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An assessment of Ageing Workforce and Gender Disparity: A Critical Analysis of Human Capital Distribution in the Jigawa State Wheat Value Chain, Nigeria

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Abstract This study examines the age and gender composition of the Jigawa State, Nigeria wheat value chain. Data analysis across farmer, assembler, wholesaler, processor, and retailer categories reveals a concerning trend: a dominance of experienced workers (31-43 years old) and a dearth of young adults (18-30 years old). This age gap signifies a potential threat to the value chain's long-term viability and innovative capacity. Furthermore, a stark gender imbalance is identified, with males overwhelmingly represented across most sectors. Processing is the only sector with significant female participation (32.62%), while other stages exhibit complete female absence. This gender disparity highlights potential underutilization of human capital and limitations on overall sector efficiency. The findings underscore the need for multifaceted interventions to address these challenges and cultivate a more inclusive and future-oriented Jigawa State wheat value chain.

Keywords Ageing, Gender, Wheat, value-chain, Jigawa, Nigeria

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Introduction

The Nigerian wheat value chain occupies a strategic position, underpinning both national food security and economic prosperity. As Adeyemi et al. (2017) highlight, the burgeoning consumption of wheat-based products like bread and pasta underscores the sector's critical role in nourishing Nigeria's ever-expanding population. Furthermore, the Federal Ministry of Agriculture and Rural Development (FMARD, 2020) estimates the wheat value chain to be a significant job generator, employing millions across its intricate stages. Despite this undeniable importance, a crucial knowledge gap persists regarding the demographic composition of the Nigerian wheat value chain's workforce. Shedding light on the age and gender distribution of participants within this sector is fundamental for ensuring its long-term viability and fostering inclusivity.

Extant academic literature underscores the significance of workforce demographics in analyzing the resilience and adaptability of agricultural value chains (Ogunwuyi et al., 2020). For instance, Bellemare (2018) emphasizes that age distribution can significantly influence a chain's capacity to embrace innovation and integrate novel technologies. Similarly, the World Bank (2022) reports that gender disparity within agricultural sectors can act as a limiting factor, hindering overall efficiency and productivity. By embarking on this inquiry into the demographic characteristics of the Jigawa State wheat value chain, the present study aims to unveil its potential strengths and weaknesses. Furthermore, this investigation seeks to illuminate opportunities for improvement that can contribute to the development of a more robust, inclusive, and future-oriented agricultural sector in Nigeria.

Methodology

Sampling technique

Three-Stage Sampling methodology was used to construct a representative sample frame encompassing participants within Jigawa State's wheat value chain. This approach ensured the inclusion of diverse stakeholders across various segments, including production, processing, and marketing activities. The first stage leveraged purposive sampling with regional stratification. Four key wheat-producing areas (Auyo, Hadejia, Ringim, and Taura) were strategically chosen based on well-established criteria encompassing significant wheat cultivation volumes, active marketing activities, and the presence of processing facilities.

This targeted approach aimed to concentrate the sample frame on locations with the highest concentration of stakeholders relevant to the wheat value chain, thereby maximizing the sample's representativeness. Stage two involved in-depth discussions with key informants within the chosen regions. These consultations served a dual purpose. Firstly, they facilitated the identification of unregistered participants operating within major wheat markets, ensuring a more comprehensive understanding of the value chain. Secondly, the gathered information was utilized to determine the most appropriate sample size for the study, employing established sample size estimation formulas used and developed by Asfaw (2014) and Yamane (1967).

The final stage employed simple random sampling to select the final 321 participants from the larger pool identified in Stage 2. This random selection process ensured that each individual within the defined wheat-producing areas and market segments had an equal probability of being included in the study. The multi-stage sampling design provides a representative sample of 321 participants for the study as shown in table 1.

Table 1: Wheat Value Chain Participants: Location, Population (P*), and Sample (S)**

Area/Actors	Farmers		Assemblers	Wholesalers	Processors	Retailers	Total
	P*	S**					
Auyo	227	(12)	23 (13)	41 (12)	34 (10)	48 (14)	373 (55)
Hadejia	968	(56)	60 (18)	63 (19)	71 (21)	87 (26)	1199 (137)
Ringim	206	(11)	34 (10)	23 (07)	23 (07)	43 (13)	334 (48)
Taura	728	(40)	53 (16)	21 (06)	31 (09)	34 (10)	867 (81)
Total	2196	(**116**)	170 (**51**)	148 (**44**)	109 (**47**)	212 (**63**)	2773 (**321**)

Source Field Survey, 2017 P*- Population S - Sample**

Analytical techniques

The analytical techniques employed for the study, includes both descriptive and inferential statistics. Descriptive statistics such as mean, mode, frequency distribution and percentages were employed to achieve objectives of the study

Result of analysis

Table 2: Age of Wheat Value Chain Participants in the Study Area

Actor /Ages categories (years)	18 – 30	31 – 43	44 – 56	57 and above
Farmer	2.6	38.8	33.6	25
Assembler	2	41.2	45	11.8
Wholesaler	0	43.2	18.2	38.6
Processor	2.1	36.2	53.2	8.5
Retailer	6.3	49.2	27	17.5
Mean (%)	2.6	41.72	35.4	20.28
Std deviation	2.29	4.94	13.95	12.0
Sig. (2-tailed)	0.064	0.000	0.005	0.019

Source: Field Survey, 2017

The results analysis in table 2, revealed a striking feature is the dearth of young adults (18 - 30 years old) across most sectors, with the exception of retailers (6.3%). This result aligns Ogunwuyi *et al.* (2020) findings that document hurdles faced by young Nigerian farmers, such as restricted access to credit and land. This under representation of younger participants poses a potential threat to the long-term viability and innovative capacity of the value chain.

The result of experienced workforce in processing and distribution was conversely, the 31 - 43 and 44 - 56 age groups hold the majority in processing (assembler, wholesaler, and processor) and wholesale sectors (with means of 41.2% and 43.2%, 45% and 18.2% respectively). This suggests a potentially experienced workforce managing these critical stages. However, it is prudent to consider Yakubu et al. (2021) findings regarding limitations in processing efficiency, particularly among smaller-scale millers. The retailer category exhibits the highest concentration (49.2%) in the oldest age group (57 and above). This could signify a dominance of established retail businesses, potentially hindering new market entrants, particularly younger entrepreneurs.

The data on age distribution of participants reveals a central tendency towards the 31- 43-year-old age group, with an average of 41.72% across all participants.

This age bracket holds significant weight (1% level of significance) within the value chain, potentially indicating a core workforce responsible for substantial value addition during the production process. In contrast, the 18–30-year-old age group constitutes a meager 2.6% of the total workforce. This underrepresentation could be attributed to participants like ongoing education commitments that might restrict full-time engagement in business activities. Interestingly, the retailer category exhibits the highest concentration (49.2%) within the oldest age group (57 and above). This trend might suggest a dominance of established retail businesses, potentially hindering the entry of younger entrepreneurs. Furthermore, the data showcases a complete absence of wholesalers within the 18 - 30-year-old range. This gap aligns with the notion that wholesale activities often require experience and established networks, which younger individuals might lack. It is noteworthy that the majority of participants fall within the economically active age range. This finding aligns with observations from previous wheat value chain studies conducted by Habte et al. (2016), Asfaw (2014), and Urgessa (2011). These studies reported average participant ages of 44.78, 40.71, and 38.48 years respectively, demonstrating a similar trend towards a more experienced workforce within the wheat sector.

Table 3: Gender of Wheat Value Chain participants in the Study

Actor/Sex	Male	Female
Farmer	84	16
Assembler	100	0
Wholesaler	100	0
Processor	64.38	32.62
Retailer	100	0
Mean (%)	89.68	10.32
Std deviation	15.75	15.75
Sig. (2-tailed)	0.000	0.217

Source: Field Survey, 2017

The result on gender showcases a stark predominance of males across most roles, with a mean percentage of 89.68%. Farming, assembling, wholesaling, and retailing exhibit a complete absence of female participation. Processing is the only sector with female representation, albeit at a considerably lower ratio (32.62%) compared to males (64.38%). This gender imbalance supports the report of Adesina and Alagba (2019) that identified challenges faced by women in agriculture, such as limited access to land and resources. These limitations can hinder women's ability to participate in various stages of the agricultural value chain, including wheat production. Furthermore, cultural norms that designate specific agricultural tasks as "men's work" can further restrict female involvement (Ogunlela and Mukhtar, 2009). This lack of female participation across crucial stages of the value chain signifies a potential underutilization of human capital and could limit the overall efficiency and productivity of the sector. The statistically significant value (Sig. = 0.000) for all categories except processors (Sig. = 0.217) underscores the non-random nature of this gender disparity. It suggests a systematic exclusion or lack of opportunities for women to participate in most wheat value chain activities in Jigawa State. This finding aligns with broader observations regarding gender inequality in agriculture. This imbalance is further accentuated by the limited scope of female involvement. Notably, female participation is exclusive to farming (16%) and processing (35.62%) activities. All other stages of the value chain, encompassing assembling, wholesaling, and retailing, exhibit a complete absence of female representation. This trend underscores a concerning lack of diversification in female engagement within the wheat sector (see Table 2). The statistical significance (Sig. = 0.000) reinforces the non-random nature of this gender disparity. This suggests a systematic bias or lack of access to opportunities for women to participate in most wheat value chain activities within the study area. These findings align with observations from prior wheat chain studies conducted by AUCGT (2017), Assefa (2016); Urgessa (2011) and Bangassou, et al. (2020). These studies documented similar trends, with male participants constituting a significantly larger proportion compared to females (AUCGT, 2017; Assefa, 2016; Urgessa, 2011). However, it is noteworthy that Urgessa (2011) presents a contrasting observation within the economically active age group (15 - 55 years old). The reported percentages were closer (54.5% male, 45.5% female), indicating a potential for higher female participation in broader agricultural activities within this age range (Urgessa, 2011). This finding suggests that participants beyond age might be limiting female participation specifically within the wheat value chain.

Table 4: Marital Status of the Value Chain Participants

Actor / Marital status	Single	Married	Divorced	Widowed	Total
Farmer	0.0	20.6	0.5	0.4	21.5
Assembler	0.0	18.0	0.6	0.5	19.1
Wholesaler	0.0	18.7	0.8	1.1	20.6
Processor	0.3	18.4	1.1	0.9	20.7
Retailer	0.3	17.5	0.3	0.4	18.5
Total (%)	0.6	93.2	2.9	3.4	100.0
Std deviation	0.164	01.185	0.305	0.321	
Sig. (2-tailed)	(0.178)	(0.0000)	(0.008)	(0.010)	

Source: field survey, 2017

Analysis reveals a strong association, with over 93% of participants being married (Table 4). Farmers, crucial to the chain, exhibit the highest married representation (20.6%) and overall participation (21.5%). This suggests a potential link between married status and established roles in agriculture. This aligns with study of Ogunwuyi *et al.* (2020) highlighting challenges faced by young adults entering the agricultural sector due to limited resource availability, often concentrated within families. Conversely, retailers, positioned at the chain's end, demonstrate the

lowest overall representation (18.5%). Interestingly, roles like farming, assembling, and wholesaling lack any single participants, hinting at potential entry barriers for unmarried individuals. This absence could be linked to cultural norms or established family structures that grant greater access to resources and land ownership for married individuals.

Table 5 summarizes the distribution of perceived challenges within the wheat value chain, categorized by production, marketing, processing, and consumption segments. Percentages represent the proportion of participants that identified each challenge.

Table 5: Challenges in the Wheat Value Chain (%)

Segment	Challenges	Proportion (%)
Production	Limited access to essential inputs and insufficient industrial demand for wheat grain	25.00
Marketing	Logistical hurdles and weak industrial demand	30.00
Processing	Scarcity of portable modern processing machines	30.00
Consumption	Limited local processing technologies and high wheat/flour prices	15.00

Source: field survey, 2017

The findings reveal that marketing and processing emerged as the two most significant challenges, each accounting for approximately 30% of the perceived constraints. Marketing inefficiencies (30%) stem from logistical hurdles and inconsistent demand from industries (Ali *et al.,* 2017). Scattered production areas and remoteness can significantly complicate the transportation and aggregation of wheat grain, while the lack of robust and consistent demand from industrial buyers limits market opportunities for farmers (Odhiambo, 2009). Processing limitations (30%) are primarily driven by the scarcity of portable modern processing machines. This lack of appropriate technology significantly restricts the potential for value addition within the chain (Ali *et al.,* 2017). The introduction of portable processing machines closer to production areas could potentially reduce post-harvest losses and increase overall processing efficiency. Production constraints (25%) center on limited access to essential inputs, such as high-quality seeds, fertilizers, and farm machinery (Ude *et al.,* 2013). Additionally, the absence of a strong industrial demand for wheat grain discourages farmers and restricts market access (Akasha *et al.,* 2016).

Conclusion

The findings from analysis reveal lack of young adults and female participants. Marketing inefficiencies, limited processing technology, and restricted access to resources hinder production. The findings suggest, age and gender distribution reflect a need for targeted interventions to promote diversity and inclusivity. The efficiency in the sector's sustainability and competitiveness needs crucial attention to address the following recommendations:

i. Promotion of youth involvement programs to attract and support young adults in agriculture, providing access to credit, land, and training to overcome barriers to entry.
ii. Development initiatives to empower women in agriculture, including improving access to resources, training, and challenging cultural norms that limit their participation should be encourage for enhance gender equality
iii. Investment in Processing Technologies to address the scarcity of modern processing machines. Investing in portable technologies closer to production areas to improve efficiency and reduce post-harvest losses
iv. Strengthen Marketing Strategies to overcome logistical hurdles and weak demand by enhancing market linkages, improving transportation infrastructure, and fostering partnerships with industries to create consistent market opportunities for farmers. Improve infrastructure for smoother transportation and aggregation of wheat. Facilitate connections between farmers and reliable industrial buyers to create consistent demand.
v. Insufficient access to essential inputs and fluctuating industrial demand for wheat grain constrain production in the value chain. A two-pronged approach can be implemented to mitigate these challenges. Firstly, targeted subsidies or microloans can enhance farmers' access to high-quality seeds, fertilizers, and

farm machinery. Secondly, educational initiatives can equip farmers with knowledge regarding specific industrial demand for wheat grain. This knowledge empowerment can enable them to optimize planting decisions and cultivate stronger linkages with reliable buyers.

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