

Egg Production and Consumption: A Case Study in Teshie Municipality, Ghana

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Research Article

Article History:

Received: 16.03.2023

Accepted: 18.07.2023

Published online: 20.12.2023

Keywords:

Teshie Municipality
Egg production
Egg consumption rate
Production system
Ghana

ABSTRACT

This study was carried out to assess the production and consumption rate of eggs in Teshie municipality located in Greater Accra, Ghana. A total of 118 questionnaires were administered to the inhabitants of Teshie Municipality to assess the rate of egg consumption and production patterns among consumers, sellers, and producers. Seventy-eight of the respondents were egg consumers, 36 were egg sellers and 4 were egg producers (poultry farmers). Most of the egg consumers (71.9%), producers (50%), and sellers (63%) were Christians. The vast majority of the egg producers (75%) and consumers (59%) were men, but most (94%) of the sellers were women. All the respondents had some form of formal or informal education. All the egg producers and most (61.1%) of the egg sellers were between the ages of 36 and 60 years however, egg consumption was highest among the age range of 19 to 35 years. The egg consumption rate was very low (4 times/ week) in the study. All the egg producers reared their chickens in the deep litter system and reported high mortality (75%) among hens during the dry spell.

Yumurta Üretimi ve Tüketimi: Teshie Belediyesi (Gana) Anket Çalışması

Araştırma Makalesi

Article History:

Received: 16.03.2023

Accepted: 18.07.2023

Published online: 20.12.2023

Anahtar Kelimeler:

Teshie Belediyesi
Yumurta üretimi
Yumurta tüketim oranı
Üretim sistemi
Gana

ÖZ

Bu çalışma, Gana'nın Greater Accra bölgesinde yer alan Teshie Belediyesi'nde yumurta üretim ve tüketim oranını değerlendirmek amacıyla yapılmıştır. Tüketiciler, satıcılar ve üreticiler arasında yumurta tüketim oranını ve üretim modelini değerlendirmek için Teshie Belediyesi sakinlerine toplam 118 anket uygulanmıştır. Ankete katılanların 78'ini yumurta tüketicisi, 36'sını yumurta satıcısı ve 4'ünü yumurta üreticisi (kümes hayvanı yetiştiricisi) oluşturmaktadır. Yumurta tüketicilerinin (%71.9), üreticilerinin (%50) ve satıcılarının (%63) büyük çoğunluğunun Hristiyan olduğu görülmüştür. Yumurta üreticilerinin (%75) ve tüketicilerinin (%59) çoğunun erkek, ancak satıcılarının çoğunun (%94) kadın olduğu tespit edilmiştir. Tüm katılımcıların resmi ya da gayri resmi bir eğitim seviyesine sahip olduğu görülmüştür. Yumurta üreticilerinin tamamı ve yumurta satıcılarının çoğu (%61.1) 36-60 yaş aralığında yer alırken, yumurta tüketimi en fazla 19-35 yaş aralığında gerçekleşmiştir. Çalışmada yumurta tüketim oranı çok düşük bulunmuştur (haftada 4 kez). Tüm yumurta üreticileri; tavuklarını yerde veya altlıklı üretim sisteminde yetiştirdiklerini ve tavuklar arasında ölüm oranının çoğunlukla (%75) kuru mevsimde olduğunu belirtmiştir.

To Cite: Pomaah AN., Abdallah N., Kurşun K., Baylan M. Egg Production and Consumption: A Case Study in Teshie Municipality. *Osmaniye Korkut Ata Üniversitesi Fen Bilimleri Enstitüsü Dergisi* 2023; 6(Ek Sayı): 454-466.

Introduction

Consumption of poultry products is becoming increasingly important in Africa (Killebrew and Plotnick, 2010) as they are a cheaper source of protein (Kwadzo et al., 2013). Between the year 2000 to 2013, Nigeria followed by South Africa, Egypt, Algeria, Morocco, Tunisia and Kenya were the leading egg producers in Africa (Linden, 2015). Nigeria is now the leading egg producer in Africa (Umuahia, 2022). Egg production in Africa is still very low level although the need for high-quality nutrients such as protein and minerals. Furthermore, the demand for poultry products, especially eggs has increased tremendously due to increasing levels of income and standard of living.

Flake and Ashitey (2008), reported that 80% of the commercial poultry farms in Ghana were small and medium-scale farms however, the role of the poultry industry in rural livelihoods, food security, and poverty reduction, as well as the supply of protein requirements is enormous (Yevu and Onumah, 2021). Besides that, Maguregui (2022), reported that poultry production in Ghana has a great value on the country's economy, accounting for 14% of the country's total gross domestic product. Ghana was reported to lag behind with an animal protein intake of 53g/ capita/day against the recommended intake 65g (Anning, 2006). Kusi et al. (2015) also reported that the estimated per capita consumption of poultry products in Ghana increased from 3.5kg of meat in 2003 to 7kg in 2012. According to FAOSTAT (2023), egg consumption per capita reached 1.07kg in 2020 in Ghana which was 1.90% more than the previous year. Since the demand for poultry products exceeds local production, the shortfall in animal protein intake is seen as a supply problem rather than a demand problem. In line with this, Flake and Ashitey (2008) reported that the local or national poultry sector contributed only 10% to the local demand. The high cost of broiler production caused a shift from the production of broiler chickens to layer hens in Ghana (FAO, 2014; NEA, 2020; Kusi et al., 2015). Although several interventions were made by the government and NGOs (Non-Governmental Organations) to increase profit in the egg industry, the growth of the egg producing sector remains low. The downward trend of the poultry industry in Ghana has been primarily attributed to production cost, imports of poultry products, and marketing of products coupled with attacks from pests and diseases (Aning, 2006; Anku, 2005; Killebrew and Plotnick, 2010; Kwadzo et al., 2013; Okantah et al., 2004). This situation has rendered the domestic poultry industry uncompetitive against imported poultry products.

Ghana's poultry production is very low and there has been a steady decline in production with no increase in local chicken production in response to the increasing demand for poultry products (Aning, 2006; Flake and Ashitey, 2008). Egg consumption preference in Ghana is driven by various factors such as perception of eggs, availability of eggs, beliefs and economical reasons.

Therefore, the aim of this survey was to provide information regarding egg production and consumption in the Teshie municipality in the Greater Accra region in Ghana.

Materials and Methods

Data collection

A total of 118 questionnaires were administered to the inhabitants of Teshie municipality using the Simple Random Sampling Technique to ensure that each person from the survey area had an equal and fair chance of being selected. The questionnaires had three basic divisions; egg producers, egg consumers, and egg sellers. Out of the 118 respondents, a total of 4 egg producers, 78 egg consumers and 36 egg sellers were interviewed. The number of respondents for each division (egg producers, egg consumers, and egg sellers) was determined depending on amount of respondents available during the time of survey and their willingness to participate or be interviewed. Only respondents that were 18 years and above were targeted and interviewed since they have the purchasing power to buy eggs or start an egg-selling business. In order to ensure the careful entry of accurate data, the questionnaire was read to illiterate respondents and explained to them in languages they understood. Responses were recorded accordingly. The survey study was conducted in 2017.

Data analysis

Data collected were entered into Microsoft Excel 2013 version, sorted and the cumulative frequency of each parameter was calculated by adding the total number of observations recorded for a particular parameter. The calculated cumulative frequencies were transformed into percentages for each of the parameters measured. The percentage of a particular observation was calculated by dividing the cumulative frequency of that observation by the total cumulative frequency and multiplied by 100.

Percentage = (Cumulative Frequency of a particular observation/ total cumulative frequency)*100

(1). The calculated cumulative frequencies and percentages were represented in tables for all the observations recorded except for the gender and age distributions of consumers, which were represented in charts.

Results and Discussion

Table 1. Characteristics of egg producers in the Teshie municipality

Parameter	Outcome	Count	Percentages (%)
Gender	Male	3	75
	Female	1	25
Age (yrs.)	Total	4	100
	18-35	0	0
	36-60	4	100
Religion	Christians	2	50
	Muslims	1	25
	Traditionalists	1	25
Education	High school	2	50
	Tertiary	2	50
Mortality	Rainy spell	0	0
	Dry spell	3	75
	Both (rainy and dry seasons)	1	25
Housing system	Litter system	4	100

Table 1 presents observations regarding the characteristics of egg producers in Teshie municipality.

Gender distribution of egg producers in Teshie municipality

The majority 75% of the egg producers were males with 25% being females. The production of the egg is a very difficult, manual, and energy demanding activity. This explains the higher percentage of males involved in egg production. Also, most of the women in Teshie municipality are housewives and therefore do not involved in huge labor activities except for caring for children and other house hold chores. Similar to our observations, Mensah-Bonsu et al. (2019), reported that, the poultry value chains in Ghana are highly gender-segregated (i.e., men and women cluster at different levels of the value chain), with men dominating at the producer level of the value chain.

Age distribution of egg producers in Teshie municipality

Egg producers in Teshie municipality were between the ages of 36-60, and majority is Christians. In Ghana, livestock farming is generally not seen as a lucrative business or livelihood by the majority of the young people, and many parents do not encourage their children to study agriculture at university. Therefore, many of the people involved in livestock or egg production are old or elderly. These reasons explain the low production in layer production and consequently the low yield in egg production.

Religious background of egg producers in Teshie municipality

Furthermore, the study area is a predominantly Christian municipality, which explains why a larger proportion why larger portions of producers are Christians. In general, the population of Ghana is dominated by Christian Catholic, Protestant or other denominations. Christianity is the largest religion in Ghana, with 71.3% of the population belonging to various Christian denominations and Muslims making up 19.9% of the total population (PHC, 2021).

Educational background of egg producers in Teshie municipality

In Most parts of Ghana, poultry or livestock farming has been left for to rural people with little or no formal education in the area of expertise. This is partially due to the lack of interest in farming among the youth due to discouragement from their relatives or friends. However, in this survey, 50% of the producers interviewed had tertiary education and 50% also had high school education. As a result of the Ghana's financial problems, many families in rural areas can only afford basic education as government schools are free.

Distribution of seasonal mortality among birds observed by egg producers

The weather conditions in Ghana are defined as either the dry season or the rainy (wet) spell. There is a very high prevalence of pests and diseases in Ghana, which can affect the performance of laying

hens leading to a high mortality rates. The spread of these diseases could be severe in both the wet and dry spells, depending on the management practices of the farmers. In the current study, most of the respondents (75%) chose the dry spell as the period when they recorded the highest mortality, and few (25%) responded both the wet and dry spells where periods when they recorded high mortality. Similar to our findings, Awuni (2002) reported that most of the rural chicken mortalities in both the coastal and forest zones were recorded during the dryspell. The high mortality in the local chickens has been attributed to the fact that they are free range and only find a place to roost at night. As such, they are exposed to harsh environmental conditions such as extreme cold, high temperatures, and conditions that favor the growth of bacteria and fungi that cause an increase in disease and pest populations. Other authors (van Veluw, 1987) have also reported a 75% mortality of birds during the dry spell. In Contrast to our results, Veluw (1987), observed a higher mortality in the wet spell than in the dry spell. Goodger et al. (2002), also reported high chick mortality during the wet spell and attributed their findings to the high incidence of Newcastle disease in the wet season. In addition, Tauson et al. (1999), also found mortality of 21-27% in laying hens kept in the deep litter system, mainly as a result of infection mainly as a result bacterial infections caused by pecking at bare skin by more aggressive laying hens. However, Abdul-Rahman (2017) did not observe any effect of climatic season on mortality in commercial flocks.

The litter system is the most widely used production system for egg production in Ghana, especially by small and medium-scale egg producers. All the egg producers interviewed in this survey also stated that egg production is carried out in the litter system. According to NEA (2019) in Ghana, broilers and layers are reared exclusively either in the deep litter system **or** battery cages although most poultry farms use the deep litter production systems. This is because cages are very expensive to buy and maintain. However, some of the large egg-productiong farms, such as Akate farms, use both cages and the litter system.

Table 2. Characteristics of egg sellers in the Teshie market

Parameter	Outcome	Count	Percentages (%)
Gender	Male	2	5.60
	Female	34	94.40
	Total	36	100
Age (yrs.)	18-35	14	38.90
	36-60	22	61.10
Religion	Christians	23	63.90
	Muslims	5	13.90
	Traditionalists	8	22.20
Education	Basic	8	22.20
	High school	24	66.70
	Tertiary	4	11.10

Table 2 is a representation of the characteristics of egg sellers in Teshie market. Most (94.4%) of the egg sellers interviewed were women and the majority were Christians (63.9%). In general, women dominate the sales of agricultural commodities in the market in Ghana. Most of the men are only

involved in the production, with their wives or other female relatives usually acting as vendors. Most of the elderly women in Teshie municipality have little or no formal education and therefore see the marketing of agricultural commodities as the only to generate income to support their families. Also, young girls usually follow their mothers to markets to help them sell their goods which have a great influence on the girls when they become adults. Similarly, Mensah-Bonsu et al. (2019) reported that although the production level was dominated by men in Ghana, the trader and processor levels were dominated by women. Their findings are similar to those of the current study. The majority of sellers were aged between 36 and 60, and a high proportion (66.7%) had only completed secondary education, followed by primary education (22.2%) and tertiary education (11.1%). Only 38.9% of the egg sellers were between the ages of 18 and 35 years old. Due to a lack of interest in egg production and any business related to farming among the youth in Teshie Municipality, the percentage of youth compared to the elderly in the egg-selling business was very low.

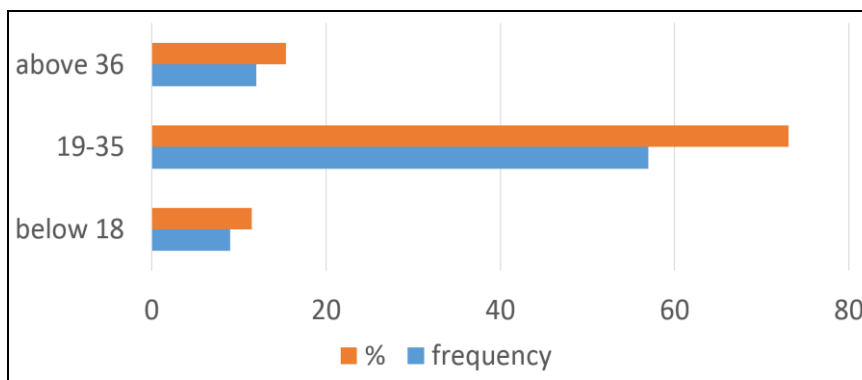


Figure 1. Age (yrs.) distribution of egg consumers in the Teshie Municipality

Figure 1 is a graphical representation of the age distribution of egg consumers in Teshie municipality. A critical observation of Figure 1 revealed that most of the egg consumers in the study area were between the ages of 19 and 35 years. This may be due to financial independence at such an age and the desire to usually have protein in diets. In addition, most young people in Ghana prefer to eat various local Ghanaian dishes with eggs at home or in other public places. Boiled egg rubbed with ground pepper is also consumed as a snack in Ghana which is being sold by vendors across the street and preferred mostly by young people. Furthermore, eggs are much cheaper than any kind of meat in Ghana which explains the higher consumption of eggs among the young adults (19-35 years) with poor employment histories (The World Bank, 2020), especially in rural areas such as Teshie. However, most of the adults (the elderly) in Ghana prefer meat. In an average Ghanaian household, the parents followed by the eldest siblings, are the main consumers of meat in the family since they are the primary providers of money for their families. During festive periods when there is an extra surplus of meat, some may be provided to the kids as well. Also, most Ghanaians try to avoid eggs as they get older because of the belief that cholesterol can raise or make them susceptible to diseases such as diabetes, high blood pressure or some form of cardiovascular disease. Similar to our results, Ayim-

Akonor and Akonor (2014) also reported that older respondents consumed lower amount of eggs compared to the younger respondents. Contrary to our results, Mingle et al. (2021) found that among age groups, elderly people (51–80 years) consumed more eggs than the young people (13–50 years), with older men (60–80 years) consuming the most eggs.

The gender of egg consumers is shown in Figure 2. 46 of them are male and 32 of them are female. As the head of the family is a man and the main source of income for many families in Teshie, it is obvious that they would consume a high number of protein meals either egg or meat in addition to their daily carbohydrate meals. Men were in the majority confirming the dominance of men in the family line of developing towns like Teshie. Also, men are the the hardest working gender in this municipality, which would give them the advantage of consuming more eggs than women. However other researchers (Mingle et al., 2021) found no significant difference in egg consumption between men and women.

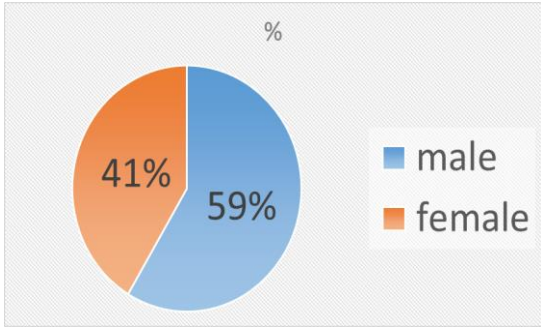


Figure 2. Gender of egg consumers in the Teshie municipality

Table 3 is a representation of the education and religious characteristics of egg consumers in the Teshie municipality. Similarly, in a municipality where Christianity is prevalent, the majority of sampled egg consumers (71.8%) are undoubtedly Christians. Unlike more developed communities in Ghana, the Teshie municipality among other rural communities has a huge number of traditionalists or native believers. These are people still adhering to the old gods and pouring libation at shrines, which is a ritual pouring of a liquid, or grains such as rice, as an offering to a deity or spirit, or in memory of the dead. The majority (43.59%) of the respondents had vocational (non-formal) education, followed by high school and basic school education respectively. Basic and high school education in Ghana is free in government schools; however, many families in rural communities such as Teshie cannot afford uniforms or books due to extremely poor financial backgrounds. As a result of this, boys in their early ages may join their fathers in occupations such as fishing, carpentry, or mechanics and learn these jobs informally as they grow. On the other hand, girls may be recruited by sewing companies or other businesses and grow to be skilled in that business.

Table 3. Education and religious characteristics of egg consumers in the Teshie municipality

Parameter	Outcome	Count	Percentages (%)
Religion	Christians	56	71.79
	Muslims	6	7.69
	Traditionalists	16	20.51
Educational level	Basic	18	23.08
	High school	26	33.33
	Vocational (non-formal)	34	43.59

Table 4 represent egg consumption rate among the respondents in Teshie municipality. It was observed that most of the respondents (23.08%) consumed an egg four times a week followed by 20.51% consuming an egg twice a week and 17.95% consuming an egg either once or 3 times a week. Only 5.12% of the respondents consumed eggs either 6 or 7 times per week. Similar to our results, Abive-Bortsi et al. (2022) also observed a lower egg consumption pattern among respondents in the Volta region of Ghana. According to Iannotti et al. (2014), although eggs are of a great significant benefit, their consumption and availability in countries like Kenya, Malawi Ethiopia, and India, particularly in Sub-Saharan Africa and Asia are low. The number of eggs consumed per week by an individual in Ghana can be influenced by several factors such as preference, choice of food, spiritual beliefs, financial status, or other social reasons. In addition, there are several cheap sources of protein in Ghana, such as beans and fish, which are preferred and consumed in relatively higher quantities than eggs. Health is also considered a key factor by consumers when confronted with the decision to eat eggs, as eggs are viewed in terms of cholesterol and its effect on the heart (Bertechini and Mazzuco, 2013). Several studies (Djousse and Gaziano, 2008; Li et al., 2013) have shown that egg consumption is positively related to CVDs in diabetic subjects but the case of healthy individuals remains rather unclear. Although not included in this study, there are some negative perceptions about eggs because of their cholesterol content. Also, many people in Ghana link cholesterol to obesity and some diseases which discourage its consumption. In a study by Ayim-Akonor and Akonor (2014), about 60% of the respondents reported that bird diseases did not affect their consumption decisions as they would not be transmitted by eggs, but the remaining 40% stated that a bird disease such as influenza could be transmitted to a consumer and would therefore hinder their decision to eat eggs. Furthermore, Abive-Bortsi et al. (2022) revealed that individuals in the higher income class could afford eggs and other different kinds of proteins such as meat, milk, or fish, indicating that the income level of consumers plays an important role when it comes to purchasing decisions.

Table 4. Egg consumption rate in Teshie municipality

Egg consumption times per week	Count	Percentage (%)
Once	14	17.95
Twice	16	20.51
Thrice	14	17.95
Four times	18	23.08
Five times	8	10.26
Six times	4	5.13
Seven times	4	5.13
Total	78	100

Table 5 represents the evaluation of egg nutritional content by consumers. As can be seen from Table 5, many (60.26%) of the consumers rated eggs as a high source of protein followed by 29.49% rating eggs as a very high source of protein with only 10.26% of respondents rating eggs as a low source of protein. Similar to our findings, other studies (Applegate, 2000; de Groot et al., 2020; Ayim-Akonor and Akonor, 2014) also reported that most consumers considered eggs as the most source of protein. In a study conducted by Abive-Bortsi et al. (2022), more than half of the respondents (56.36%) were not aware of the nutritional content of eggs, but, 40% were able to mention protein as the main nutritional content of the egg.

Table5. Evaluation of the protein content of egg by Consumers

Egg Ratings	Frequency	Percentage (%)
Low	8	10.26
High	47	60.26
Very High	23	29.49

Conclusion

The involvement of the youth and women in egg production in Ghana is generally low, particularly in the survey region where the majority of the egg producers were men and elderly. The egg-selling business in Ghana is gender segregated as was observed in Teshie municipality with women dominating the egg-selling business sector. Weekly egg consumption in Ghana is very low, especially in the survey area. Egg consumption was highest among the youth with women and the elderly having the lowest consumption rate. Egg production has been left to people in rural areas of Ghana with inadequate knowledge about egg production due to a lack of interest in poultry production and agriculture in general. Educational level in the rural communities in Ghana is very low and the majority of the employees and employers in the poultry sector especially, the small-scale poultry farmers do not have any formal educational background in poultry production. The egg producers, egg consumers, and egg sellers interviewed in the survey region had some form of formal or informal educational background however; their area of education was not necessarily related to their field of

work (poultry production). Although the educational background in the survey region was low, egg consumers in Teshie had some form of knowledge or information about the nutritional content of eggs and were able to rate eggs as a low, high, or very high source of protein. Egg production in Teshie municipality is completely carried out in a deep litter system which is one of the most common production systems for poultry production in Ghana. Based on the findings in this survey, there is an urgent need for an educational campaign through electronic and printout media to educate people in Teshie and Ghana in general about the importance of poultry production. This will help increase the performance of the local egg-producing sector leading to a higher rate of egg consumption. This educational campaign should also focus on educating people in Ghana, especially the youth and women on the importance of their involvement in the egg production sector and how it could solve some of the unemployment and low egg production problems. Information regarding the nutritional benefits of an egg should be disseminated via social networks and other platforms because there are negative perceptions about eggs that inhibit people from consuming them. Many people especially, the elderly and women have the perception that egg causes cardiovascular, obesity, and other health problems based on false information so it is also suggested that information regarding the cholesterol content of egg should be made available to the general public since it is one of the major factors affecting egg consumption. Information regarding the safety level of cholesterol and the recommended quantity of eggs needed to be consumed per week should be available to the public via the radio and television channels since higher consumption above a certain quantity may cause health problems. This educational campaign should be held both in English and local dialects. The government should provide subsidies in a form of a reduction in the price of feed materials to encourage the youth and farmers that are already involved in poultry production since the high cost involved is one of the major factors inhibiting people from investing and engaging in poultry production. There should be collaboration between the private and the government sector to boost the local egg-producing sector because it has been rendered uncompetitive against the imported eggs. Scholarships should be available for people that are interested in studying agricultural or animal science in high school and the tertiary level. This will create awareness and draw people's attention towards agriculture in general. It is further suggested that studies regarding egg consumption should be carried out in various parts of the country especially, in the Northern rural communities with the lowest egg consumption rate to obtain a national outlook. This will help fight kwashiorkor, a disease marked by severe protein malnutrition among infants and children. This study proves that there is an urgent need to raise awareness about the nutritional and health benefits of eggs in Ghana. Success in such awareness creation will go a long way to greatly minimize acute malnutrition in Ghana.

Statement of Conflict of Interest

Authors have declared no conflict of interest.

Author's Contributions

The contribution of the authors is equal.

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