

**COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH,
GHANA**

FOOD RESEARCH INSTITUTE

**REPORT ON PRE-TESTING OF QUESTIONNAIRES
FOR MILLET VALUE CHAIN IN GHANA**

Food Research Institute, Ghana
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Members:

- Dr. Charlotte Oduro-Yeboah
- Hannah Oduro
- Samuel K.K. Amponsah

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INTRODUCTION

1.1 Background to study

Respondents commonly misinterpret questions, a feature consistently recognized by many researchers as a frequent difficulty with questionnaire design (Hilton, 2015). Thus, questionnaire instruments are often subjected to pre-testing to ensure that the intended information are obtained. Pretesting is a known procedure mostly employed in checking that questions outlined in questionnaires are understood by the targeted individuals, reduce sampling error and increase questionnaire response rates (Drennan, 2003; de Leeuw, 2001). In this study, pre-testing was used in assessing issues relating to millet value chain in Ghana.

In Ghana, millet is known to be one of the oldest cereal crop for domestic use is mostly cultivated in northern region (particularly, Northern, Upper East and Upper West of Ghana (covering 29% total land area), (SRID-MoFAD, 2011). Darfur and Rosentrater (2016) mentioned that the main priority in producing millet is consumption and less important as a cash crop. Millets contain 60-70% carbohydrates, 7-11% proteins, 1.5-5% fat, and 2-7% crude fibre and are also rich in vitamins and minerals (Singh *et al.*, 2012). Millet is an alkaline forming grain that is gluten-free, therefore an excellent option for people suffering from celiac diseases and gluten-sensitive patients often irritated by the gluten content of wheat and other more common cereal grains (Saleh *et al.*, 2013; Moreno *et al.*, 2014).

1.2 Objectives

The main aim of this pre-testing study was to assess the suitability of the questionnaires in eliciting information from key stakeholders within the millet value addition chain.

METHODOLOGY

2.2 Study area

The study centered on some selected communities in Upper East and Greater Accra regions of Ghana. Selection of study sites was based on some three stage sampling criteria including, geographical location, level of millet farming activities as well as processing activities – both village level processed and SMEs. This form of sampling criteria allows for the attainment of all information needed to achieve the purpose of this study.

2.3 Data collection

Data collection was done through the use of semi structured interview guides designed for the various stakeholders identified in the millet value chain. These stakeholders were farmers, traders, village level processors, SMEs and consumers. Village level processors are actors in the chain who transform millet with or without other food crops into traditional products such as Brukina, Fura, Pito, Koko and Tuo zaafi (TZ). To ensure that all needed information was captured, interview sessions were transcribed onto an audio recorder with the consent of the respondents. In all, 110 questionnaires comprising of 20 each for farmers, traders, village level processors, SMEs and 30 for consumers were administered.

2.4 Data analyses

Responses obtained from the various interviewees were coded and fed into SPSS version 23 prior to analysis. Minitab version 17 and Microsoft Excel statistical Tool Pac were used to generate charts and tables. Parametric test, particularly Two Sample T-test was then applied in testing for significance difference at an confidence level of 0.05.

RESULTS

3.1 Demographic characteristics

The demographic characteristics of the respondents within the various units of millet value chain are outlined in Table 1.

In terms of gender, females dominated the as traders, village level processors, consumers and SMEs. This could be due to the fact that women are mostly in charge of post treatment of millet. However, men dominated the pre-harvesting of millet production which could be due the energy needed to cultivated millet. Thus, indicating that millet production in Ghana is gender – based.

The dominant age group for farmers as respondents was 40-50 years whereas respondents within the traders, village level processors and consumers were mostly within below 40 years. However, for the SMEs category, early percentage which represented the majority were in both ae groups, namely below 40 years and 40-50 years.

More than half or the respondents across the various stakeholders within the millet value chain with the exception of respondents within the ‘farmers category’ are with formal education. For traders and village processors category, majority of the respondent truncated their education at the JSS level whereas tertiary education was the limit of most respondents for the SMEs and consumers category.

Respondents with married marital status dominated the following categories, farmers, traders and village level processors. For consumers category, most of the respondents were singles which could be attributed to the sampling area.

Regarding nationality, all the respondents were Ghanaian with a few being foreigners, particularly Nigerian.

Table 1: Demographic characteristics of respondents representing the various stakeholders in millet supply chain

Categories	% Response				
	Farmers	Traders	Village level processors	SMEs	Consumers
Sex					
Male	74	0	0	44	46.7
Female	26	100	100	56	53.3
Age					
Below 40	15	42.1	73.7	44.4	86.7
40 - 50	50	36.8	15.8	44.4	3.3
50 - 60	10	21.1	5.3	11.1	6.7
Above 60	25		5.3		3.3
Education					
Yes	5	52.6	63.2	88.9	100
No	95	47.4	36.8	11.1	0
Level of Education					
None					
Primary		30	16.7		
JHS		60	58.3	12.5	6.7
SHS		10	16.7		6.7
SSCE			8.3		
Tertiary				87.5	86.7
Others					
Marital Status				NA	
Single		12	42.1		80
Married	85	74	47.4		20
Widowed	15		5.3		
Divorced		18	5.3		
Nationality					
Yes	100	100	94.7	100	100
No	0	0	5.3	0	0

3.2 Farmers

More than half of the farmers interviewed (70%) work on farm size between 1 – 3 ha (Fig. 1) with 25-50% of it cultivated for millet by most of them (50%) (Fig 2).

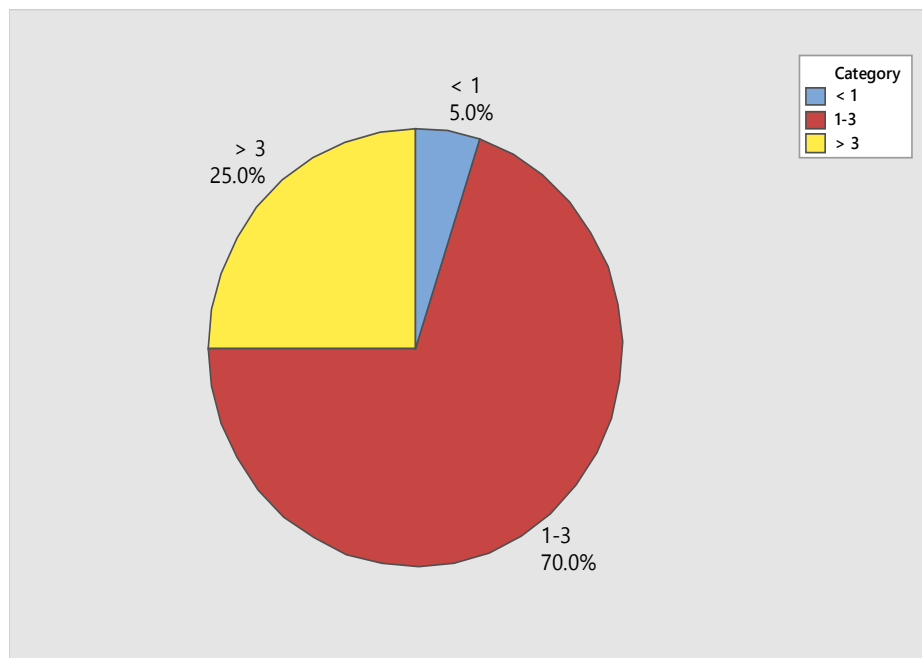


Figure 1: Farmland size cultivated by farmers interviewed

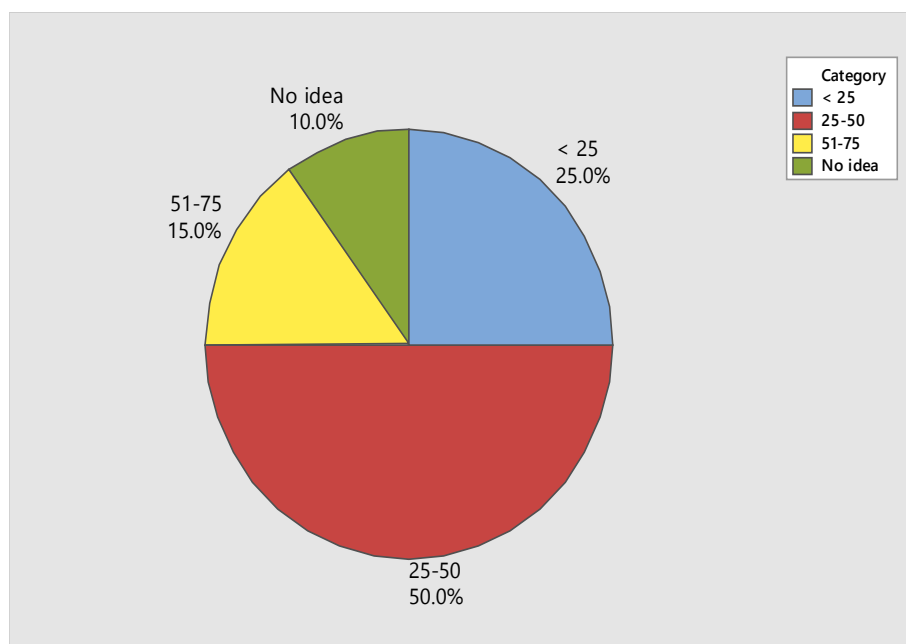


Figure 2: Percentage of farmland devoted to millet cultivation

In terms of labour, most of the respondent (75%) engage both hired and communal labour (Fig. 3) with community members as the source of labour (80% of respondents).

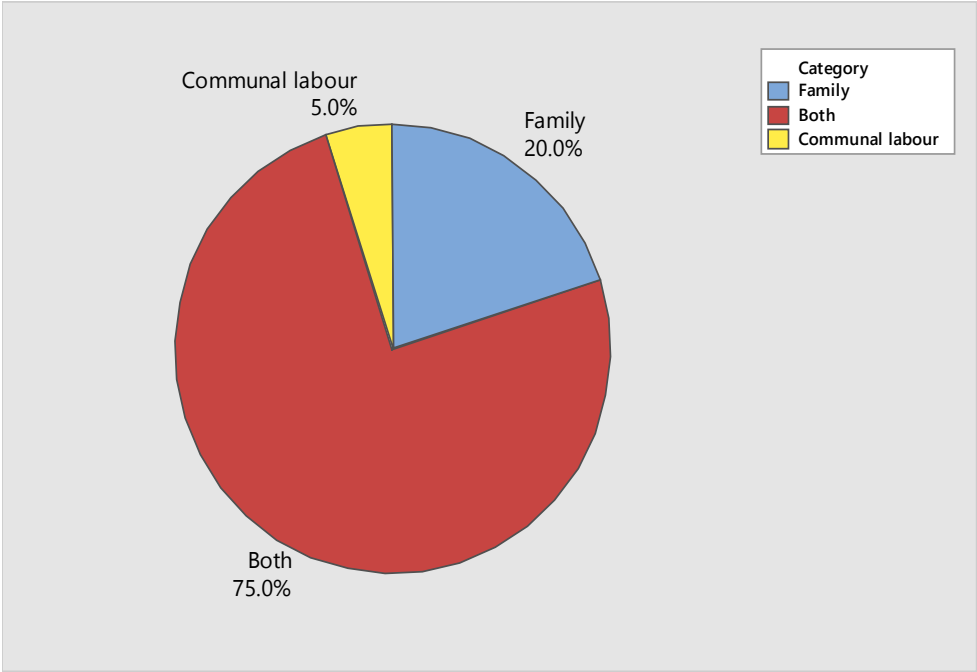


Figure 3: Forms of labour for farm works

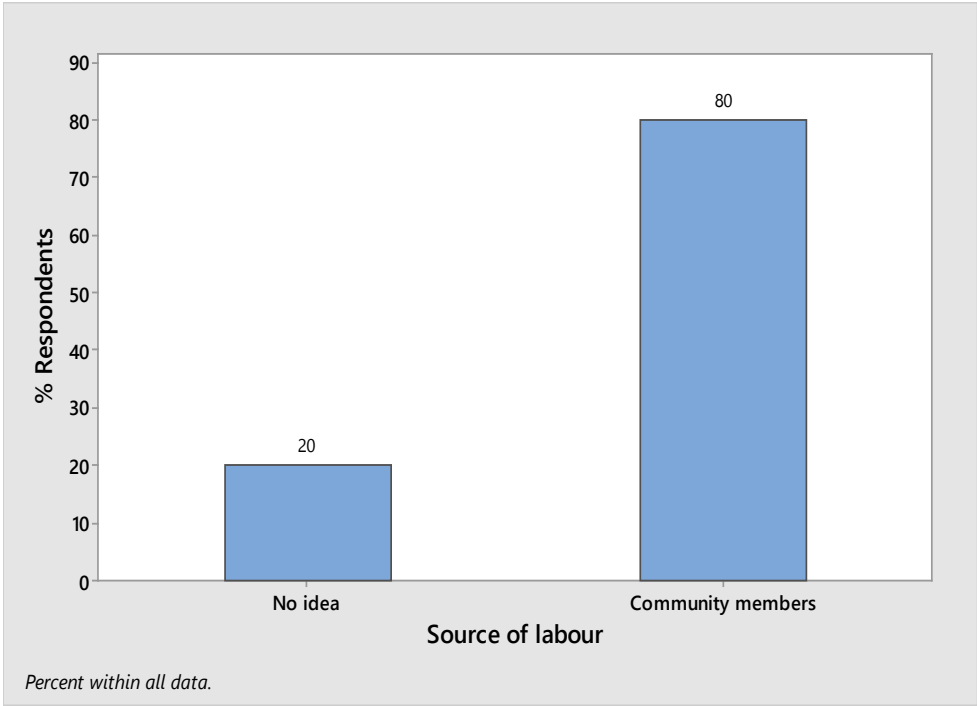


Figure 4: Source of labour for farm works

Averagely, 44% of the labour used are female with 55% as male labour from family and hired source was 63% and 40% respectively (Table 1).

Table 2: Yield of millet harvested by farmers

Variables	Family labour	Hired labour	Female labour	Male labour
Mean	63.3	40.3	44.7	55.3
Standard Error	5.6	4.5	2.9	2.9
Count	20.0	16.0	19.0	19.0
Minimum	10.0	10.0	30.0	30.0
Maximum	100.0	70.0	70.0	70.0

Table 3: Percentage of labour source employed by farmers

Variables	Yield per hectare (State)	Yield per hectare (farm)
Mean	855.0	653.5
Standard Error	32.0	26.8
Count	20.0	20.0
Minimum	600.0	450.0
Maximum	1100.0	900.0

The average consumption of crops by farmers interviewed ranged from 30% (leafy vegetables) to 87% (sorghum) (Table 3). However, the most consumed crops were sorghum (87%), millet (86%), maize (77%) and soybean (70%).

Table 4: Consumption (%) of crops harvested by farmers

Crop	Millet	Maize	Sorghum	Leafy	Cowpea	Onion	rice	Soybean
Mean	85.56	76.67	86.67	30.00	67.50	40.00	45.71	70.00
SE	5.19	7.14	7.15	-	19.74	-	6.85	19.15
Count	18.00	18.00	15.00	1.00	4.00	1.00	7.00	4.00
Minimum	40.00	20.00	30.00	30.00	20.00	40.00	20.00	20.00
Maximum	100.00	100.00	100.00	30.00	100.00	40.00	60.00	100.00

The average quantity of crops by farmers interviewed on annual basis ranged from 150 kg (onions) to 568 kg (maize) (Table 4). Most dominant crops harvested per year were maize (568 kg), millet (410 kg) and leafy vegetables (200 kg).

Table 5: Quantity / kg of crops harvested by farmer per year

Crop	Millet	Maize	Sorghum	Leafy	Cowpea	Onion	Rice	Soybean
Mean	410.0	567.5	153.3	200.0	160.0	150.0	178.6	174.0
Standard Error	56.4	56.7	24.6	-	29.5	-	42.1	37.8
Count	20.0	20.0	15.0	1.0	5.0	1.0	7.0	5.0
Minimum	70.0	100.0	50.0	200.0	100.0	150.0	50.0	70.0
Maximum	1000.0	1000.0	400.0	200.0	250.0	150.0	400.0	300.0

The average price of crops harvested by farmers interviewed on annual basis ranged from 100 Ghana cedis (onions) to 228 Ghana cedis (Cowpea) (Table 5). Highest price was observed for the following crops Cowpea (228.8 Ghana cedis), Rice (137.2 Ghana cedis) and Millet (129.7 Ghana cedis).

Table 6: Price (Gh) of crops harvested by farmer per year

Crop	Millet	Maize	Sorghum	Cowpea	Onion	Rice	Soybean
Mean	129.7	106.6	121.1	228.8	100.0	137.2	130.0
SE	3.1	2.8	3.7	7.2	-	34.3	20.0
Count	20.0	20.0	14.0	4.0	1.0	6.0	3.0
Minimum	105.0	90.0	100.0	210.0	100.0	90.0	90.0
Maximum	150.0	120.0	135.0	240.0	100.0	305.0	150.0

Buyers for these crops were people who patronizes respective markets. Further, markets and homes were mentioned as the main selling locations for the investigated crops with markets serving as the main selling location (Fig. 5). Two main types of millet were identified by the farmers. These were late millet, early millet and sorghum¹ (Fig. 6).

¹ Is sorghum a millet?

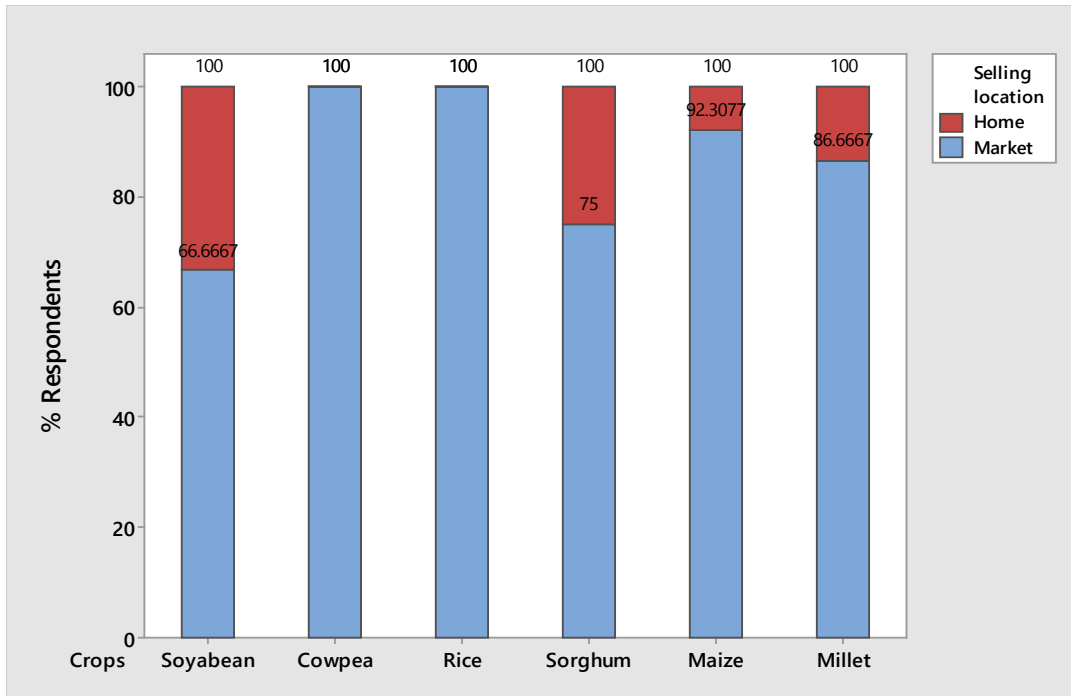


Figure 5: Selling points for the various crops harvested by farmers

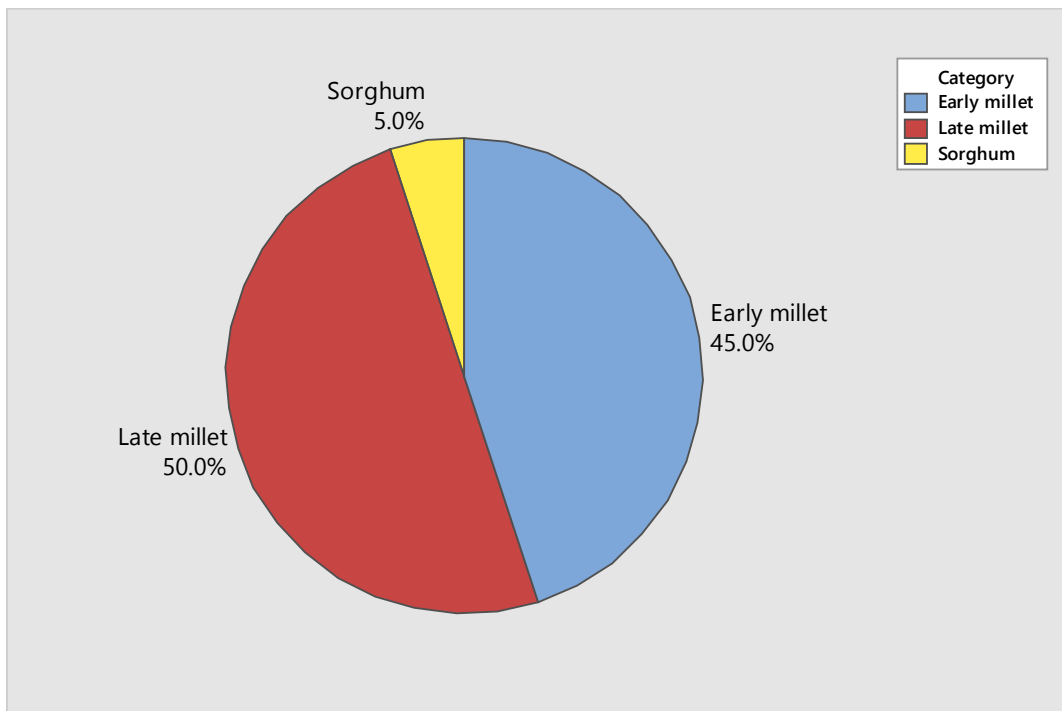


Figure 6: Types of millets cultivated by farmers

Average quantity for this year and last years ranged from 285 kg (early millet) to 326 kg (Late millet and 361 kg (early millet) to 424.5 kg (late millet) (Tables 6 & 7). Mann – Whitney test did not show any significant difference between the quantity for both years under investigation.

Table 7: Quantity of different types of millet for this year

Crops	Early millet	Late millet	Sorghum
Mean	285.00	326.30	300.00
Standard Error	59.10	42.60	100.00
Count	18.00	20.00	2.00
Minimum	50.00	100.00	200.00
Maximum	1000.00	800.00	400.00

Table 8: Quantity of different types of millet for last year

Crops	Early millet	Late millet	Sorghum
Mean	361.10	424.50	375.00
Standard Error	67.70	65.40	125.00
Count	18.00	20.00	2.00
Minimum	100.00	100.00	250.00
Maximum	1200.00	1200.00	500.00

Average price of millet types for this year and late years ranged from 104.3 Ghana cedis (early millet) to 126.75 Ghana cedis (Late millet) and 108.7 Ghana cedis (early millet) to 116.94 Ghana cedis (late millet) (Table 8 & 9) Mann – Whitney test did not show any significant difference between the price of millet types for both years under investigation ($p = 0.05$).

Table 9: Price of different types of millet for this year

Crops	Early millet	Late millet	Sorghum
Mean	104.28	126.75	120.00
Standard Error	2.53	2.77	-
Count	18.00	20.00	2.00
Minimum	90.00	105.00	120.00
Maximum	130.00	150.00	120.00

Table 10: Price of different types of millet for last year

Crops	Early millet	Late millet	Sorghum
Mean	108.67	116.94	127.50
Standard Error	6.96	2.78	7.50
Count	15.00	18.00	2.00
Minimum	90.00	90.00	120.00
Maximum	150.00	135.00	135.00

The main mode sale for millet crops were at the local market and supply to millet processors in the communities around. Estimated mean selling price for millet at home and local market was 116 and 120 Ghana cedis respectively (Table 10). Additionally, the minimum and maximum selling price at both selling locations are provided in Table 10.

Table 11: Price for adopted mode of sale/ Gh cedis

Mode of sale	Local market	Supply millet processor in the community
Mean	116.11	120
Standard Error	3.42	8.20
Count	18	5
Minimum	90	105
Maximum	150	150

The average cost of labour and total cost of production (mile per ha) within the area under investigation were 11.13 Ghana cedis and 287.29 Ghana cedis (Table 11).

Table 12: Cost of labour as reported by farmers

Variable	Average cost of labour (Gh cedis)	Total cost of production of mile / ha
Mean	11.13	287.29
SE	4.69	46.84
N	20	17
Minimum	3	0
Maximum	100	700

The estimated mean cost of transportation to local market and millet processor was 5.85 and 5.45 Ghana cedis, covering an average distance of 4.78 km and 0.1 km respectively (Tables 12 & 13).

Table 13: Cost of transporting millet to Local market by farmers

Variable	Cost of transportation to major selling points	Average. km to major selling points
Mean	5.85	4.78
SE	0.80	0.71
N	20	20
Minimum	0	0
Maximum	15	10

Table 14: Cost of transporting millet to millet processors by farmers

Variable	Cost of transportation	Average. km
Mean	5.45	0.10
SE	5.24	0.07
N	20	20
Minimum	0	0
Maximum	105	1

All the farmers interviewed do not keep records of their millet farming business as well don not engage the services of credits institutions. Constraints facing farmers in millet cultivation are outlined in Fig. 7, with inadequate inputs (26%), diseases and pests (21%) and climate change (18.1%) serving as dominant constraints hindering millet cultivation.

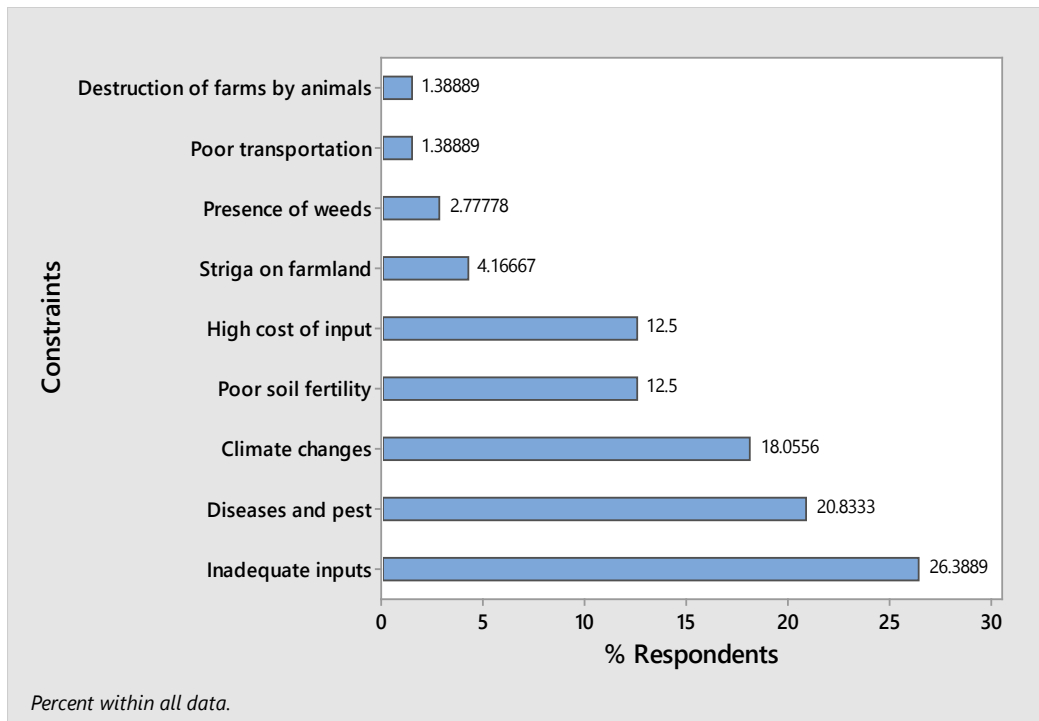


Figure 7: Constraints facing farmers in the production of millet

Nonetheless, most of the farmers interviewed (95%) process millet into other traditional millet related foods, mostly for home consumption (Fig.8).

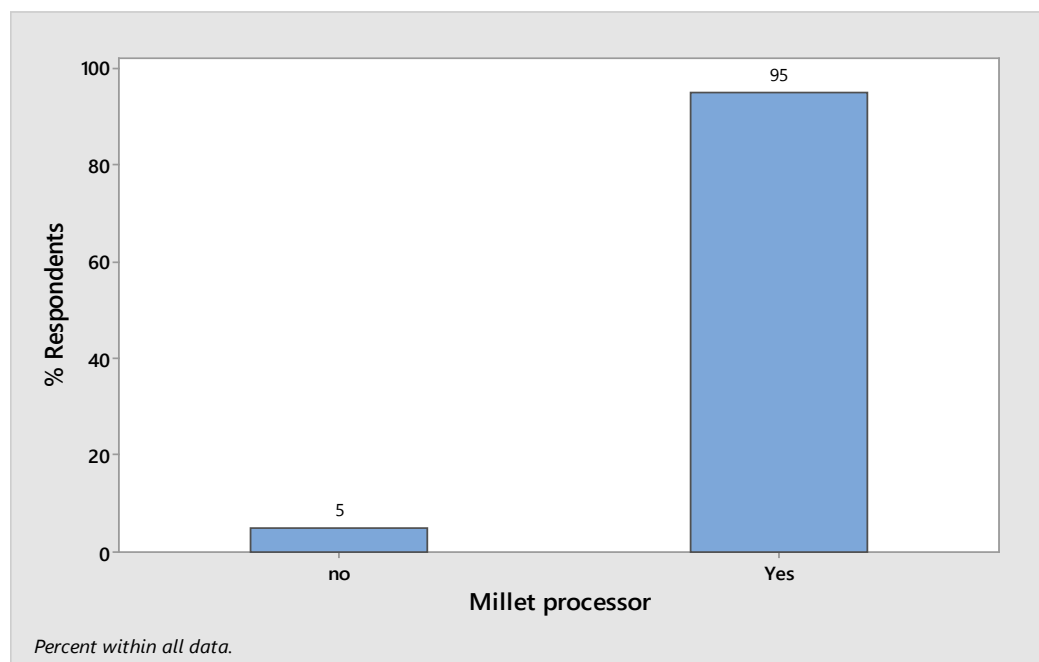


Figure 8: Processing of millet into millet related products by farmers

3.3 Traders

Majority (15.8%) began their business in millet trading from 1998 (Fig. 9) with most (57.9%) as the sole owner or as self-owners (Fig. 10).

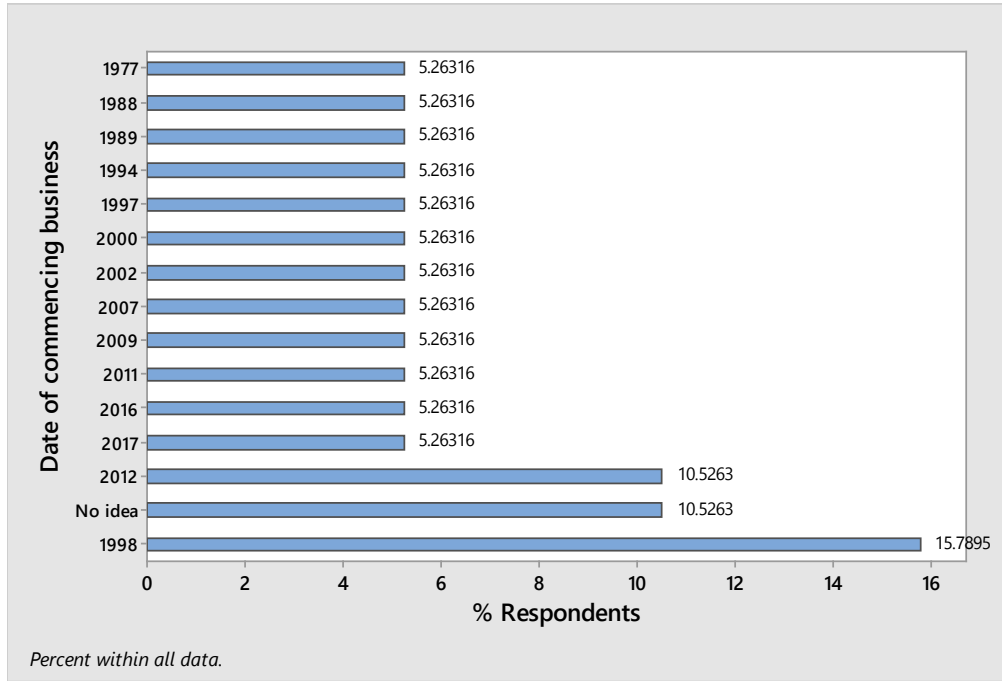


Figure 9: Date of establishing the millet trading business

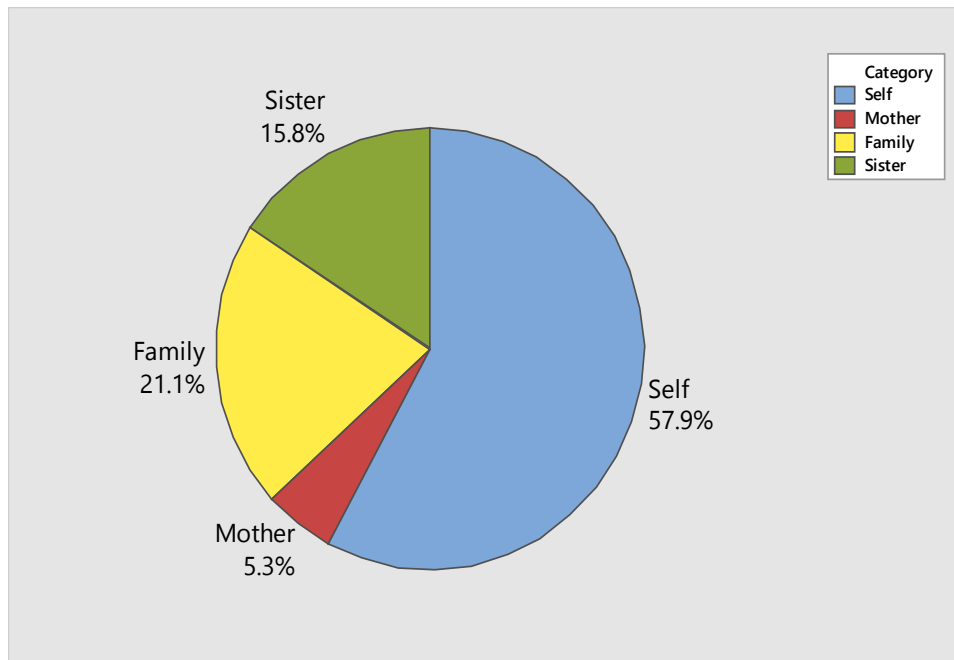


Figure 10: Ownership form of millet trading business

However, 21.1% and 5.3 % are in partnership and commission form of ownership respectively (Fig. 11). Majority of the respondents were introduced into the millet trading business by the mothers (36.8%) in Fig. 12.

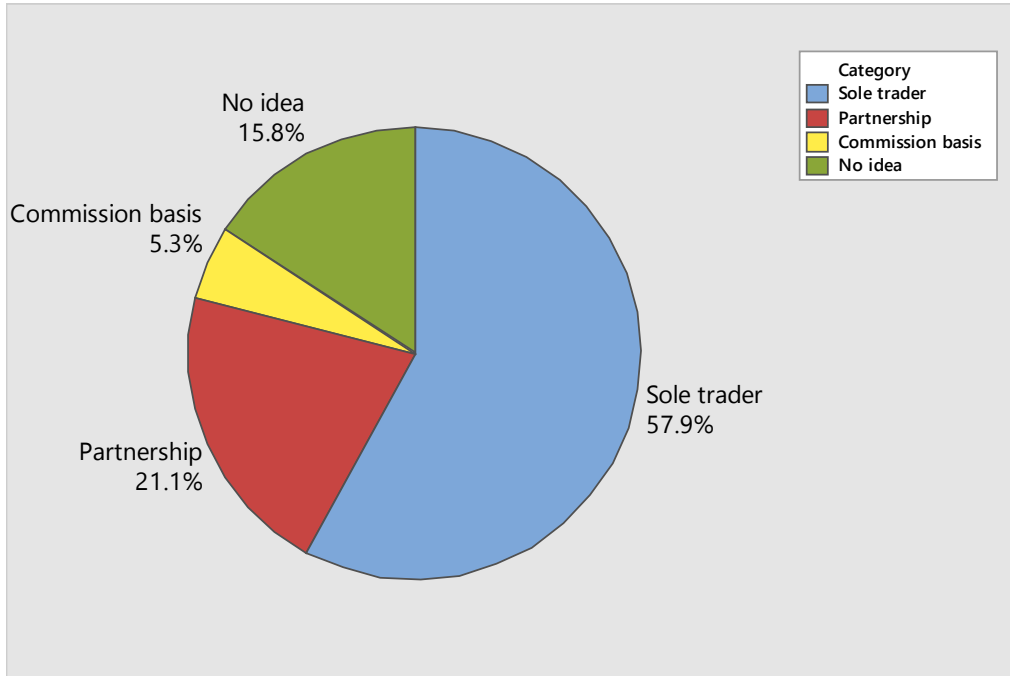


Figure 11: Ownership structure of millet trading business

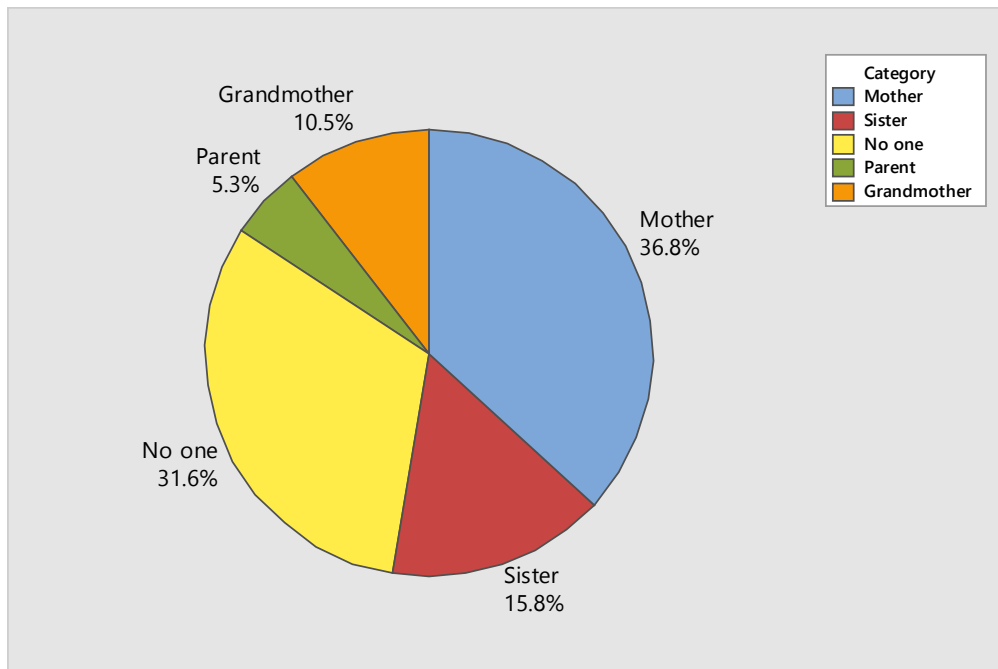


Figure 12: Agents of induction into millet trading business

Also, more than half of the respondents (78.9%) are willing to expand (Fig. 13). The main units of measure used by traders in millet business are olonka (54.3%) and bags (45.7%) (Fig. 14).

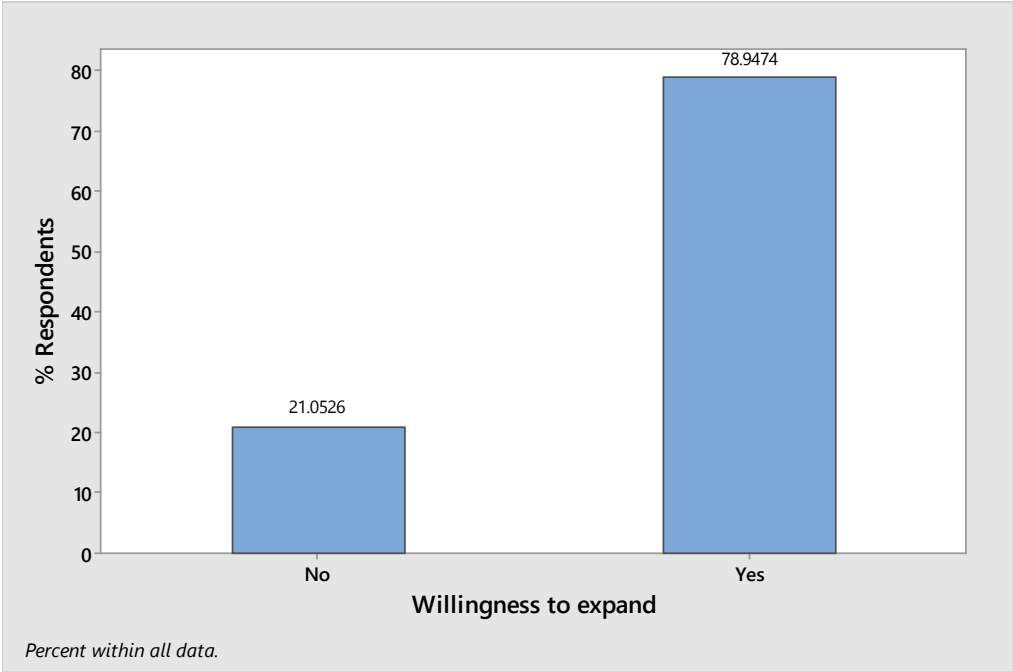


Figure 13: Willingness to expand trade in millet business

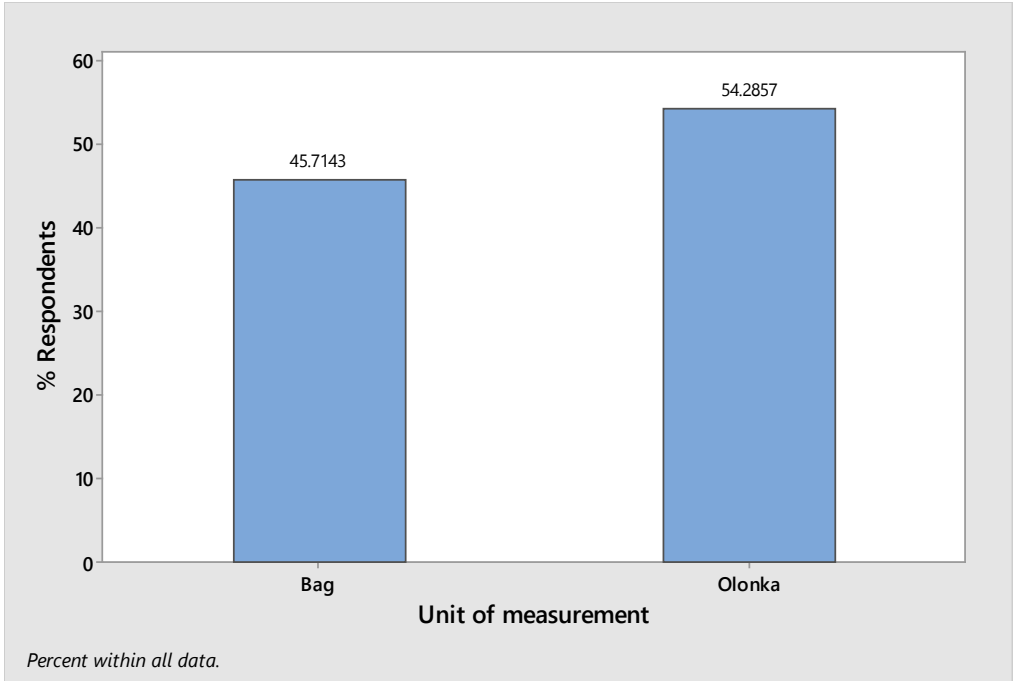


Figure 14: Main units of measure for millet used by traders

The average price of one olonka and bag of millet estimated as 5.8 and 226 Ghana cedis respectively (Table 14).

Table 15: Current price of the various unit of measurement used in trading millet

Unit of measurement	Tons	Olonka
Mean	226.00	5.75
Standard Error	32.50	0.09
N	13.00	16.00
Minimum	34.00	5.00
Maximum	550.00	6.00

Table 16: Transportation cost for various unit of measure for millet

Quantity	N	Minimum	Maximum	Mean	Std. Deviation
50kg	13	10	500	69.85	135.27
100kg	2	5	20	12.50	10.61
Motor King	2	5	5	5	0
Kia truck	3	20	30	25	5
Trailer	0	0	0	0	0

Collectively 68.8% of the respondents obtain their commodity from markets with the northern part of Ghana including Bawku, Paga and others, with a few buying their produce from Nima market (Fig. 15).

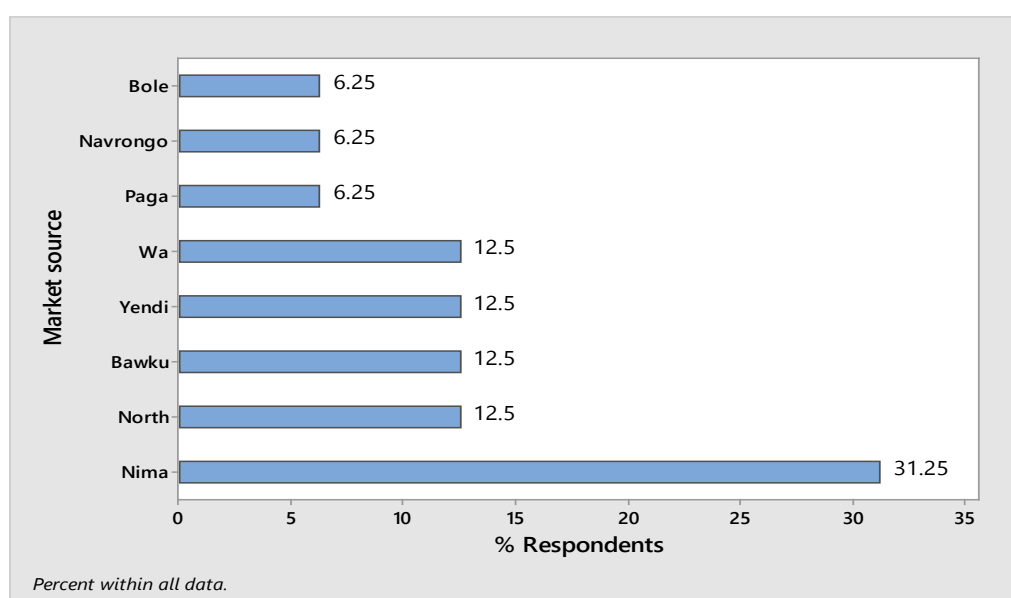


Figure 15: Various markets for sourcing millet by traders

The month of scarcity was found to be February, July and March (Fig. 16) whereas the months abundance for millet was reported to be March and April (Fig. 17).

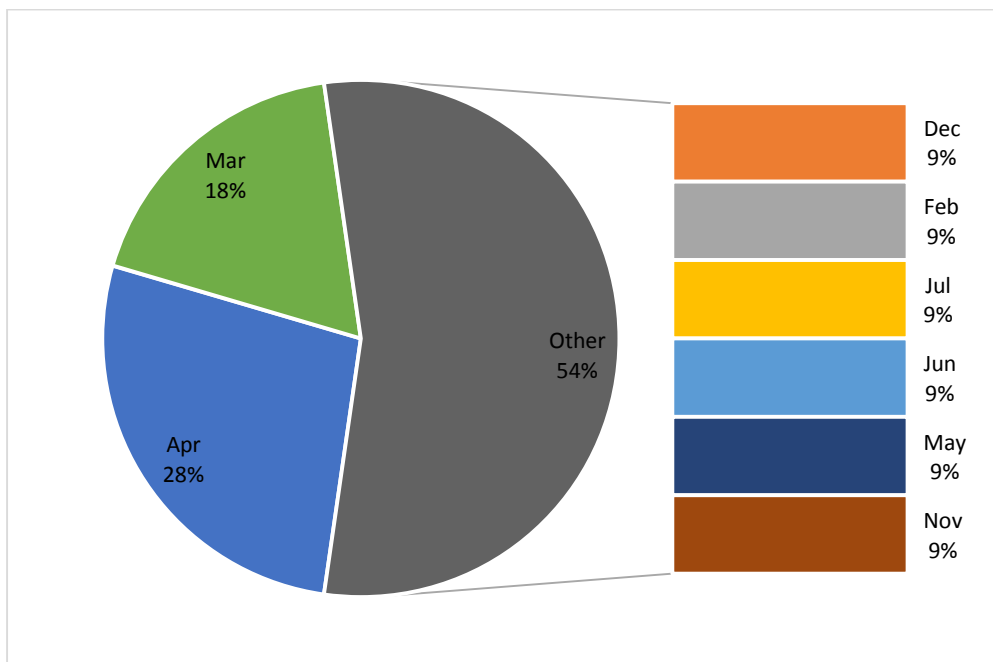


Figure 16: Period of abundance for millet as reported by traders

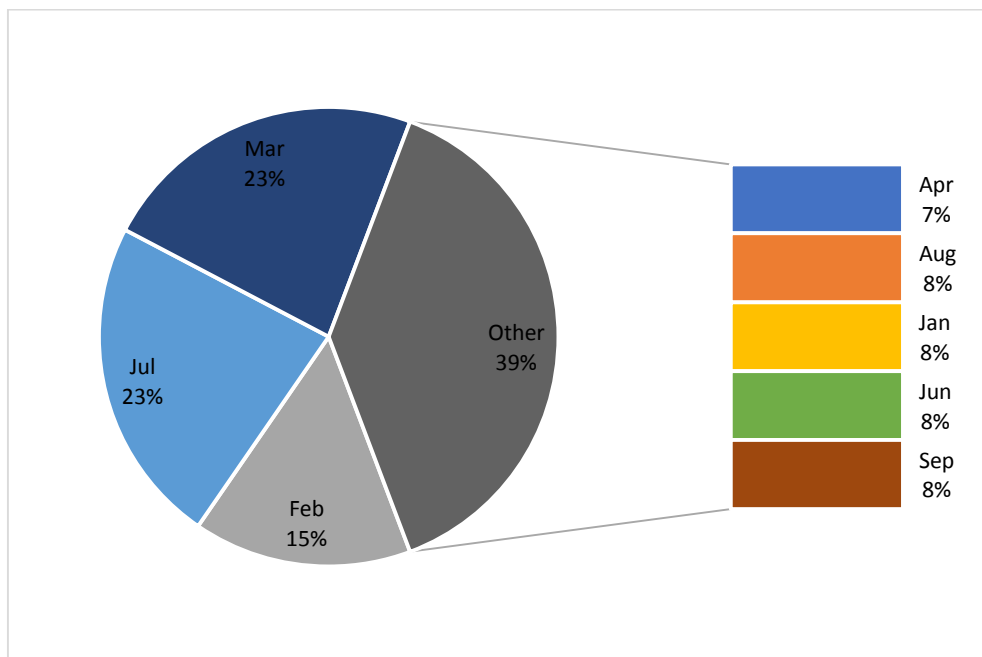


Figure 17: Period of scarcity for millet as reported by traders

The average price of a bag millet during the scarcity and abundant period was computed as 249.28 and 187.33 Ghana cedis respectively (Table 16) while for olonka unit of measure prices were found be 6.3 and 4.5 Ghana cedis for periods of scarcity and abundance (Table 17).

Table 17: Seasonal price (Gh) of millet per ton

Season	Abundance	Scarcity
Mean	187.33	249.23
Standard Error	10.67	13.60
Minimum	100.00	145.00
Maximum	250.00	325.00
Number	15.00	14.00

Table 18: Seasonal price (Gh) of millet per unit of olonka

Season	Scarcity	Abundance
Mean	6.33	4.50
Standard Error	0.31	0.00
N	6.00	5.00
Minimum	5.50	4.50
Maximum	7.00	4.50

The mean price range for a bag of millet throughout the year was 150 in October and December to 260 Ghana cedis in February, March and April (Table 18).

Table 19: Price per ton of millet sold during the year by traders

Month	N	Minimum	Maximum	Mean	Std. Deviation
January	2	200	300	250	70.71067812
February	2	220	300	260	56.56854249
March	2	220	300	260	56.56854249
April	2	220	300	260	56.56854249
May	1	220	220	220	
June	2	220	250	235	21.21320344
July	1	220	220	220	
August	2	230	250	240	14.14213562
September	1	220	220	220	
October	1	150	150	150	
November	1	220	220	220	
December	1	150	150	150	

Additionally, the average quantity of millet sold by traders annually ranged from 20.9 in January to 150 bags in December (Table 19).

Table 20: Quantity of millet sold per month by traders

Month	N	Minimum	Maximum	Mean	Std. Deviation
January	5	0.5	100	20.9	44.23149331
February	2	3	60	31.5	40.30508653
March	2	3.5	50	26.75	32.88046533
April	2	2	40	21	26.87005769
May	1	50	50	50	
June	2	5	60	32.5	38.89087297
July	2	5	40	22.5	24.74873734
August	1	30	30	30	
September	1	40	40	40	
October	1	60	60	60	
November	1	100	100	100	
December	1	150	150	150	

Majority of the respondents indicating that processors (85.7%) and household members (14.3%) were the main buyers (Fig. 18).

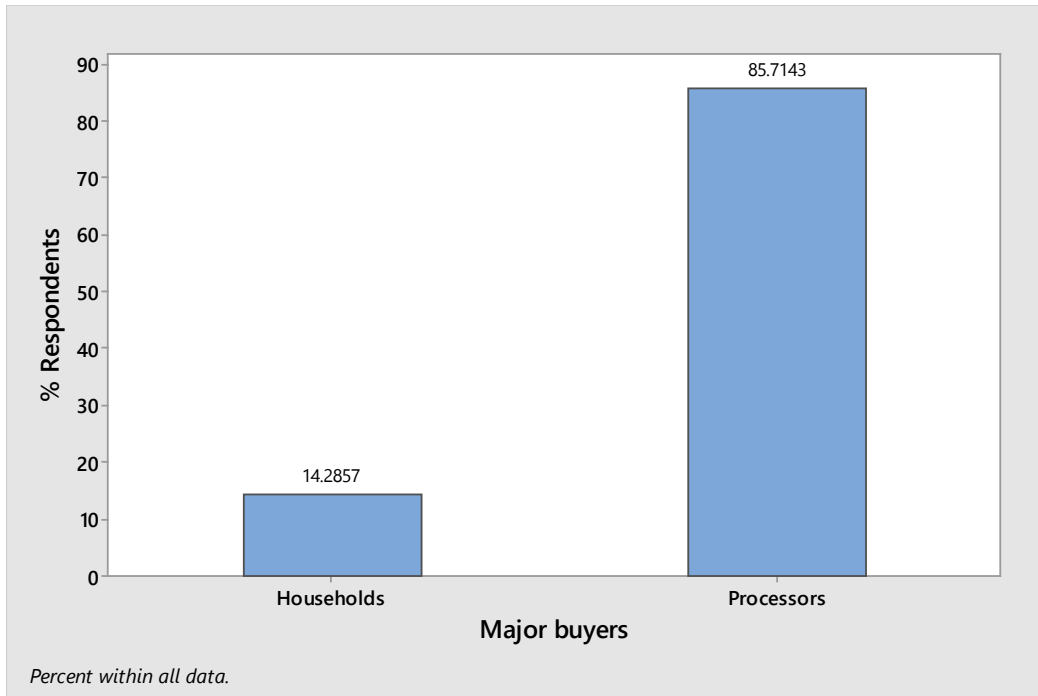


Figure 18: Major buyer of millet from traders during the year

Additional purchasing organizations are outlined in Fig. (19), from which roadside food vendors and households were found to be the dominant purchasing organizations (21.2%).

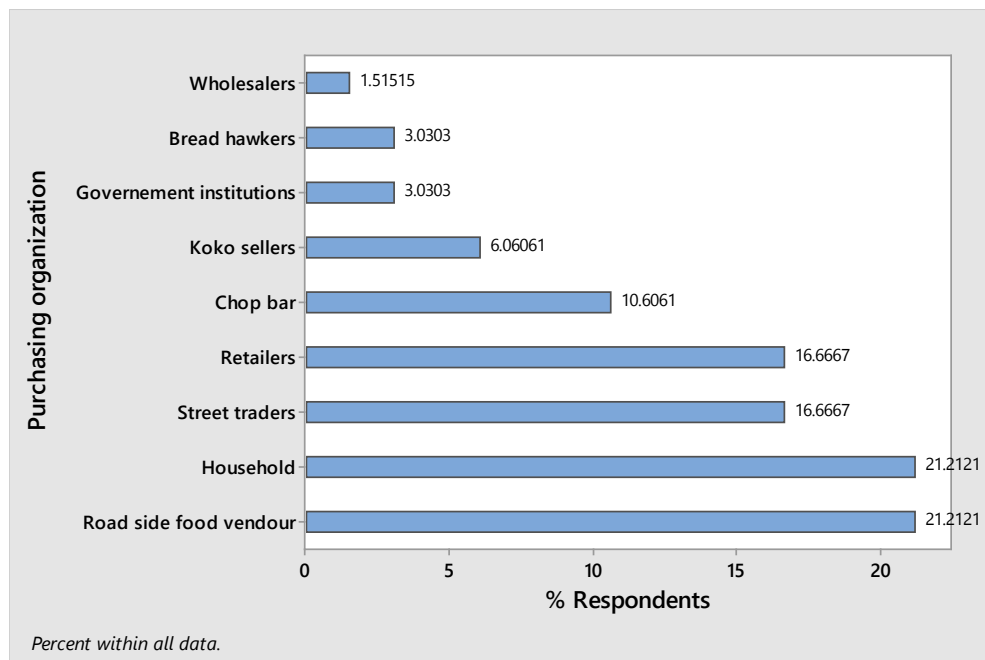


Figure 19: organizations that purchase millet from traders

Regarding improvement, respondents indicated key areas including availability, transportation, quality and price tag, out of which majority (47.1%) mentioned that the price tag of purchasing millet per bag must be reduced (Fig. 20).

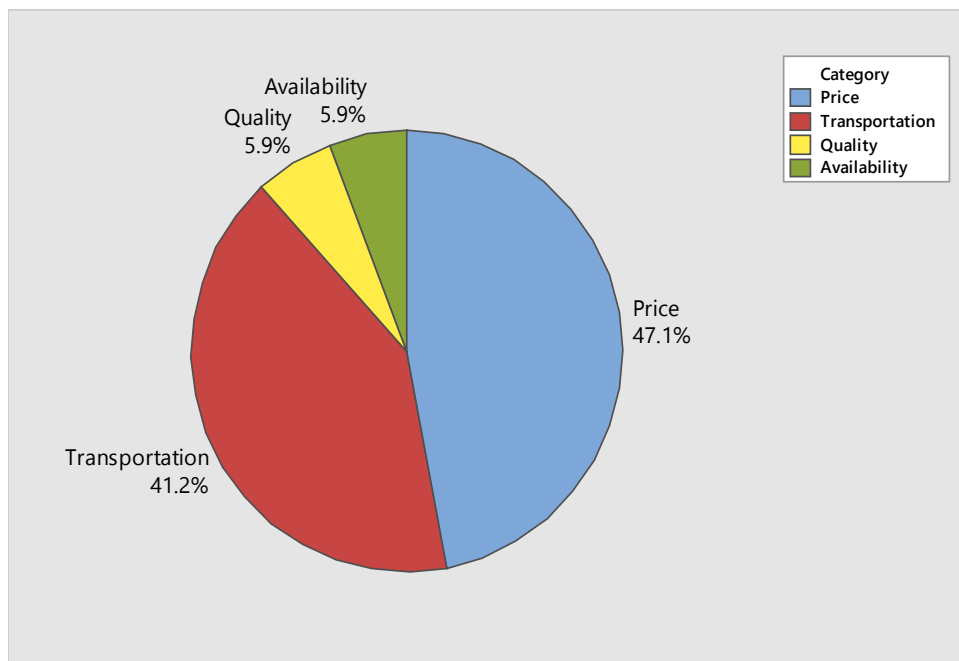


Figure 20: Areas in the millet and supply chain that needs attention as reported by traders

In view of that, 31.6 % of the respondents preferred a moderate price tag of 100 Ghana cedis per bag (Fig. 21).

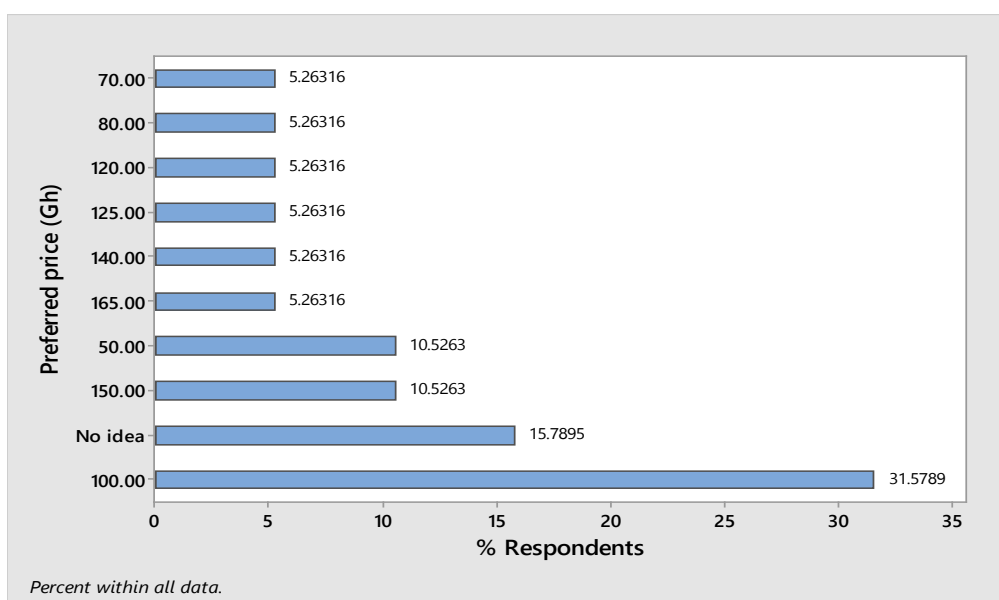


Figure 21: Preferred price of bag of millet by respondents

In terms of financial assistance, majority of the respondents (89.5%) do not engage the activities of credit facilities (Fig. 22).

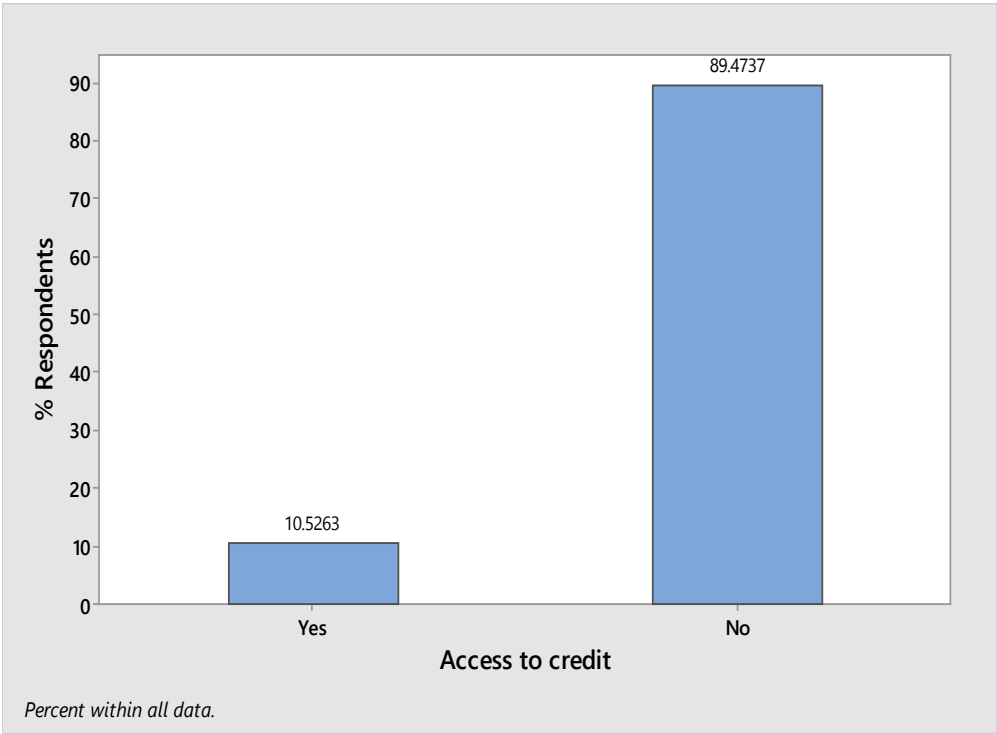


Figure 22: Credit accessibility by respondents

However, with a few of the respondents having access to credit facilities, Sinapi Aba was found to be credit company with an interest rate of 32%, shop as a collateral and being the owner as eligibility criteria.

3.4 Village Level Processors

Majority of the respondents (15.8%) established their millet business in 2016 (Fig. 23). However, none of the respondents mentioned allegiance to any associations.

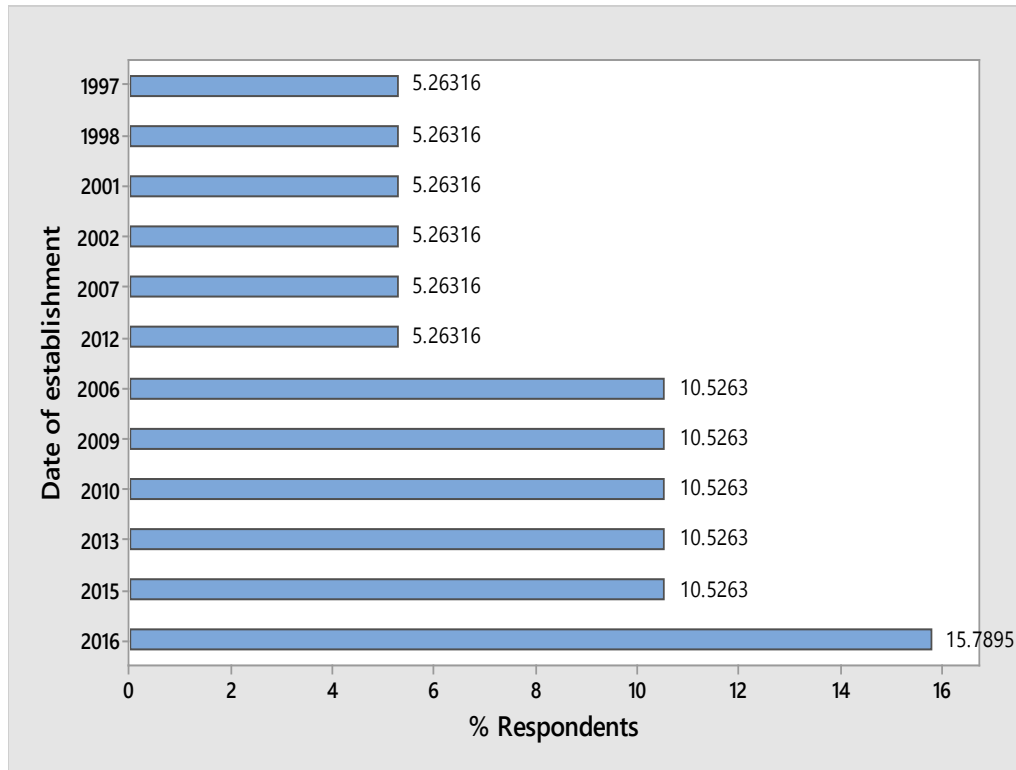


Figure 23: Date of establishment for millet based business

Most of the respondents (78.9%) engaged in sole trading business type (Fig. 24), thus having 100% holdings in the business (Fig. 25). However, respondents engaged in partnership form of business mostly practice 10-50% and 50-99% share holdings (Fig. 25).

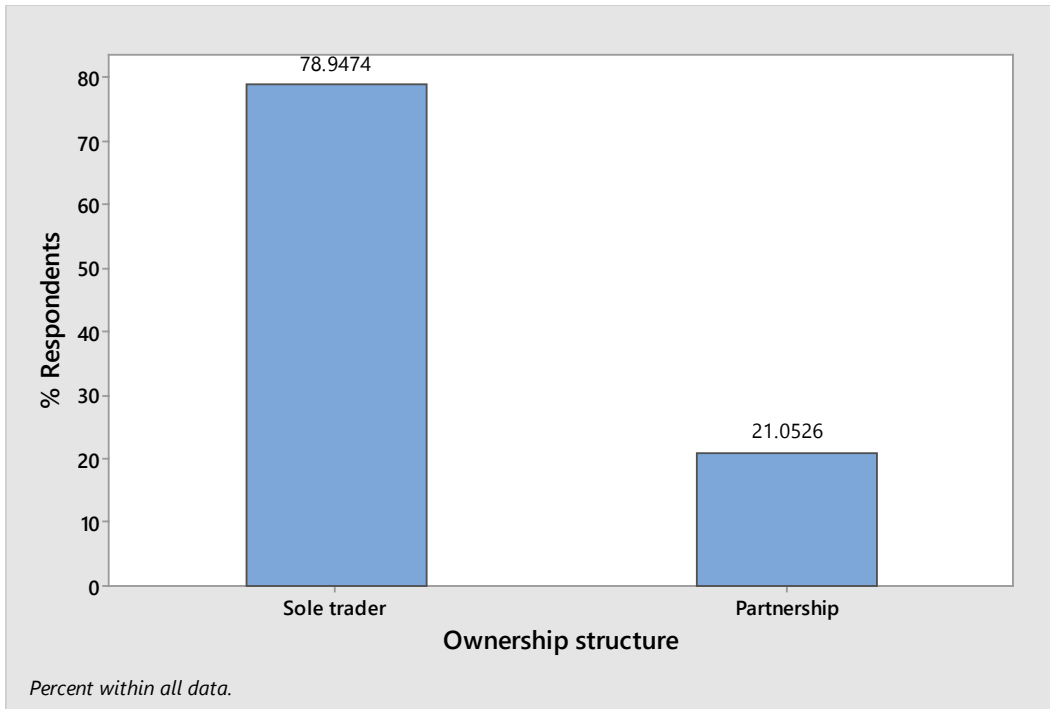


Figure 24: Structure of business ownership

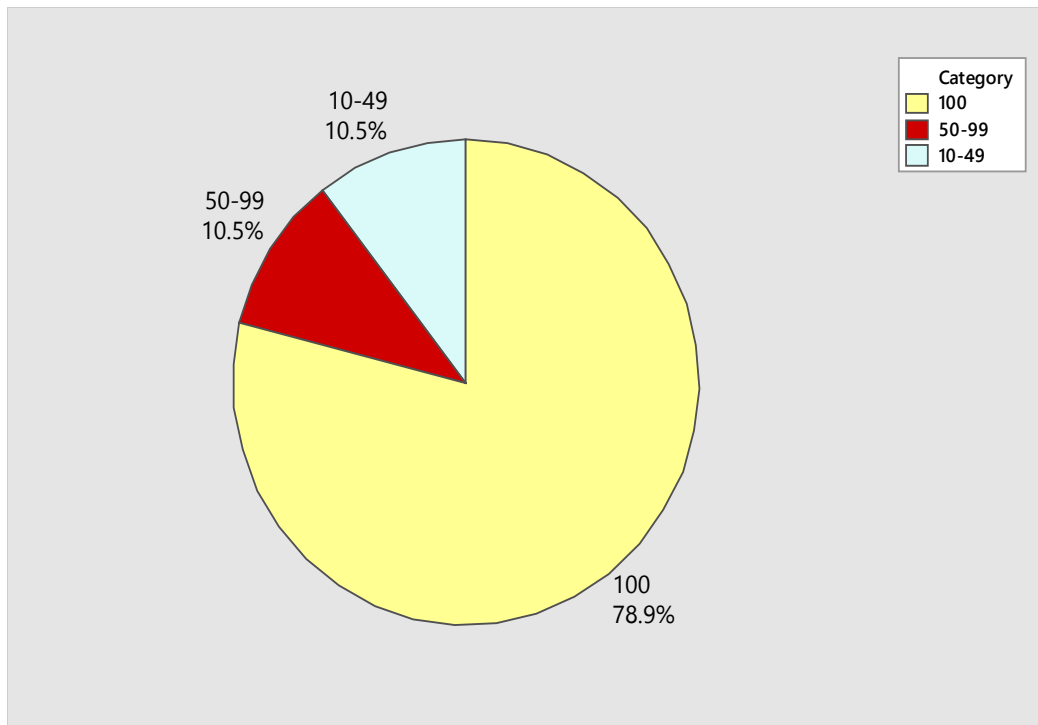


Figure 25: Percentage of participation by respondents engaged in partnership form of business

In terms of business outputs, majority of the respondents interviewed (47.5%) are into production and service rendering activities (Fig 26).

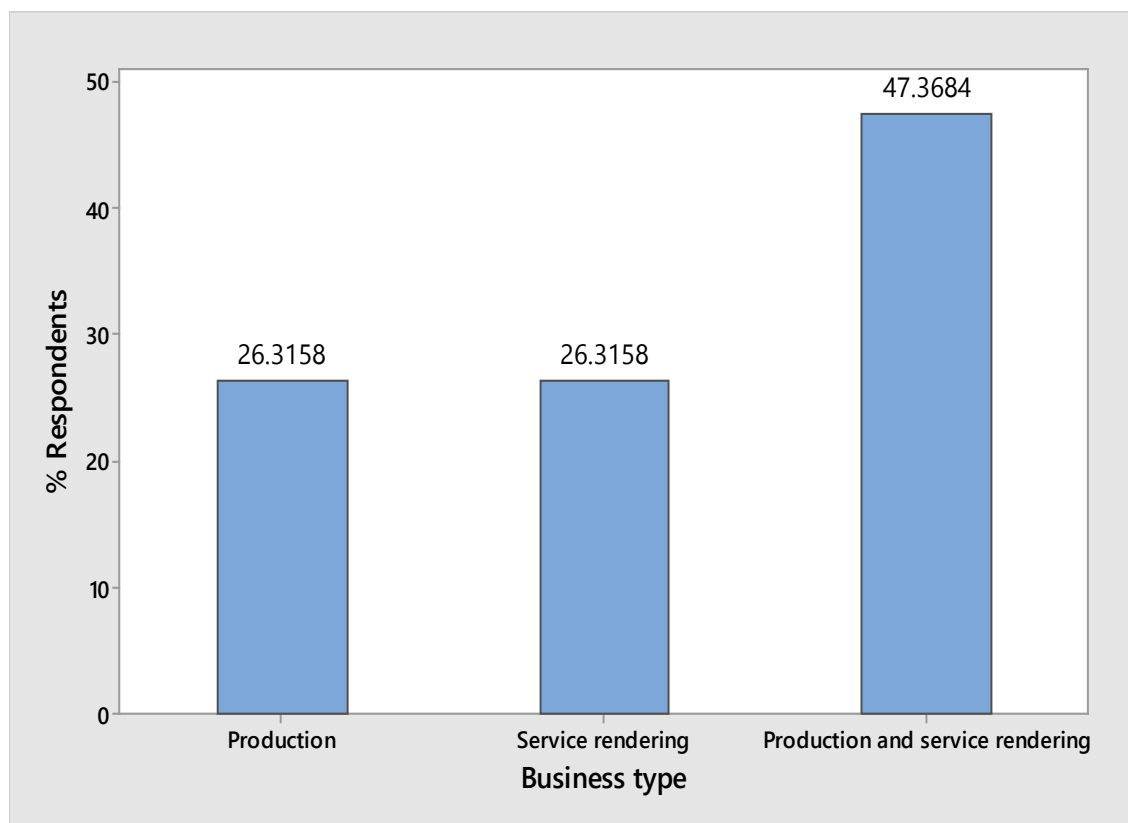


Figure 26: Type of business provided by processors

Regarding expanding the business, more than half of the respondent (78.9%) are willing to expand their millet processing business (Fig. 27).

Most of the respondents interviewed (66.7%) are into koko production with some producing other products like Brukina and Fura (Fig. 28).

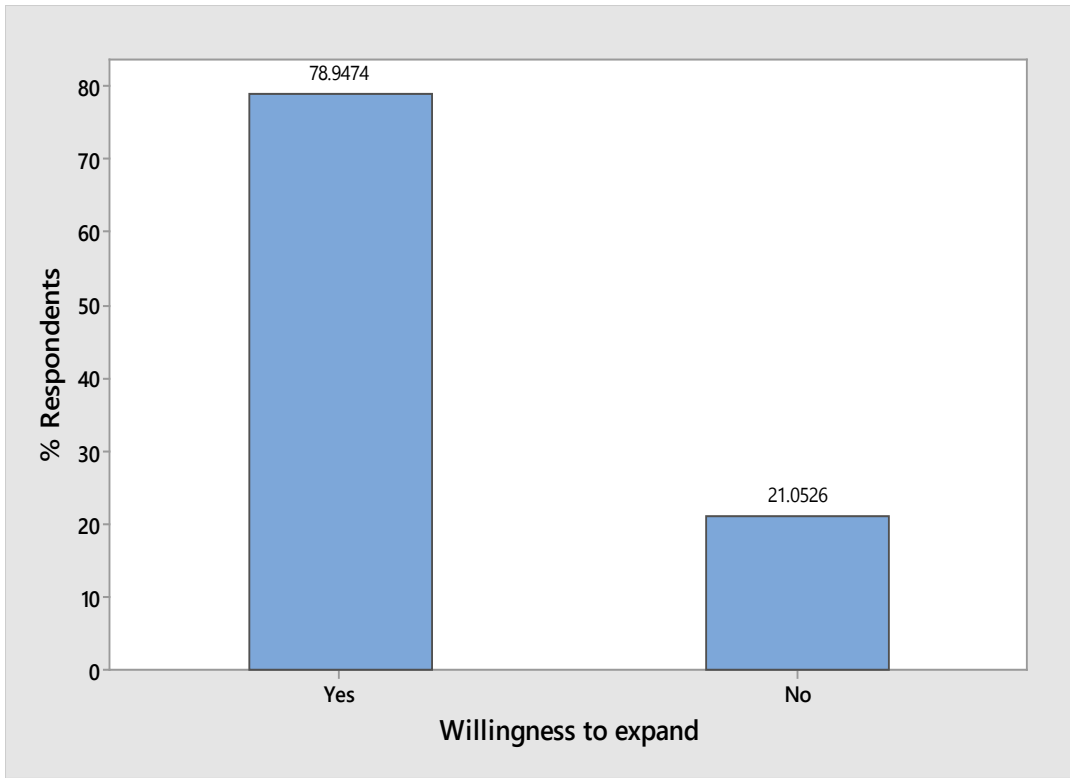


Figure 27: Willingness to expand millet based business by respondents

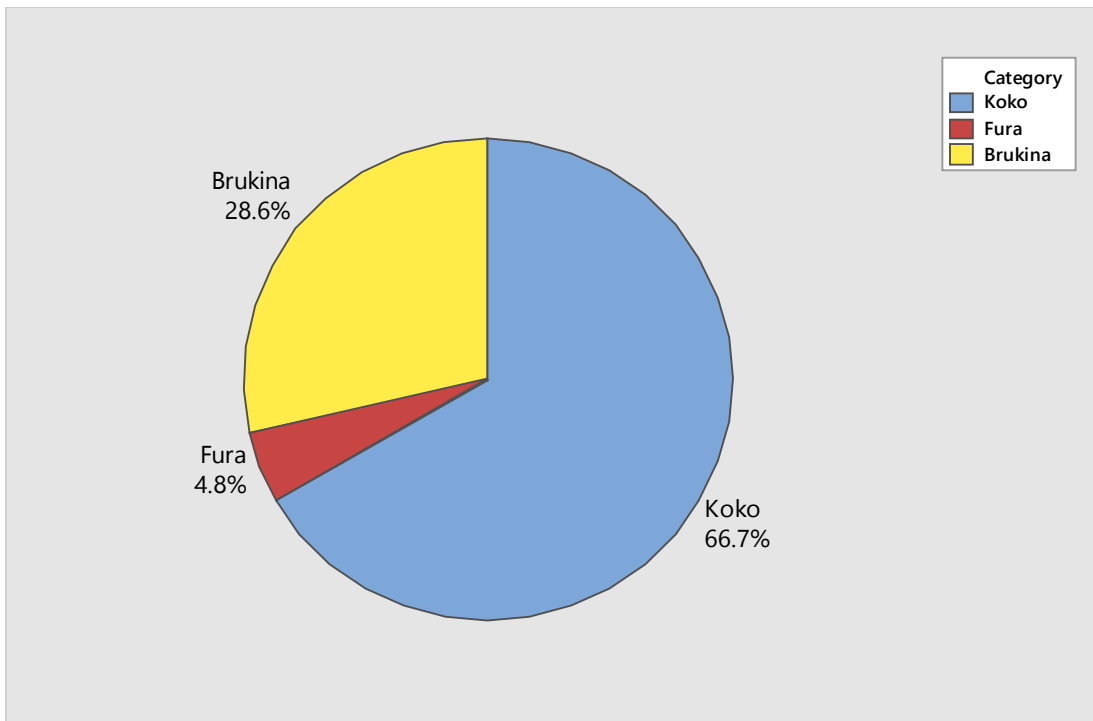


Figure 28: Types of product produced by processors

From Fig. 29, three categories of patronizes were identified including workers, students and the general public, the dominant category of patronizes was the public (45.8%).

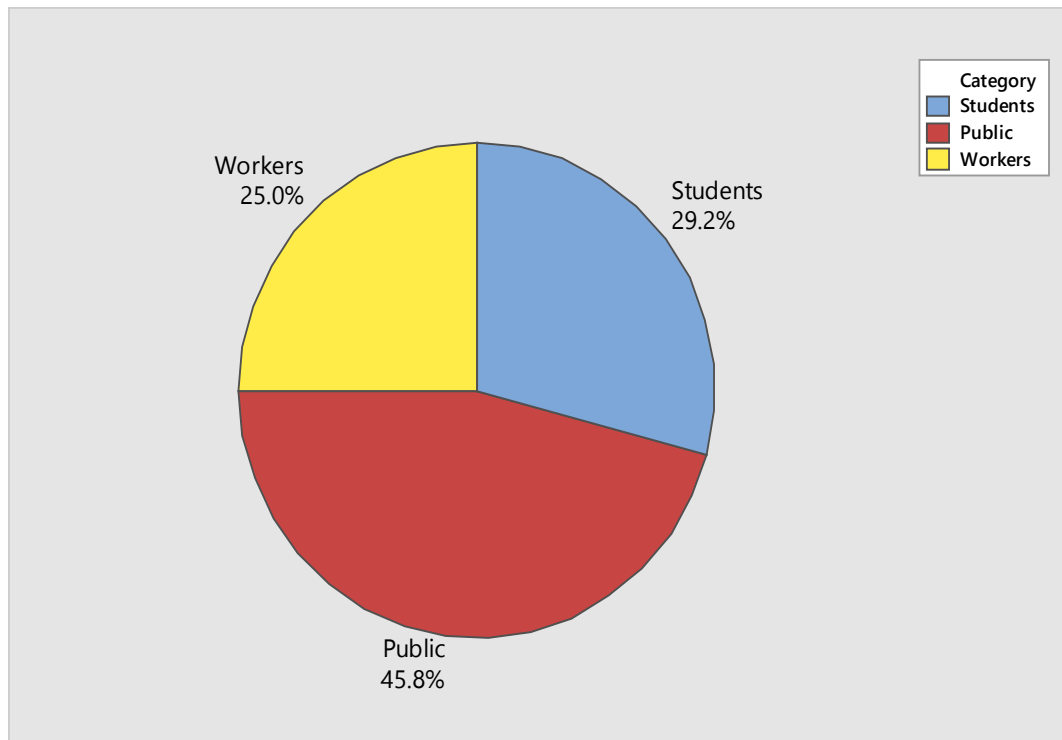


Figure 29: Corresponding buyers of above mentioned millet based products

More than half of the respondents consume (60%) millet based foods while other use millet based foods as breakfast, beverages and supper (Fig. 30).

The mean price of millet products was estimated at approximately 1 Ghana cedis, ranging from 0.5 Ghana cedis to 2.5 Ghana cedis. All the respondents (100%) reported that millet is included in their products with koko products accounting the highest level of millet inclusion (66.7%) followed by Brukina (28.6%) (Fig. 31).

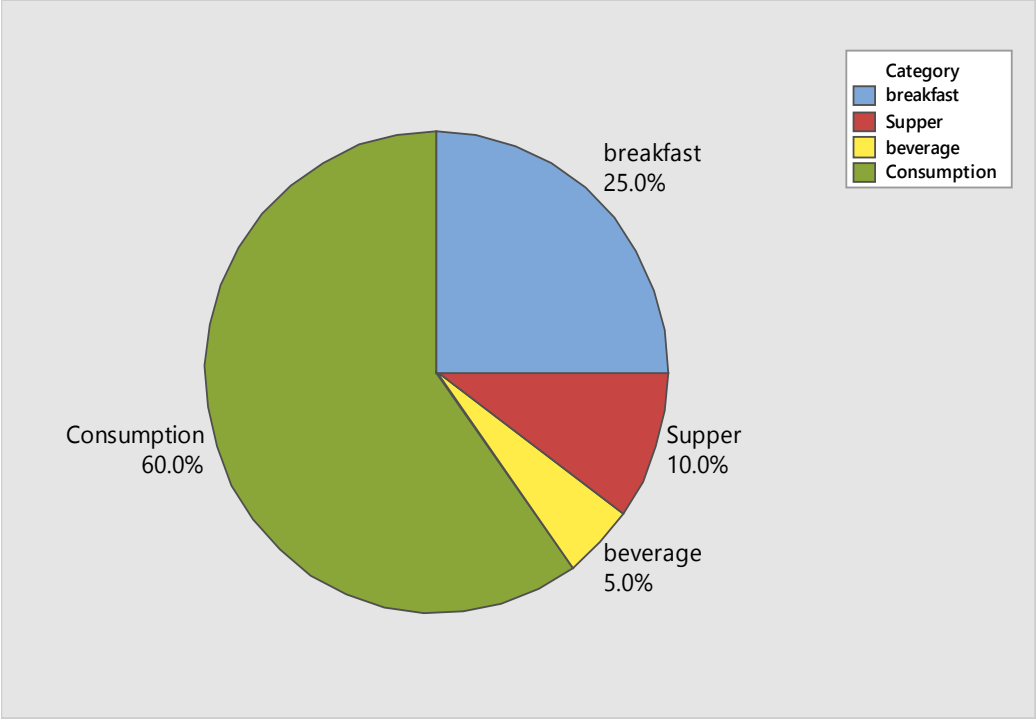


Figure 30: Uses of products by identified buyers

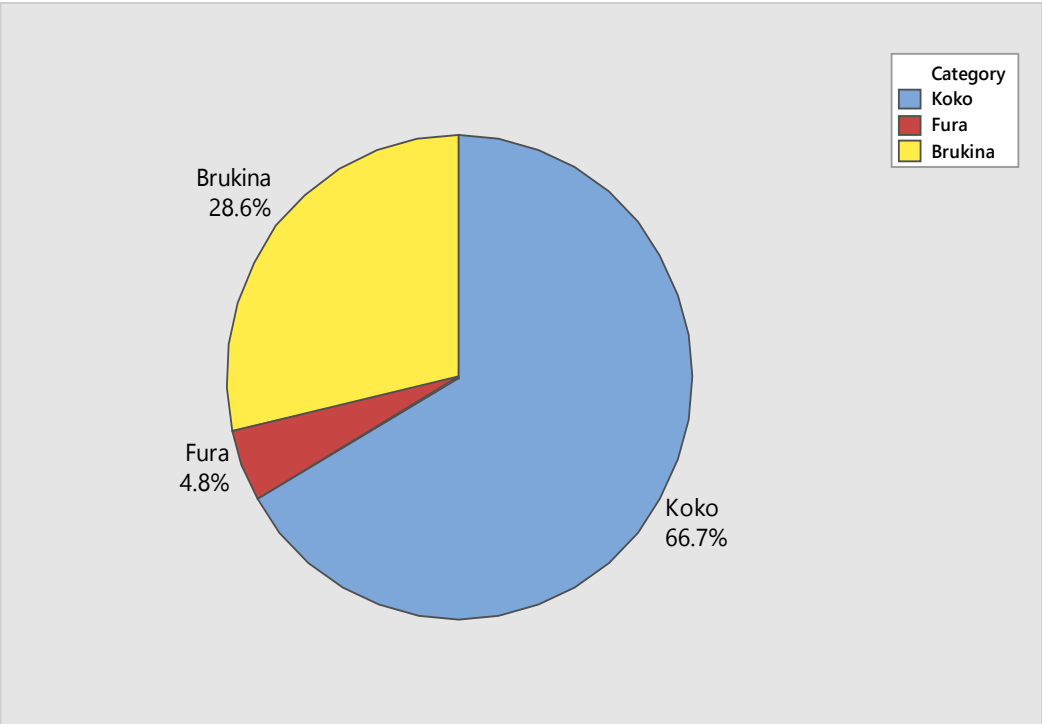


Figure 31: Products produced with millet

Though the highest level of millet inclusion was 100% with the lowest being 40%, the level of millet inclusion exercised by majority of the respondents was 70% and 90 % (15.8%) as shown in Fig. 32.

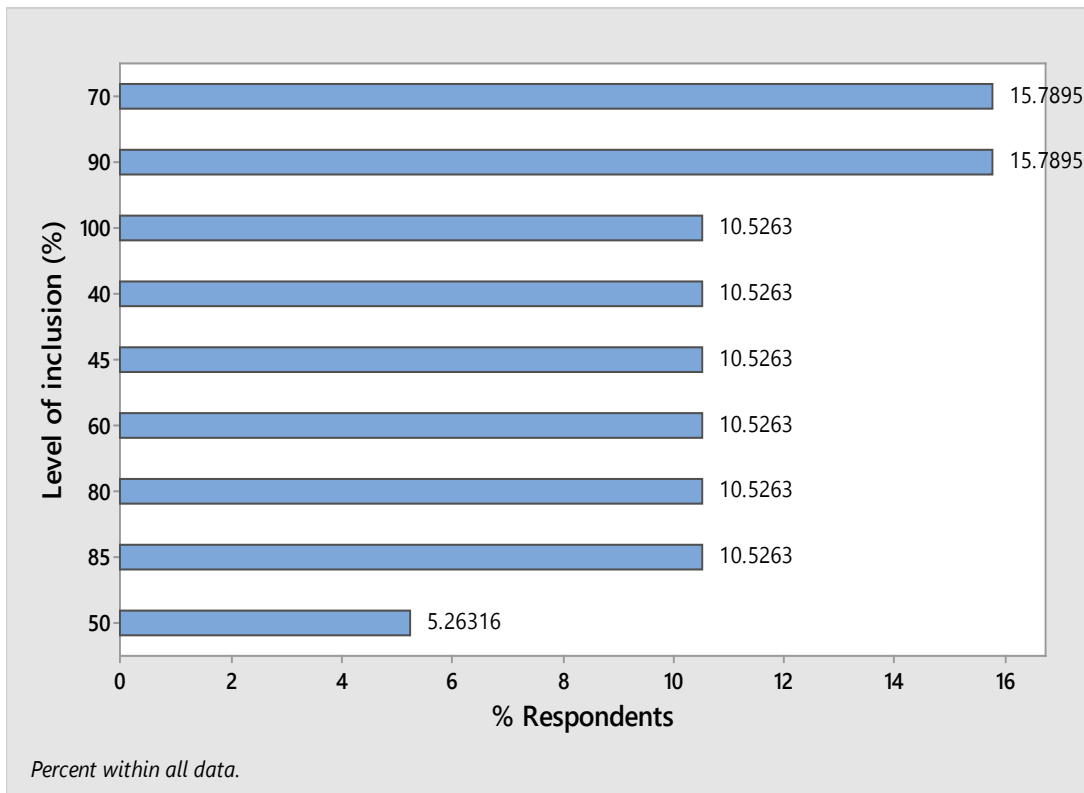


Figure 32: Level of millet inclusion (%) for millet based products

Majority of the respondents (42.1%) revealed the use of 2 bags of millet in the production of millet based products while 21.1% use 1 bag (Fig. 33).

Respondents interviewed revealed that millet inclusion improves the quality of the product as well as reduces the cost of production (Fig. 34).

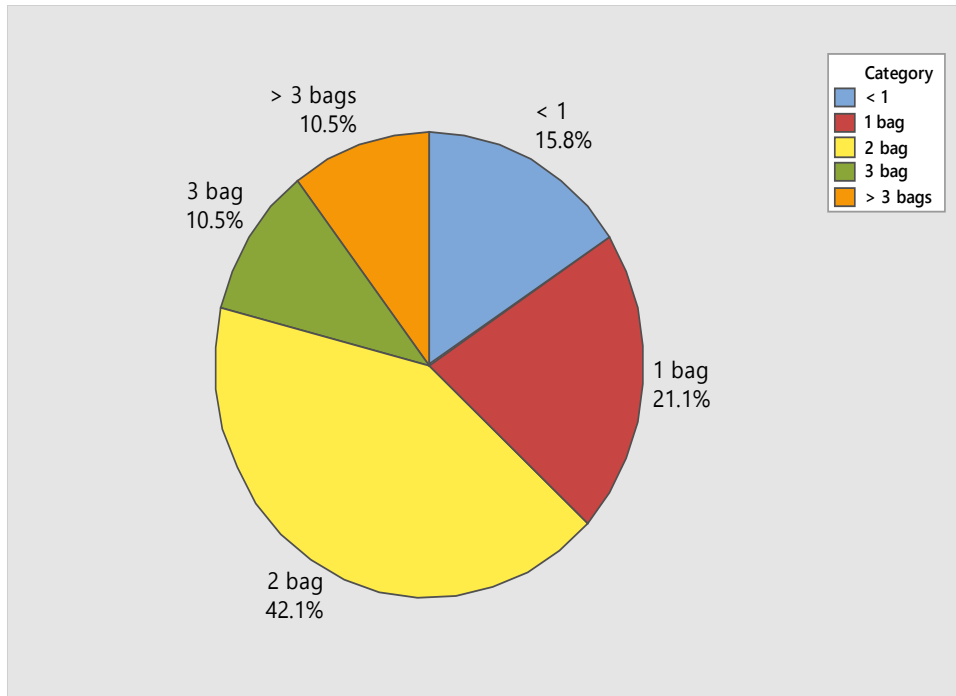


Figure 33: Monthly quantity of bags for operations

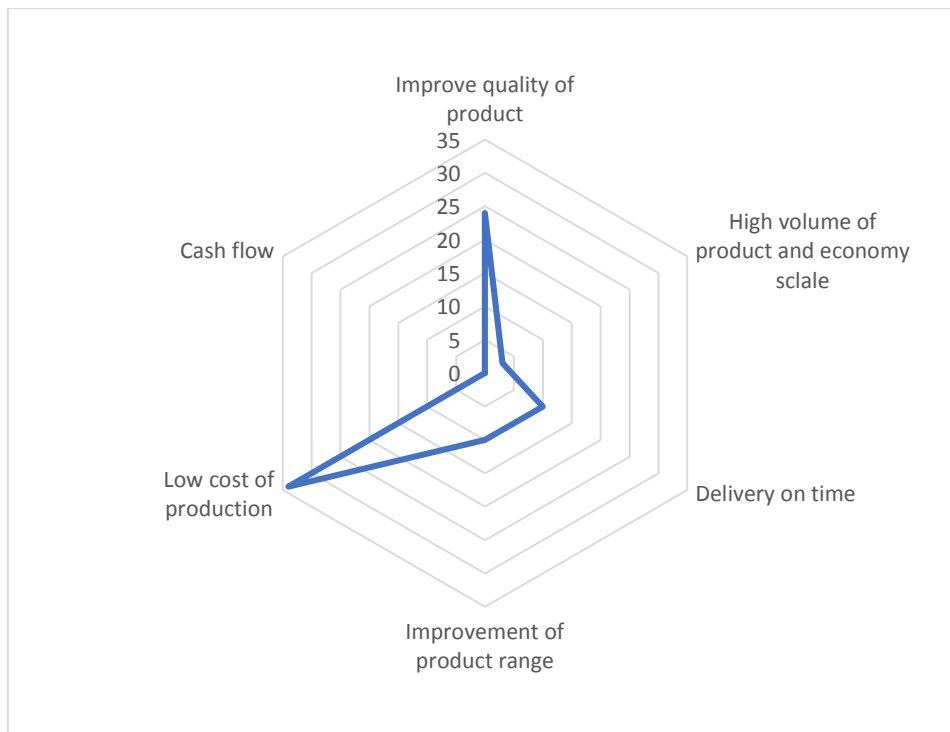


Figure 34: Impact of millet in producing millet based products

Ten different categories of purchasing organizations were identified (Fig 3). Students (30.6%), Worker and Roadside food vendors (11.1%) and street traders (8.3%) representing the most dominant groups (Fig. 35).

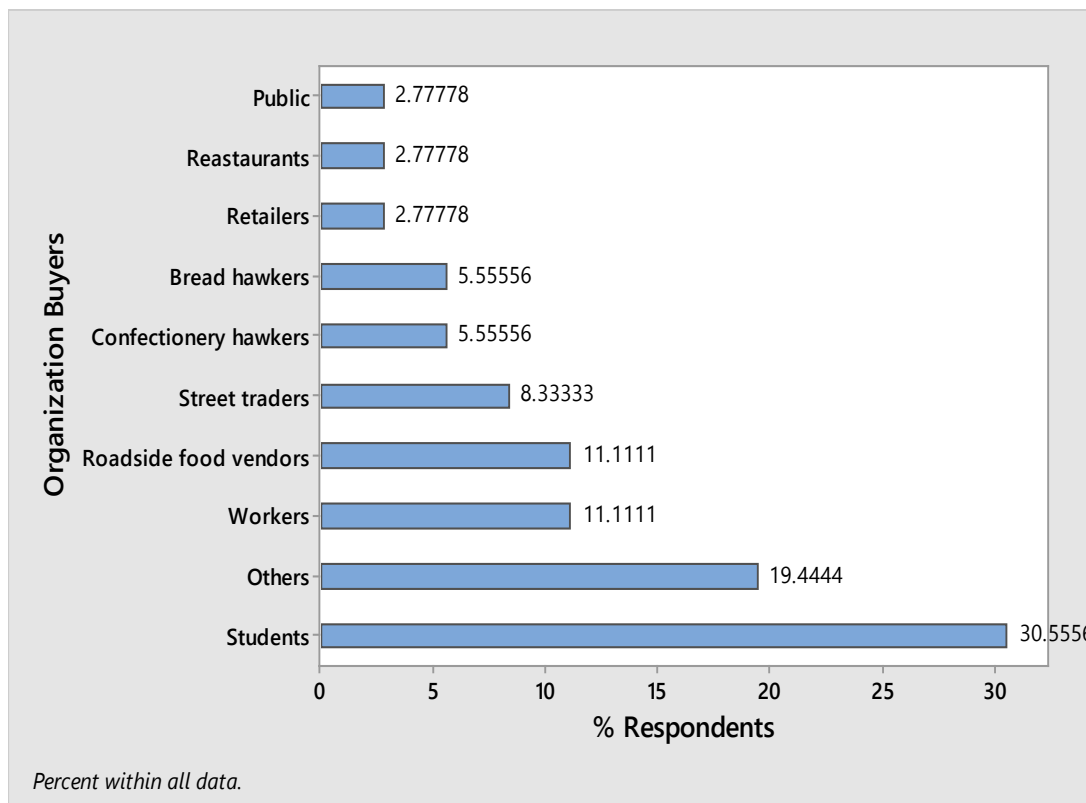


Figure 35: Patronizing categories for millet based foods

Interviewees mentioned seven key areas in the millet supply chain that demands urgent improvement, of which the key areas are price fluctuations (38.9%), Transport issues² (22.2%) and quality of millet (16.7%) (Fig. 36).

More than half of the respondents (78.9% and 52.6%) expressed interest in learning new millet product and inclusion of millet flour in more product in the future respectively (Figs. 37 & 38).

² Fare and nature of road

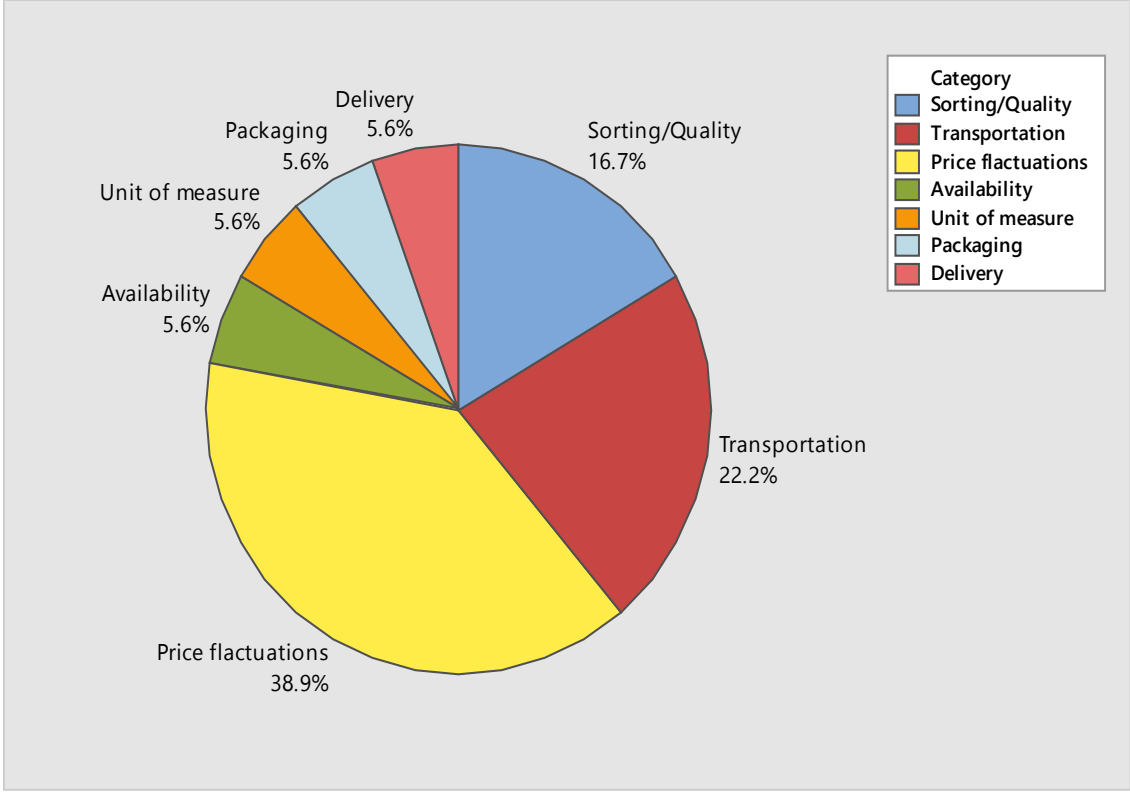
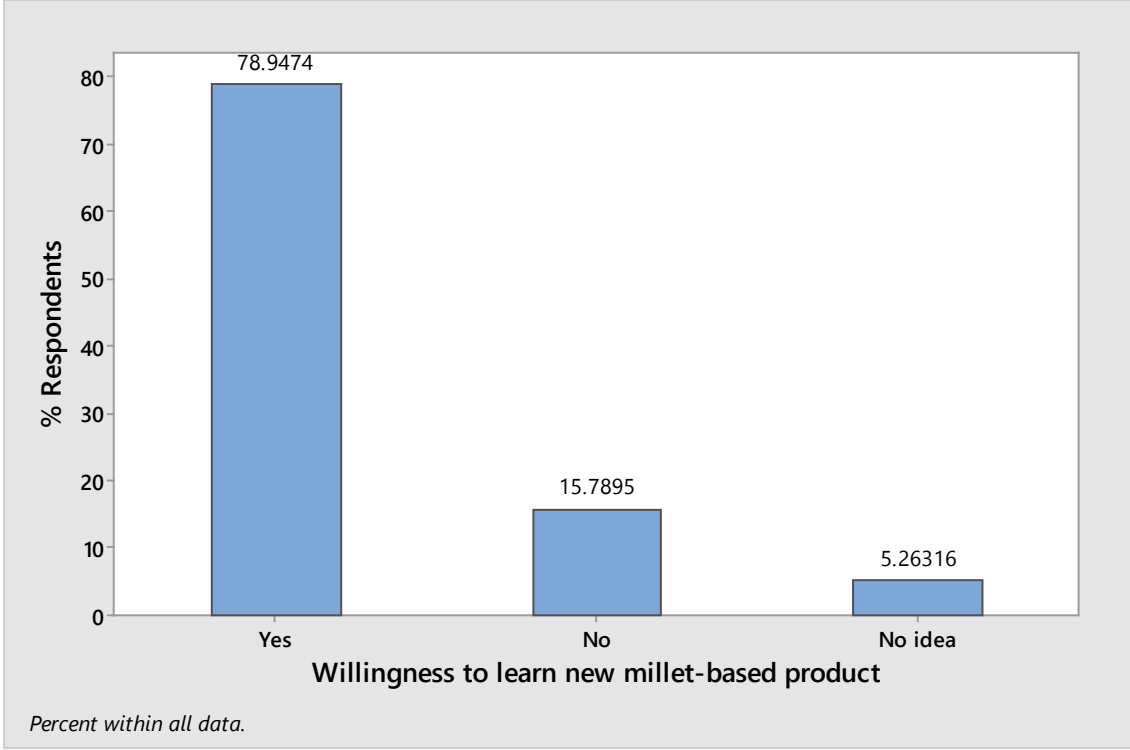


Figure 36: Areas in the millet supply chain that needs improvement



Percent within all data.

Figure 37: Willingness to learn new millet product

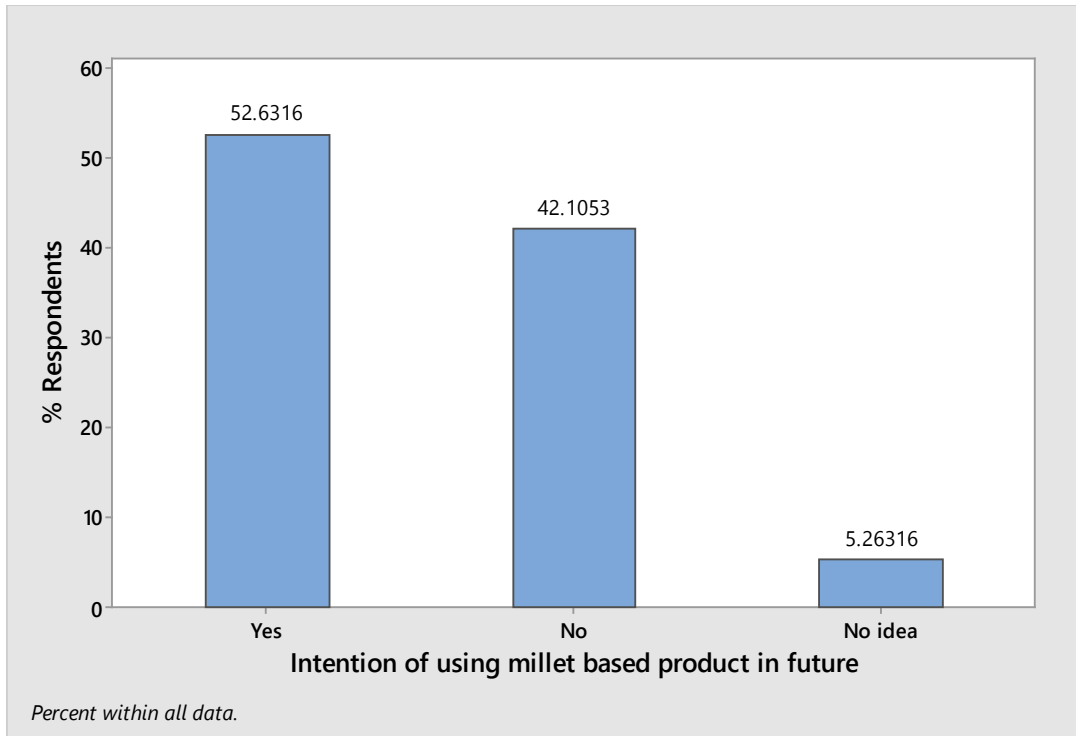


Figure 38: Willingness to invest in applying millet flour in the future

The most preferred quantity of millet for operation was 10 kg (36.8% of the respondents) as shown in Fig 39. All respondents had no access to credits or loan to finance their operation.

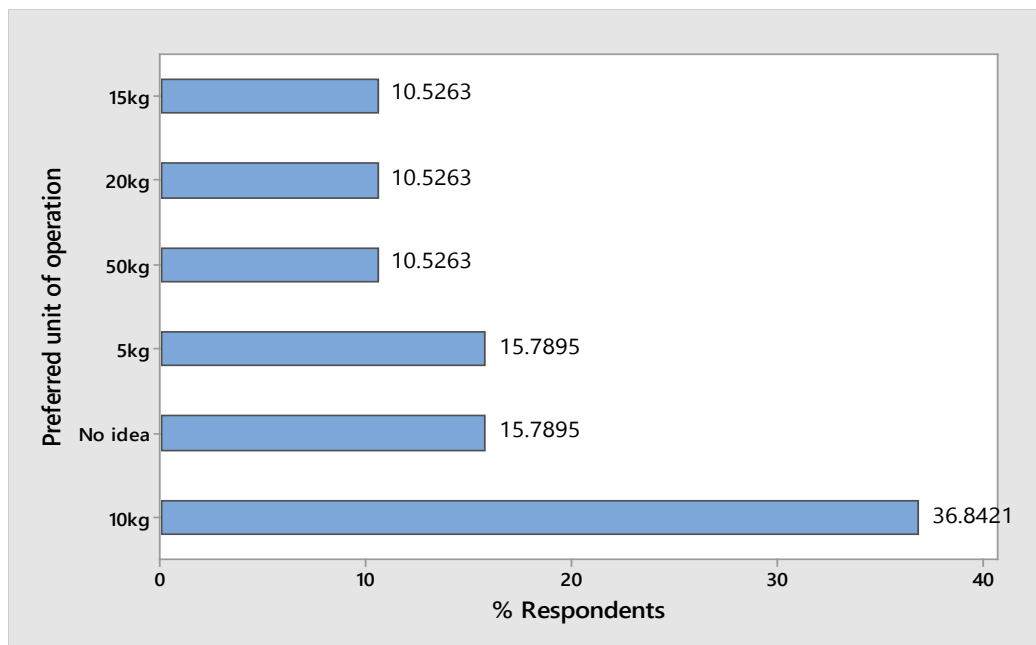


Figure 39: preferred unit of operation (quantity of bags)

3.5 SMEs

Majority of the respondents (22.2%) established units for producing millet based products from 2007 to 2014 (Fig. 40). Further, the oldest starting year for the production of millet based products per the respondents (11.1%) was in 1993.

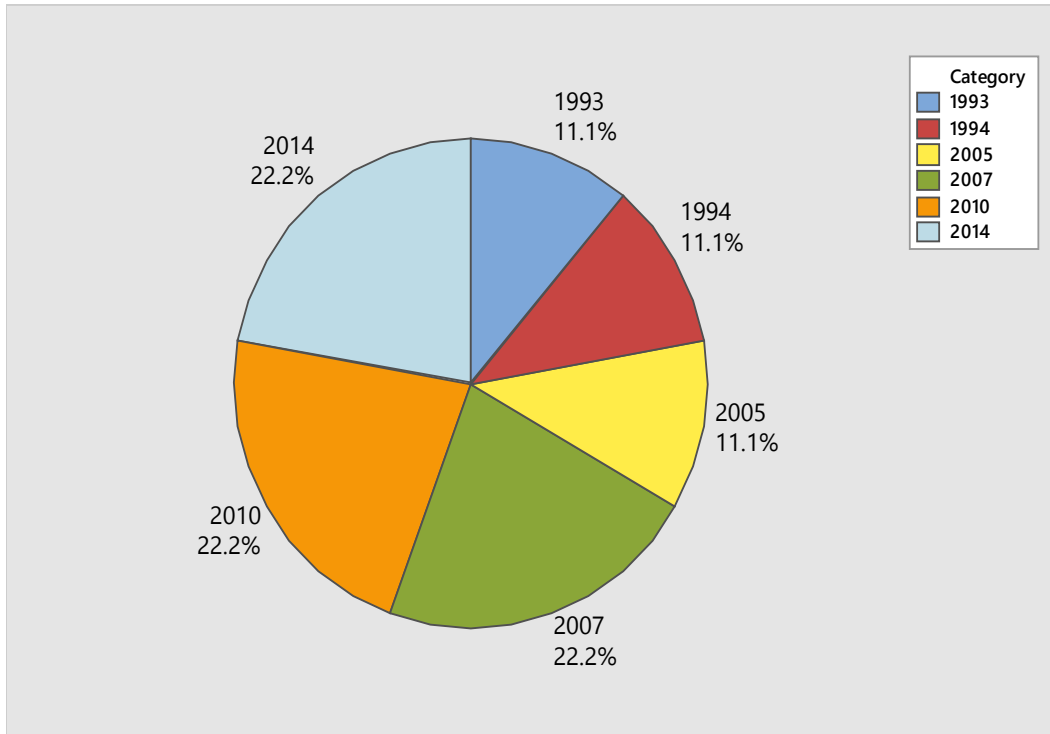


Figure 40: Date of establishment for the various SMEs interviewed

Nearly half of the respondents (44.4%) were into sole ownership with some practicing private limited liability company (33.3%) and partnership (22.2%) form of business ownership (Fig 41).

The various types of millet based products from the various SMEs are shown in (Fig. 42) with most of the SMEs engaged in the production of Hausa Koko (41.2%).

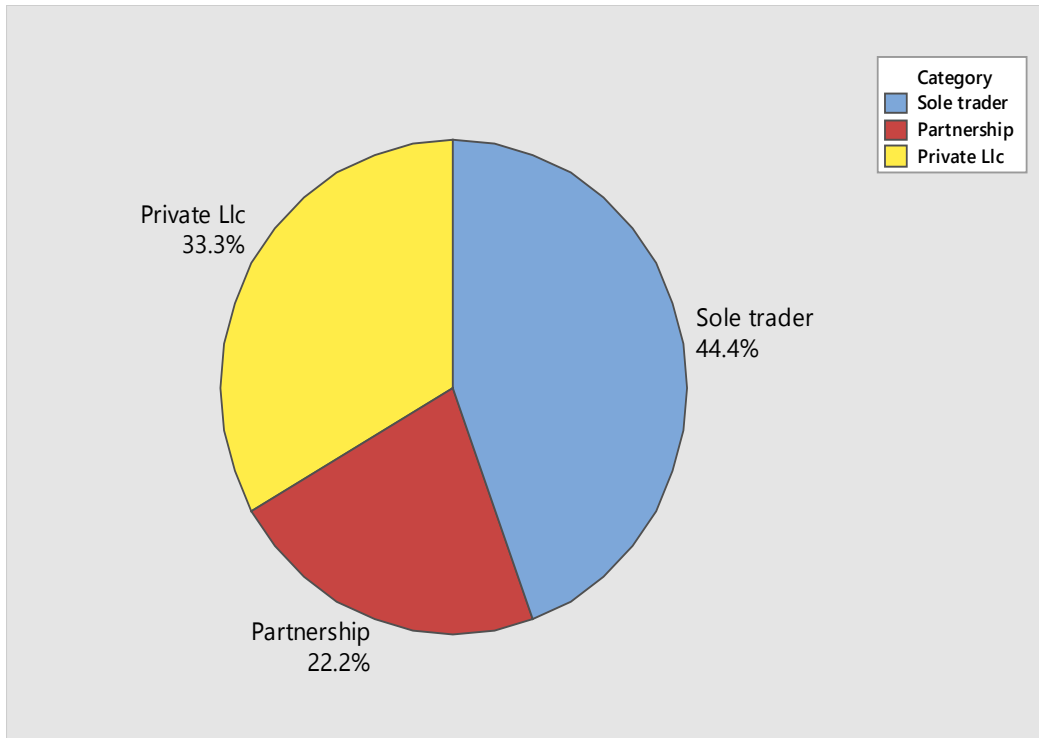


Figure 41: Percentage of SMEs engage in the various types of business ownership

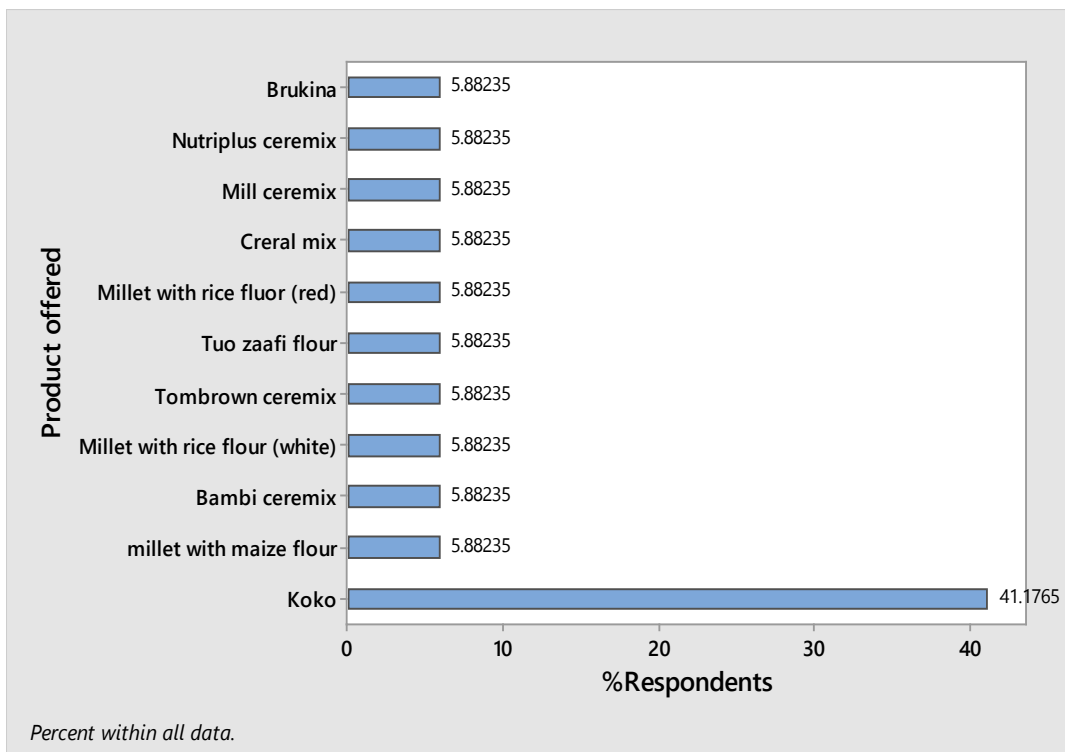


Figure 42: Products produced SMEs interviewed

The mean production value for last and this year was computed as 584 000 and 196 000 Ghana cedis respectively. Additionally, the range of production value for both last year and this year are provided in Table 20.

Table 21: Value of millet products produced by SMEs for last and this year

Variables	N	Mean	SE	Min	Max
Value of millet products/ last year (Gh cedis)	7	584	234	5	1700
Value of millet products/ this year (Gh cedis)	8	196	698	5	490

The various equipment used in the production of millet related products included oven, heat sealer, corn mill, attrition mill and others (Fig. 43).

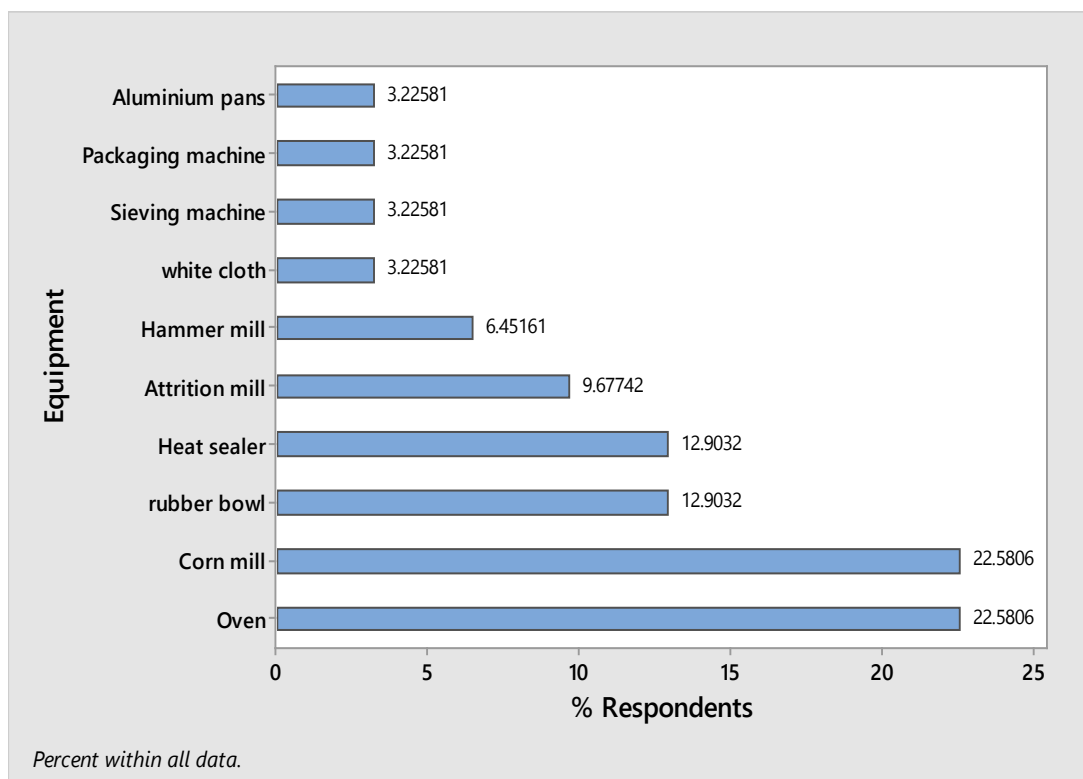


Figure 43: Various equipment used by SMEs in the production of millet based foods

Further, the impact of these equipment on business engaged in the production of millet based products are provided in (Fig 44). Improvement on product quality and ensuring on-time delivery were the main positive impacts of automation in millet production.

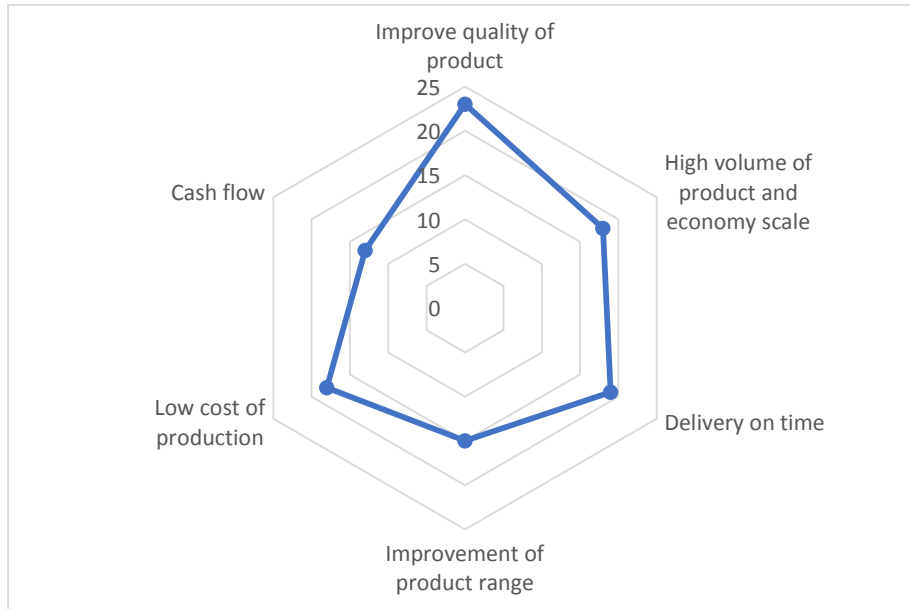


Figure 44; Impacts of equipment on the production of SMEs' millet related products

Identified purchasing categories for millet related products by SMEs were wholesalers, exporters, wholesalers, street traders and road side vendors (Fig. 45).

Nonetheless, the preferred purchasing categories were direct sales, students, wholesalers with exporters (50%) and direct sales (25%) as the most proffered purchasing groups (Fig. 46). Reasons assigned to exporters and direct sales as being the most preferred purchasing groups included assured economic returns (cash flows) as well as trading in larger quantities and obtaining feedbacks to enhance quality of products respectively.

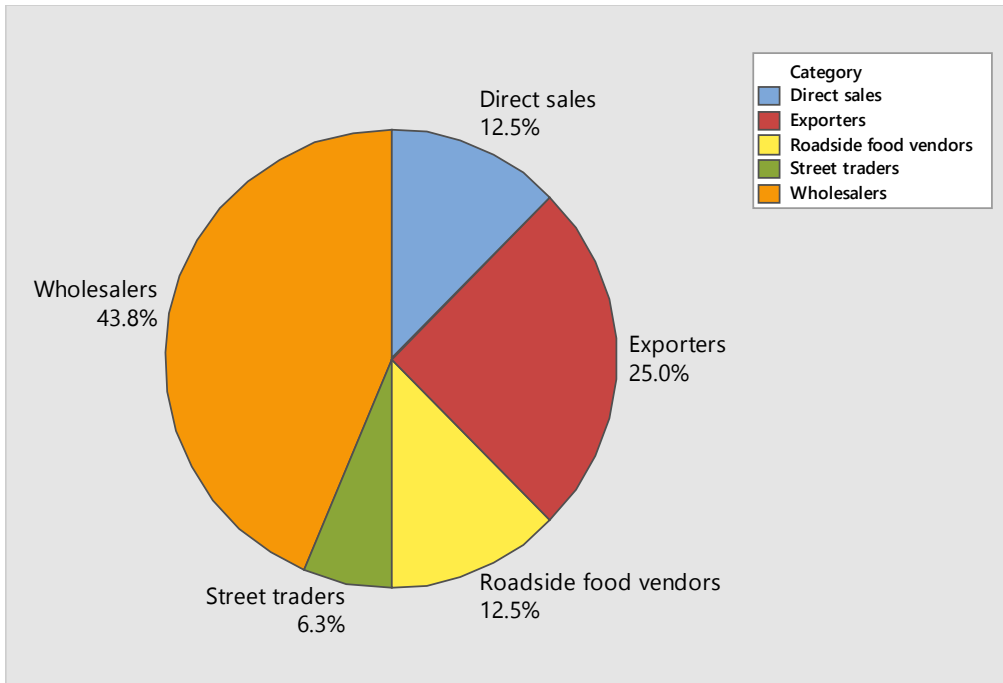


Figure 45: Purchasing categories of SMEs millet related foods

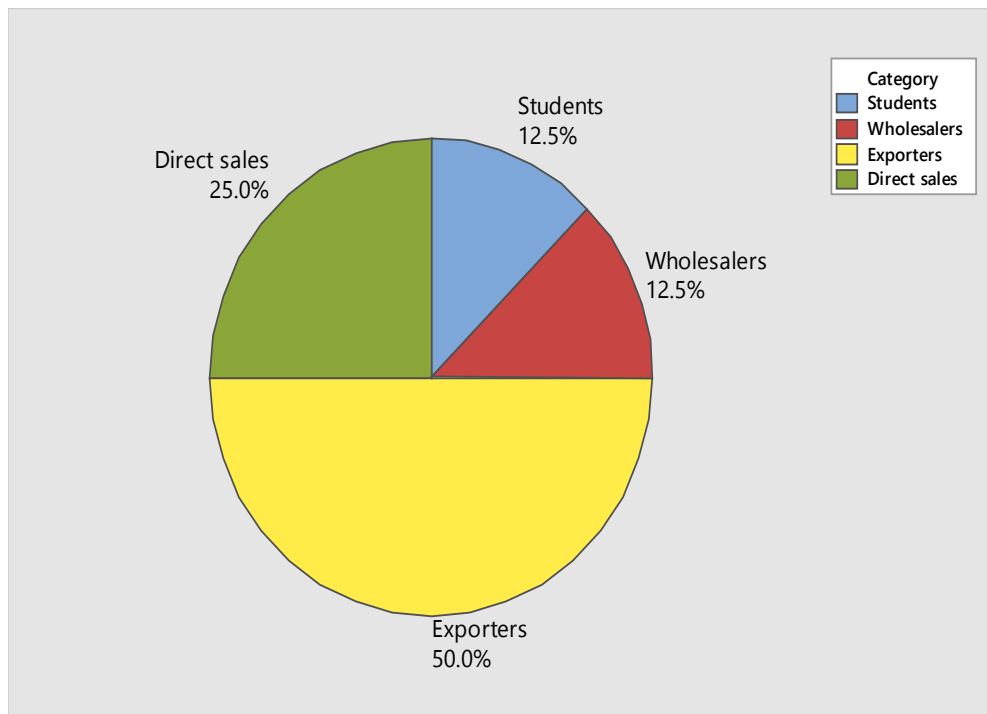


Figure 46: Preferred purchasing categories of SMEs millet related foods

Respondents indicated that the following areas in the millet based product business chain such as packaging, quality, storage forms by wholesalers and price of millet needs improvement. Specifically, majority of respondents (70.2%) indicated the quality of millet obtained for processing demands urgent attentions particularly sorting of millet (Fig 47).

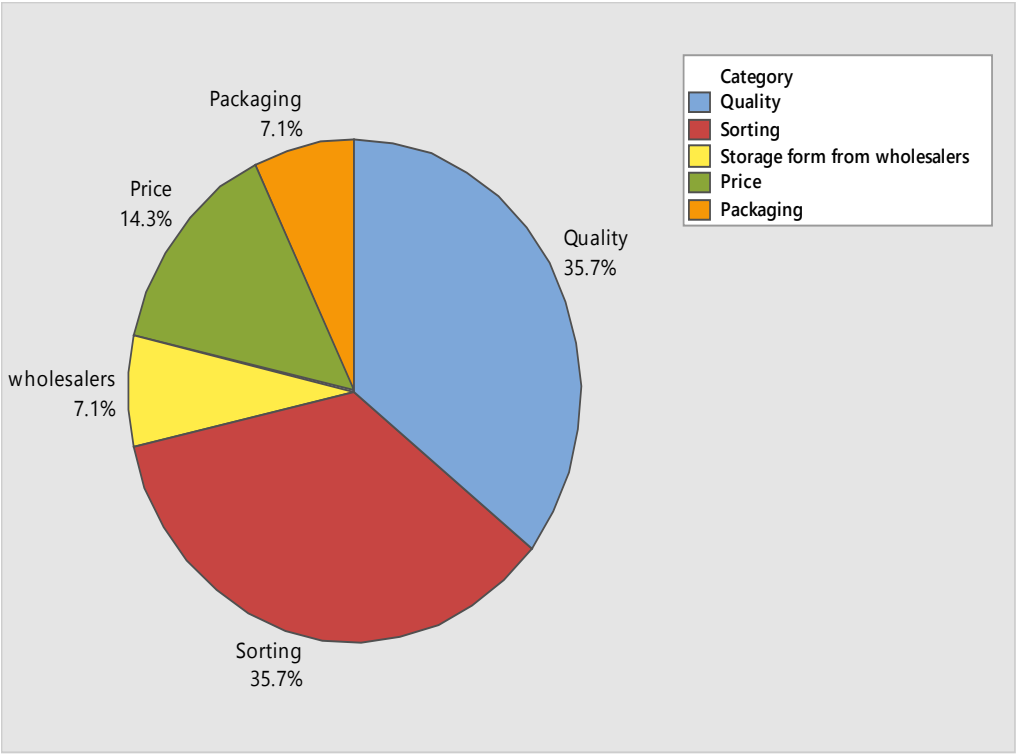


Figure 47: Areas in millet supply and availability that demands attention as reported by SMEs

Majority of the respondents indicated willingness to include learn new products from millet (33.3%) as well as the desire to include millet flour in more products in the future (33.3%) (Fig. 48).

In ensuring more profit, the average price and unit of operations (kg) as indicated by the respondents were 200.6 Ghana cedis and 192 kg. The minimum and maximum preferred unit of operations (kg) and price as provided in Table 21.

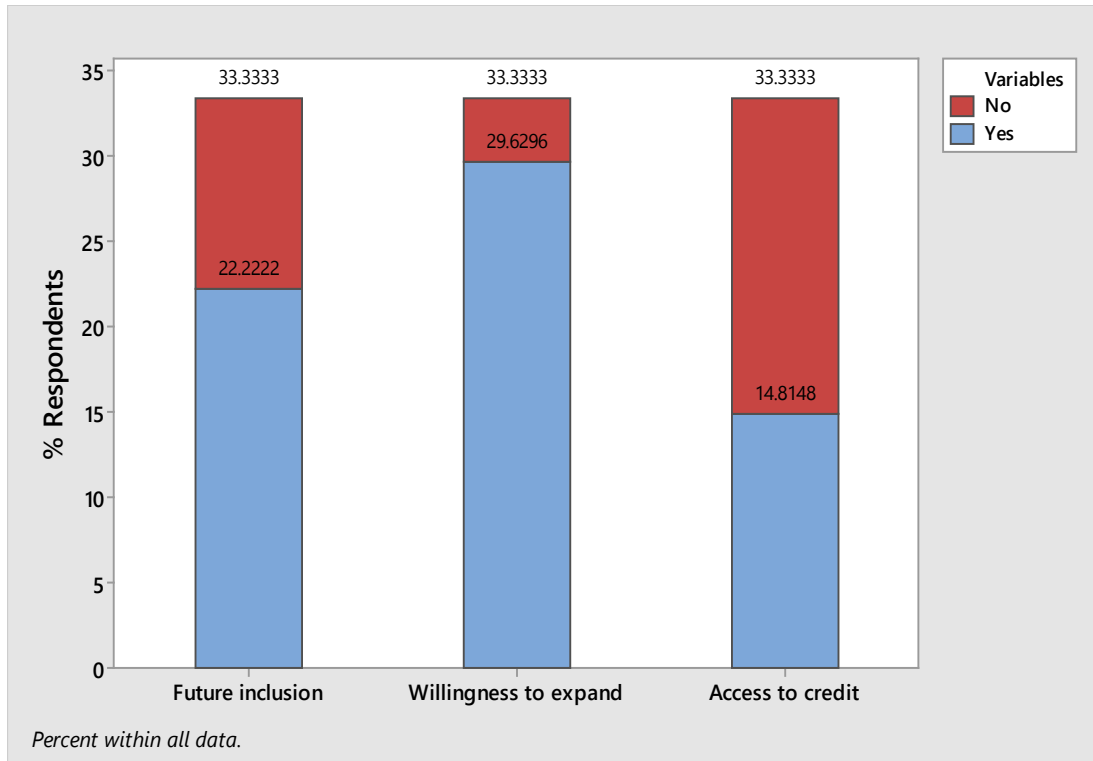


Figure 48: Willingness to expand business and include millet in future products as well as access to credit facilities

Table 22: Preferred price and quantity reported by SMEs

Variables	N	Mean	SE	Min	Max
Preferred price/ Gh cedis	8	200.6	59.1	80	600
Preferred unit of operation/ kg	9	192.2	69.6	208.7	600

Most of the respondents do not engage the activities of credit facilities, however with respondents relying on the activities of these credit facilities, banks and micro finance institutes were known to be the major source of credits (Fig. 49).

Further, to facilitate credits transactions, eligibility criteria were having a fixed deposit as well as being the owner or CEO of the business venture while conditions needed to fulfilled involved having registered document, guarantors, collateral and others (Fig 50).

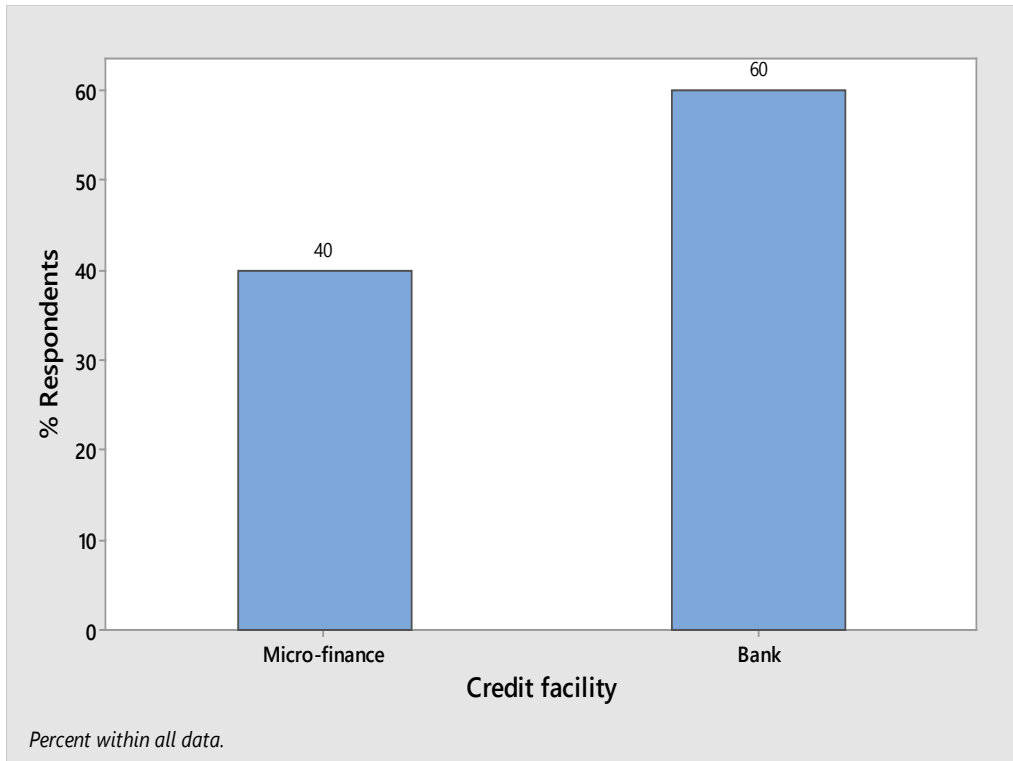


Figure 49: Credit facilities that assist SMEs financially

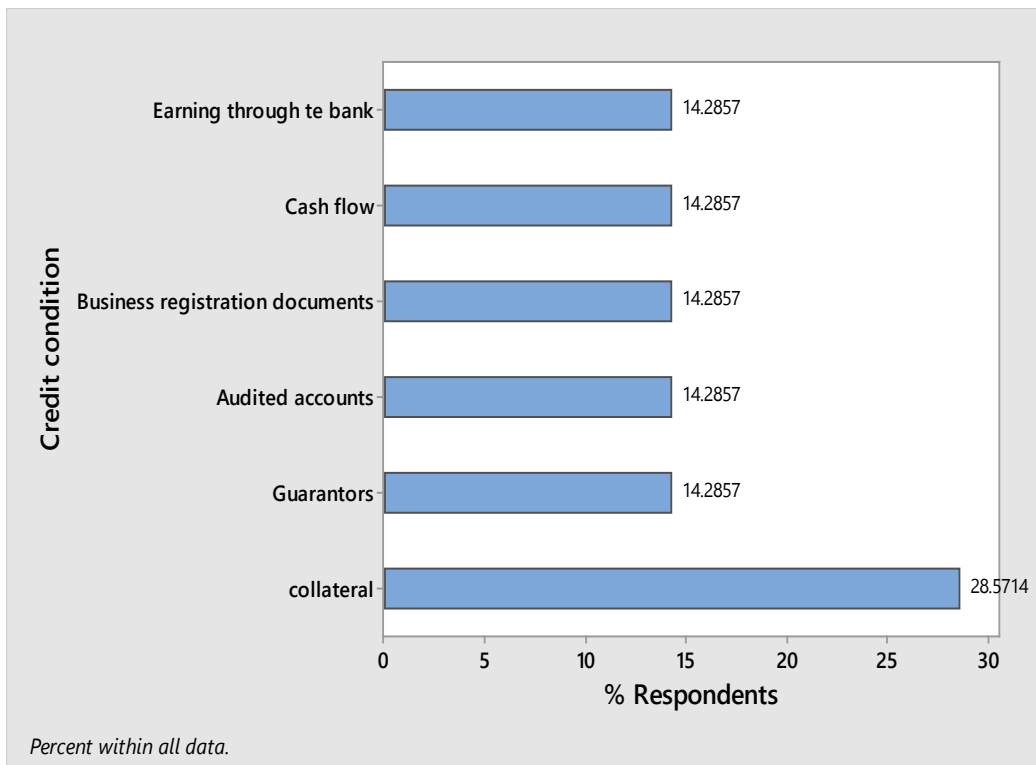


Figure 50: Conditions stipulated by credits or loan institutions

The average credit period and interest rate were estimated as 30 months and 37.63 % respectively. The minimum and the maximum credit period and interest rates are provided in Table 22.

Table 23: Characteristics of credits or loan institutions

Variables	N	Mean	SE	Min	Max
Credit period/ months	7	30.07	6.25	12	60
Interest	4	37.63	3.52	33	48

Many forms of constraints faced by these SMEs have been outlined in Fig. 51 with inadequate inputs including millet and capital as the major constraint bedeviling the growth of SMEs involve in the production of millet based products.

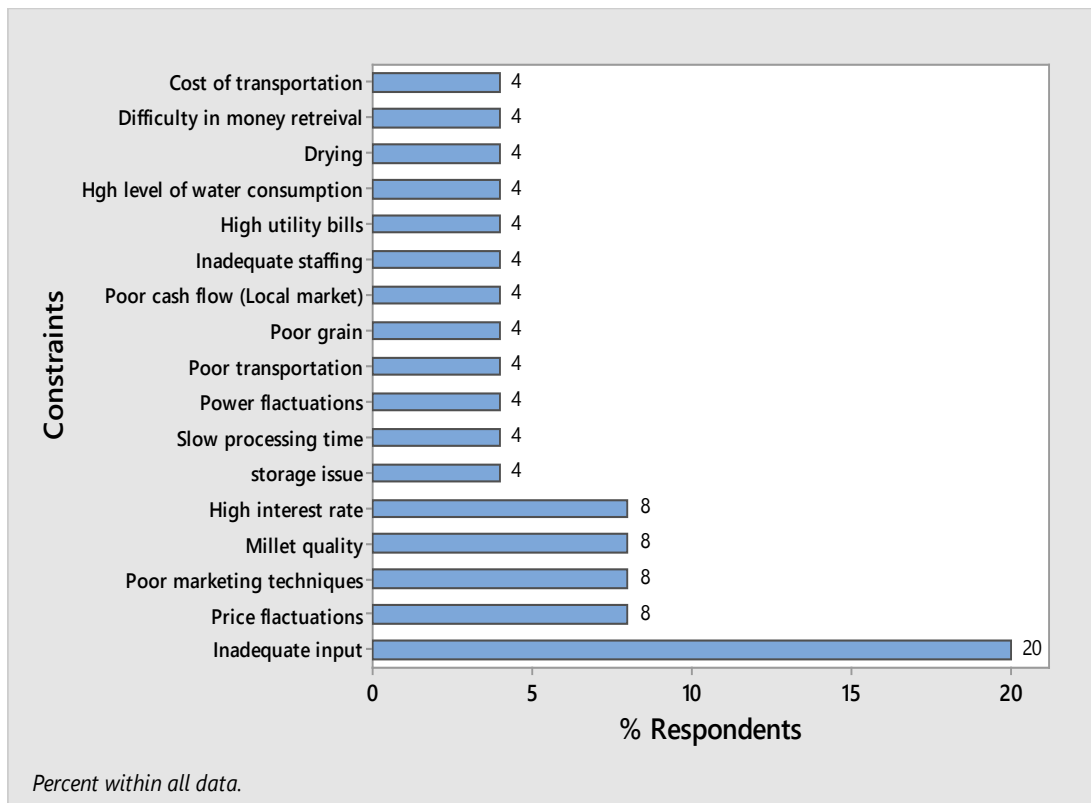


Figure 51: Constraints facing SMEs in millet processing

3.6 Consumers

Majority of the respondents (40%) admitted consuming millet on monthly basis while a few (3.3%) consume on bi-monthly basis. Majority of the respondents (18.9%) who presumably maybe parents or guardians provide their kids with millet based foods, mostly on 'twice weekly' basis (56.3% of respondents). Similarly, majority of the respondents provide their family members with millet related foods, often on weekly basis (31.3% of respondents) (Fig. 52).

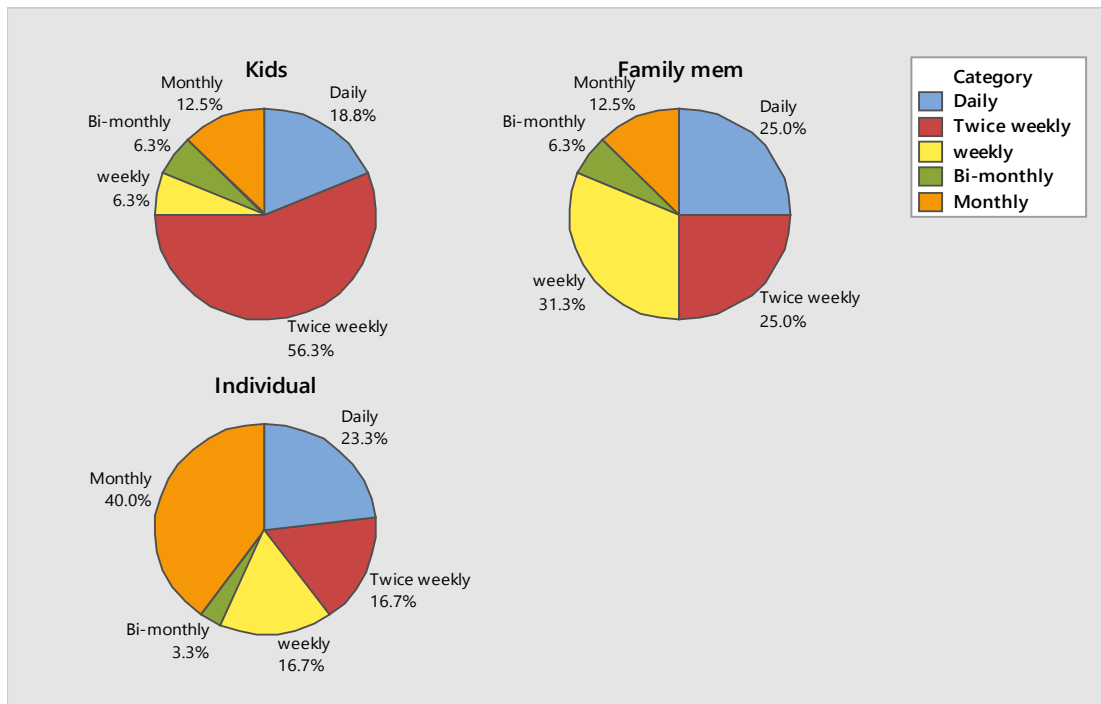


Figure 52: Frequency of millet consumption by various consumers of millet based foods

Regarding millet based foods consumed, respondents revealed six products with koko (52.5%) and Brukina (23.7%) being the most consumed millet related foods (Fig 53).

In terms of preference, majority of the respondents preferred their millet based foods in the form of bread (38.9%) and semi-solid paste (27.8%) as outlined in Fig. 54.

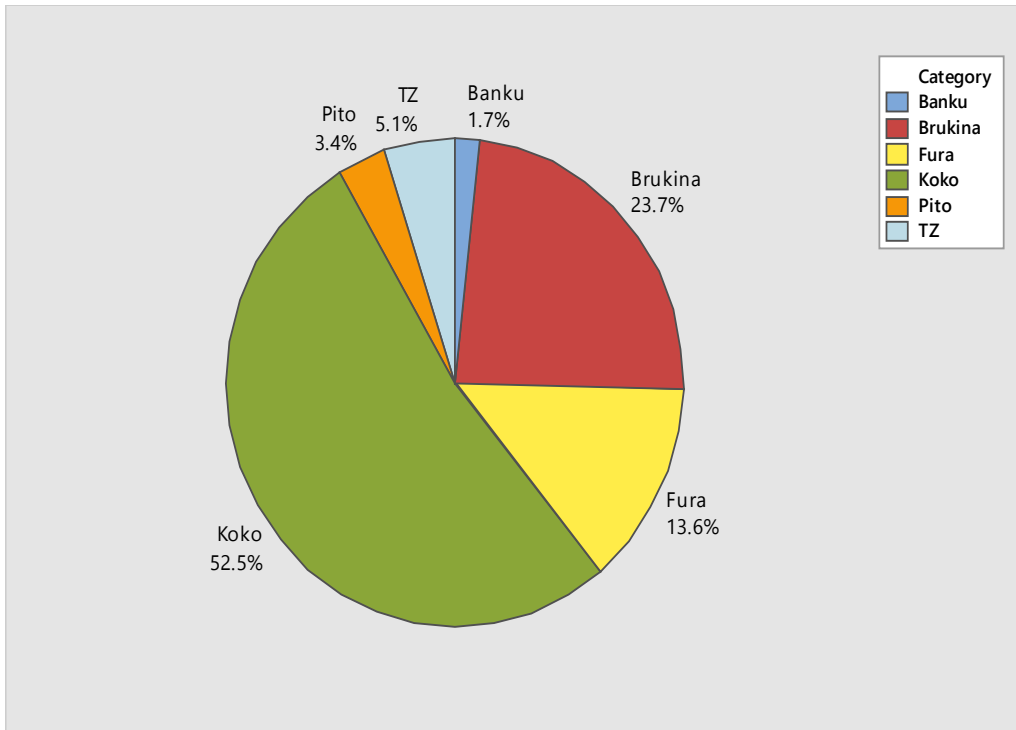


Figure 53: Types of millet based foods consumed by respondents

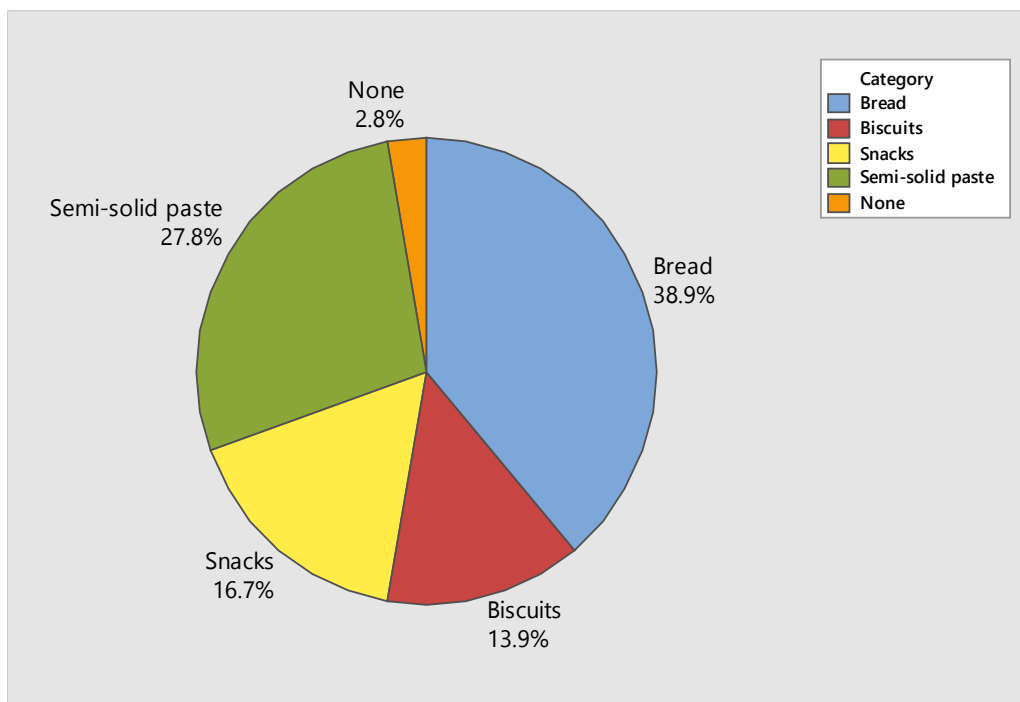


Figure 54: Preferred form of millet based products as reported by consumers

Though a list of nutritional benefits were provided by some respondents (Fig 55.), majority of them viewed millet based foods as a source of carbohydrate.

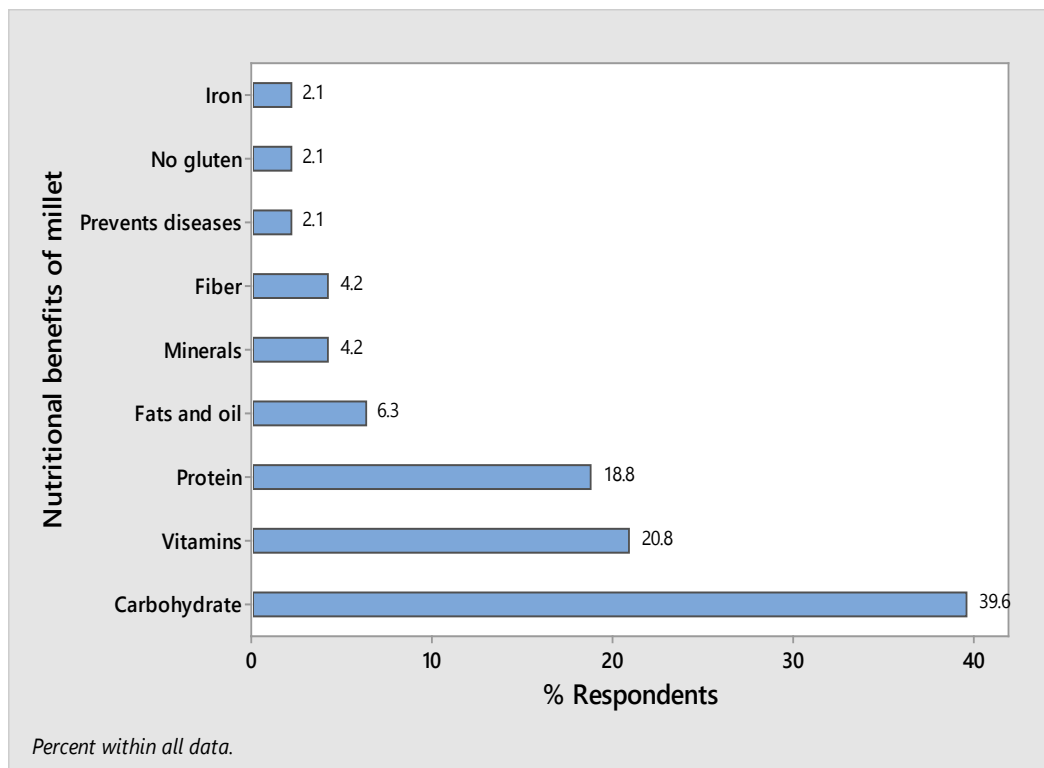


Figure 55: Nutritional benefits of consuming millet based foods

Most of the respondents (25.6%) mentioned no reactions after consuming millet based foods, though minority (2.2%) revealed the presence of some reactions (Fig. 56).

Fig 57 shows the various foods/ ingredients that respondents mix with millet or millet related foods. Mixing milk and koko (millet diet) was found to be practiced by most respondents (23.1%).

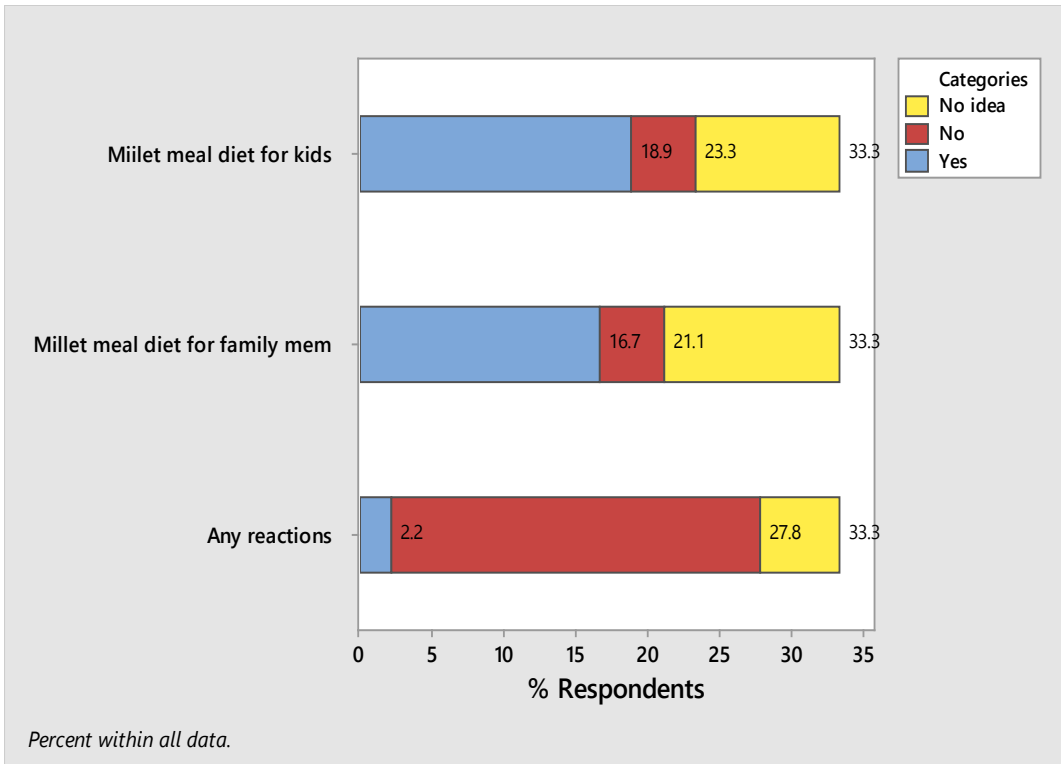


Figure 56: Consumption and allergic reactions to millet products

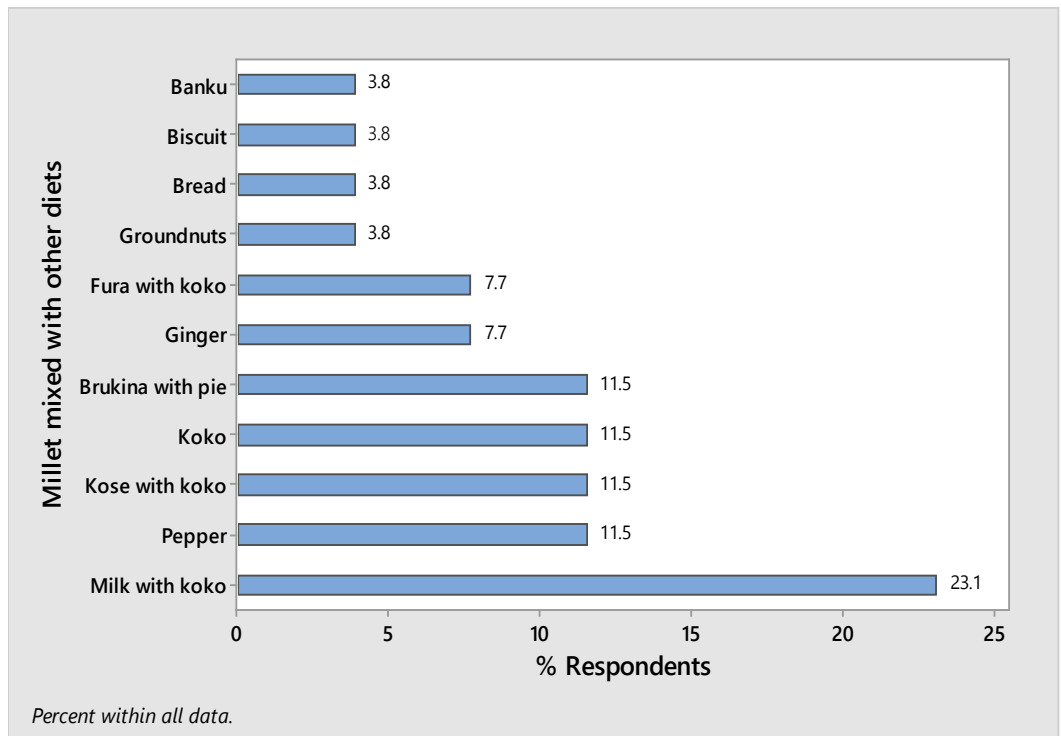


Figure 57: Types of foods mixed with millet products

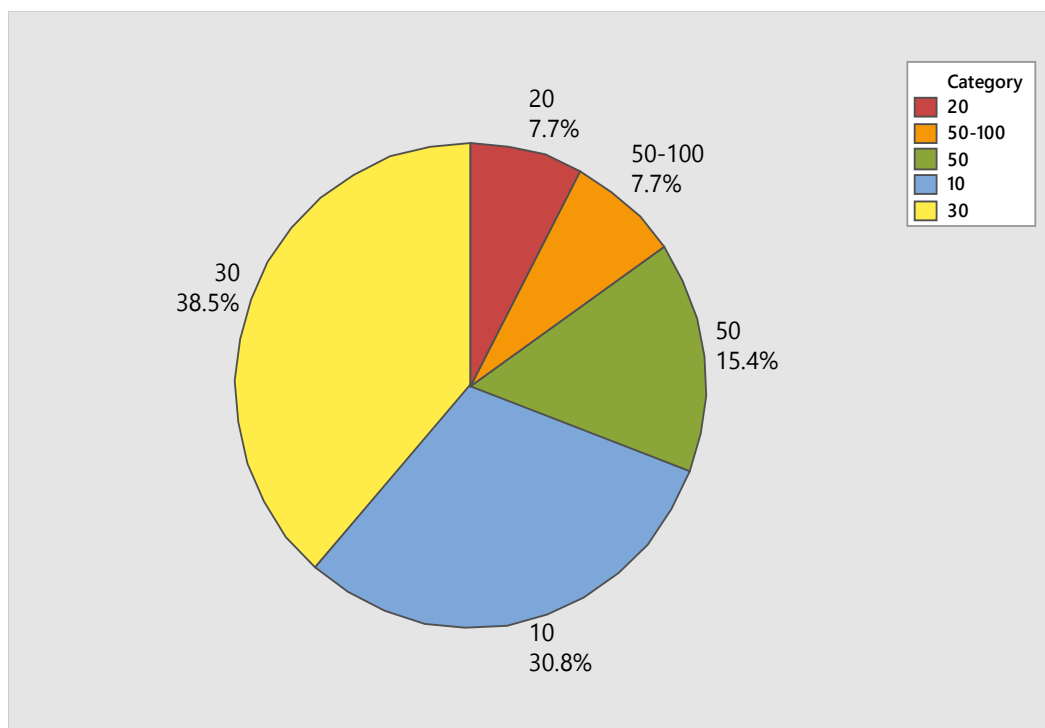


Figure 58: Categorization of preferred level of increase in millet consumption

Further, the level of millet inclusion (%) with regards to mixing millet/millet related foods and other foods/ingredients ranged from 5 to 100 with an average of 44.2 (Table 23).

Table 24: Level of inclusion of millet in millet based foods and preferred level of increase by respondents

Variables	N	Minimum	Maximum	Mean	Std. Error
Level of inclusion (%)	6	5	100	44.2	16.04
Preferred level of increase	1	20	20	20	-

Respondents indicated that transport cost, processing, availability of millet, quality and packaging were the key areas within the supply and availability chain of millet that needs urgent attention (Fig. 59). Particularly, 28.6% of the respondents mentioned that quality and availability of millet are the key areas that need to be addressed.

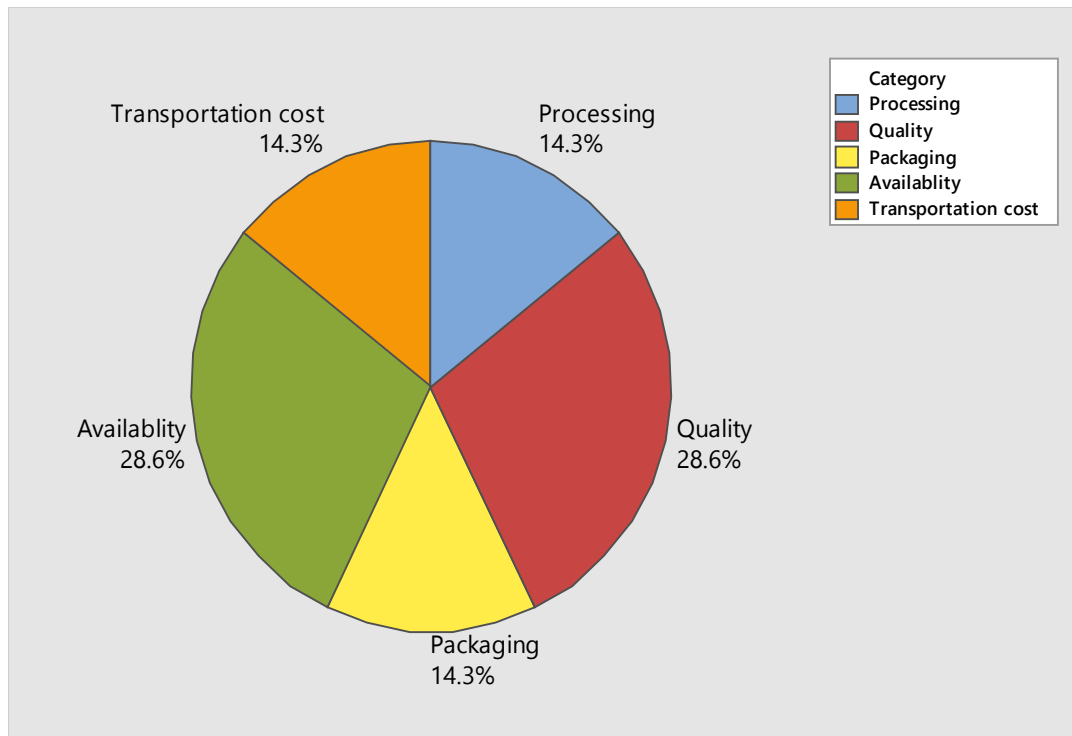


Figure 59: Areas in millet supply and availability the requires attentions

Most of the respondents (28.5%) showed that they are willing to learn new products from millet. Also, 20% of the respondents indicated the willingness to increase family consumption of millet. As a result, 38.5% of the respondents preferred to increase the family's millet consumption by 30% (Fig. 60).

Knowledge of government regulations to protect consumers as well as means of improving it enforcement was absent among majority of the respondents (76.7%). However, a few (3.3%) indicated that FDA, Ghana is responsible for protecting consumers with market surveys as a means to enhance enforcement (Fig 61).

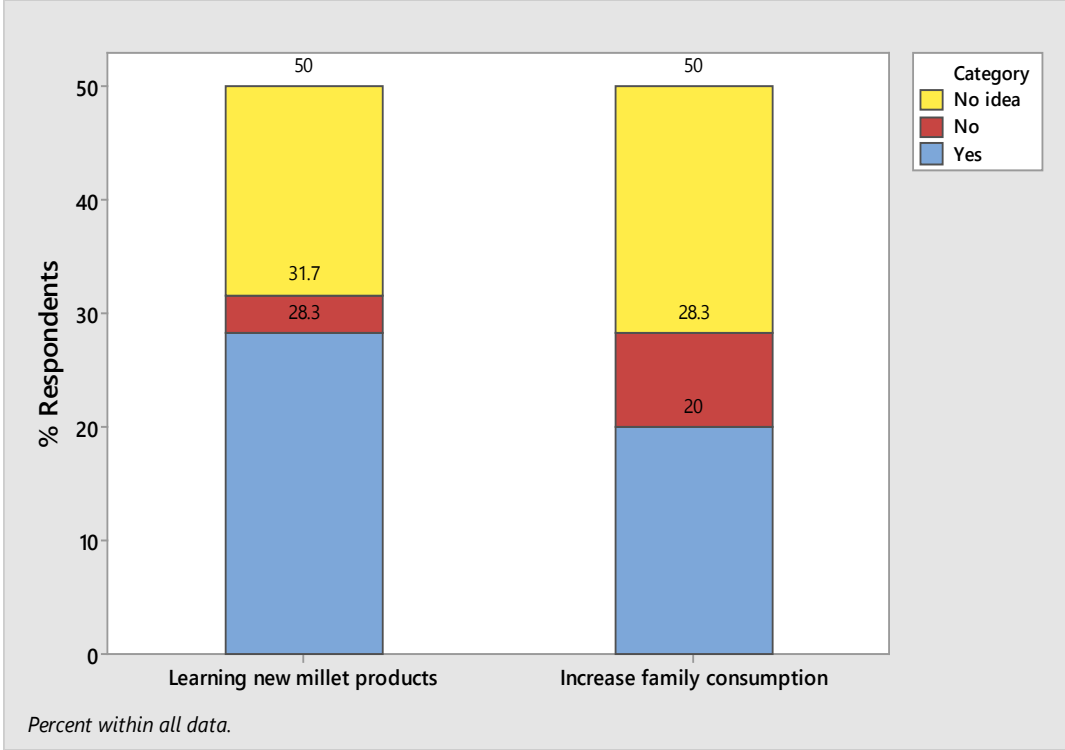


Figure 60: willingness to learn new and increase the consumption of millet by consumers

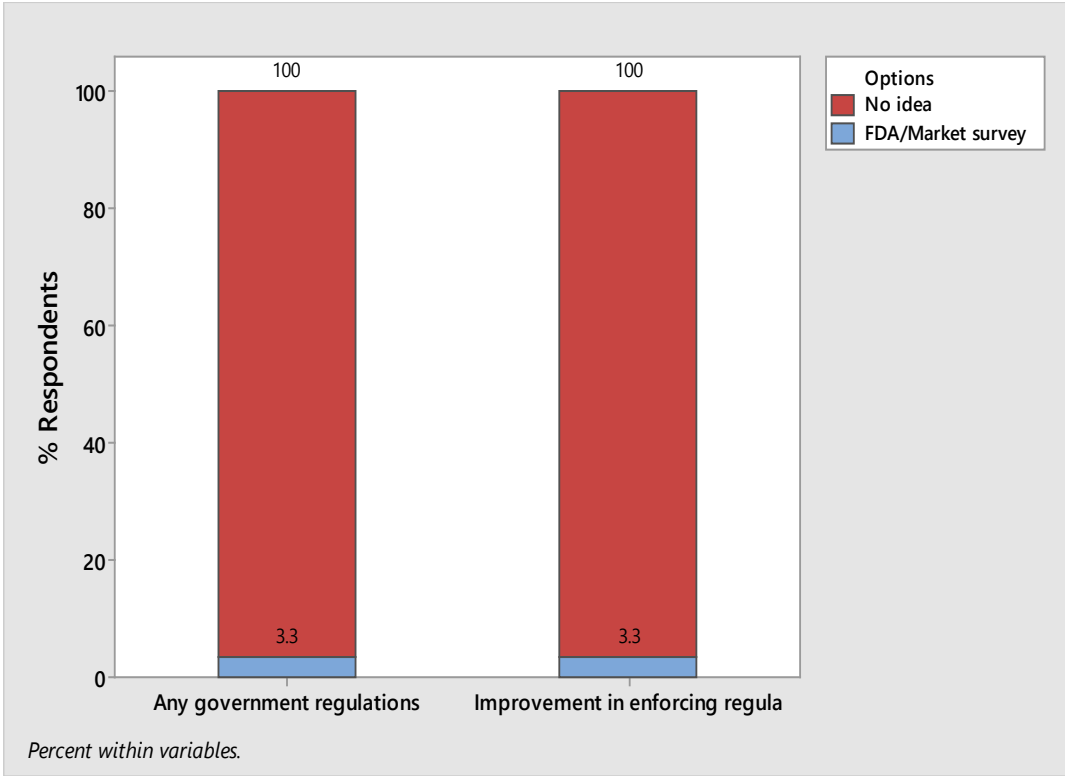


Figure 61: Regulations and enforcement of food safety issues to protect consumers

Considering issues bordering on general and millet related food safety and celiac diseases, majority of the respondents (100%,72.3% and 92.3%) had no idea (Fig. 62).

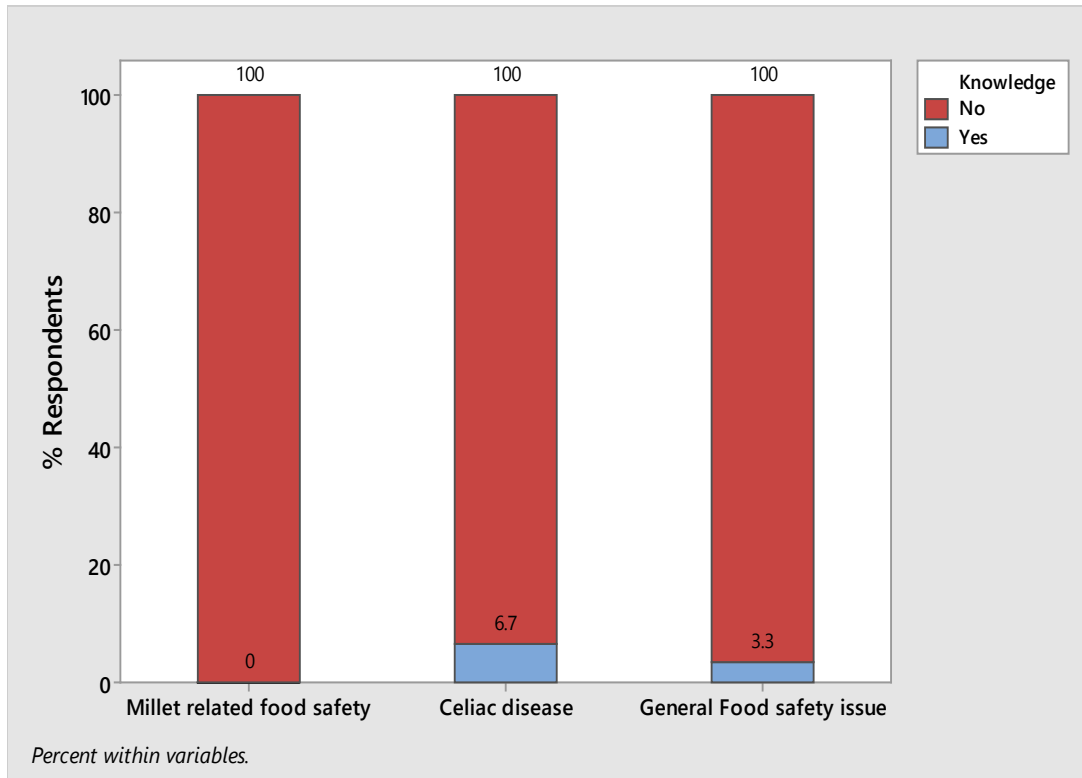


Figure 62: Knowledge on food safety and celiac diseases reported by respondents

Majority of the respondents (33.3%) who knew about CD indicated that celiac disease originates from consuming gluten related diet (Fig 63).

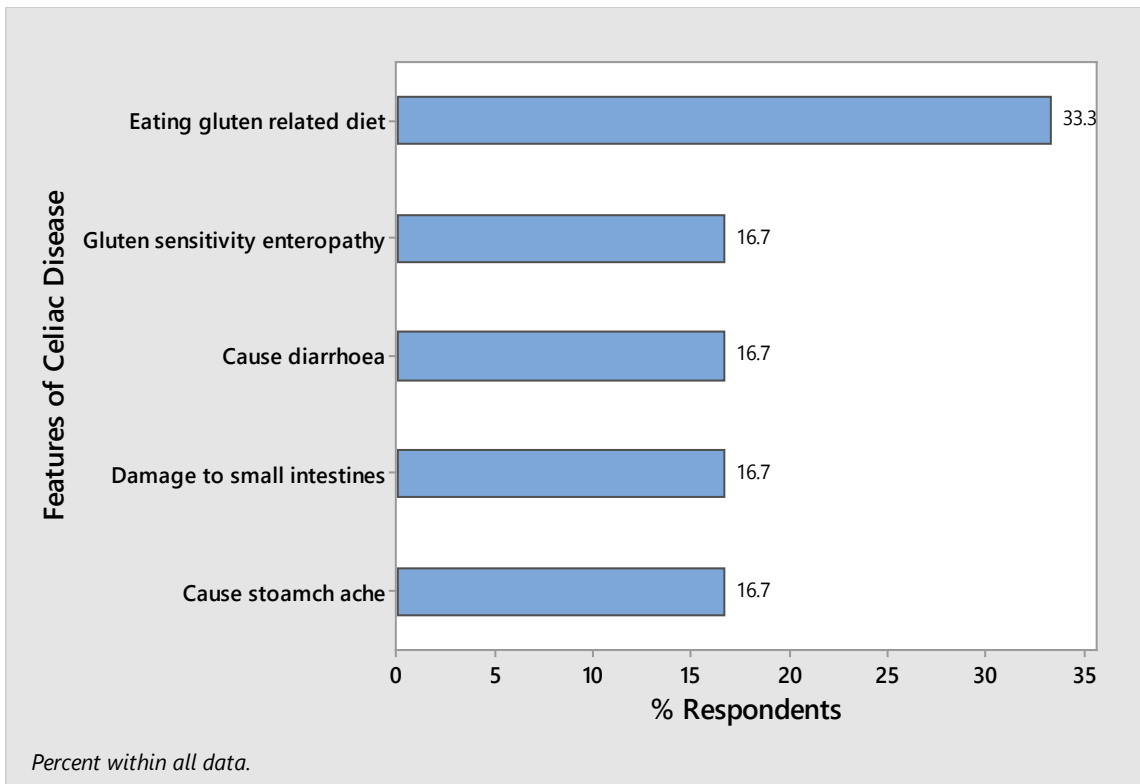


Figure 63: Knowledge on celiac diseases characteristics reported by respondents

DISCUSSIONS

4.1 Respondent motivation

Based on informal comments and observations made during pretest interviews, it seems likely that respondent motivation to participate in the upcoming interviews will be an important issue to address. For instance, 6 out of 9 SMEs respondents were reluctant in releasing information pertaining the value of production for last year and this year, even though they were aware that information gained will be held confidential. Further, the technicality of questions for consumers resulted in a dip in motivation for participation. Similarly, for traders, questions on quantity of millet per month (January - December) reduced enthusiasm in participation. Respondents for village level processors mentioned that 'the who buys it' option in Q19 was similar to Customer category which implies duplication of response as well as zeal reduction in answering the questions. Thus, it will be crucial to develop methods for encouraging participation and confidentiality.

4.2 Unspecified Likert scale

Request for clarification on the 6 – scale options for eliciting the impact of millet on production suggests that response inaccuracies and inconsistency may be introduced. In the absence of clarity, different respondents may answer the questions regarding Likert scale differently, possibly due to the experience of both the interviewer and the interviewee. For instance, most of the respondent attributed the highest positive value to 6 instead of 1. Secondly, most interviewers and interviewees used the serial number (S/N) for the ranking instead of stating it emphatically in the check box provided. Based on this observation, all the SMEs and 12 out of 20 respondents for the village level processors faulted. Based on the

above stated pretest reports and standard survey practice, Likert scale items should be clearly specified.

4.3 Non-exclusive and Non-exhaustive multiple choices

Several items seemed difficult for respondents to understand and answer because the response categories either overlapped, were non-exhaustive, or conveyed excessively complex perceptions. For instance, with SMEs Q 24 which centers on the preferred unit of millet to use, opinions of some respondents were beyond the multiple answers provided (e.g 100, 450, 600 kg). For VLP, Q19 which indicates ‘what is millet used product used for?’ confused respondents since they were limited to food per their experience, thus a concise multiple choice is needed. Again, for Q22 in the VLP questionnaires, the unit of measure should be both olonka and bags since most of the VLP are often inclined to olonka than bags.

Concerning consumers, multiple choices for Q16 and Q18 which state ‘Do you feed your children with millet meals?’ and ‘Do you feed your family with millet meals?’ respectively was not convenient for singles especially. Thus, to make the multiple choice exhaustive, ‘Not Applicable’ option should be included. Further, follow-up phrases should be applied to provide respondents with convenience in responding to the various questions. For instance, a follow-up phrase like ‘if Yes, how often do you feed your family members or kids. Regarding traders, multiple choices for Q13 was insufficient based on the fact that one respondent indicated that the business is owned by the sister – an option which was absent from the options provided. Hence, multiple choices should be exhaustive with follow-up phrases where possible to ensure consistency in responses.

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Taking cognizance of the upcoming project on millet, pre-testing of sample questions for the various stakeholders in the millet supply chain has revealed that some short falls which need to be addressed.

5.2 Recommendation

Steps to address the above-mentioned limitations encountered during the pre-testing periods are urgently advocated.

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