sectors, builds strong and market-led public-private partnerships in order to ensure the establishment of inclusive and pragmatic market economy, enhances access and quality of infrastructure to attract quality foreign direct investment, identifies new sources of growth, empower and stimulate the private sector, and supplements the private sector in strategic areas, and gives emphasis to public-private partnership on problem solving innovations and research activities."

Though the current private sector investment on wheat production is limited, the Ethiopian government gives a high priority on the wheat sector through creation of enabling policy environment for investment. In addition, the current growing local and global demands for wheat are great opportunities for private sector investment in large commercial irrigated farms.

## Agro-processing

The current growing urbanization and the high local demand for wheat food products are great market opportunities for private investment in agro-processing industries in Ethiopia. Wheat agro-processing is one of the investment options in wheat sector. Survey reports showed that there were over 400 cereal and/or wheat processing factories all over the country (FBIRD, 2022). About 92.5% of the factories were reported to be wheat flour. Most of the factories are located along main roads and their production is for local markets (Figure 9). They produce only single product (83.3% of the factories). About 43.3 % of the factories have no internal quality control laboratories.

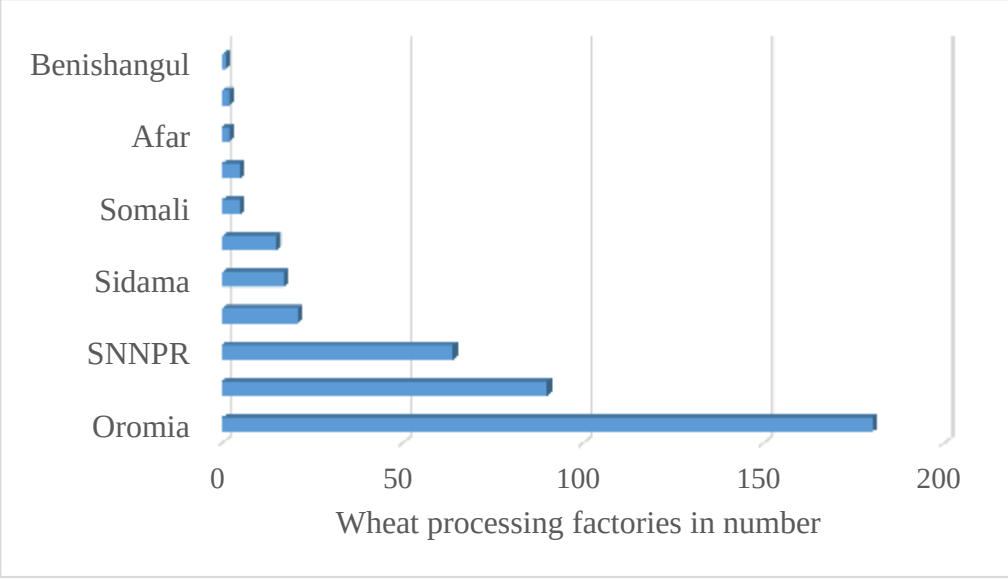


Figure 9 Distribution of Wheat processing factories in Ethiopia
Source: FBIRDC, 2022

Figure 9 shows that the majority of wheat processing factories (45%) are located in Oromia and followed by Amhara (22%). This shows that there is a potential for both wheat production and processing investment options in the regions. Even though there is investment opportunities in wheat processing, there are various constraints and challenges that affect smooth and full capacity functioning of the factories. The report of FBIRDC (2022) indicate that 70% of the factories have shortage of raw material (wheat), 42.2% of the factories have shortage of electric power supply, 28.4% have constraint of working capital, 24.7% of the factories

have foreign exchange challenge, and 23.7% have water supply constraint. The challenges hinder and limit the functions and expansions of existing and new factories.

Investment in wheat agro-processing is carried out by private limited companies, sole proprietorship, share companies, cooperatives, and partnerships (Figure 10).

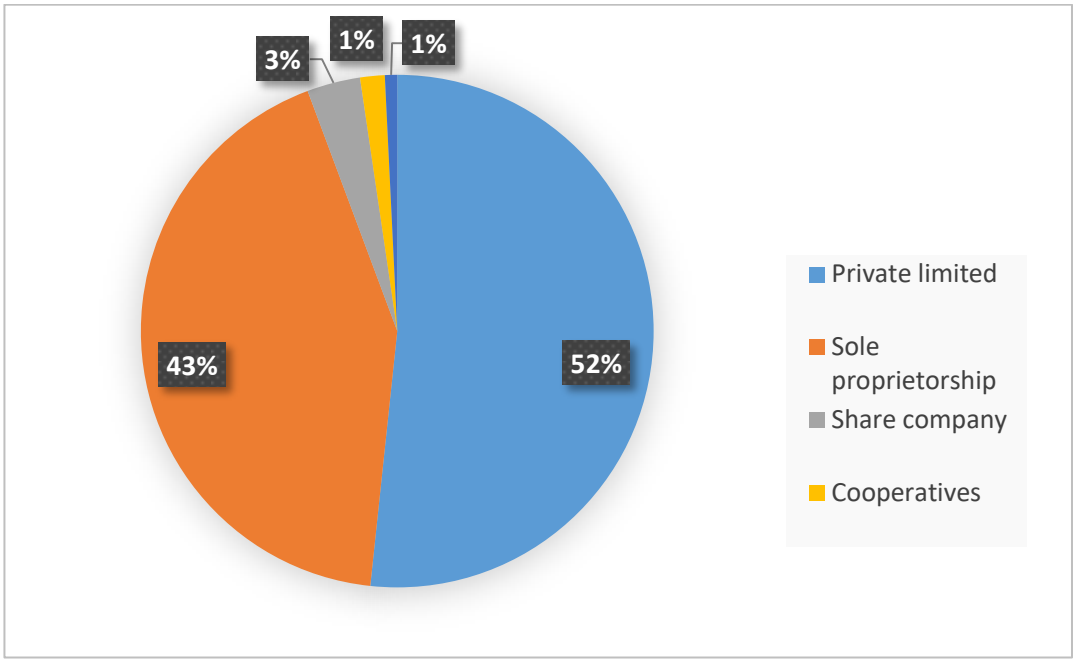


Figure 10 Ownership of wheat processing factories
Source: Compiled from FBIRDC, 2022

Majority of wheat processing factories (52%) are owned by private limited companies, and 43% are owned by sole proprietorship. Small proportion (5%) of factories are owned by Share Company, Cooperatives and Partnership. This shows that 95% of ownership status of wheat processing factories are held by private limited companies and sole proprietorship. These wheat processing factories have investment capital that ranges from 6 million to 43 million birr, and working capital of 5 million to 30 million birr (FBIRDC, 2022). They have also 21,306 permanent workers over 7,200 daily laborers in 2022. There were also a total of 215 expatriates in the wheat processing factories. This shows that wheat processing has great employment opportunities. However, there is a significant difference between factories actual processing capacity and initial installed capacity as well as between annual production plan and actual amount produced. The agro-processing factories are generally observed to have capacity utilization

problems where they function under their full capacity (FBIRDC, 2022).Therefore, wheat agro-industries need to be strengthened and expanded by solving their challenges and constraints that are related to supply of raw material, electric power, working capital, foreign exchange, and adequate water.

# Conclusion

National agricultural production efforts increasingly focus on enhancement of production and productivity to ensure food security, increase export revenues, and substitute imports. Wheat is one of the major food and cash crops with low production and productivity, and increasing consumption demand. The gap between domestic production and consumption demand has been increasing. This gap will be increasing if past wheat production and management practices continue in the future. Bridging production and consumption gap requires enhancement of wheat production and productivity. Enhancing wheat production and productivity needs involvement of all stakeholders including private sector to jointly plan and take coordinate actions along wheat value chain. It is through increased production and productivity that objectives of ensuring wheat food self-sufficiency, reduced wheat prices and generating export revenues can be achieved. However, enhanced production and productivity entails adoption of improved agricultural technologies and favorable agricultural investment policy environment as well as development of infrastructures including irrigation facilities, roads, and energy supply.

Therefore, to ensure domestic wheat food self-sufficiency and generate marketable surplus for export market, there is a need to focus on enhancing wheat yield per unit area or productivity to offset the gap between production and consumption demand. Yield improvement needs proper use of improved technologies (seeds, production & management practices), high inputs utilizations (fertilizers, chemicals, irrigation), mechanized farming, disease & pest control mechanisms, soils & natural resources management, and support mechanisms (finance, and extension services). Encouraging private sector investments in wheat production & agro-processing is crucial to develop wheat sector. This needs development of infrastructure and provision of services that include irrigation, use of machinery for mechanized farming, working capital, and credit services. Improving wheat marketing is also critical to enhance production and productivity. This involves efficient inputs and outputs marketing, and solving constraints along wheat value chain. Establishing conducive policy & legal environments to invest on wheat production, processing, marketing, and export are crucial elements for the development of Ethiopian wheat sector.

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