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## UNDERSTANDING TRADITIONAL BEER CONSUMPTION IN RURAL RWANDA: KEY INSIGHTS ON THE PREVALENCE, DOMINANCE AND PREFERENCES

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## ABSTRACT

The study aims to fill a research gap by analyzing the consumption patterns of traditional beers in rural areas of Rwanda, with a specific focus on how socio-demographic characteristics influence the prevalence of alcohol use, regional dominance, and preferences. It was conducted in four districts in Rwanda: Gisagara, Gicumbi, Kirehe and Rusizi, serving as the intervention study area. Data were collected in 2023 from 107 consumers, and various statistical tests were applied to generate insights into the consumption of traditional beer patterns across regions. The analysis took into account various socio-demographic aspects, including gender, age, age of first alcohol use and formal education levels, to understand patterns and differences in the consumption of traditional alcoholic beverages. Generally, the findings revealed significant differences in the consumption of traditional beer within rural communities throughout the study's four districts. In particular, statistically significant differences between males and females were noted in the consumption of banana beer. However, these variations were not statistically significant in sorghum beer, suggesting a more balanced consumption between sexes. Regarding the prevalence, the results indicated that middle-aged males are predominant consumers of traditional beers, especially those without or with a low level of formal education, such as completed only primary school. Early initiation into traditional beer consumption is still common and may contribute to alcohol use in adulthood, despite the current legal restrictions. Gicumbi remains the district with the highest consumption of sorghum beer, which reflects local preferences and brewing traditions. In contrast, Gisagara and Kirehe report the highest levels of banana beer consumption, highlighting the cultural and economic significance of banana-based beer in these two districts. These findings underscore the regional dominance and preferences for specific types of traditional beer. Recognizing these patterns could be essential for tailoring interventions that are health-related, economic, social and regulatory-centred perspectives, that aim to promote communities' well-being in rural areas.

**Key words:** consumption, prevalence, dominance, preference, banana beer, sorghum beer, traditional beers, Rwanda

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## INTRODUCTION

The consumption of alcoholic beverages has existed for many years in the world, and almost every society has a history with alcohol [1, 2]. Brewing and consuming traditional beers has been in the spirit of our ancestors for a long time [3]. Across different countries, people from various socio-economic backgrounds, especially in rural areas, are engaged in consuming traditional beers.

The consumption of traditional beers, like other alcoholic beverages, is tied to different socio-demographic patterns such as age, gender and education, to list a few. For instance, within the rural social structures, the production of traditional beer was typically under the female purview, whereas the consumption of beer was largely the preserve of elder men [4]. In Rwanda, like in other African countries, traditional beers such as banana and sorghum beers are among the most widely consumed alcoholic beverages by the population. These two famous traditional beers serve different roles in the lives of Rwandans, especially those in rural communities.

Traditional beers, such as sorghum and banana beers, are regarded as the diet of millions of people [5] and hence contribute to food security on a global scale [6,7]. As suggested by Sawadogo-Lingani et al. [8], notably, these traditional alcoholic beverages are considered as a source of potential human nutritional value, as they are brewed from locally produced raw materials reported to be rich in fiber, various proteins and essential minerals for the human body [9, 10]. In addition, the consumption of traditional beers also contributes to the safeguarding of socio-cultural values in societies [11]. In this regard, traditional beers are served as appetizers for social entertainment, customary practices, and religious purposes, among others [12, 13]. For example, in Rwanda, banana and sorghum beers were used to reward participants in labor pooling works traditionally known as “*Ubudehe*”. In this context, these traditional beers were observed as a tool for promoting social cohesion through mutual assistance among people living in the same area, and this, in the past, was preoccupied with agricultural activities to ensure timely farming operations and enhance food security purposes [14].

Beyond their sociocultural significance, traditional beers also play an important economic role, mainly in rural communities. Their consumption serves as one means of income diversification for producers and sellers [15, 16, 17]. Despite occasional questions regarding the quality of traditional African alcoholic beverages [18, 19], they remain widely consumed in Rwanda, particularly at home and in small taverns located in rural centers. Specifically, due to local regulations governing the sale and consumption of both conventional and non-conventional alcoholic beverages, rural



area residents typically visit taverns in the afternoon after spending long hours working on various activities such as crop production and livestock rearing.

In Rwanda, as in other African countries, traditional alcoholic beers, predominantly made from cereal and grains, with banana often as an adjunct [20, 21]. Well-known examples in Rwanda include banana beer, referred to as “*Urwagwa*”, and sorghum beer known as “*Ikigaga*” or “*Amarwa*”. These traditional beverages carry significant socioeconomic value through informal production and sale, and they are culturally embedded in community traditions. Yet, their widespread and often unregulated consumption raises concerns related to excessive alcohol intake and unsafe production practices. Despite their multifaceted importance in Rwandan society, there is a lack of studies examining alcohol prevalence through consumption patterns and its broader implications. This study, therefore, seeks to document and analyze consumption patterns that may influence alcohol prevalence, dominance and preference in rural areas of Rwanda.

## MATERIALS AND METHODS

### Study area

The present study was conducted in four districts located across different provinces of Rwanda. These include Gicumbi in the northern province, Gisagara in the southern province, Rusizi in the western and Kirehe in the eastern province. Being located in rural areas, the economies of these districts are primarily based on agricultural activities. The study areas were purposively selected not only for each district’s potential to produce raw materials used in brewing banana and sorghum-based traditional beers, but also due to the widespread local consumption of these beverages, particularly in rural small bars. This dual relevance makes it meaningful to capture insights into local consumption patterns and regional preferences of the traditional beer across Rwanda.

### Data frame and sampling

The data was gathered in October 2023 while conducting the diagnostic study of traditional beer consumers in four (4) Districts. A combination of two non-probabilistic sampling methods, including purposive and snowball approaches, was used. Purposive sampling targeted consumers in small bars across the four study areas, and this was chosen for its flexibility, as it does not require a fixed sample size or underlying theories [22], while ensuring the inclusion of participants with relevant experience and knowledge of traditional beer. To expand the sample while ensuring a culturally sensitive approach that respects the local traditions and social networks, a snowball approach was applied to get informed consent more effectively, as initial respondents were referred to others through trusted contacts [23], thereby fostering a sense of trust and ensuring voluntary participation and confidentiality during the



data collection. The data was obtained through a survey using a questionnaire administered to 107 non-randomly selected consumers of traditional beers (“*Urwagwa*” and “*Ikigage*”). Although modest, the sample is appropriate for the exploratory nature of this study, which does not aim for statistical generalization [24], but rather capturing meaningful analysis of the consumption prevalence through frequencies in drinking, dominance and preferences. Additionally, due to financial and logistical limitations that have prevented the expansion of the sample size, a targeted and purposeful approach was more practical in the study. Data on socio-demographic variables such as age, sex, and educational attainment were electronically recorded using A Kobo Collect software. The age variable was separated into three groups, and levels of education were split into primary school, secondary and vocational training school. Additional data was gathered on consumed quantities and weekly drinking frequency to understand the consumption patterns. Additional information about the sample distribution is provided in Table 1.

### Methods of data analysis

In this study, the analysis was conducted using RStudio software. The information was presented in tables with descriptive statistics summarizing attributes of the respondents. In addition to the descriptive statistics, various statistical tests were performed to understand the differences and conclude about the prevalence, dominance and preferences of the type of traditional beer consumed across regions. To assess the data distribution, non-parametric tests, including the Shapiro-Wilk normality test, were first performed. Based on the non-normal distribution of the data, non-parametric tests, including the Kruskal-Wallis test and a post hoc Dunn test with Bonferroni correction, were performed to ensure robust and accurate analysis. Considering a 5% margin error, the results of these tests have indicated whether there are significant differences in the mean quantities across the four districts, as well as socio-demographic characteristics such as gender, age and education, and thus supporting conclusions on regional preferences for traditional beer types. In line with the method used by Knight *et al.* [25] in studying traditional alcohol consumption among *Mbendjele* communities living in Congo, a prevalence was assessed based on weekly frequency of consumption of *Urwagwa* and *Ikigage*, rather than the conventional approach of recalling on alcohol consumption over the last two weeks. This is because *Urwagwa* and *Ikigage* consumption are not consistent across time in small bars and depend on availability and access in small bars.

## RESULTS AND DISCUSSION

### Socio-demographic characteristics of the consumers of traditional beers

As illustrated in Table 2, the present study involved a majority of males (77), representing 72.0% and a minority of women (30), representing 28.0%, in the study area. Across all districts, namely Gisagara, Gicumbi, Kirehe and Rusizi, a gender



disparity in the consumption of traditional beer was observed. Similar findings have been documented in other African countries. For instance, in Cameroon, [26] reported that, while women were historically the traditional brewers of African beers, men were the primary consumers. In Kenya, [27] and [28] reiterated that, although traditional beers have become a business primarily run by women, their consumption, particularly of brews like *Busaa* and *Chang'aa*, remains largely controlled by elderly men. Likewise, men dominate in the consumption of *Palm wine* (sap from palm trees or raffia palm), *Burukutu* and *Pito* (fermented from sorghum or maize), which are the main traditional alcoholic beverages locally produced and consumed in Nigeria [29].

Looking at the age distribution of consumers of traditional beers, the results show that the consumption of traditional beer varies across groups in the study area. The highest proportion (68.2%) of consumers falls within the adult age group (31-55 years), followed by a substantial number of younger individuals (18.7%) aged between 18 and 30. Only a small proportion of the elderly group of individuals (above 56 years old) consume traditional beers. In Rwanda, a country with a youthful population, older age groups are less likely to engage in traditional beer consumption compared to younger and middle-aged adults. This phenomenon is also evident in Botswana, where the findings revealed that reduced beer consumption among older individuals is attributed to caregiving duties often associated with this demographic group of people [30].

The study also analyzed consumer behavior by assessing the age of first initiation of alcohol use through traditional beer consumption. The findings revealed that, across the four study districts, a significant proportion started drinking alcohol at an early (under 18 years) and youthful age (18-30 years), while initiation after 30 years old was relatively low. Specifically, early initiation of alcohol use ranged from 36.4% to 54.2% per district, young initiation from 45.8% to 58.1%, and late initiation from 0.0% to 9.1%. Despite the legal prohibition of underage alcohol consumption in Rwanda, these results suggest that early initiation contributes to the prevalence of alcohol use in adulthood. This finding is consistent with earlier studies, which concluded that the early and young age of alcohol use may lead not only to higher drinking intensity and prevalence in adulthood [31, 32], but also, to high dependence on alcohol and other adverse health outcomes [33, 34].

Furthermore, the study assessed the educational background of traditional beer consumers. The findings revealed that most consumers have no formal education (13.1%) or low educational attainment (up to primary level, 76.6%). As the population who completed secondary school and other high levels is relatively low, this suggests that individuals with higher education levels may be more likely to drink modern brews rather than traditional beers. Similarly, while these results corroborate



the views of Rashied [35], who observed that the consumption of alcohol decreases with increasing education, income and age; they contradict the conclusions of Khamis *et al.* [36] who argue that education is among the key socio-demographic and economic factors that expose individuals to alcohol consumption.

### **Drinking frequency patterns for traditional beers across the study areas**

The frequency of weekly drinking of traditional beers was used to assess the prevalence of alcohol use among the population across districts. As indicated in Table 3, banana and sorghum beers are most frequently consumed 3-5 times per week across all districts (44.8%), with a high rate observed in Gisagara (72.0%), whereas consumers in Rusizi and Kirehe tend to drink on special occasions (54.5% and 47.5%, respectively). However, the upper boundary (5 times per week) and the midpoint (4 times per week) of the frequency of drinking are consistent with the findings of the study conducted by Kayodé *et al.* [37], who investigated the technological and socioeconomic aspects of the consumption patterns of *Tchoukoutou* and *Chakpalo* in Benin. This similarity suggests that the high frequency of consumption (3-5 times a week) of *Urwagwa* and *Ikigage* across districts reflects a broader regional pattern, thereby leading to the same conclusion. This underscores not only the cultural significance but also the other multifaceted roles played by traditional beers in the communities [38]. Therefore, the overall findings indicate a significant prevalence in rural communities, where regular weekly consumption is culturally common and accepted.

### **Drinking frequency for traditional beers by socio-demographic patterns**

The assessment of drinking episodes differs across socio-demographic aspects such as gender, age and education. As illustrated in Table 4, males consume traditional beers more frequently than females across all categories of weekly intake. For instance, the results show that 81.2% of the surveyed consumers who consume banana and sorghum beer every day are males. Females show a relatively lower frequency but still participate notably, especially on special occasions (33.3%). These findings corroborate the views of Agbley *et al.* [39] noting the dominance of males over females in the consumption of traditional beer in the Ho municipality of Ghana, and those of Carina *et al.* [40] who linked the alcohol use among men of the Ijaw community in Bayelsa, Nigeria, to perceptions of superiority.

Regarding age, the findings indicate that adults aged 31-55 years have the highest frequency of consuming traditional beers across most weekly categories. Young adults (18-30 years) have a moderate frequency, with 37.6% drinking daily and 22.9% consuming 3-5 times per week. Older adults (above 55 years) have the lowest drinking frequency, with minimal daily consumption and moderate consumption on weekends. In this context, the data indicate the high prevalence in traditional beer consumption among males and adults aged 31-35, who demonstrate a high rate of



frequent drinking episodes per week. However, the considerable rate of daily consumption rate among young adults (18-30 years) also underscores the contribution to the prevalence of alcohol use in rural communities.

Taking into consideration educational attainment, consumers with little to no formal education, such as those without schooling or with only a primary education, are the most frequent consumers of traditional beer. For instance, the findings reveal that 12.5% and 77.1% of individuals who consume beer 3-5 times per week fall into these categories. In contrast, those with secondary education exhibit moderate to low consumption frequencies, while individuals with vocational training have minimal representation. This pattern reveals an inverse relationship between education level and traditional beer consumption, aligning with the findings of Ziegel *et al.* [41], who indicated a strong negative correlation between high educational attainment and alcohol use in Uganda. These findings suggest that high educational attainment may serve as a protective factor for the prevalence of alcohol use, according to the data, noted among individuals with little or no formal education across districts.

### **Dominance in the consumption of traditional beers in rural areas**

In addition to assessing the prevalence of traditional beer consumption based on weekly frequency, the study also examined the pattern of dominance of sorghum and banana beer in geographic areas and socio-demographic factors through the mean quantity consumed per week. As a general result, the mean quantity of sorghum and banana beer consumed per week varies significantly across districts. Specifically, for sorghum beer, the differences in mean quantity are statistically highly significant as evidenced by the Kruskal-Wallis' test ( $W= 36.034$ ;  $P= 0.0000$ ). However, although observed, the variations in weekly mean quantities are not statistically significant when other demographic factors such as gender, age and education are taken into account. These findings highlight the geographic dominance of Gicumbi district in the sorghum beer consumption.

With regard to the banana beer, the estimated weekly mean quantity also varies significantly across all districts ( $W=16.201$ ,  $P=0.0010$ ), with males significantly dominating females ( $W=6.3791$ ,  $P=0.011$ ). More precisely, except for Kirehe District, males consume nearly twice the weekly mean quantity of banana beer consumed by females in other districts. These findings witness the dominance of males in the consumption of traditional beer, such as *Ikigage* and *Urwagwa* in Rwanda, shaped by the geographic context.

The influence of the geographic area on the consumption of alcoholic beverages has also been documented in previous studies, such as those of Donadini & Spigno [42] in Namibia and others across sub-Saharan countries [43, 44]. This observed dominance of males is further supported by the existing literature, which consistently



shows that men are more likely to consume traditional alcoholic beverages and tend to drink larger quantities than women [45, 46, 47]. In Rwanda, there is also a local saying "Inzoga ni iy'Abagabo", meaning that "Banana beer is for men", which reflects this perception, making traditional beer, especially banana beer, a symbol of masculinity [48, 49]. These gender-based differences underscore the dominance of men in the consumption of traditional beer, shaped by the cultural norms that tolerate and even encourage males to drink [50].

Concerning age, although the observed differences in weekly mean quantity of both banana and sorghum beer are not statistically significant for either type of beer (sorghum beer:  $W=1.2936$ ;  $p=0.5237$ , banana beer:  $W=0.9683$ ;  $p=0.6162$ ), some age-related patterns are observable across districts. Specifically, except for Rusizi, the highest weekly mean quantities of sorghum beer are consumed by people aged between 18 and 30 years and from 30 to 55 years. Although not statistically confirmed, this suggests the potential dominance of younger and middle-aged adults in the consumption of traditional beers. Unexpectedly, these results contrast with previous studies, such as those of Cravero *et al.* [51], which suggested that alcohol consumption differs significantly with the age of consumers.

Furthermore, when analyzing the consumption of banana and sorghum beer by education levels. The results revealed that there is variability across all four districts. Although not statistically significant, this variability, characterised by the wider confidence intervals (CIs), was particularly observed in Gisagara and Rusizi Districts. In conclusion, all districts showed the variations in the weekly mean quantities of sorghum beer consumed, with Gicumbi recorded the highest consumption of sorghum beer while Gisagara and Kirehe showed the dominate in Banana beer. Nevertheless, these differences are not attributed to socio-demographic characteristics such as gender, age, or education in any of the districts.

Regarding the consumption of banana beer, significant gender-based differences were observed. Gisagara recorded the highest weekly mean consumption (3.32 liters and 4.20 liters). However, no statistically significant differences were observed in the mean quantities consumed when considering age and education level. The disparities in the consumption underscore the importance of cultural practices, the availability of different types of beers across regions, and other socio-demographic factors. For instance, in Rwanda, some regions are recognized as hubs for brewing specific types of traditional alcoholic beers, such as sorghum beer in Gicumbi district (6.75 liters), which has the highest consumption rates. Table 5 provides further insights into the mean quantities of sorghum and banana beers weekly consumed by gender, age and levels of education.

### **Preferences in the consumption of traditional beer across regions and gender**

As illustrated in Table 5, the Kruskal-Wallis' test showed significant differences in weekly mean quantities of both sorghum and banana beers consumed across four districts and between males and females (only for banana beer). To validate these regional and gender-based preferences, a pairwise comparison of weekly means was initiated. According to Table 6, the Bonferroni post-hoc test showed that, for sorghum beer, there are significant differences between Gicumbi and Gisagara (mean difference of 3.17 liters,  $p=0.0045$ ), Gicumbi and Kirehe (2.53 liters,  $p=0.0344$ ), and between Gicumbi and Rusizi (5.99 liters,  $p=0.0000$ ). On the other hand, no significant differences were observed in the remaining districts, suggesting that Gicumbi is the dominant district in sorghum beer consumption. As also noted by Musabanganji *et al.* [7], the preference for sorghum beer in Gicumbi may be attributed to the district's prominence as a producer of sorghum in Rwanda.

Additionally, when comparing Gisagara and Kirehe to the Rusizi district regarding the banana beer, the significant differences in the weekly mean quantities consumed are evident, suggesting that the former two districts consume more of this alcoholic beverage. In particular, the mean difference between Gisagara and Rusizi (3.20 liters,  $p=0.0040$ ) and Rusizi and Kirehe (3.21 liters,  $p=0.0039$ ) is nearly the same and significant at the 5% level. However, despite Gicumbi having a higher mean quantity than Rusizi, the difference is not statistically significant. In line with this outcome, the dominance of Kirehe and Gisagara exhibits the preference for banana beer in these two districts.

Regarding gender, pairwise comparisons of the weekly mean of banana beer consumption across the four districts revealed notable differences with some significant variations. As shown in Table 7, the results indicate that, in Gisagara and Kirehe, males consume, on average, more than females by 2.27 and 2.22 liters, respectively ( $P<0.05$  in both districts). However, in Gicumbi and Rusizi, males also consume relatively more than women, but the differences are not statistically significant ( $P>0.05$ ). This pattern of male dominance in Rwanda is consistent with the findings of Dumbili [52] and Clausen *et al.* [53], who reported that men are generally more likely to engage in alcohol consumption but also show a stronger preference for traditional brews in countries such as Nigeria and other parts of sub-Saharan Africa.

### **Limitations of the study**

For several reasons, it is important to acknowledge the limitations of this study. First of all, the data on the consumption of traditional beer is self-reported by the respondents and may be subject to social bias resulting from the under- or overestimation of consumption frequencies. Second, the dataset might not reflect the information on informal and unregulated consumption of traditional beers. Third,



only four districts (Gicumbi, Gisagara, Kirehe and Rusizi) were considered in the geographic study's area, which might result in limited generalizability. Lastly, the lack of longitudinal data restricts the understanding of how consumption changes over time. Addressing these limitations in future research would contribute to a better understanding of alcohol prevalence, dominance and preference across other rural regions of Rwanda.

## CONCLUSION AND RECOMMENDATIONS FOR DEVELOPMENT

The present study highlights the consumption patterns of Rwanda's traditional beers, focusing on four districts Gisagara, Gicumbi, Kirehe and Rusizi. It offers descriptive insights into the prevalence, dominance and preferences of banana and sorghum beers across the study area. The results revealed that traditional beer consumption is dominated by males. Regarding education, consumption is high among less-educated individuals and lower among those with high educational attainment. Concerning age, the study pointed out that the prevalence of traditional beer consumption is high among aged adults (31-55 years) who mostly consume at least 3 to 5 times per week. Despite the existence of the law of prohibition, the early initiation in alcohol use was also noted, with the highest prevalence observed during adolescence (under 18) and early adulthood (18 to 30 years).

Regarding the frequency of traditional beer consumption, the results show that banana and sorghum beer are predominantly consumed 3-5 times per week by middle-aged male adults (31-55 years) and individuals without or with a low level of education, such as those who completed only primary school. Analysis of the weekly quantity of banana and sorghum beer consumed also revealed significant differences between regions. Additionally, substantial differences in weekly mean quantities of banana beer consumed by males and females were observed, particularly in Gisagara and Kirehe districts, where this type of traditional beer is preferred over sorghum beer.

Lastly, given that traditional beers are home-brewed, these findings highlight the need for targeted interventions addressing both consumption and production. Producers should consider regional preferences, while efforts to curb underage drinking and promote alcohol education, such as public campaigns and awareness initiatives, should be prioritized, especially in areas where banana and sorghum beers are widely consumed. These alcoholic beverages also play a key role in supporting rural informal economies and promoting socio-economic well-being across all age groups and genders. Additionally, given the dynamic nature of the traditional beer consumption across the four districts, such as regional preferences for sorghum beer in Gicumbi District and banana beer in Gisagara and Kirehe and their gender-based dominance, further research should incorporate longitudinal



studies to track how consumption trends evolve and their broader socioeconomic impacts. This will inform evidence-based policies and interventions to support the sustainable growth of traditional brewing and consumption practices while addressing challenging issues such as public health, informal economies and cultural norms.

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## **Conflict of interest statement**

The author declares that there is no conflict of interest regarding this publication. The research was conducted with full academic integrity and objectivity.



**Table 1: Sample distribution across the study area**

Province	District	Geographic coordinates	Number of respondents
North	Gicumbi	1° 34' 45" S; 30° 4' 4"E	31
South	Gisagara	1° 43' 58" S; 29° 41' 50" E	25
East	Kirehe	2° 15' 24" S; 30° 43' 34" E	11
West	Rusizi	2° 34' 12" S; 29° 4' 31" E	40
<b>Total</b>			<b>107</b>

Source: Survey data, 2023

**Table 2: Socio-demographic characteristics of the consumers**

Characteristics		Gicumbi	Gisagara	Kirehe	Rusizi	Overall
<b>Gender</b>	Male	24 (77.4%)	15 (62.5%)	8 (72.7%)	30 (75.0%)	77 (72.0%)
	Female	7 (22.6%)	10 (37.5%)	3 (27.3%)	10 (25.0%)	30 (28.0%)
<b>Age</b>	18-30	7 (22.6%)	5 (20.0%)	1 (9.1%)	7 (17.5%)	20 (18.7%)
	31-55	19 (61.3%)	16 (64.0%)	10 (90.9%)	28 (70.0%)	73 (68.2%)
	Above 55	5 (16.1%)	4 (16.0%)	0 (0.0%)	5 (12.5%)	14 (13.1%)
<b>Age of drinking initiation</b>	Under 18 years old	12 (38.7%)	14 (56.0%)	4 (36.4%)	20 (50.0%)	50 (46.7%)
	18-30	18 (58.1%)	11 (45.8%)	6 (54.6%)	20 (50.0%)	55 (51.4%)
	Above 30	1 (3.2%)	0 (0.0%)	1 (9.1%)	0 (0.0%)	2 (1.9%)
<b>Education</b>	None	4 (12.9%)	2 (8.0%)	0 (0.0%)	8 (20.0%)	14 (13.1%)
	Primary	24 (77.4%)	18 (72.0%)	11 (100.0%)	29 (72.5%)	82 (76.6%)
	Secondary	3 (9.7%)	4 (16.0%)	0 (0.0%)	3 (7.5%)	10 (9.3%)
	Vocational training	0 (0.0%)	1 (4.0%)	0 (0.0%)	0 (0.0%)	1 (1.0%)

Source: Survey data, 2023



**Table 3: Drinking intakes (frequency) across the study area**

Characteristics		Gicumbi	Gisagara	Kirehe	Rusizi	Overall
Frequency of consuming traditional beers	3 -5 times a week	13 (41.9%)	18 (72.0%)	5 (45.5%)	12 (30.0%)	48 (44.8%)
	Every day	13 (41.9%)	2 (8.0%)	0 (0.9%)	1 (2.5%)	16 (14.9%)
	On special occasions	2 (6.5%)	3 (12.0%)	6 (54.5%)	19 (47.5%)	30 (28.0%)
	Once a week	3 (9.7%)	1 (4.0%)	0 (0.0%)	7 (17.5%)	11 (10.3%)
	Only on weekends	0 (0.0%)	1 (4.0%)	0 (0.0%)	1 (2.5%)	2 (1.9%)

Source: Survey data, 2023

**Table 4: Drinking intakes by age group, gender and level of education**

Characteristics		3- 5 times a week	Every day	On special occasions	Once a week	Only on weekends
Gender	Male	38 (79.2%)	13 (81.2%)	20 (66.7%)	6 (54.5%)	1 (50.0%)
	Female	10 (20.8%)	3 (18.8%)	10 (33.3%)	5 (45.5%)	1 (50.0%)
Age	18-30	11 (22.9%)	6 (37.5%)	2 (6.7%)	2 (18.2%)	0 (0.0%)
	31-55	28 (60.4%)	9 (56.2%)	25 (83.3%)	9 (81.8%)	1 (50.0%)
	Above 55	9 (18.7%)	1 (6.3%)	3 (10.0%)	0 (0.0%)	1 (50.0%)
Education	None	6 (12.5%)	2 (12.5%)	4 (13.3%)	1 (9.1%)	1 (50.0%)
	Primary	37 (77.1%)	13 (81.2%)	23 (76.7%)	9 (81.8%)	0 (0.0%)
	Secondary	5 (10.4%)	1 (6.3%)	2 (6.7%)	1 (9.1%)	1 (50.0%)
	Vocational training	0 (0.0%)	0 (0.0%)	1 (3.3%)	0 (0.0%)	0 (0.0%)

Source: Survey data, 2023



**Table 5: Weekly mean quantity (in liters) of sorghum and banana beer across districts**

Geographic areas		Gisagara	Gicumbi	Kirehe	Rusizi	X <sup>2</sup> Kruskal-Wallis	P_Value
<b>Sorghum beer (Ikigage)</b>							
District	Overall	3.60 (2.45-4.74)	6.75 (5.17-8.30)	3.36 (2.61-4.11)	2.07 (1.50-2.64)	36.034	0.0000** *
Gender	Male	3.80 (2.37-5.22)	6.88 (5.02-8.74)	3.5 (2.50-4.50)	2.1 (1.39-2.81)	0.6740	0.4116
	Female	3.30 (1.01-5.58)	6.29 (2.63-9.94)	3 (0.56-5.48)	2 (0.99-3.01)		
Age	(18-30)	2.17 (0.00-4.41)	6.29 (5.41-7.17)	-	3.57 (1.73-5.41)	1.2936	0.5237
	(31-55)	4.13 (2.38-5.88)	7.21 (4.74-9.68)	3.40 (2.56-4.24)	1.68 (1.06-2.94)		
	Above 55	3.75 (1.36-6.14)	5.62 (1.14-10.10)	-	2.20 (0.16-4.24)		
Education	None	5.00 (5.00-5.00)	6.00 (0.00-15.46)	-	2.25 (0.72-3.78)	1.302	0.7287
	Primary	3.83 (2.32-5.34)	6.75 (4.50-8.81)	3.36 (2.61-4.52)	2.03 (1.33-2.74)		
	Secondary	2.50 (0.00-5.81)	7.67 (0.00-17.71)	-	2.00 (0.00-4.45)		
	TVET	1.00 (na-na)	-	-	-		
<b>Banana beer (Urwagwa)</b>							
District	Overall	3.32 (2.32-4.31)	2.51 (1.50-3.53)	3.40 (2.76-4.06)	1.32 (0.96-1.70)	16.201	0.0010** *
Gender	Males	4.20 (2.94-5.46)	2.86 (1.63-4.12)	3.81 (3.18-4.44)	1.50 (1.06-1.94)	6.3791	0.0011** *

	Females	2.00 (0.57-3.43)	1.26 (0.00-2.86)	2.33 (0.90-3.77)	0.80 (0.14-1.46)		
Age	(18-30)	1.83 (0.00-3.76)	2.71 (0.23-5.20)	5.00 (na-na)	1.57 (0.28-2.86)	0.9683	0.6162
	(31-55)	4.07 (2.97-5.16)	2.63 (1.21-4.05)	3.25 (0.00-3.86)	1.18 (0.78-1.57)		
	Above 55	2.75 (0.00-8.76)	1.80 (0.00-5.13)	-	1.80 (0.00-3.64)		
Education	None	5.00 (0.00-43.12)	1.75 (0.00-5.30)	-	1.63 (0.63-2.62)	0.9820	0.8056
	Primary	3.33 (2.16-4.50)	2.63 (1.45-3.79)	3.41 (2.76-4.06)	1.28 (0.83-1.72)		
	Secondary	2.50 (0.00-2.29)	2.67 (0.00-5.03)	-	2.27 (0.00-14.14)		
	TVET	3.00 (na-na)	-	-			

Statistical significance at the 99% (\*\*\*), 95% (\*\*) and 90% (\*) confidence levels

Source: Survey data, 2023

**Table 6: Comparisons of mean differences between districts of the study zone**

<b>Sorghum beer</b>			
Comparison of x by district (Bonferroni)			
Col Mean \ Row Mean	Gicumbi	Gisagara	Kirehe
Gisagara	3.172554 0.0045*		
Kirehe	2.528387 0.0344*	0.095441 1.0000	
Rusizi	5.996006 0.0000*	2.282611 0.0674	1.607916 0.3236
alpha = 0.05 Reject Ho if $p \leq \alpha/2$			
<b>Banana beer</b>			
Comparison of x by district (Bonferroni)			
Col Mean \ Row Mean	Gicumbi	Gisagara	Kirehe
Gisagara	-1.813595 0.2092		
Kirehe	-2.177012 0.0884	-0.764250 1.0000	
Rusizi	1.378204 0.5044	3.205698 0.0040*	3.212802 0.0039*
alpha = 0.05 Reject Ho if $p \leq \alpha/2$			

(\*) significant level at 5%

Source: Survey data, 2023



**Table 7: Comparisons of mean differences between men and women across the study zone**

District	Mean Difference (Females – Males)	p-value	Significance
Gisagara	-2.265346	0.0117*	Significant
Gicumbi	-1.279306	0.1004	Not Significant
Kirehe	-2.220332	0.0132*	Significant
Rusizi	-1.633589	0.0512	Not Significant

(\*) significant level at 5%.

Source: Survey data, 2023



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