

**PJN**

ISSN 1680-5194

PAKISTAN JOURNAL OF  
**NUTRITION**

**ANSI***net*

308 Lasani Town, Sargodha Road, Faisalabad - Pakistan  
Mob: +92 300 3008585, Fax: +92 41 8815544  
E-mail: [editorpjn@gmail.com](mailto:editorpjn@gmail.com)

## Extent of Awareness and Food Adulteration Detection in Selected Food Items Purchased by Home Makers

Nidhi Gupta<sup>1</sup> and Priti Panchal<sup>2</sup>

<sup>1</sup>Department of Family Resource Management, S. M. Patel College of Homescience, Vallabh Vidyanagar - 388120, Gujarat, India

<sup>2</sup>Vocational Stream of Home Science, Vallabh Vidyanagar, Gujarat - 388120, India

**Abstract:** Food is essential for sustenance of life. Adulteration of food cheats the consumer and can pose serious risk to health in some cases. The present study was planned with the main objective of identifying buying practices of homemakers and their extent of awareness related to selected food products. Stratified sampling method with questionnaire cum interview schedule was adopted to collect data. Tool was standardized by difficulty index, validity index and split half reliability method. Statistical test such as chi-square between awareness and occupation, t-test among age group, educational level and extent of awareness were carried out. Study revealed that respondent's awareness related to rights and responsibilities was good but poor related to food adulteration. Education, family income and occupation had an effect on extent of awareness. Age and awareness has no correlation while a positive correlation was found between family income and awareness. This research paper is the part of the work carried out under the project funded by University Grant Commission, India.

**Key words:** Food adulteration, adulterants, adulteration detection

### INTRODUCTION

Consumer is the largest economic group and central point of all marketing activities. With the rise in the income of people, the quality, the quantity and the sophistication of the consumer goods has also increased. The market is literally overflowing with the new products based on intricate technology. It is very difficult for the consumer to select one food item because of misleading advertisements, improper media emphasis and food adulteration. As a result of these malpractices, the ultimate victim is a consumer, who innocently takes adulterated foods and suffers.

Consumer behavior appears static in general which is in the need of its entire conversion to dynamic. The behavior process involves some or all of the following steps (Fig. 1).

A good buying behavior reflects philosophy about the nature of consumer and provides a logical means of organizing the vast quantity of information on variables that influence the buying practices. Buying practices involves the determination by market agencies of kind, qualities and quantities of goods desired by consumer. Buyer has to find out the desired qualities of goods sold at satisfactory prices. Buying consumes a great deal of time, energy and money. Effective buying requires a specialized knowledge of content of goods, their resources and their use. (Kotler, 1990) Consumers have no choice except to face a wider variety of buying situations than in the past, one result is that there has been and will continue to be an increase in the number of consumer problems and disputes particularly

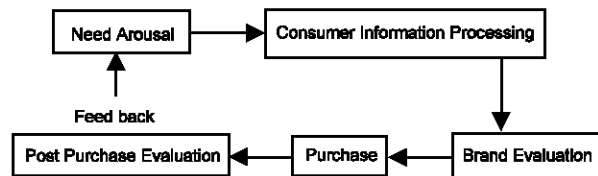


Fig. 1: Model of Buying Behavior

involving consumer rights and legal protection. To meet these challenges successfully Consumers must arm themselves against these problems since they are not automatically protected by the working of the market. Therefore, a consumer's best defense is knowledge of his/her rights as a consumer and of the remedies which exist to resolve these problems when they occur. "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" (Garman and Jonest, 1992).

Adulteration may be intentional or unintentional. The former is a willful act on the part of adulterator who intended to increase the margin of profit. On the other hand, adulteration may be incidental contamination, which is usually due to ignorance, negligence or lack of proper facilities.

Adulteration is defined as "the process by which the quality or the nature of a given substance is reduced through:

- The addition of a foreign or an inferior substance e.g. addition of water to milk.
- The removal of vital vitamins, e.g. removal of fat from milk". (Mudambi and Rajgopal, 1985)

The causes of adulteration may be:

- Availability of too many products in the market
- Poor buying practices of consumers.
- Consumer mentality of bargaining,
- Consumer psyche.
- Availability of adulterants.

It is true that, adulteration primarily thrives in a period of shortages. The consumer's real income is falling due to rising prices of even essential commodities. Psychologically, consumers pay less attention to the quality of products during this period. He/she is facing disadvantages in the form of adulteration. Now a day, "Adulteration is health menace". Thus, food adulteration takes many forms: mixing, substitution, abstraction, concealing the quality sale of decomposed foods and using false labels. The pity is that the so-called modernization has brought with it, the evils of adulteration.

Somehow, the Indian consumer has become accustomed to live with adulteration. Even educated consumers do not pay attention to the menace of adulteration. (Sundaram, 1985).

Many of the spices, ready to eat ground masalas and commonly used products are found contaminated/adulterated. The adulteration problem in India has attained massive dimensions.

#### Types of adulteration:

There are three types of adulteration namely:

- *Intentional adulterants*: Intentional adulterants are sand, marble chips, stone, mud, chalk powder, water, mineral oil and coal tar dyes. This adulteration cause harmful effects on the body.
- *Metallic contamination*: Metallic contaminations include arsenic from pesticides, lead from water, and mercury from effluents of chemical industries, tin from cans etc.
- *Incidental adulterants*: Incidental adulterants are pesticide residues, tin from can droppings of rodents, larvae in foods. Metallic contamination with arsenic lead, mercury can also occur incidentally. Pests such as rodents and insects intrude into the food at high degree and produce filth in the form of excreta, bodily secretions and spoilage through micro organisms. The most common incidental adulterants are pesticides, D.D.T and marathion residues present on the plant product. The maximum permissible residue allowed for D.D.T, marathion is 3 ppm.

Chemical like D.D.T are absorbed by the small intestine when ingested. The toxins usually pile up in the fatty tissues of such vital organs as the thyroid, heart, kidney, liver, mammary gland and damage these organs. They can be transferred from the umbilical cord/ blood to the growing foetus and through breast milk in children, the disease apart from crippling them inhibits their growth (Table 1).

The studies conducted by Nimkar (1976); Pande (2000) reveals that homemakers were the actual buyers for the food in the family. Home makers took independent decision in all the areas of food buying except financial aspect. "Availability of money resource and availability of the product" in the market were the most important factors, whereas "food habit" and "nutritional requirements" were the least important factors while buying a product. On the other hand low income group home makers preferred rationing store, and independent store for the groceries and miscellaneous items. For the selection of stores low income group home maker gave more importance to credit facilities, lowest price and location of the store. Majority of the home makers from low income group collected all information from friends and neighbors. Among home makers retail shops were more used than wholesale shops for purchasing grains, monthly purchasing was most common among the employed and unemployed homemakers for grains and grocery.

Roday (2002) tested food samples examined at various Public Health Laboratories in the state of Maharashtra during the year 1993. He found that in small cities like Jalgoan, Nanded and Jalna the percentage of adulteration is very high compared to bigger cities viz. Nagpur, Pune, Amaravati, Solapur etc.

Subedi (2001) has recorded a marked rise in case of major food and beverages adulteration in Nepal. The published report summarized a substantial rise in adulteration of mustard and rapeseed oil with Argemone Mexicana.

According to lab test conducted by Food Technology and Quality Control Department, over 66 percent of the samples were found contaminated. Out of 149 mustard rapeseed samples, 98 of them were contaminated with Argemone Mexicana. Similarly, 44 percent of the black pulses were found adulterated with coal tar and inedible mix. Last year the adulterated figure was only 12.5%.

The report has also said that 40% of ghee in the market was contaminated with vegetable fat and high concentration of fatty acids, while 27% of vegetable ghee in the market was contaminated due to the use of low quality raw materials. Like wise 54.5% samples of papad were also found adulterated.

The review thus reveals that the researches on enhancing awareness of consumers related to adulteration and its detection are sporadic. Although efforts have been made to detect the percentage of food adulteration in number of cities big and small, none of

Table 1: Health Hazards of Adulteration

Sr. No.	Adulterant	Food Articles	Effects on Health
1	Argemone oil	Oils and fats	Epidemic dropsy, glaucoma, blindness, cardiac arrest.
2	Pesticide Residue	All types of foods	Acute or chronic, poisoning, with damage to nerves and vital organs.
3	Mineral oil (used motor oil)	Oils and black pepper	Diarrhea, vomiting, cancer.
4	Methyl/ alcohol	Alcoholic liquors	Blurred vision, blindness, death.
5	Lead chromate	Turmeric and powder mixed spices	Anemia, brain damage.
6	Metanil Yellow	Turmeric, mixed spices, saffron, dehusked pulses, rice, golden beverages	Tumours, cancer, testicular degeneration in males.
7	Lead	Tap water, some processing foods	Lead poisoning, causing footdrop, anemia, brain damage.
8	Kesari dal	Pulses and besan	Paralysis of legs
9	Dung	Coriander powder	Tetanus
10	Iron filling	Suji, tea leaves	Possibility of tetanus

Source-YOJANA, April 16, 1980, page 16 "Government of India"

the study deal with knowledge and awareness of women (homemaker) about food adulteration. That is why investigator found it necessary to generate awareness among the homemakers about the existing food adulteration practices of the retailers and manufacturers and equip them with simple household test for detecting adulteration.

**Objectives of the study:**

- To identify popularly used brands of selected food products by the homemakers.
- To study buying practices of homemakers related to selected food products.
- To measure the extent of awareness related to food adulteration among selected group of homemakers.
- To measure the relationship between extent of awareness of the homemakers related to food adulteration and their age, income and education.
- To measure the adulteration in selected food products through standard lab testing procedures.

**METRIALS AND METHODS**

In the present study questionnaire was prepared in four parts:

- Background information of the respondents;
- Buying practices of the homemakers;
- Awareness scale on food adulteration;

The awareness scale was prepared with items or statements which are based on factual information related to consumer's responsibilities and food adulteration. While preparing the scale, care was taken to include all such questions that would elicit the information needed to attain the objectives of the study. To establish the validity and difficulty index of the awareness scale a panel of judges from five faculties (Faculty of Education, Master of Business Management, Business Studies Department, Economics, Home Science Department) were selected and requested to check the clarity and correctness of each statement. The reliability of awareness scale was 0.67. All the items that had validity index of 0.20 or more and difficulty index between 0.30 and 0.70 were included in final scale. The final scale consisted of 33 items.

Out of 281 families in Mahadev area 60 families were selected from the sample population on the basis of stratified systematic sampling technique. The questionnaire was filled up; the data were then processed, tabulated and analyzed. The data were analyzed employing descriptive as well as rational statistics. In this, rational statistics such as correlation, student-t test were computed; on the basis of that test null hypothesis was accepted or rejected.

To fulfill the objective of testing the popularly used brands, the standard lab testing procedures were carried out for selected spices and flours. Three qualities of selected food products were taken i.e. standard (Branded), sub-standard (packed but not branded) and loosely available. Selection was done after identifying the popularly used brands by the respondents. The lab-tested results were matched for the amount of adulteration and results were briefed on the absence/presence of adulterant in food products.

**RESULTS AND DISCUSSION**

**Background information:** The result revealed that from the selected sample size one-third of respondents were less than or equal to thirty years of age, while half of the respondents were between 31 to 50 years of age group, 28% of respondents were educated up to higher secondary. In the present study majority of the respondents i.e., 70% were homemakers, while self employed and professionals were very less i.e., almost 2% each.

**Major decisions for purchasing food:** The result disclosed that, in 45% of families, the home maker took the major decisions for purchasing food for their families, where as 16.67% of families were dependent on the decisions made by the husband, one fourth of the families under study took the decisions jointly (husband and wife) and in only very few families, decisions were taken up by their in laws.

**Buying practices of the homemakers:** The present study was carried out on sixty respondents. The buying practices includes the type of packaging used while purchasing, brand choice, shop choice and purchase frequency of the selected items undertaken for study.

Table 2: Distribution of the Respondents with respect to their Extent of Awareness regarding Rights and Responsibilities related to food quality

Sr. No.	Rights and responsibilities	Frequency	Percentage
1.	Low (<27.68)	8	13.33
2.	Moderate (27.68-33.24)	48	80.00
3.	High (> 33.24)	4	06.67
	Mean	30.36	
	Standard deviation	2.68	
	Aggregate mean item score	1.687	
	Range	18-36	

Table 3: Distribution of the Respondents with respect to their Extent of Awareness regarding Food Adulteration

Sr. No.	Adulteration	Frequency	Percentage
1.	Low (<20.38)	9	15.00
2.	Moderate (20.38-25.92)	36	60.00
3.	High (> 25.92)	15	25.00
	Mean	23.15	
	Standard deviation	2.77	
	Aggregate mean item score	1.543	
	Range	15-30	

**Types of packaging:** The results depicted that nearly 38 percent of the respondents were using chilly powder, coriander power, turmeric power and besan in packed form, where as only 2% bought packed sindhav. Half of the respondents purchase suji in packed form.

Nearly half of the sample respondents used loose flours of singoda, moriya, rajagara and bajara. Very few, that is, 10% of the respondents purchased asafotedia, besan, salt, rice flour in loose form. Wheat is bought by 83.33% of the respondents in whole form followed by rice and bajara that is 68.33 and 50% respectively. Only one-fourth of the respondents purchased turmeric, coriander and garam masala in whole form. It is interesting to note that, nearly half of the respondents were not using sindhav, sanchal, handwa flour, moriya flour and singoda flour.

**Preference of brand:** When the distribution of the respondents with respect to their use of brands while purchasing spices was done, the result showed that 40% respondents used Ramdev brand, where as one-sixth of the respondents used Gaytri and Parth brand. Very few of them used Everest, Balaji and Badshah brand of food items selected for the present study (Fig. 2).

**Purchase frequency:** With respect to purchase frequency, the facts discovered through survey revealed that half of the respondents purchased singoda flour, moriya flour and bajara flour on monthly basis. More than half of the respondents purchased whole wheat and rice yearly, while very few respondents purchased flours and spices weekly or fortnightly (Fig. 3).

**Shop used:** The result revealed that the most popular type of shop used by the respondents under study for spices and flour was a general kiriyana store where as

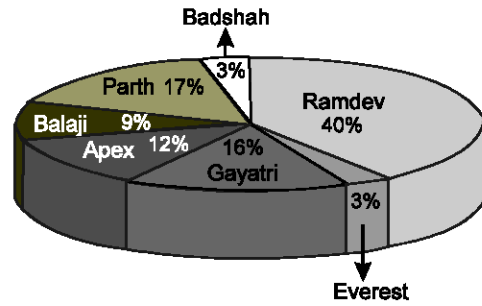


Fig. 2: Preference of brand for selected spices

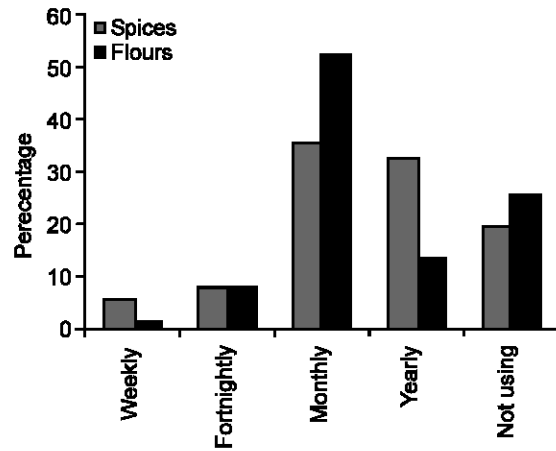


Fig. 3: Purchase frequency of selected spices and flours

only 5% of the respondents purchased spices from small scale industries (Fig. 4).

**Consumer awareness:** Regarding consumer awareness the result depicted that majority, that is, two-third of the respondents were moderately aware about their rights and responsibilities related to food quality and food adulteration. The aggregate mean item score regarding consumer rights and responsibilities was found to be 1.687 which shows a shift towards high awareness (Table 2). The aggregate mean item score was found to be 1.543 regarding food adulteration which shows on an average the respondents were moderately aware regarding adulteration of food (Table 3).

**Food adulteration problem faced:** The result depicted that little less than half of the respondents have sometimes or other faced problem of adulterated food, one-fifth of the respondents have never come across adulterated food or may be they were not aware about adulterated food.

**Testing of hypothesis:** In this, rational statistics such as correlation, student-t test were computed, on the basis of the above test, null hypothesis was accepted or rejected.

Table 4: Co-efficient of Correlation for Five Variables including Extent of Awareness

Variables	Age	Education	Family income	Awareness
Age	0	-0.31*	0.35**	0.03
Education		0	0.40**	0.44**
Family income			0	0.62**
Awareness				0

\*\*Significant at 0.01 level \*Significant at 0.05 level

Table 5: Effect of Age on Extent of Awareness

Group	Age (in years)	Extent of awareness	
		N	Mean
1	Young (<30)	20	53.15
2	Middle (31-50)	31	53.61
3	Old (> 50)	09	54.00
Mean contrast			t-value
1	2	0.46	0.3511
2	3	0.39	0.6842
1	3	0.85	0.4427

\*\*Significant at 0.01 level \*Significant 0.05 level

H<sub>0A</sub>: There exist no relationship between extent of awareness of the respondents and their personal and family variables.

Personal variables

H<sub>0A1</sub>: Age

H<sub>0A2</sub>: Educational level

H<sub>0A3</sub>: Family income,

H<sub>0A1</sub>: There exist no relationship between extent of awareness of the respondents related to food adulteration and their age.

Product moment correlation was computed between extent of awareness of the respondents and their age, which revealed no significant relationship either at 0.01 level or at 0.05 level of significance (Table 4). Thus, null hypothesis was not rejected.

Age had no influence on the extent of awareness of the respondents, whether he/she was young, middle or old age (Table 5). Age was found negatively correlated with education (r-0.31) and highly positively correlated with family income (r = 0.35<sup>\*\*</sup>). It was also found that respondents of old age group were less educated and vice versa. The result also revealed that homemaker of older group had higher family income. So probably age has indirect influence on the extent of awareness of the respondents. The result of studies carried out by Garman and Jonest (1992) and Dhyani and Saklani (1994) revealed similar results as that of the present study that is the age was not found to influence the extent of awareness of the respondents as a consumer.

H<sub>0A2</sub>: There exist no relationship between extent of awareness of the respondents related to food adulteration and their education.

Product moment correlation was computed between extent of awareness of the respondents and their educational level which revealed highly positive

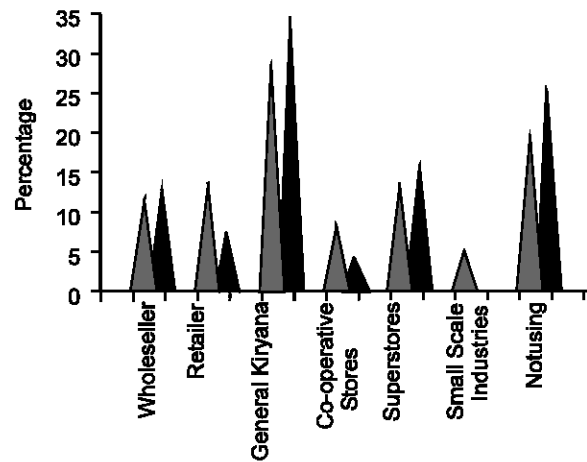


Fig. 4: Shop used by respondents for purchasing selected spices and flours

Table 6: Effect of Education on Extent of Awareness

Group	Education	Extent of awareness	
		N	Mean
1	Illiterate	15	51.47
2	Secondary	26	52.96
3	Collage	19	55.89
Mean contrast			t-value
1	2	1.49	1.020
2	3	2.93	2.442*
1	3	4.42	3.480**

\*\*Significant at 0.01 level, \*Significant at 0.05 level

Table 7: Effect of Family Income on Extent of Awareness

Group	Family income (in Rs.)	Extent of awareness	
		N	Mean
1	Lower (<5000)	31	52.00
2	Middle (5000-12500)	15	54.13
3	Higher (>12500)	14	56.14
Mean contrast			t-value
1	2	2.13	1.598
2	3	2.01	1.446
3	1	4.14	3.184**

\*\*Significant at 0.01 level, \*Significant at 0.05 level

relationship significant at 0.01 level and at 0.05 level of significance. (Table 4). To find out if there exist any significant difference in the extent of awareness among illiterate, having higher secondary education or with college education respondents, t-test was computed. The result revealed that there exists no significant difference between extent

of awareness of the respondents who were illiterate and respondent with secondary educations, significant difference existed between extent of awareness of the respondents with secondary education and college education and college education and illiterate. (Table 6) Thus, null hypothesis was rejected.

Table 8: Absence or Presence of Adulteration in Selected Food Products Adulterant

Food items	Brand tested	Rapid test	Result	Adulterant	Remark
Chilly powder	i)Standard ii)Substandard iii)Loose	Take 2 gm of the sample, in a test-tube, add few ml of solvent ether and shake. Decent ether layer in to a test-tube containing 2 ml of dilute HCl, shake it.	A pink to red colour red lower acid layer in chilly powder	i)Not found ii)Oil soluble coaltar dye iii)Not found	8.69 percent or the respondents used sub branded Apex chilly powder. This dyes are toxic and intake of excess could lead to abnormalities of eyes, bone, skin, lungs etc.
Tumeric powder	i)Standard ii)Substandard iii)Loose	Take 2 gm of tumeric powder in a test-tube. Add small quantity of water and few drops of concentrated HCl to it.	Appearance of bubble in a tumeric powder	i)Not found ii)Not found iii)Chalk powder	21 percent of the respondents used tumeric powder. Chalk powder not to be digest by human system and they can affect the normal digestion.
Coriander powder	i)Standard ii)Substandard iii)Loose	Take a teaspoonful of coriander in a glass of 100 ml of water	Inferior material float on the surface	i)Not found ii)Not found iii)Dung	21 percent of the respondents used loose coriander powder which may lead to tetanus
Asafoetida	i)Standard ii)Substandard iii)Loose  i)Standard ii)Substandard iii)Loose	i)Shake little portion of the sample with water and allow to settle down at bottom. ii)Take a small quantity of sample in a test-tube, boil it, cool and add few drops of iodine solution	Impurities and resins will settle down of the bottom  Appearance of blue colour.	i)Resin ii)Resin iii)Resin/starch  i)Not found ii)Starch iii)Starch	16.67 percent and 15.38 percent of the respondents purchased loose and substandard brand that is Annapurana. Consumer pay excessive money for adding starch.
Salt	i)Tata ii)Nirmasuddh iii)Loose	Stir a spoonful of sample of salt in a glass of water	The solution become white and impurities settle down	i)Not found ii)Not found iii)Chalk powder	20 percent of the respondents purchased loose salt. It was adulterated with chalk powder and it cannot be digest by human. body and affect the normal digestion
Sindhav	i)Loose-1 ii)Loose-2 iii)Loose-3	Stir a spoonful of sample of salt in a glass of water	The impurities will settle down.	i)White powdered stone ii)White powdered stone iii)White powdered stone	43.33 percent of the respondent used sindhav. White powdered stone affect the soft lining of the digestive track.
Sanchal	i)Loose-1 ii)Loose-2 iii)Loose-3	Stir a spoonful of sample of salt in a glass of water	When water is filtered, impurities were seen on filter paper.	i)Earthy material and powdered stone ii)Earthy material and powdered stone iii)Earthy material and powdered stone	One half of the respondents purchased loose sanchal. Earthy material could be a carrier of disease producing bacteria.
Powdered sugar	i)Loose-1 ii)Loose-2 iii)Loose-3	Dissolve 10 gm of sample in a glass a water	The solution become white and impurities settle down	i)Chalk powder ii)Not found iii)Not found	41.67 percent of the respondents used loose powdered sugar. Chalk powder cannot digest by human body and affect the normal ditgestion.

Table Cont.:

Food items	Brand tested	Rapid test	Result	Adulterant	Remark
Wheat flour	i)Loose-1 ii)Loose-2 iii)Loose-3	Dough is prepared from wheat flour.	More water has to be used and chapaties prepared out of this will blow out. Chapaties prepared from adulterated wheat flour will taste insipid.	i)Atta from which maida-suji has been extracted ii)Not found iii)Not found	Only 11.67 percent of the respondents used loose wheat flour. Adulterated wheat flour affect the normal digestive system of human body.
	i)Loose-1 ii)Loose-2 iii)Loose-3	ii) Take approximately 5-10 gm of sample in a test-tube and add approximately 20 ml CCL4	Wheat flour come out the top and chalk powder and other grit will settle down.	i)Grit or chalk powder ii)Not found iii)Not found	
Rajagara flour	i)Loose-1 ii)Loose-2 iii)Loose-3	ii) Take approximately 5-10 gm of sample in a test-tube and add approximately 20 ml CCL4	Rajagra flour come out the top and chalk powder and other grit will settle down.	i)Grit or chalk powder ii)Grit or chalk powder iii)Grit or chalk powder	One half of the respondents used loose rajagara flour. Grit can affect the normal digestive system of human body.
Bajara flour	i)Loose-1 ii)Loose-2 iii)Loose-3	ii) Take approximately 5-10 gm of sample in a test-tube and add approximately 20 ml CCL4	Bajara flour come out the top and chalk powder and other grit will settle down.	i)Grit or chalk powder ii)Not found iii)Not found	45 percent of the respondents used loose bajaara flour. Grit can affect the normal digestive system of human body.

Education highly influences the extent of awareness of the respondents. Higher educational level reveals higher extent of awareness.

It was also found positively correlated with family income ( $r = 0.40^{**}$ ). In other words respondents of higher education were found to have higher family income and also when educational level increased, respondents have more resources at their disposal thus, exposure also increased, which effected the awareness of the respondents. The results of the study carried out by Dhyani Saklani (1994), were similar to the present study which states that education and family income were found strongly associated with consumer awareness.

$H_{OA3}$ : There exist no relationship between extent of awareness of the respondents related to food adulteration and their family income.

Product moment correlation was computed between extent of awareness of the respondents and their family income which revealed highly positive relationship significant at 0.01 level and at 0.05 level (Table 4).

To find out if there exist any significant difference in the extent of awareness of the respondents which were from lower income, middle income and higher income t-value was computed (Table 7). The result revealed that there exist no significant difference in the extent of awareness of the respondents with lower family income and middle family income and middle family income and higher family income, but there is highly significant difference in the extent of awareness of the respondents with lower

family income and higher family income of the respondents. Thus, null hypothesis was rejected.

Family income highly influences the extent of awareness of the respondents. Higher the family income, higher the extent of awareness. Family income was highly positively correlated with age ( $0.35^{**}$ ) and education ( $0.40^{**}$ ). It was found that respondents of higher family income have more resources at their disposal which in turns may lead to higher purchase frequency leading to more market experience and also more exposure to magazine and newspapers which often carry information for consumers which in turn may effect the awareness of the respondents.

**Experimental method:** The result revealed that Ramdev asafoetida (standard) was found to be adulterated with resins. Substandard product like Apex-chilly powder and Annapurna asafoetida were adulterated with oil soluble coaltar dyes and starch respectively. Apex chilly powder was found dark in colour compared to other two samples, moisture content was also found more (plate no-2) than the other two sample. Loose-1 coriander powder and loose-1 turmeric powder were found adulterated with dung and chalk powder respectively. It was found that in loose-1 coriander powder. Approximately 50 percent of adulteration would be there in coriander loose powder. It is indeed interesting to note that all the three loose samples of salt, sanchal and sindav were found adulterated when lab tested.



Loose-1 wheat flour was found adulterated with grit and atta from which maida-suji has been extracted and taste was also insipid. All the three loose samples of rajagara flour were found to be adulterated with grit or chalk powder. In visual inspection of wheat flour and bajara flour, loose-1 flour one was darker in colour rather than other two samples, the reason could be that more bran particles were present in loose-1 flour that is wheat flour and bajara flour.

The results also revealed that almost all loose products were found adulterated except handwa flour, rice flour and singoda flour rather than standard or sub-standard food products (Table 8).

**Conclusion:** Form the present study it could be concluded that low income group respondents were least educated, had low awareness about their rights and responsibilities and food adulteration. So this group needs to be armed with lot of information and training on the issues of food adulteration and ways to raise their voice when felt cheated. They had limited income, so they could not reach the standard items of their choice. On seeing such condition of consumer, our government has made sincere efforts to curb the fraudulent practices by enactment of various laws. It is highly unlikely that more legislation or increasing fines and jail terms alone will help reduce adulteration, particularly given the corruption that exists in the enforcement area and the low conviction rate. Greater consumer vigilance and action alone can help improve the situation. But such efforts are not fruitful unless consumers themselves are aware of their rights and responsibilities. Under these circumstances, consumer literacy is the need of the hour with special attention to low income groups who suffer the most.

## REFERENCES

- Dhyani, A. and A. Saklani, 1994. To assess awareness of consumers towards consumer protection laws. In. *J. Marketing*, 23, No. -7,8, July - August, pp: 9-12.
- Garman and Jonest, 1992. Older American's knowledge of consumer rights and legal protection. *J. Consumer Study and Home Eco.*, 16: 283-291.
- Kotler, P., 1990. *Marketing management*, 6<sup>th</sup> addition, Prentice-Hall of India Private Limited, New Delhi, pp: 196-201.
- Mudambi, R. and M. Rajgopal, 1985. *Fundamentals of foods and nutrition* Wiley estern limited, New Delhi, pp: 196-228.
- Nimkar, A., 1976. Food buying practices of unemployed and employed home maker, *The Indian Journal of Home Science*, Vol. 10, No-1, Home science association of India, Coimbatore.
- Pande, U., 2000. A study of ascertaining buying practices of consumable goods among low income group", Unpublished Master's Thesis, P.G. department of Home Science S.P. University, Vallabh Vidyanagar.
- Roday, S., 2002. *Food hygiene and sanitation*, Tata Mc. Graw - Hill Publish in company Ltd., New Delhi, pp: 248-249.
- Subedi, 2001. <http://www.nepalnews.com.np/contents/englishdaily/ktmpost/2001/may/05/index XI.htm>.
- Sundaram, S., 1985. *Consumer protection in India* B.R. publishing corporation, Delhi, pp: 66-77.