



Prevalence and Awareness of Food Adulteration and Misbranding in a Rural Area of Kancheepuram District, Tamil Nadu

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Abstract

Frauds in various consumer sectors are now commonly practiced particularly in developing countries including India. Foods are purposely contaminated with additives to increase bulk, attractiveness, disguise spoilage and increase profit. All food products targeted for adulteration are high commercial value products and /or produced in high tonnage around the world and have direct impact on national progress and production (GDP). Despite the fact, there is a paucity of reliable data with regards to adulteration and misbranding in rural Tamil Nadu. The present cross sectional study assesses the prevalence and awareness of food adulteration and misbranding among rural consumers in south India. The study population comprised of 75 households selected using systematic random sampling method from in and around Chunampet Village clusters, Cheyyur Taluk, Kancheepuram district. Structured questionnaire was used to assess socio demographic characteristics (age, sex, education, occupation, per day average income), awareness level, brands purchased and history of food illness. Quantitative data was analyzed using SPSS and T-test and chi-square analysis was used to assess the relationship between variables. Simple procedure was used to detect adulterants in fifteen commonly consumed food items in rural area. Commonly consumed food items were identified based on the household grocery list. The prevalence of food adulteration (in terms of purity) ranged from 80% - 10%. Awareness level was highest for literates than illiterates. Further, rights and responsibility related to food adulteration was found to be poor among this population. Product, Nutrition and food label awareness level was only 2% of the households. However, misleading statements in terms of (e.g. no added Mono sodium glutamate) was observed among 25% of the branded products surveyed. Occupation, Education and income have significant effect on awareness level. Thus, consumer movements in this direction have to be actively encouraged through awareness and education on food adulteration and misbranding among this population.

Keywords: Food Adulterations; Misbranding; Awareness; Survey Prevalence Rural India

Abbreviations: GDP: National Progress and Production; AFND: Association of Health, Food, Nutrition and Dietetics; FSDA: Food Safety and Drug Administration; PFA: Prevention of Food Adulteration Act.

Introduction

Since medieval times there has been presence of food fraud in both developed and developing nations along with efforts

which have been undertaken to stamp out occurrence of this fraud. In addition, there is growing concern among food control authorities to promote the welfare of people and the main motivation behind promoting a clear control with respect to food manufacture as well as marketing to ensure that the needs of the consumer and the honest trader is protected. The central point of all marketing activities is the consumer who is identified to be the largest economic group. With the increase in globalization, there is an

overflow in the number of new products available. There has been a notable shift in world food trade over the past three decades. The importance given to classical food products including coffee, tea, sugar and cocoa has been reduced with increasing consumer demand for processed food as a result of diet upgrade. Changes in consumer food habits around the world are associated with rising income, growing health consciousness and urbanization. Other aspects contributing to change in consumer habits involves international migration, communication revolutions and international tourism. There is increasing difficulty for consumers to select food items as a result of misleading advertisements, improper emphasis by traditional and modern media as well as rampant increase in food fraud [1-8].

In developing countries like India, frauds in various consumer sectors are now commonly practiced and food is purposely contaminated with additives to increase bulk, attractiveness, disguise spoilage and increase profit. All food products targeted for adulteration are high commercial value products and /or produced in high tonnage around the world and have direct impact on national progress and production (GDP). These types of malpractices with respect to food make consumers the ultimate victim as they undergo suffering due to lack of food safety. Moreover, these malpractices are more prevalent among rural consumers as they are generally ignorant and also unorganized. Rural market in general comprised of duplicity of branded goods (misbranding) and sub-standard goods and there are no quality checks on production and sale of such products. The problems of food fraud in India take two main forms. First, it involves a direct method where merchants perform straightforward adulteration. This involves reducing the quality of food by adding some additives which involves insidious commercial debasement of food [9] either due to intentional or unintentional in nature. Intentional adulteration is often wilful where the adulterator intends to increase his overall margin of profit. Sometimes adulteration occurs unintentionally due to contamination as a result of ignorance, negligence or lack of proper facilities. The second category of food fraud involves passing off food under misleading brand names, descriptions as well as claims. This may also include concealment of nutritional content and labelling and occur mainly due to growth in the power of the marketing. In order to keep their market share, or even stay in business, traders large and small have had to "swim with the tide"; hence the problems grow. In order to prevent adulteration, The Ministry of Health and Family Welfare, has initiated a program called as The Prevention of Food Adulteration Act (PFA) which is designed to be a basic food security act where authorities take various samples and test them at regular intervals [10-12,8]. Further, to protect the consumer from these frauds, government of India has initiated legal measures particularly an initiation of the

Consumer Protection Act, enacted on 24th December 1986, where special emphasis is given to consumer education to ensure that people become aware about their rights and responsibilities especially among rural consumers. Despite these efforts, the levels of fraud still prevail in rural areas.

The awareness, knowledge as well judgement of food is found to be directly related to habits, attitude as well as perception of what "good food" entails which are often linked to social, cultural as well as economic influences. This is found to explain why today a large number of studies which focus on food safety, food adulteration, mislabelling and misbranding [13,14] is carried out more in developed countries. The consumer attitude towards food safety and food fraud is not found to be of great impact in a number of developing countries as previously the level of consumer impact was less [13]. However this situation is rapidly changing with a number of researchers concentrating on improving consumer awareness of food products in India [2,3,9]. Despite the fact, there is a paucity of reliable data with regards to adulteration, nutrition labelling awareness and misbranding in rural Tamil Nadu, as this data is more important to frame an appropriate policy and regulations. The aim of this study is to identify the prevalence of food adulteration, awareness towards food and nutrition labelling and misbranding in rural consumers in southern India.

Methodology

Study participants comprised of 75 households were recruited using random sampling method from in and around Chunampet Village Clusters, Cheyyur Taluk, Kancheepuram district, Tamil Nadu, (southern India). Individuals aged \geq 20 years and preferably female households were selected and structured questionnaire was administered. The study was conducted over a week period (August 17-23rd) using a trained nutritionist and research assistant across 8 different villages. A study was conducted in Tamil and hence questionnaire was translated to local regional language to ensure reliable information.

Food Adulteration, Misbranding and Food labelling Awareness

In order to select a most commonly consumed foods, we used a 24 hr recall to understand their consumption quantity and quality of the foods consumed. The 24hr recall covers all the information including brand, quality, place where consumed, quantity and household portion tool. A questionnaire was administered to a 75 participants who does both purchasing and cooking of food items. Further, ten most common shops nearby houses / villages areas were visited and bought ten (n=10) commonly consumed foods and packed products (n=15) as identified in 24hr recall for adulteration and misbranding respectively. These shops were identified

based on the choice of consumers participated in this study. To identify the level of adulteration among different food items we adopted protocol listed from Food Safety and Drug Administration (India). However, an attempt was made to select only simple household procedures to ensure translation of research among rural consumers. An awareness of these products was captured under Nutrition labelling questionnaire.

Food and Nutrition Labelling Awareness

The questionnaire for this study was presented in four different parts including socio-demographic information, awareness of food adulteration, misbranding of products and food claims, nutrition and food label related issues. The preparation of this scale involved making use of items or statements which contain factual information with respect to consumer responsibilities and food adulteration. A pilot study was conducted with ten respondents and a reliability index of more than 0.7 was obtained for all statements tested. The protocol for the study was approved by the Institutional Ethics Committee of the Association of health, Food, Nutrition and Dietetics (AFND) and informed consent was obtained from all study participants.

Statistical methods

All analysis were conducted using the statistical software package SPSS, (12.0 version; SPSS Inc., Chicago IL). Fischer's exact analysis was used to assess the relationship between variables. All tests of significance were two-tailed and p values <0.05 were considered statistically significant.

Results

About 15 consumed foods were identified from household grocery list and purchased in ten shops from eight villages. The foods were tested for adulterant as specified in the Food Safety and Drug Administration (FSDA) Appendix 1. The Table 1 shows the prevalence of Food Adulterant in these villages.

The prevalence of food adulteration (in terms of purity) ranged from 90% for tea powder and iodized salt and lowest purity was obtained for rice with an approximately prevalence of 10%. The most alarming was the amount of contamination in salt. The survey revealed that 70% of the survey participants were found to be consuming adulterated milk. Moreover, food products such as pulses were found to have impurities that have carcinogenic properties. Wheat and Rice another staple food of Indian residents also was found to have a large amount of impurities. Almost all the foods obtained through unpacked form while only tea powder, Chilli Powder, Honey are obtained through packed form. The test results reveal an alarming amount of contamination in the daily diet of the survey participants.

Foods Items (n=15) Cereals	Adulterant %
Rice	10%
Wheat	40%
Semolina	80%
Pulses	40%
Coriander	60%
Chilli Powder	20%
Turmeric Powder	40%
Asafoetida	60%
Tea Powder	90%
Coffee Powder	70%
Honey	90%
Milk	70%
Salt	80%
Iodized Salt	90%
Sugar	60%

Table 1: Prevalence of Food Adulterant (n=15).

Awareness of Consumers

The study included 75 participants and majority of the respondents were women (92 %), one third respondents were of the age group 30-40 years (80%) and were found to be illiterate (40%) or completed up to class 5 (29.3%) level of education. Most of the respondents were found to be homemakers (28 %) with some of them being daily wagers (26.7%) or shop owners (24%). The home makers made the decision with respect to food products being bought (38.7%) while small percentage (12%) of the families' decision was made by the husband or by a joint family system (20%). The purchase frequency of the respondents purchased their products on a daily (40%) to weekly (25%) basis with respect to products like spices while staples like wheat and rice were purchased on a monthly basis (70%). Most (90%) of the participants were found to purchase from local kirana stores and for major food products they depend their own farming (data not shown).

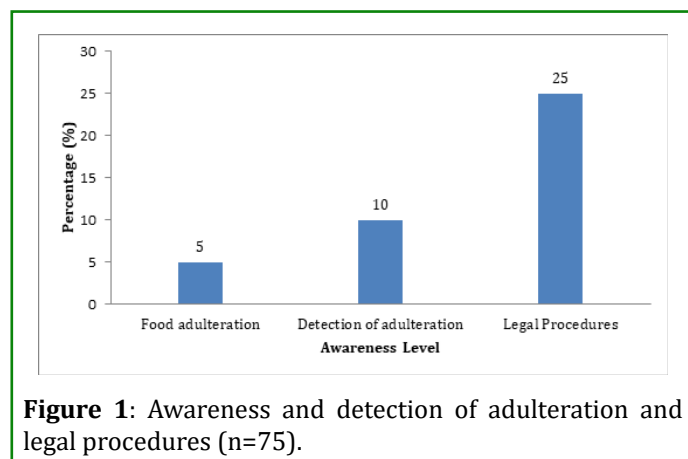


Figure 1: Awareness and detection of adulteration and legal procedures (n=75).

	Variables	Food Adulteration n (%)
Education	Up to class 12	8 (72.7%)
	Up to class 5	2 (18.2%)
	Bachelor's degree	1 (9.1%)
	Illiterate	0 (0%)
	Master's degree	0 (0%)
	Professional degree	0 (0%)
	Total	11(100%)
Occupation	Farmer	2(18.2%)
	House Wife	8(72.7%)
	Shop Owner	1(9.1%)
	Professional	0 (0%)
	Daily Wage	0 (0%)
	Total	11(100%)
Gender	Male	3(27.3%)
	Female	8(72.7%)
	Total	11(100%)
Family income	Less than 2000	3 (27.3%)
	2000-5000	7 (63.6%)
	5000-10000	1 (9.1%)
	More than 10000	0 (0%)
	Total	11(100%)
Sick family members ^β	0	8 (72.7%)
	1	2 (18.2%)
	2	1 (9.1%)
	3	0 (0%)
	Total	11(100%)

Table 2: Relationship between awareness of food adulteration and demographics: ^βlast six months; percentage values are in comparison with an unawareness group.

Awareness of food adulterants

Participants were questioned on their knowledge of adulterants in food and found that 70% of the participants were not aware of the concept while 64% have not come across the presence of an adulterant in their food. The awareness of complaint procedures related to adulterated food was very low (5%) as observed in Figure 1. Awareness level was highest for literates than illiterates and was more among men rather than women. The knowledge of food adulteration was found to be highest among families that the least number of sick people. A significant difference in perception of awareness of food adulteration and education ($p=0.004$), occupation ($p=0.045$), gender ($p=0.027$), family income ($p=0.030$) and number of sick members in the

family ($p=0.003$). Thus knowledge rights and responsibility related to food adulteration was found to be poor among this population.

Awareness of Food Claims and Food Safety

Product, Nutrition and food label awareness level was only 2% of the households. A few respondents gave importance to the nutritional content of packaged foods (16%). Misleading statements in terms of (e.g. no added Mono sodium glutamate) was observed among 25% of the branded products surveyed. Since in the present study only 2% was aware, a further comparison was not made with socio-demographic variables. The respondents identified that they did not read any information presented on packaged products and often

were found to be misled by advertisements.

Awareness of Misbranding

The percentage of misbranding prevailing in the rural area was obtained from the shops. Most misbranding items are fried snacks (e.g. Kir Kir for Kur Kure), chocolates (eg Kit Kat for Kit Kat and Dairy Milk for Dairy Milk) and biscuits (Milk Shakti biscuit for Milk biscuit).

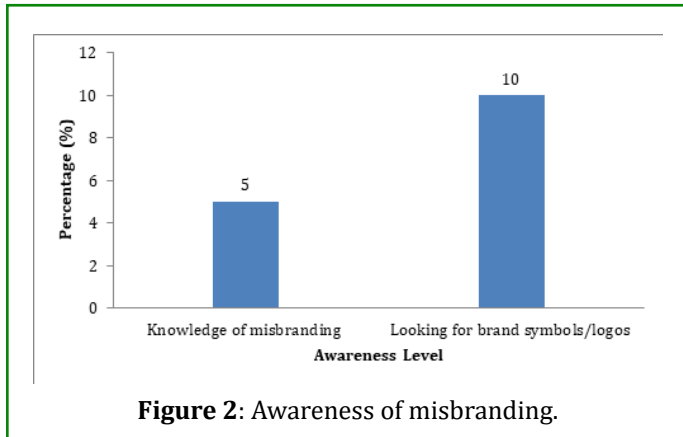


Figure 2: Awareness of misbranding.

From Figure 2 shows that majority of the shops (75%) showed presence of counterfeit products and that the number of counterfeit products was highest among snacks. Awareness of concept of misbranding was only among 5% of respondents. The respondents indicated that they only looked

for product colour and packaging style when they purchased processed goods and rarely looked at the labelling. Only few respondents gave importance to verifying if the product was original by (e.g. by identifying the correct brand logo/symbols) (10% of the respondents) as observed in Figure 3. A significant difference in perception of awareness of food claims and safety and education ($p = 0.034$), occupation ($p = 0.016$), gender ($p = 0.021$), family income ($p = 0.036$) and number of sick members in the family ($p = 0.024$) as observed from Table 4. Thus, consumer movements in this direction have to be actively encouraged through awareness and education on food adulteration and misbranding among this population.

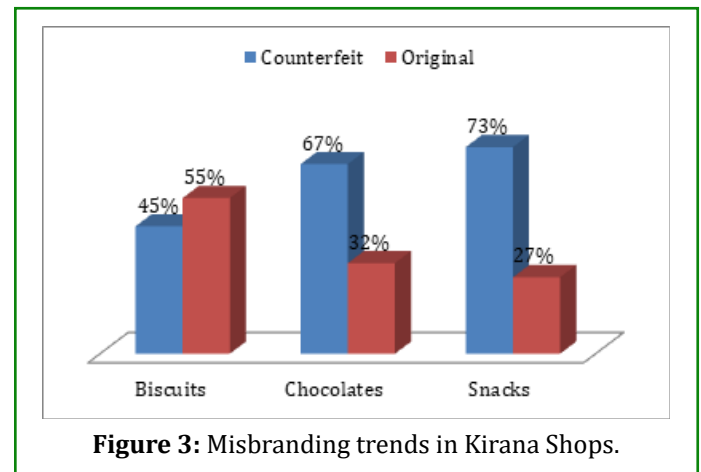


Figure 3: Misbranding trends in Kirana Shops.

Food items	Household Protocol	Result	Adulterant
Wheat Flour	Sprinkle on water surface / Shake sample with dil HCL	Bran will float on the surface / effervescence indicates chalk	Present (Excess bran/ chalk powder)
Rice	Rice is immersed underwater / handpicking	Rice will float whereas impurities will sink	Present (Stones/Grit)
Semolina	Spread a small quantity (2 tsp) of sample on a paper, and draw magnet over it	Iron flakes if present will cling to the magnet.	Iron / Flakes
Sugar	Mix sugar with water	Sugar will dissolve leaving any impurities to settle down	Present (Chalk powder/ dirt)
Pulses	Shake 5 gms: of the pulses with 5 ml of water. Add a few drops of hydrochloric acid.	The appearance of pink colour in the solution.	Present (Metanil yellow / Lead Chromate)
Coriander Powder	A teaspoon of Coriander powder is mixed in a glass of water (100ml)	Impurities and substandard materials float on the surface	Present (Dung)
Chilli Powder	Take a tea spoon full of chillies powder in a glass of water.	Colored water exhibit presence of artificial colour. Any grittiness that may be felt on rubbing the sediment at the bottom of glass confirms the presence of brick powder/sand, soapy and smooth touch of the white residue at the bottom indicates the presence of soap stone.	Present (Brick/salt/talc powder)

Salt	Mix water and Salt in a glass	Salt dissolves while impurities settle down	White powdered
Iodized Salt	Cut a piece of potato, add salt and wait minute and add two drops of lemon juice.	If Iodized salt blue colour will develop, there will not blue colour	Common Salt
Turmeric Powder	2 gms of Turmeric powder is mixed in a test tube with water and few drops of HCL	Appearance of bubbles in Turmeric powder	Present (Chalk / Brick Powder) or metanil yellow
Asafoetida	Shake little portion of the same with water and allow to settle.	Soap stone or other earthy material will settle down at the bottom.	Present (Resins)
Tae Powder	Tea powder is laid on the table and a magnet is moved over it.	Iron based impurities will stick to the magnet	Present (Iron flakes/ fillings)
Pepper Corns	Sample is spread over a table and observed keenly using one's own sight.	Papaya seeds can be identified	Absent
Coffee Powder	Coffee powder is sprinkled on a clear glass of water.	Coffee powder will float while impurities will sink while leaving a trace behind them.	Present (Chicory Powder)
Honey	Add a few drops of honey into a glass of water	Some of the honey dissolves in the water while pure honey forms thin thread like structures and settles down	Present (Molasses sugar)
Milk	The presence of water can be by putting a drop of milk on a polished slanting surface.	The drop of pure milk either or flows lowly leaving a white trail behind it, whereas milk adulterated water will flow immediately without leaving a mark.	Water

Table 4: Number of sick members in the family ($p= 0.024$) as observed.

	Criteria	Awareness of misbranding N (%)
Education	Illiterate	4(100%)
	Up to class 5	0 (0%)
	Up to class 12	0 (0%)
	Bachelor's	0 (0%)
	Master's degree	0 (0%)
	Professional degree	0 (0%)
	Total	4(100%)
Occupation	Farmer	0 (0%)
	House Wife	4(100%)
	Shop Owner	0 (0%)
	Professional	0 (0%)
	Daily Wage	0 (0%)
	Total	4(100%)
Gender	Male	0(0%)
	Female	4 (100%)
	Total	4 (100%)

Family income	Less than 2000	2 (50.0%)
	2000-5000	2 (50.0%)
	5000-10000	0 (0%)
	More than 10000	0 (0%)
	Total	4(100%)
Sick family members ^β	0	4 (13.8%)
	1	0 (0%)
	2	0 (0%)
	3	0 (0%)
	Total	4(100%)

Table 3: Relationship between awareness of food adulteration and demographics: * $p < 0.05$; ^βlast six months; percentage values are in comparison with an unawareness group.

Discussion

The present study examined the prevalence of food adulteration and misbranding in Tamil Nadu and surprisingly the study found high percentage of food adulterants and misbranding products in the rural area. There is a poor awareness among consumers with reference to prevalence of food adulterant, food safety and laws related to food. Generally it can be observed that adulteration rate increases when there is a food shortage. As the prices of food products keep increasing there is a demand for cheaper products and this is when adulteration increases as dishonest dealers tend to supply the consumers with adulterated food products at cheaper prices which the public unknowingly consume. A study by [15, 16] showed that food adulteration was higher in smaller cities like Jalgoan, Nanded and Jalna when compared to bigger cities such as Nagpur, Pune, Amravati, Sholapur, etc while another study has revealed a significant increase in the amount of food adulteration in Nepali villages in particular over 66% of the food samples that were being tested showed positive for food adulteration. In this study the number of products which showed signs of adulteration was quite high indicating that over the last three decades the situation remains marginally the same. There were a number of studies that showed that home makers were typically the ones who tend to purchase food for the entire family [17-19]. The studies also revealed that homemakers tend to take almost all the decisions related to purchase of food except in their financial aspects. In the present study apart from the woman others including her husband and the joint family system also take decisions hence efforts to promote knowledge should be directed towards all sections of the population. In addition, the present study correlated the awareness level and number of sick people and results showed people who are unaware about adulterants and food safety issues are more affected by infections like diarrhoea, food poisons, cold etc. Fake products are more prevalent in this village but in general

consumers are not aware and buy these products by looking at their colours and package but not reading the labels. In the present study only five percent of the consumers reported that they look at the labels. Thus it can be established that in order to meet the challenges that customers face today, there should be increased knowledge and awareness with respect to issues of food safety, misbranding and health claims. It can be promoted that the best defence any consumer has against these issues is knowledge of his/her rights as a consumer and of the remedies which exist to resolve these problems when they occur. Fake products create damage to leading companies' sales and brand image. Fake products also create problems to consumers on their health. Hence, the MNCs and other leading companies that are worse affected by fake brands have to promote awareness among the rural population with respect to buying these products. "Knowledge and awareness about adulterated foods, laws and its rights related to adulterated food is crucial in a society where technology heightens opportunities for perpetrators of fraud deception and misrepresentation" [20].

Food claims are found to transfer information from manufactures to consumers with respect to nutritional and positive benefits, which can be obtained with respect to consumption of different components/constituents in food products. However if food claims fail to achieve a specific objective due to misinformation of the contents of the product then it would result in resulting in a negative impact on market efficiency [21-23]. Consumer misunderstanding and lack of proper information availability is found to invalidate the tremendous effort in terms of financial and human resources that the food industry other developed countries are making to communicate food nutrition content responsibly. The present study had several limitations. Firstly, being a cross sectional study, it does not allow us to make a cause and effect inference particularly the prevalence of food adulterant and its impact on health of consumers.

Secondly, the sample size is low to assess the accurate prevalence of villages and moreover sample is restricted only few villages of particular district. Hence this may not be representative of entire Tamil Nadu. Further, only structured questionnaire has been adopted, it would have been useful if more of qualitative information has been collected to assess their perception and attitude towards food safety [24-27]. However, this study also has several strengths: The first study to assess the prevalence of misbranding, counterfeit products and awareness of food labelling among the villagers. Further we had assessed relationship between per-capita incomes, education of respondents, food borne illnesses with magnitude of adulteration in each house-hold. Furthermore, the research also showed that not much studies have focused on the awareness of the consumers when it comes to food adulteration while there are studies that provide detailed analysis on the amount of contamination that happens in most of the food samples however, studies dealing with the awareness of respondents in rural areas in relation to food adulteration are severely lacking. This is one of the main reasons as to why the investigator felt it was necessary to educate respondents on the existing adulteration practices of retailers and manufacturers and to instil knowledge on detecting food contamination among women [28-32]. In conclusion the study reported low awareness of food safety and high prevalence of food adulterant among south Indian rural consumers. Health education in food safety to avoid food adulteration and mislabelling issues is both possible and cost-effective, but it should be culture specific and should respond to technological, economic and social situations that prevail in a particular society or cultural groups. Identification of educational needs and lacunae in knowledge and perceptions is the first step towards developing educational material.

References

1. Sudershan RV, Rao GMS, Rao P, Rao VV, Polasa K (2008) Food safety related perceptions and practices of mothers – A case study in Hyderabad, India. *Food Control* 19(5): 506-513.
2. Gavaravarapu SRM, Vemula SR, Rao P, Mendu VVR, Polasa K (2009) Focus Group Studies on Food Safety Knowledge, Perceptions, and Practices of School-going Adolescent Girls in South India. *J Nutr Educ Behav* 41(5): 340-346.
3. Rao GMS, Sudershan RV, Rao P, Rao MVV, Polasa K (2007) Food safety knowledge, attitudes and practices of mothers—Findings from focus group studies in South India. *Appetite* 49(2): 441-449.
4. Dhyani A, Saklani A (1994) To assess awareness of consumers towards consumer protection laws, *J. Marketing* 23(7-8): 9-12.
5. Kalpagam P, Sudershan RV, Subba Rao GM, Rao MVV, Rao P, et al. (2006) KABP Study on Food and Drug Safety in India: A Report, Food & Drug Toxicology Research Centre, National Institute of Nutrition, Hyderabad.
6. Rae A, Josling T (2003) Processed food trade and developing countries: protection and trade liberalization, *Food Policy* 28(2): 147-166.
7. Athukorala P, Jayasuriya S (2005) Processed foods exports from developing countries and food safety related market access issues: aims and scope of the research project', Background Paper Prepared for the Workshop on International Food Safety Regulation and Processed Food Exports from Developing Countries: A Comparative Study of India and Thailand, Research Information Systems, New Delhi.
8. Bhat RV, Rao RN (1997) Food regulation', Food Safety, Bangalore: The Bangalore Printing and Publishing Co. Ltd, pp: 118-139.
9. Umali-Deininger D, Sur M (2007) Food safety in a globalizing world: opportunities and challenges for India, *Agricultural Economics* 37: 135-147.
10. Srilakshmi B (2003) New Age International, Food Science, pp: 313.
11. Vidya C, Rao D B (2010) A Text Book Of Nutrition, Discovery Publishing House.
12. Chadha (2004) The prevention of food adulteration act and rules.
13. Wilcocky A, Pun M, Khanonax J, Aung M (2004) Consumer Attitudes, Knowledge and Behaviour: A Review of Food Safety Issues. *Trends in Food Science & Technology* 15(2): 56-66.
14. Karoui R (2012) Food Authenticity and Fraud, *Chemical Analysis of Food: Techniques and Applications*, pp: 499-517.
15. Sundaram S (1985) Consumer protection in India, Delhi: B.R. publishing corporation, pp: 66-77.
16. Roday S (2002) Food hygiene and sanitation, New Delhi: Tata Mc. Graw - Hill Publish in company Ltd, pp: 248-249.
17. Subedi (2001)
18. Nimkar A (1976) Food buying practices of unemployed and employed home maker, *The Indian Journal of Home Science*, 10(1) Coimbatore: Home science association of

- India.
19. Pande U (2000) A study of ascertaining buying practices of consumable goods among low income group, Vallabh Vidyanagar: P.G. department of Home Science S.P. University.
 20. Garman ET, Miescier MC, Jones P (1992) Older American's knowledge of consumer rights and legal protection. *Journal of Consumer Studies & Home Economics* 16(3): 283-291.
 21. Brookes G (2010) Economic Impact Assessment of the European Union (EU)'s Nutrition & Health Claims Regulation on the EU Food Supplement Sector and Market. European Health Claim Alliance, GBC Ltd, UK, pp: 1-33.
 22. Hawkes C (2004) Nutrition Labels and Health Claims: The Global Regulatory Environment. World Health Organisation.
 23. Mason MJ, Scammon DL (2011) Unintended Consequences of Health Supplement Information Regulations: The Importance of Recognizing Consumer Motivations, *Journal of Consumer Affairs* 45(2): 201-223.
 24. Kamala S (1974) Food authenticity, *Baroda Journal of Nutrition* 49(1).
 25. Motarjemi Y, Moaref A (2000) Food borne disease: A focus for health education, Geneva: World Health Organization.
 26. Naik Y (2010) 25% of milk in state adulterated, *The Times of India*.
 27. Rao SC (2010) Food adulteration goes unchecked, *The Times of India*.
 28. Martin T, Dean E, Hardy B, Johnson T, Jolly F, et al. (2003) A new era for food safety regulation in Australia Original Research Article', *Food Control* 14(6): 429-438.
 29. Mensah LD, Julien D (2011) Implementation of food safety management systems in the UK Original Research Article, *Food Control* 22(8): 1216-1225.
 30. Liu S, Xie Z, Zhang W, Cao X, Pei X (2013) Risk assessment in Chinese food safety Review Article, *Food Control* 30(1): 162-167.
 31. Jacquet JL, Pauly D (2008) Trade secrets: Renaming and mislabeling of seafood Original Research Article, *Marine Policy* 32(3): 309-318.
 32. Khapre MP, Mudey A, Chaudhary S, Wagh V, Dawale A (2011) Buying Practices and Prevalence of Adulteration in Selected Food items in a Rural Area of Wardha District: A Cross - Sectional Study, *Online J Health Allied Scs* 10(3): 4.