

Empirical analysis of the consumer behavior and preferences for the health security of tribal population in North East India

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Abstract

In the North east states of India, pork is the dominant form (78%) of meat consumption. The study attempts to understand the consumer behaviour and preferences of pork and pork products in selective North East states to know the prospect of pork centric enterprises in the area. An economic analysis of 716 consumers indicated significant differences in pork consumption across age, education and occupation categories. Friedman test revealed a significant difference in the frequency of pork consumption among the states of North East India. Pork preparation, visual attributes and place of buying pork impacted pork consumption decision. Butcheries and street vendors were most favored place of buying pork products. Pork pickle and nuggets was most preferred product. An increased consumption of pork products along with increased demand for greater variety in local pork products by the youth indicates presence of huge untapped market and a prospective scope to increase the income and employment opportunities.

Keywords: Pork, Consumer Preferences, Employment, ANOVA, Health

JEL codes: D12, D19, I12, I19

1. Introduction

The consumption value of egg, fish and meat is more than double in North Eastern states as compared to an all India average of 29.21 percent and it remained as the dominant item of consumption in the

given region. Growth in meat consumption is factored out for demographic changes (Allievi et al., 2015); nutritional requirements to consumer food with high animal protein content (Hawkesworth et al., 2010) and change in consumer preferences. It is predicted that in the following decade, the meat consumption levels in developed nations will continue to remain high, while in the developing nations like Latin America and Asia, the meat demand is expected to increase fourfold (FAO & OECD, 2019).

Pork is the most consumed meat in North Eastern states of India accounting for 77.8 percent of the total meat consumption (Kadrivel et al., 2018). From 90's the difference of values of the consumption of fish, egg and meat per person of rural and urban increased from 6 to 28 (NSSO, 2014). But within this time period the consumption individually within rural and urban areas almost got doubled and specially in 2011 the percentage increase was higher in consumption of egg, fish and meat in rural areas (76%) relative to urban areas (71%) (Bhattacharjee, 2021). This scenario is in synchronization with India's consumption of fish, egg and meat. According to National Research Centre on Pig (NRCP), piggery not only acts as an insurance coverage for the rural poor, but it also contributes significantly in narrowing down the growing demand for animal protein. In India, the optimization of pork production concedes with the changing consumer habits due to increase per capita pork consumption in the country from 294.39 thousand metric tons to 316.52 thousand metric tonnes during 2015-2021 (OECD & FAO, 2021). Pork consumption in India can give a one-shot solution for protein and revenue generation by solving India's weak protein consumption and boosting income for rural farmers.

Consumers, being the last value chain actor, play a critical role in the success of pork industry. Knowing consumer preferences and attitude on consuming pork products like bacon, ham, pork sausages are essential to suggest required intervention on strengthening the forward and backward linkages for increased income through market participation. Consumers consider a wide variety of visual attributes while making choices and making purchasing decisions of pork and pork based product. Appearance has a considerable influence on pork, is valued by the consumer (Fortomaris et al., 2006). Visual meat attributes such as freshness, more fat to lean ratio, colour, marbling and tenderness relate to pork quality (Banović et al., 2009) and these visual pork attributes greatly influence consumer's choice of pork consumption at the point of purchase (Banović et al., 2012).

The aim of the paper is to understand the consumer behaviour and changing preferences of pork products in North East states (Assam, Meghalaya and Nagaland) and analyze the factors driving the consumption behaviour with reference to the socio demographic characteristics and gender perspectives. Effort is also made to explore the factors affecting the consumption decision with special reference to the particular visual attributes which influence the consumption preferences.

2. Materials and Methods

The study is made around the given 4 points:

- Socio demographic characteristics of the consumer and income with consumption behaviour.
- Factors affecting purchase of pork and influence of visual attributes.
- Consumption pattern and type of pork product preferred.
- Health awareness and health outcome by gender and for children. .

Quantitative research methods are adopted to analyze the randomly surveyed sample of 716 (aged 18 years and above) from rural and urban districts by using convenience sampling method. The data for various relevant aspects are collected by primary survey through a structured and validated questionnaire. The information on consumer behaviour, consumption pattern and preferences, health aspect and expenditure were collected from consumers aged 18 years and above through the quantitative and qualitative methods. With ANOVA consumers' behaviour is analyzed on the basis of social demography (age, education and occupation) characteristic and income. Factor analysis with significance identified the attributes which influence the consumption in recent time period. Friedman test was also conducted to assess if there are any significant differences across the three states in terms of pork consumption. Responses on the type of pork products, processed pork, and preparation type, willingness to pay for safe pork and change in consumption within family are analyzed to get the gap in the existing pork product market. With simple percentage method the health awareness and health outcome is examined by three categories – male, female and children. ANOVA study was conducted to understand if there are any significant differences in terms of pork consumption frequency across the various socio-demographic characteristics in the three different states.

2.1 Study area and sample distribution among the North Eastern states.

Table 1: Sample size from the selected North- Eastern states of India

S.No.	State	Sample size
1.	Assam	250
2	Meghalaya	250
3	Nagaland	216

Table 1 indicates the sample collected from each of the three states Assam is situated in south of the eastern Himalayas along the Brahmaputra and Barak River valleys. Assam covers an area of 78,438 km². The state is bordered by Nagaland in the east and Meghalaya in the south along with other North East states of India. Nagaland is landlocked state with an area of 16,579 square kilometres (kms), population of 1,980,602 as making it one of the smallest states in India (Ministry of Home Affairs, Government of India, 2020). Meghalaya, meaning "abode of clouds" covers an area of approximately

22,430 square kms (Government of Assam, 2023).

3. Results and Discussion

3.1 Socio-economic Characteristics of Pork Consumers

More than half of the percentage (Table 2) of consumer in Meghalaya and Nagaland comes within the category of 18-30 years which is almost 16 percent more on an average as compared to Assam. Almost 45 percent of the consumers in Meghalaya have higher education which is relatively 16 percent more as compared to Assam. Nagaland has least percent of consumers with higher education (3%) but highest (40%) concentration of pig farming is in the given state. Mixed farming is common occupation in Nagaland with very insignificant percentage of population is self-employed. Economic base of the consumers are calculated by classifying the income of the consumers into 5 categories less than Rs. 5000, Rs. 5000 to Rs. 10,000, Rs. 10,000 – Rs. 30,000, Rs. 30,000 – Rs. 50,000 and Rs. 50,000 and more. Assam had the highest mean income (37.2%), in the category of Rs. 10,000 – Rs. 30,000 followed by Meghalaya with the highest number (43.2%) of consumers belonging to the income category of Rs. 5000 – Rs. 10,000. Nagaland had the highest number of consumers (66.5%) belonging to the lowest income category of less than Rs. 5000.

Nagaland was found to have the least percentage of consumers in with higher education and maximum consumers in the lowest income bracket which shows the interdependency of income and higher education. Primary occupation structure in Nagaland also reflects limited diversification as major concentration is in primary sector. The consumption pattern of female in Meghalaya also reflects the socio-cultural feature of the area. Garo, Khasi and Jaintia Hills have its own unique language, traditions and practices and most tribes are known for matrilineal society and culture (Department of Arts and Culture, Government of Meghalaya, n.d.).

Table 2: Socio- economic characteristics of pork consumers

Socio-Demographic Factor	Categories	Assam		Meghalaya		Nagaland	
		Frequency	%	Frequency	%	Frequency	%
Gender	Male	211	84.4	109	43.6	21	9.7
	Female	39	15.6	141	56.4	195	90.2
Age	18-30 years	88	35.2	131	52.4	22	10.1
	31-42 years	69	27.6	70	28.1	48	22.2
	43-60 years	86	34.3	46	18.4	112	51.8
	61-75 years	7	2.8	3	1.2	29	13.4
	Above 75 years	0	0	0	0	5	2.3
Highest Level of Education	No formal education	4	1.6	1	0.04	40	18.5
	Primary	23	9.2	29	11.6	66	30.5

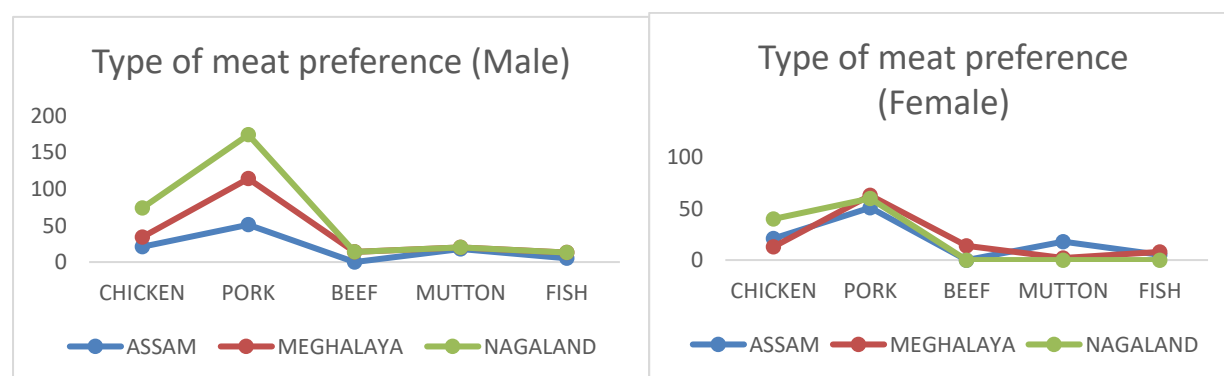
	Secondary	153	61.2	110	44.1	104	48.1
	Higher Education	70	28.1	111	44.4	6	2.7
Primary Occupation	Crop Farming	60	24.1	69	27.6	61	28.2
	Pig Keeping	20	10.2	30	13.5	86	39.8
	Mixed Farming	30	13.5	29	13.3	90	41.6
	Self Employed/ Business	21	10.6	27	11.8	6	2.7
	Service	45	18.1	46	18.3	13	6.1
Income Category	less than Rs. 5, 000	66	26.4	57	22.8	133	66.5
	Rs 5, 000- Rs. 10,000	73	29.2	108	43.2	34	17
	Rs. 10,000 - Rs. 30, 000	93	37.2	38	15.2	25	12.5
	Rs. 30, 000- Rs. 50, 000	14	5.6	29	11.6	6	3
	more than Rs. 50, 000	4	1.6	18	7.2	2	3

Source: Author's own compilation

3.2 Consumer's meat preference

Chicken, Pork, Beef, Mutton and Fish are the preferred meat options available to consumers. (Figure 2). Pork and chicken are the most preferred meat among male and females in all the three states. In Meghalaya, pork is more consumed by female and male consumers prefer chicken. In Assam and Nagaland more than half of the male population consumes pork more than female. The increasing requirement of protein is more fulfilled by the male population in given two states as compared to Meghalaya. Women in Nagaland are found to consume more chicken than pork whereas in Assam insignificant difference is noted in the consumption of chicken by gender (Figure 1)

Figure 1: Gender-wise distribution of meat preference



Source: Author's own compilation

3.3 Consumption Behavior of Pork Consumers

Frequency of purchase to consume is estimated to understand the consumption behavior of pork in selective study area. Friedman test revealed that there was a significant difference in the frequency of pork consumption across Assam, Nagaland and Meghalaya. The model is fit with p-value 0.000 and chi square of 100.50. The frequency of pork consumption at Nagaland is at fortnightly level (Mean: 3.8) as compared to Assam and Meghalaya with a mean consumption of twice a week (Mean: 2.63). Maximum respondents in Assam and Meghalaya prefer to purchase pork for consumption on a weekly basis (75% and 72.8% respectively) whereas in Nagaland almost 37% of consumers purchase pork for consumption on a weekly basis and 46% on a monthly basis. Accessibility of market and other infrastructure issues like road connectivity and transport cost restrict Nagaland consumers to purchase pork less frequently as compared to other two states. There is an insignificant difference in pork consumption frequency between male and female even though females are marginally consuming more pork (once and twice a week) than male.

Table 3: Pork purchasing frequency for consumption

	State	Mean	Median	Mode	S.D	Friedman Test
Frequency of consumption	Assam	2.63	3	2	0.987	Chi Square – 100.50 P value = 0.000***
	Nagaland	3.8	4	5	1.296	
	Meghalaya	2.64	2	2	1.060	

An ANOVA study is also conducted to understand if there are any significant differences observed across the various socio-demographic characteristics for the three different states w.r.t the frequency of pork consumption. In Assam (Table 3), significant differences are observed for pork consumption across different age, education and occupation categories (p value: 0.00, 0.08, and 0.00). Difference in pork consumption across occupation and income (p value: 0.000 for both) appeared to be significant for Nagaland. Income categories are the only factor that had a significantly varied in consumption pattern for Meghalaya (p value: 0.025). The study clearly reflects that with an increase in income, the frequency of consumption of pork increases but there is no common pattern of consumption behavior of pork in North East states with respect to income categories. In Meghalaya, a significant difference (p value: 0.42, mean difference: .671) is found between the frequency of pork consumed by those belonging to income group of Rs. 30,000-50,000 vis-à-vis those belonging to less than Rs. 5000. A similar and significant difference is identified for consumers belonging to income categories of less than Rs. 5000 and Rs. 10,000-30,000 (p value: 0.000, mean difference: 1.630) in Nagaland.

Table 4: ANOVA results between the consumption behavior and socio-demographic characteristics of the consumers.

	State	Age	Education	Occupation	Income
Frequency of consumption	Assam	7.020***	2.973**	5.488***	2.340*
	Nagaland	0.652 ^{n.s.}	1.876*	3.878***	11.642***
	Meghalaya	0.523 ^{n.s.}	0.951 ^{n.s.}	0.136 ^{n.s.}	2.833**

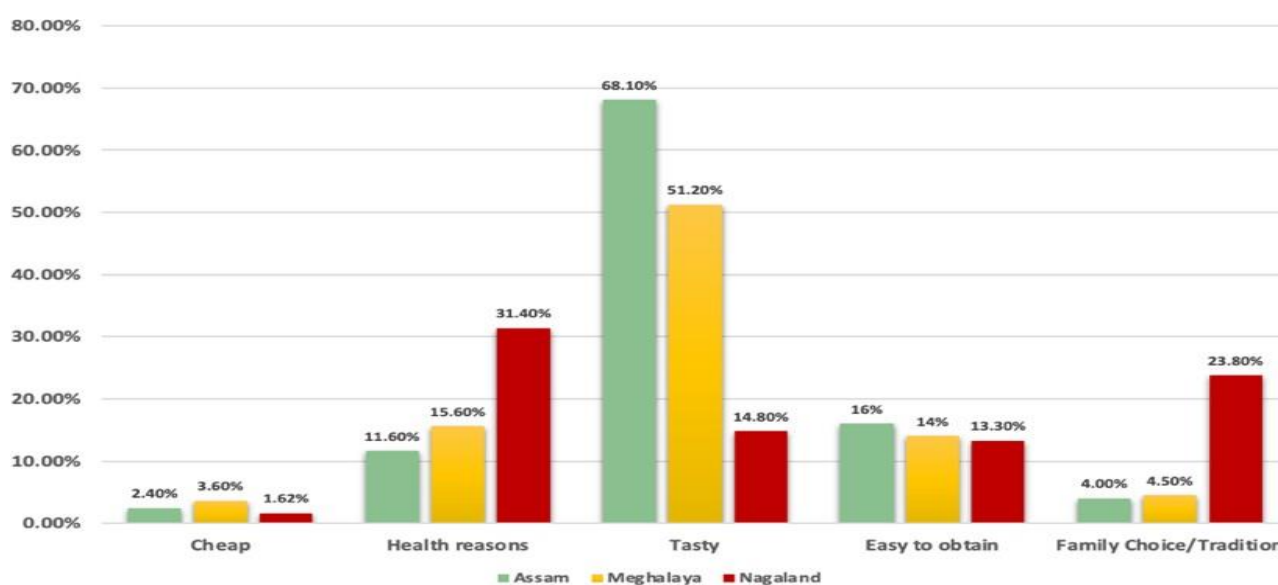
***, **, *denote 1%, 5% and 10% levels of significance respectively

n.s: not significant

3.4 Factors Affecting Purchasing Decision

Several reasons such as cheap, health, tasty, easy to obtain and family choice/tradition affect the purchasing decision of pork. The analysis showed that taste is the most important reason for buying pork in Assam (68.10 percent) and Meghalaya (51.20 percent). But in Nagaland major factor influencing the choice is health concern (31.40percent) which is followed by family choice/tradition. (Fig 2).

Figure 2: Factors affecting purchasing decision



Source: Author's own compilation

Among the visual attributes of pork, freshness emerged to be the most important attribute with 98% of consumers in Meghalaya rating it at the top of all attributes, followed by Assam at 33% and Nagaland at 50.5%. Consumers in Assam consider lean to fat ratio as second most important visual attribute impacting the pork purchase decision. In Meghalaya and Nagaland color is the next important consideration made before purchasing pork. Tenderness ranked as third important visual attributes

among the states while making the purchasing decision of pork.

3.5 Pork Purchasing Preference by Location

The consumers prefer to buy pork products from supermarkets, butcheries, wholesalers and producers. The analysis revealed that butcheries/street vendor/small shops are the primary place of purchase (90 percent) of the pork consumers in Assam. On the contrary, producers are the primary place of purchase for pork products in Meghalaya and Nagaland. Presence of aggregators in pork market is almost nonexistent in North East for which the diversified pork product demand is majorly untapped. The linkages both forward and backward through aggregators can make the pork market efficient through competition among the producers and consumers.

3.6 Pork Consumption pattern

The pork consumption pattern of the consumer is studied in terms of pork type, processed pork products, pork preparation, willingness to pay more for a safer pork and family pork consumption in study area (Table 5).

Table 5: State-wise analysis of pork consumption pattern

Question	Response options	Frequency		
		Assam	Meghalaya	Nagaland
Type of pork	Fresh pork	96.4	98.2	99.4
	Frozen pork	0	0	0
	Processed pork	3.6	1.8	0.6
Processed pork products	Pork sausage	11.7	21.2	33.5
	Ham	4.0	5.2	9.4
	Pickle & Nuggets	27.5	38.8	47.6
Preparation of pork	Pork stew	38.0	26.8	5.2
	Fried pork	33.6	32.0	4.5
	Boiled pork	23.6	34.0	90.3
	Grilled pork	4.8	4.4	0
Willingness to pay more for safer pork	Yes	64.0	62.8	73.2
	No	36.0	37.2	26.8
Pork consumption in your family	Increased	62.8	58.3	65.7
	Decreased	7.2	11.2	4.6
	No change	29.6	29.2	30.7

Source: Author's own compilation

Fresh pork is the major type which is consumed in North East states where insignificant percentage of consumer showed preference for processed pork. Among the various pork products available in market, pickle & nuggets are found to be mostly purchased which is followed by processed pork products and pork sausage. Pork stew is the most preferred method of pork preparation in Assam whereas boiled pork is highly preferred in rest of the two states. It is reported by major percentage of consumers (60) that the consumption of pork has increased with time. Population within the age bracket of 18 to 45 showed the wide choice of diverse pork products but non availability of the diverse product is reported as common limitation in pork market.

4. Health Aspect and Expenditure:

The consumers, being health-conscious, are willing to pay more for safer and naturally grown pork (pork with no antibiotics and drugs). More than 60 percent of the consumers in selected study area showed maximum willingness to pay more for safer pork products. Nagaland consumers are found most concerned and expressed more willingness to pay for safer and naturally grown pork products.

Table 6: Health Issues by Gender and Children (%)

S.no	Health Issues/ Diseases	ASSAM			MEGHALAYA			NAGALAND		
		Male	Female	Children	Male	Female	Children	Male	Female	Children
1	Illness (Influenza)	1.6	2.0	3.	9.2	10.4	6.8	10.8	9.7	7.2
2	Gastrointestinal signs	14	4	3.2	10.4	9.6	9.5	5.6	4.2	4.0
3	Neurological disease	1.3	1.6	-	0.8	-	-	0.8	0.6	0.6
4	Swelling on hand	0.8	2.4	0.2	-	-	-	2.6	2.6	2.6
5	Flu	2	2	3.2	9.6	10.5	10.8	7.4	6.4	7.5
6	Itching and redness	2.8	3.2	5.2	3.2	3.2	3.2	3.5	3.1	3.8
7	Weak immune system	4	4	3.2	2.4	2.4	2	2.4	2.2	2
8	Maternal death and foetal death	-	-	-	-	-	-			
9	Complication during pregnancy	-	-	-						

According to the National Family Health Survey Data (NFHS-5) conducted in 2019-21, 18.25% of the

population suffer from zoonotic disease (gastrointestinal symptoms) in Assam, Meghalaya and Nagaland. From Table 6 and 7 the health status of the pig/ pork product consumers in the study area is examined. It clearly reflects that gastro intestinal symptoms and itching and redness of skin is common health issue for all in the North East state, irrespective of sex and age(children). Flu is reported as dominant health issue for all specially in Meghalaya and Nagaland.

Table 7: Health Expenditure (Rs.) Incurred out of Total Expenditure by Gender and Children (monthly)

S.no	Health Issues/Diseases	Expenditure incurred by health issues								
		ASSAM			MEGHALAYA			NAGALAND		
		Male	Female	Children	Male	Female	Children	Male	Female	Children
1	Illness (Influenza)	50-200	100-300	100-500	100-500	300-1500	200-1400	400-500	400-500	400-500
2	Gastrointestinal signs	100-800	100-500	100-500	300-2000	200-1500	200-1200	500	500	500
3	Neurological disease	600-1000	500-2000	-	500	-	-	1500	2000	1500/month
4	Swelling on hand	100-400	100-200	300	-	-	-	350	350	350
5	Flu	100-400	200-1000	200-1500	250-1500	250-1000	250-1000	450-500	500-600	450-500
6	Itching and redness	100-1000	100-500	150-450	200-500	200-500	200-500	300-320	350-400	320-350
7	Weak immune system	200-1000	200-1500	400-1200	300-500	300-500	300-500	300-350	300-350	300-350
8	Average Expenditure	432	521	450	545	625	575	560	638	560

Female health expenditure is reported highest in North East states as compared to men and children which is mainly due to late reporting of sickness leading to higher intensity of sickness. Though the pork consumers experienced all kind of health issues in Assam yet they incurred the least expenditure on health diseases due to the better access to health diagnosing facilities and improved road connectivity with hospitals (Paul et al., 2019). Being the physical closest in handling the animal it is found that women are least aware of the biosecurity measures to be followed while handling pig. Concern for the health and hygiene while purchasing pork has increased, especially after the pandemic. A study conducted in Delhi also identified that higher the health orientation and awareness of the consumer, the better are the motivations to consume nutritious food (Gupta et al., 2023). Consumers are giving growing importance to quality pig products which are handled by following the proper bio security measures and are graded by the quality control authorities.

5. Conclusion

The empirical analysis has demonstrated the socio-demographic characteristics of the pork consumers and clearly indicated the changing preference pattern of consumers. The consumer's choice to purchase pork is mainly affected by the decision of pork preparation (stew, fried, boiled and grilled), visual attributes (more lean to fat, tenderness, freshness, etc.) and place (butcheries, supermarkets, wholesalers, etc.) of buying pork. Health security, being one of the key parameters of sustainable livelihood, was found to be lagging behind in Nagaland as the pork consumers (male, female and children) incurred highest monthly health expenditure. On the contrary, the pork consumers incurred the least monthly health expenditure in Assam. Complication during pregnancy and maternal death/foetal death was not found at all across all the three states.

Youth are found to prefer diverse pork products and non-availability of the diversity fulfilling the basic benchmarks of quality and hygiene in the market is the common issue in whole North East states. The pork products are majorly bought from butcheries/street vendor/small shops. Processed pork products such as ham, sausages, pickle and nuggets are demanded by approximately 65 percent of consumers but due to scarcity of expected products they end up in buying fresh pork. This is due to the absence of market linkages connecting the diverse consumers and unorganized producers. It can be turned into a highly profitable source of income in the agricultural sector by two major interventions: Firstly organizing the producers into clusters and opening up the market for involvement of local aggregators. Local players from within the North East states can strengthen the local economy by following the economic practices which are close to the socio cultural background of the area. This will open the gateway for entrepreneurship and start-ups in processed pork products to bridge the gap between growing diversified product demand and unorganized subsistence level of production.

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