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RESEARCH ARTICLE

Misconceptions and their Influence on Chicken Egg Consumption Pattern, Buying Behavior and Attitudes among the Urban and Rural Communities in Western Province of Sri Lanka

A.D.S.P. Ariyachandra, G.I.S. Alwis, G.R.M.L. Bandara, R.K. Mutucumarana*, B.M.R.L. Basnayake[a]

Faculty of Agricultural Sciences, Sabaragamuwa University of Sri Lanka, Belihuloya 70140, Sri Lanka

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*Correspondence: ruvinim@agri.sab.ac.lk ORCID: https://orcid.org/0000-0002-4860-8205

ABSTRACT

Misconceptions and their influence on chicken egg consumption pattern, buying behaviour, and attitudes among the urban and rural communities in Western province of Sri Lanka were investigated. A total of 690 respondents representing Colombo, Gampaha, and Kalutara districts were interviewed using a pre-tested questionnaire. Chi-square analysis and the descriptive statistics were used to analyze the data. According to the results, 67.1% of respondents believed that the village chicken eggs are more nutritious than the commercial chicken eggs. The majority (95.4%) did not accept the fact that the brown eggs are nutritionally sound than the white shelled eggs. Of the total respondents, 46.2% trusted that the daily consumption of chicken eggs can lead to hypercholesterolemia and increases the risk of cardiac disorders. Information derived from the general public and social media were identified as the main sources of the misconceptions discussed. In conclusion, of all misconceptions tested two misconceptions: (1) the eggs from village chicken are nutritious than the commercial chicken eggs and (2) the chicken eggs when consumed daily can increase the risk of cardiac disorders, do exists. The study further concluded that the majority of the participants are willing to change their attitudes if it is guaranteed that both the village and commercial chicken eggs are coequally nutritious, and both white and brown eggs are safe to eat daily, infertile, and coequally nutritious.

***Keywords**: Village chicken, Cholesterol, Buying behaviour, Cardiac disorders, Misconceptions.*

INTRODUCTION

Chicken eggs are one of the highly nutritious and low-cost food commodities which provide a wide array of nutrients that benefit human's health (Miranda *et al.*, 2015). Among different dietary protein sources, eggs are ranked one of the best high-quality proteins for human, which second only to the breast milk. Moreover, eggs are enriched with essential amino acids, unsaturated fatty acids, folic acid, vitamin D, vitamin E, vitamin B_{12} and choline (Talakesh *et al.*, 2020). Generally, a medium sized cooked chicken egg contains 0.56 g of carbohydrates, 6.29 g of protein, 186 mg of cholesterol, 5.3 g of total fat, 2.0 g of monounsaturated fat, 1.6 g of saturated fat, and 0.7 g of polyunsaturated fat

(Kuang *et al*., 2018). Scientific evidence suggests that the eggs are inclusive of various biologically active substances such as antibacterial, immunomodulatory, antioxidant, anti-cancer, and anti-hypertensive substances that may play a vital role when treating and in the prevention of infectious and chronic diseases (Abeyrathne *et al*., 2013).

Sri Lankan layer industry has gained a faster development over the past decades, and accounts 16.02 million layer population and 2.20 million backyard poultry population (Livestock Statistical Bulletin, 2021). Sri Lankan egg industry fulfills the local demand of eggs to 21.8 million of its population (Department of Census and Statistics, 2021). The most recent data suggested that the average total egg production in Sri Lanka reached 2,934.55 million and the annual per capita consumption was 132.3 (Livestock Statistical Bulletin, 2021). In any community, pattern of egg consumption, buying behavior and perception towards eggs can be influenced by various factors. As Sri Lanka is a multi-cultural, multi-ethnic, and multi-religious country, the community suffers from several misconceptions about eggs. Those misconceptions might negatively effect on their buying behavior and consumption pattern. Moreover, socio-economic factors may also influence on egg consumption (Wickramasinghe *et al*., 2015). The risk of coronary diseases due to daily consumption of eggs is one of most prevalent misbelieves that affects the egg consumption. As described by Drouin-Chartier *et al*. (2020), eating eggs up to an egg daily may not increase the danger of cardiovascular diseases. As recommended by American Heart Association, a healthy person could limit his or her daily cholesterol intake to 300 mg on average. Therefore, daily consumption of an egg containing 180 mg of cholesterol is widely acknowledged (Ravindran, 2017). However, the American Scientific Advisory Committee for the 2015-Dietary Guidelines stated that they are not willing to make this recommendation since the existing evidence demonstrates that no significant relationship exists between dietary cholesterol and serum cholesterol and the cholesterol is not a nutrient of concern for overconsumption (Alexander *et al*., 2016).

Other prominent misconceptions exist among general public in Sri Lanka includes (1) existence of life in commercial eggs, (2) higher nutritional value in brown eggs over white eggs, (3) higher nutritional profile of village chicken eggs over commercial eggs, (4) higher nutritious nature of raw eggs over cooked eggs and (5) refraining from preparing or eating eggs by pregnant women. According to Curtis *et al*. (1986) and USDA (2023), there is no significant changes in the protein content between the brown and white shelled egg groups despite a minor variation has been observed in albumen solids. This variation is quite negligible and not widely to be useful in practical approaches. Moreover, digestibility of egg protein from raw eggs are much lower than those from cooked eggs (Evenepoe *et al*., 1998).

The surveys conducted in Sri Lanka to appraise (1) the misconceptions related to egg consumption and (2) how these misconceptions effect on buying behavior

and attitudes towards the chicken eggs consumption are highly limited. Considering the inevitable necessity, this study was conducted to investigate consumer awareness regarding chicken eggs, socio- economic factors determining egg consumption rates and frequencies and misconceptions exist about chicken eggs among the public community of Western province in Sri Lanka.

MATERIALS AND METHODS

Data collection

The preferred geographical area chosen for this study was the Western province as it (1) ranked the 2nd place of the total poultry farms registered and (2) consists of a significant number of backyard (25,635) and commercial poultry (3,114) farms (Livestock Statistical Bulletin, 2019). The main research material consists of a pre-tested self-administrated questionnaire. Research approach used in the survey was deductive. A total of 690 respondents from Western province (361,199, and 130 respondents from Colombo, Gampaha, and Kalutara districts, respectively) was selected using simple random sampling technique. The questionnaire consisted of 41 questions, prepared to determine the consumer attitudes and purchasing behavior for chicken eggs, and consumers' awareness in the aspects of egg's nutrition, health benefit and risks, fertility and socio-economic features affecting egg consumption frequencies and pattern. Secondary data used in this study were gathered from the Department of Census and Statistics and the Ministry of Livestock and Rural Community Development.

Data analysis

The data were statistically analyzed using SPSS (Statistical Package for Social Sciences) version 22. Chi square analysis and the descriptive statistics were used in the analysis of data.

RESULTS AND DISCUSSION

Demographic and socioeconomic characteristics of the respondents

Table 1 and 2 represent the general demographic and socioeconomic characteristics of respondents. Out of 690 respondents, the number of respondents represented from Colombo, Gampaha, and Kalutara districts were 52.3%, 28.8%, and 18.9%, respectively. The majority of them were females (51.7%) and belonged to 18-30 age group (60.9%). The majority of the respondents were unmarried (53.5%) and from urban community (66.1%). Of the total respondents, the majority were from the private sector, educated up to higher education level (52.8%) having a monthly income level distributed between 50,000-100,000 LKR (40.1%). Buddhists (80.4%) were dominant who represented the ethnicity Sinhalese (89.7%).

Table 1: Demographic and socioeconomic characteristics of the respondents

Characteristic	%
District	
Colombo	52.3
Gampaha	28.8
Kalutara	18.9
Gender	
Female	51.7
Male	48.3
Age (Years)	
< 18	1.3
18-30	60.9
30-60	35.3
> 60	2.5
Marital status	
Married	46.5
Unmarried	53.5
Locality	
Urban	66.1
Rural	33.9
Ethnicity	
Sinhala	89.7
Tamil	5.4
Muslim	4.3
Other	0.6
Religion	
Buddhism	80.4
Catholic	11.6
Hindu	3.3
Islam	4.3
Other	0.4
Educational level	
Primary education	3.4
Secondary education	43.8
Higher education (Graduate and Postgraduate)	52.8
Income distribution (LKR)	
<25,000	27.1
25,000 -50,000	5.4
50,000 -100,000	40.1
>100,000	19.4
Unemployed	8.0

LKR: Sri Lankan Rupees

Consumption pattern and buying behaviour

The present study revealed that from the total respondents, 95.8% consume chicken eggs. However, 4.2% of the respondents do not consume chicken eggs. The majority (65.9%) of the respondents consume both village and commercial chicken eggs (Figure 1) with the frequency of 3-5 eggs per week (39.1%). Most of the respondents purchase chicken eggs from retail shops (48.9%) and supermarkets (33.5%). The egg consumption frequency of the respondents and the places where they purchase chicken eggs are presented in Figures 2 and 3.

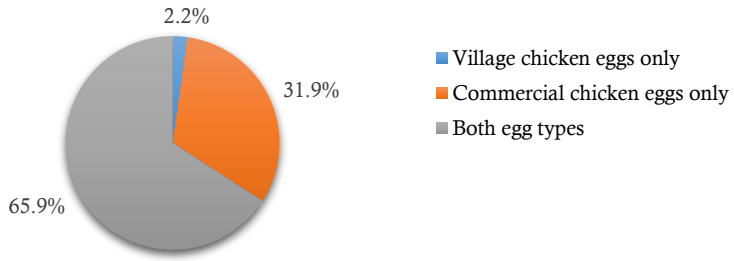

Figure 1: Preference for commercial and village chicken eggs

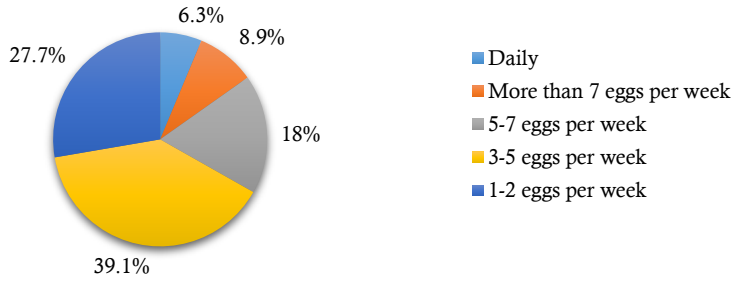

Figure 2: Egg consumption frequency of respondents

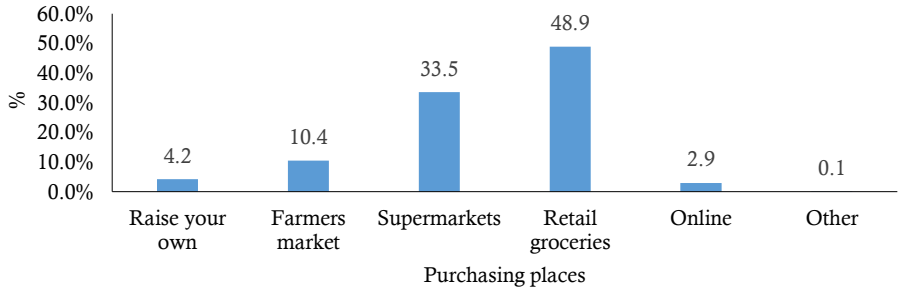

Figure 3: Chicken eggs purchasing market places

Egg omelets were the most preferred way of consuming eggs (38.2%), while full-boiled eggs were the second most preferred way (21.8%) (Figure 4). Of the total respondents, 53.5% preferred to eat brown eggs while 30.1% preferred to eat white eggs. Preference for brown eggs was based mainly on their larger sizes (14.8%). Easy handling and less damages (4.1%) were the other reasons considered for selecting brown eggs. Availability (5.9%), brand name (32.5%), and attractive packing (3.6%) were the other reasons to select brown eggs during purchasing. However, out of the total respondents, only 4.6% believed that the chicken eggs with brown shells are more nutritious than white shelled eggs and 95.4% did not agree with the fact. The respondents who preferred to eat white eggs (30.1%) had mentioned (1) the low cost (3.1%), (2) the belief that the white eggs are nutritious than brown eggs (26.4%), (3) easy handling (3.1%), (4) attractive packing (30.2%), and (5) brand name (2.3%) as the major reasons for their selection.

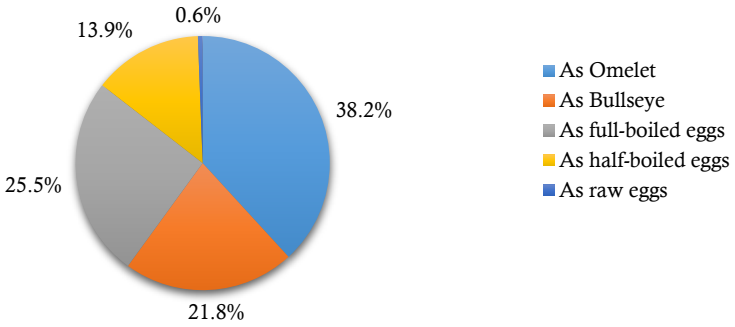

Figure 4: Preferred form of egg for consumption

According to the results, the majority (73.5%) did not prefer other types of eggs (Figure 5). Quail eggs (14.9%) were the most consumed egg type next to chicken eggs. Consumption of duck, turkey, and geese eggs were comparatively low.

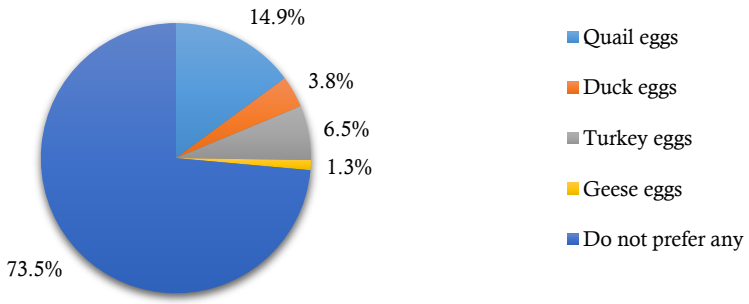

Figure 5: Preference for different types of eggs

Reasons mentioned by the respondents (4.2%) who do not consume chicken eggs are indicated in Figure 6. The majority (43.4%) did not have any special reason to limit their eggs consumption. An imaginary belief of eggs' ability to elevate blood cholesterol and to cause heart diseases (14.1%), fishy odour (10.3%), and unpalatability (9.5%) were the other main reasons.

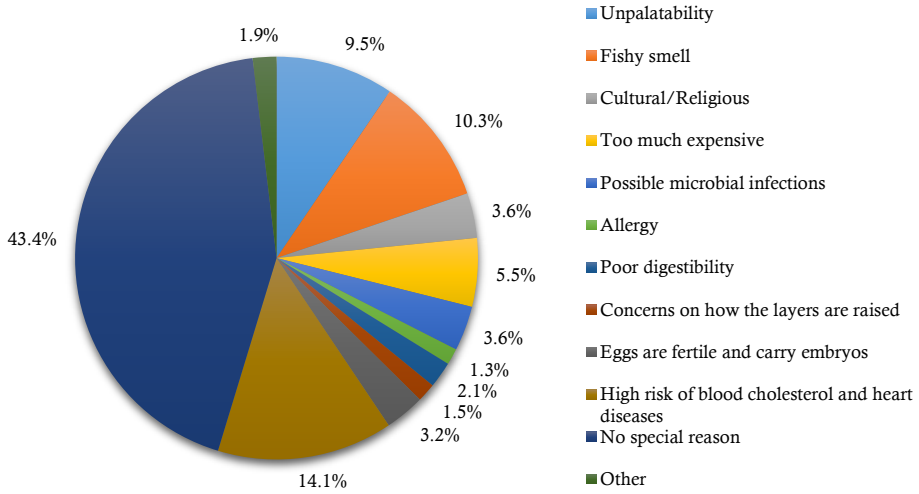

Figure 6: Reasons for limiting egg consumption

Of the total respondents, 53.4% did not agree with the misconception that the farm chicken eggs available in the market are fertile and carry embryos. Only 17.3% agreed with the fact while 29.3% had no idea. Further, most respondents (60.5%) were aware of the fact that only the hens are reared in commercial layer farms. In addition, 67.1% of respondents stated that the village chicken eggs are more nutritionally sound and secure to eat than the commercial chicken eggs. However, of the total respondents 9.4% did not agree with this misbelief, while 23.5% had no idea.

Of the total respondents, 46.2% believed that the consumption of chicken eggs on daily basis may results hypercholesterolemia while increasing cardiac disorders. It has negatively impacted 34.3% of respondents' buying decisions. However, 32% of the respondents did not believe this fact while 21.8% respondents had no idea. The respondents who believed the fact were relied on the information collected from the communities (34.3%) and newspapers (28.1%). The sources how the public gathered information about this misconception is illustrated in Figure 7. Of the total respondents, 41.8% believed that the raw eggs are more nutritionally sound than the cooked eggs. However, 17% of respondents did not agree with the fact while 41.2% had no idea. The majority of the respondents agreed with this misbelief, and it was based on the information gathered from the media (8.9%), social media (21.5%), newspapers (24.4%), general public (42.1%) and other sources (3.1%). Misconception also do exist with the fact that the pregnant women must not either eat or prepare chicken

eggs was not affect the consumption pattern or frequency of respondents (52.5%). 36.4% had no idea about this misconception while only 11.1% still believed it.

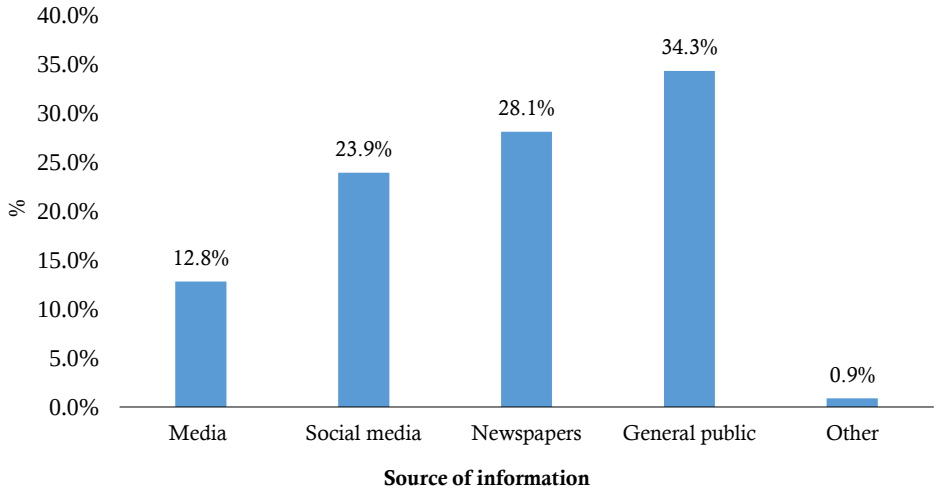

Figure 7: The sources of information for how the community gather misconception that the consumption of chicken eggs on daily basis causes hypercholesterolemia while increasing the risk of coronary diseases

Based on the results, 95.8% respondents representing the urban and rural communities consume chicken eggs. Irrespective to the geographic locations, the finding of this study suggested that the percentage of people who consume chicken eggs has been increased (Wickramasinghe *et al.*, 2015; 85.5% *vs.* Present study; 95.8%) over the past years in Sri Lanka. It implies that the public awareness with reference to egg's nutritional profile and food safety have been increased. Besides, as reported by the Food and Agriculture Organization, consumption of eggs in South Asia is far below the developing-country average (FAO, 2007). As described in Scudiero *et al.* (2023), only 44% of Indian households consumed eggs during the period of 2011-2012. However, Turkish egg consumer profile indicated comparatively a higher value (98%) (Mizrak *et al.*, 2012). As revealed in this study, the eggs consumption frequency of the majority of the respondents (39.1%) was 3-5 eggs per week. Interestingly, the results suggested that the consumption frequency of eggs has been escalated from 1-2 eggs per week (Wickramasinghe *et al.*, 2015) to 3-5 eggs per week. A significant relationship has been observed between the frequency of chicken egg consumption and the consumer's age. As per Pearson chi-square test results (Table 2), a relationship exists between the age and the frequency of chicken egg consumption (Pearson Chi-Square: 0.016). With aging, the community believed that they have to consume at least 3-5 eggs per week to acquire proper dietary nutrients.

The majority of the respondents purchase chicken eggs from the retail shops (48.9%) and supermarkets (33.5%) and they are the current dominant suppliers in food supply chain in Sri Lanka. The results of the present survey found that the preference towards eggs for other poultry species are very poor. This is in a complete agreement with Mizrak *et al.* (2012), as there is poor access to other types of eggs (E.g. turkey, duck, and geese eggs) which ultimately led to poor consumption frequencies. The present study, therefore, suggests that the chicken eggs dominate in the Sri Lankan food market.

Table 2: Results derived from the Pearson Chi-square test

Age × Frequency of eating chicken eggs	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	24.741[a]	12	0.016
Likelihood ratio	20.842	12	0.053
Linear-by-linear association	2.173	1	0.140
Number of valid cases	668		

[a] 9 cells (45.0%) have expected count less than 5. The minimum expected count is 0.57

As revealed by this study, the majority of the total respondents preferred brown eggs than white eggs, while the majority disagreed with the fact that the brown eggs are more nutritionally sound than white eggs. According to Talakesh *et al.* (2020), one third of the Teheran families in Iran believed that brown shelled eggs have more nutritional value than chicken eggs with white shells. Hence, the results obtained from the current study suggests that Sri Lankan community is well aware with the fact that, there is no nutritional difference between brown and white eggs. Nevertheless, the respondents' market preference was quite different and though they were aware above the above fact, they still preferred to purchase brown eggs upon their availability.

Misconceptions and their influence on chicken egg consumption pattern and buying behaviour

As revealed in the present study, most of the respondents were aware with the fact that farm chicken eggs available in the market are infertile, do not bear embryos and only the hens are reared sex separated in commercial layer farms. It proved that Sri Lankan society have a better understanding about the rationale of poultry farming. Of the total respondents, the majority (67.1%) have stated that village chicken eggs are nutritionally richer, more secure and healthier to eat as compared to chicken eggs available commercially. This misbelief was also present in the society years back (Wickramasinghe *et al.*, 2015). Moreover, according to Mizrak *et al.* (2012), the majority of Turkish society preferred to consume village chicken eggs because of the faith that the eggs from village chicken are produced more naturally. Age, profession, or education level had no

significant relationship with the trust of that the village chicken eggs are nutritionally sound than farm chicken eggs.

Most of the respondents believed the misconception that the consumption of chicken eggs on daily basis may increase blood cholesterol levels increasing the risk of cardiac disorders. This misconception has been made uncertainty among public and had dragged down the egg consumption. The situation is more or less similar in the Turkish society where it is the 2nd most dominant reason for limiting egg consumption in Turkish people (Mizrak, *et al.*, 2012).

Though some people believe that the raw eggs are more nutritious than cooked eggs raw eggs typically suffer from some drawbacks. According to Evenepoel *et al*. (1998), the true ileal digestibility of uncooked egg protein is poorer than that of cooked egg protein (51.3 *vs.* 90.9%, respectively). Moreover, eating raw eggs is known to increase the risk of *Salmonella* food poisoning (Musaj *et al.*, 2018) while eating raw eggs regularly over the time may lead to biotin deficiency (Dasgupta, 2019). This is due mainly to the presence of avidin in egg albumen which can bind with biotin thus making biotin unavailable for absorption. Cooking eggs denatures avidin, therefore impairs its outstanding ability to bind biotin (Dasgupta, 2019).

Eggs are enriched with high-quality protein, macronutrients and micronutrients. However, cultural taboos play a remarkable role in several nutritional applications, including consumption of eggs during pregnancy though most beliefs are not reliable and not based on facts (Lutter *et al.*, 2018). In Nepal, religion has been recognized as the most frequent reason for not eating eggs by pregnant women (Christian *et al.*, 2006; Lutter *et al.*, 2018). However, the present study demonstrates that there is no such misconception exists among the Sri Lankan community. The recent findings by Zhang *et al*. (2022) suggested that the cholesterol from eggs positively associate with gestational diabetes mellitus (GDM). According to those authors each extra egg consumed per day is positively linked with GDM therefore limiting egg intake to a reasonable level in pregnant women to reduce the danger of GDM has been proposed.

CONCLUSIONS

In conclusion, the present study revealed that two misconceptions: (1) the eggs from village chicken are more nutritious than the commercial chicken eggs and (2) the chicken eggs when consume daily can results hypercholesterolemia while increasing the risk of cardiac disorders do still exists among the Sri Lankan urban and rural community. Eggshell colour has no influence on the purchasing decision. Most of the community representing the Western province do conscious with the fact that commercial chicken eggs are infertile, not bearing live embryos and are farmed sex separated. Eating eggs during pregnancy do not exclude by the community. Though the sample in majority consists of

knowledgeable professionals, most of them are trusting the information gathered from the social media and general public when make purchasing decisions. The present study also concluded that most of the participants are pleased to switch their attitudes if it is guaranteed that both the village chicken and commercial chicken eggs are coequally nutritious, both white and brown eggs are safe to eat daily, are infertile and coequally nutritious.

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