ISSN:0976-3031

Available Online at http://www.recentscientific.com

International Journal of Recent Scientific Research
Vol. 7, Issue, 4, pp. 10636-10642, April, 2016

International Journal of Recent Scientific Research

Research Article

DESCRIPTIVE STATISTICAL ANALYSIS OF HYGIENIC CONDITIONS OF STREET FOOD OF CHANDIGARH REGION

Sneh Lata., Geetika Sharma., Preeti Kanwar., Mahavir Joshi., Kalpana Tilak And Tulika Mishra*

Department of Biotechnology, University Institute of Biotechnology Chandigarh University, Gharuan

ARTICLE INFO

Article History:

Received 11th January, 2016
Received in revised form
14th February, 2016
Accepted 18th March, 2016
Published online 28th
April,2016

Keywords:

Street food, Food borne diseases, one sample T-test, ANOVA test, Regression, Histograms.

ABSTRACT

Street foods are of main concern today due to their popularity and ease of availability. As it is fulfilling the requirements at reasonable rates, population usually refers to street food. But the food safety and sanitation is also a very important aspect. A Questionaries' of sixteen questions was prepared and people were asked to fill it according to their experience with street foods. A descriptive analysis on the data generated was done and results were interpreted. Serious food poisoning is linked with unhygienic street food consumption. Lack of Knowledge among people as well as vendors is the main cause of food borne diseases. This study is concerned with the satisfactory or unsatisfactory response of people according to their experience.

INTRODUCTION

The choice of food varies from place to place, country to country and even community to community. In country like India there are many cultures and community that are coexisting, so as the variety of food. Street food industry plays an important role in fulfilling these requirements at a very reasonable price. Street foods are source of income for many people especially the population below poverty line. A street food vendor is broadly defined as a person who offers foods for sale to the public without a permanent built up structure but with a temporary static structure or mobile stall-head load/wheel-barrow/truck (Janie and Marie, 2010). The street food trade has been emerged into a large food sector that provides an income for the vendors and reasonably priced food to millions of people of the world (Ohiokpehai, 2003). In most of the developing countries street food industry plays an important role in fulfilling the demands of reasonable food shift by the city dwellers (Campbell, 2011). The knowledge of vendors regarding sanitation, food freshness & hygiene is of great concern In addition to the profit gained by street vendors;it fulfills the desire of customers of being good in taste and reasonable rates.But besides this the other hidden and important fact is about the hygiene,With the rise in popularity of street food the graph of food borne diseases is also rising.(Muzaffar *et al.,* 2009).The street-food traffic has been reaching new facet in many developing countries and is identified as a phenomenon that has great economical and socio-cultural importance.(Lucca *et al*., 2006).

Abdalla *et al.,* (2009) found that food handling personnel plays a significant role in maintaining the safety of food throughout the food production and storage stages. Bad hygienic practices by the vendors may allow bacteria to come into contact with food and cause food poisoning. Failure to maintain equipment and utensil's hygienemay cause food poisoning. Gordon-Davis (2011) has found the most common food poisoning bacteria as *Salmonella, Staphylococcus aureus, Clostridium perfringens, Bacillus cereus, Escherichia coli (E.coli)* and *Clostridium botulinum,* with *Salmonella* being the most common.

It is reported that street foods have epidemiological links with illness (El-Sherbeeny *et al.,* 1985; Abdulsalam and Kaferstein, 1993; Muinde and Kuria, 2005).Themicrobial studies conducted on street foods in Bloemfontein and Johannesburg in South Africa have showed that after rigorous hard work and emphasis on hygiene the safety of street foods was better than expected in these two urban areas (Steyn *et al.,* 2011) Sale and

**Corresponding author: Tulika Mishra*
Department of Biotechnology, University Institute of Biotechnology Chandigarh University, Gharuan

consumption of street food is rising day by day and this will continue to grow (WHO, 2006).
The contamination is mainly due to unhygienic conditions, poor maintenance of premises, poor personal. The health certificate is to be kept by the vendors, presented on inspection and renewed annually (Ackah *et al.,* 2011). Martins (2006) explained thatmost vendors started with businesses where a relatively small capital layout is needed, such as in street food vending.

Chandigarh is a tricity and there are many communities that are coming here for various purposes that can be good education and other economical aspects. Accordingly the demands are diverse.

Study Objective

The present study emphasis not only on Hygiene & food safety but also included

1. Influence of various factors on vendors as well as customers
2. Satisfaction level of hygiene of street food among people

MATERIALS AND METHODS

Participants

Areas nearby Chandigarh City were chosen for collection of samples because it is actually a hub of three states (Punjab, Haryana and Himachal),so the variations in taste and likings of differently located people will be tested. More over the sample size of 120 adults aged 18-64 years were targeted especially females as they are more keen and interested towards street food .This research took a period of two months during which data was collected from the field, organized, analyzedand presented in analytic form.

Questionnaire

The study employed the use of self-structured questionnaire to collect the required primary dataSampling is necessary because population interest is large, diverse and scattered over a large geographic area (Kothari, 2008). Simple random sampling was used and total sample population is hundred respondents. Primary data was collected through the use of self-structured questionnaires. A questionnaire consisted of a number of questions in a definite order on a form or set of forms. The questionnaire contained both structured and semi structured questions.

Parameters Included

The sixteen parameters were chosen in order to evaluate taste as well as the hygienic choice of population enlisted below.

1. Cleanliness in terms of use of gloves, dustbin, hair cap
2. Sources of food
3. Hygiene of staff
4. Utensils cleanliness (Whether using detergent or not)
5. Food Quality(Oil free)
6. Health of staff
7. Ingredients of food(Whether fresh or not)
8. Popularity of place
9. Way of presentation of food
10. Surroundings
11. Cooking skills of staff
12. Time of serving
13. Dealing of staff with customers
14. Dealing of staff among themselves
15. Genuine price according to food
16. Dedication towards work

Analysis of Sample Responses

Statistical analysis:Data collected during field work were entered and analyzed using statistical package for social science (SPSS) for windows version 7.0 (IBM SPSS 20.0) for descriptive statistics (mean, frequency and percentages) of the data. To check the dependence of dependent variable on independent variable was done through the one sample T test.Chi square test was performed.Dependent variable regression was checked through ANOVA test.

Descriptive statistics:Descriptive statisticalanalysis is a tool which is used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures.

Skewness is a measure of symmetry, the lack of symmetry. The Skewness for a normal distribution is zero, and symmetric data should have Skewness near zero. Negative values indicate data has skewed left and positive value indicates that data has skewed right.

Kurtosis is a measure of normal distribution of data. That is, data sets with high kurtosis tend to have heavy tails, or outliers. Data having high kurtosis will have a heavy tails and vice versa.

Regression

Regression analysis is a statistical process for estimating the relationships among variables. It focus is on the relationship between a dependent variable and one or more independent variables

ANOVA (Analysis of variance)

ANOVA is a data analysis method of great applicability and can be easily modified that is flexible in nature (Armstrong *et al*., 2000).Analysis of variance is a method of considerable entanglement and suitability(Armstrong *et al*., 2002). Analysis of variance (ANOVA) in its many forms is used to simultaneously test the equality of all groups in a study. One-way and 2-way ANOVA are forms of this technique (Gaddis 1998). ANOVA is presented as a widely used and highly versatile statistical tool for assessing the performance of two or more groups on a broad range of dependent variables as well as independent variables (Fitzgerald,2000).It was devised originally to test the differences between several different groups of treatments (Snedecor and Cochran, 1980).

One sample t-Test and Factor Analysis

The one-sample t-test is used to determine whether a sample comes from a population with a specific mean.Factor analysis is a method of data reduction. Factor analysis is a technique that requires a large sample size. Factor analysis is based on the correlation matrix of the variables involved, and correlations usually need a large sample size before they stabilize.

RESULTS AND DISCUSSION

Descriptive Analysis

A self-designed questionnaire was used toexplore various factors of hygienic conditions of street food which effects on the different questions regarding factors of hygieneThe data shown in table 1 clearly shows that respondents are agreed with the fact that hygienic factors do impact their performance, except in the case of popularity where is almost 1 case of maximum variable whichsupport that data is normal.Skewness of the collected data also shows that data is normal which signifies that the response of the participants is not skewed either positively or negatively. The response of respondents is forming a particular group which signifies that they are agreed in same manner

Histograms are the graphical representation of Skewness and kurtosis of data, as discussed earlier depicting about the normacy of data. The method of Pearson correlation was used to depict interdependency of variables on each other. The Quality offood is correlated to hygienic conditions to the extent of 50%. Positive correlation was observed with each other.

Regression

Table-3 showing Regression analysis

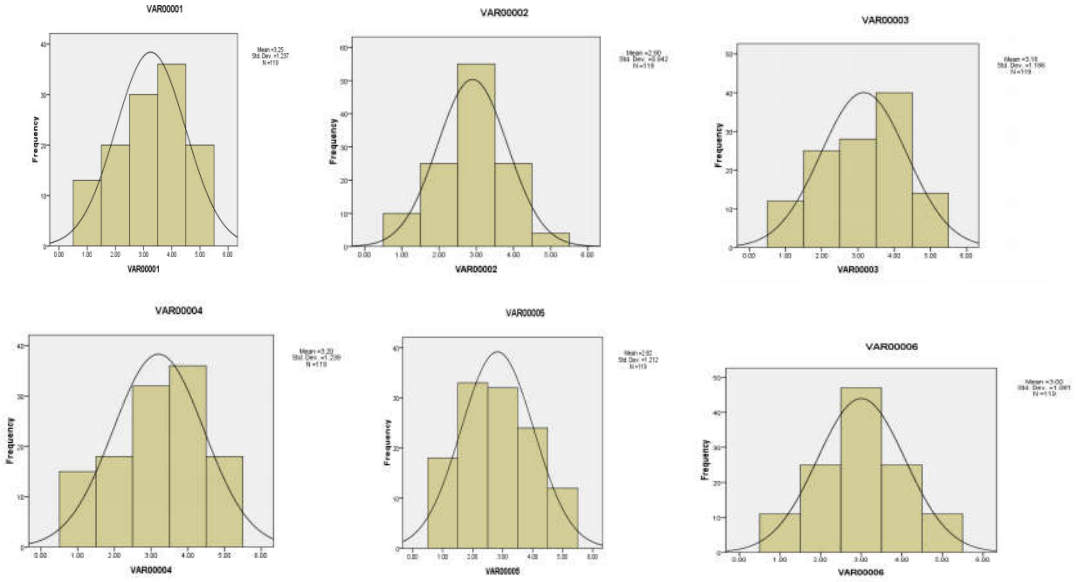
Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.664[a]	0.441	0.360	0.86159

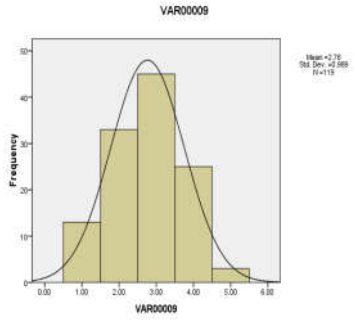
Above table is showing regression analysis in which hygienic conditions of street food has been taken as dependent factor and others as independent factors. Dependent factor is regressing by 66%.Table no.3 provides the *R* and *R*2 values. The *R* value represents the simple correlation and is 0.664 (the "R" Column), which indicates a high degree of correlation. The *R*2 value (the "R Square" column) indicates how much of the total variation in the dependent variable, satisfaction can be explained by the other independent variable. In this case, 66.4% can be explained, which is very large

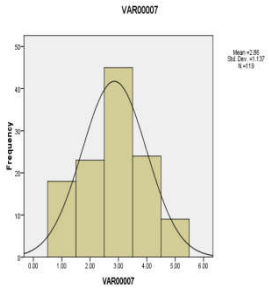
Table 1-Showing results of Descriptive Statistical Analysis

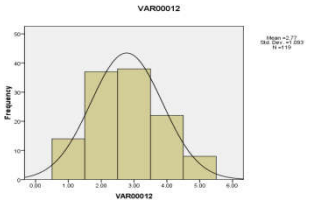
Descriptive Statistics						
	Mean	**Std. Deviation**	**Skewness**		**Kurtosis**	
	Statistic	**Statistic**	**Statistic**	**Std. Error**	**Statistic**	**Std. Error**
Cleanliness	3.2521	1.23658	-0.303	0.222	-0.860	0.440
Sources	2.8992	0.94236	-0.167	0.222	-0.126	0.440
Staff	3.1597	1.18596	-0.253	0.222	-0.884	0.440
Utensil	3.2017	1.23905	-0.311	0.222	-0.835	0.440
Quality	2.8235	1.21186	0.171	0.222	-0.889	0.440
Health	3.0000	1.08143	000	0.222	-0.457	0.440
Ingredients	2.8571	1.13709	-0.031	0.222	-0.639	0.440
Popularity	2.2269	1.07701	0.320	0.222	-1.181	0.440
Presentation	2.7647	0.98897	-0.044	0.222	-0.555	0.440
Surrounding	2.9160	1.1467	0.167	0.222	-0.648	0.440
Cooking	2.5882	1.02851	0.329	0.222	-0.313	0.440
Serving	2.7731	1.09263	0.227	0.222	-0.586	0.440
Dealing	2.6555	1.07701	0.313	0.222	-0.253	0.440
Relations	3.0336	0.92912	0.255	0.222	-0.324	0.440
Price	2.7647	1.14763	0.235	0.222	-0.771	0.440
Dedication	2.5210	1.07237	0.553	0.222	-0.155	0.440

Histograms of different variable







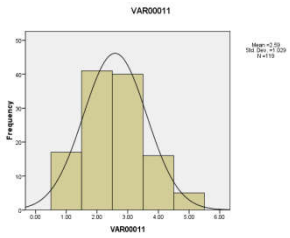


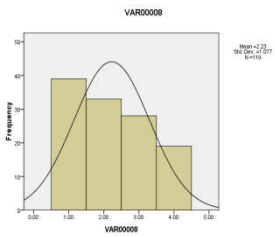
ANOVA

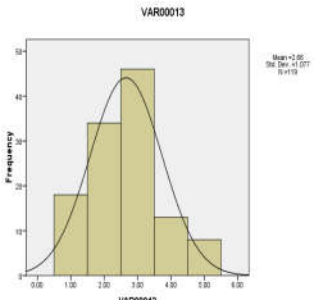
From the value shown in table 4 it can be interpreted that dependent variable is regressed by 60 % and the value is significant because ANOVA results reveal the significance ≤ 0.05.This indicates that the regression model predicts the dependent variable significantly well. Here, $p < 0.000$, which is less than 0.05, and indicates that, overall, the regression model statistically significantly predicts the outcome variable (i.e., it is a good fit for the data). It depicts the equality of all variables and their influence on both dependent and independent variables.

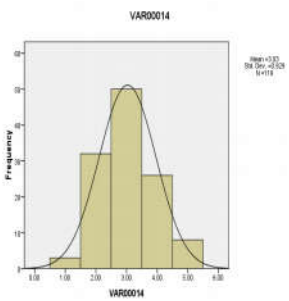
Table 4-ANOVA analysis

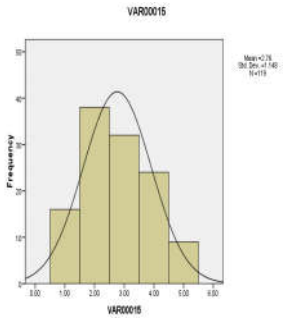
ANOVA					
	Sum of Squares	Df	Mean Square	F	Sig.
Regression	60.414	15	4.028	5.426	.000[a]
Residual	76.460	103	0.742		
Total	136.874	118			











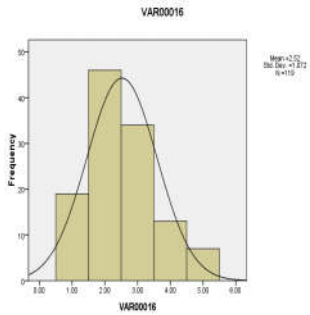


Table-2 showing correlation studies

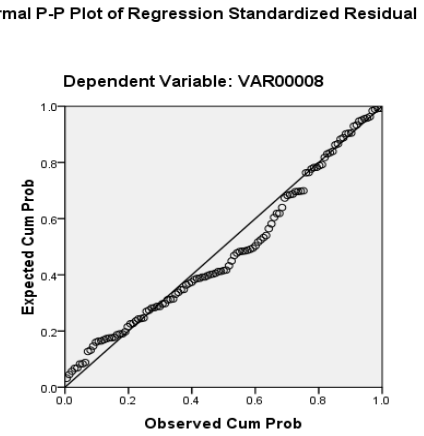
Correlations								
		Cleanliness	**Sources**	**Staff**	**utensil**	**quality**	**health**	**ingredients**
Cleanliness	Pearson Correlation	1	.706**	.752**	.641**	.460**	.520**	.520**
	Sig. (2-tailed)		.000	.000	.000	.000	.000	.000
	N	119	119	119	119	119	119	119
Sources	Pearson Correlation	.706**	1	.689**	.569**	.600**	.507**	.588**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000
	N	119	119	119	119	119	119	119
Staff	Pearson Correlation	.752**	.689**	1	.681**	.545**	.529**	.507**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000
	N	119	119	119	119	119	119	119
Utensil	Pearson Correlation	.641**	.569**	.681**	1	.560**	.525**	.508**
	Sig. (2-tailed)	.000	.000	.000		.000	.000	.000
	N	119	119	119	119	119	119	119
Quality	Pearson Correlation	.460**	.600**	.545**	.560**	1	.556**	.609**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000
	N	119	119	119	119	119	119	119
Health	Pearson Correlation	.520**	.507**	.529**	.525**	.556**	1	.558**
	Sig. (2-tailed)	.000	.000	.000	.000	.000		.000
	N	119	119	119	119	119	119	119
Ingredients	Pearson Correlation	.520**	.588**	.507**	.508**	.609**	.558**	1
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	
	N	119	119	119	119	119	119	119

**. Correlation is significant at the 0.01 level (2-tailed).

Coefficients						
	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.691	0.35		1.977	0.051
	Cleanliness	0.246	0.117	0.283	2.106	0.038
	Sources	-0.078	0.144	-0.069	-0.544	0.587
	Staff	-0.182	0.120	-0.200	-1.514	0.133
	Utensil	-0.147	0.101	-0.169	-1.452	0.150
	Quality	0.276	0.099	0.310	2.790	0.006
	Health	0.120	0.108	0.120	1.110	0.270
	Ingredients	0.144	0.106	0.152	1.361	0.177
	Popularity	0.213	0.106	0.195	1.995	0.049
	Presentation	0.073	0.094	0.078	0.780	0.437
	Surrounding	0.095	0.122	0.091	0.776	0.440
	Cooking	-0.059	0.098	-0.060	-0.600	0.550
	Serving	0.271	0.124	0.271	2.183	0.031
	Dealing	-0.326	0.123	-0.282	-2.656	0.009
	Relations	-0.187	0.102	-0.199	-1.840	0.069
	Price	0.143	0.119	0.142	1.204	0.231

Table no.3 provides the *R* and *R*2 values. The *R* value represents the simple correlation and is 0.664 (the "R" Column), which indicates a high degree of correlation. The *R*2 value (the "R Square" column) indicates how much of the total variation in the dependent variable, satisfaction can be explained by the other independent variable. In this case, 66.4% can be explained, which is very large.

the food choice as well as the hygienic conditions of street food.



One sample T-test results interpret that the significance value is ≤ 0.005. So we can generalize all the values of results.It depicts that our sample represent the whole population.

One-Sample Test						
	Test Value = 0					
	T	Df	Sig. (2-tailed)	Mean Difference	95% Confidence Interval of the Difference	
					Lower	Upper
Cleanliness	28.689	118	.000	3.25210	3.0276	3.4766
Sources	33.560	118	.000	2.89916	2.7281	3.0702
Staff	29.063	118	.000	3.15966	2.9444	3.3750
Utensil	28.188	118	.000	3.20168	2.9768	3.4266
Quality	25.416	118	.000	2.82353	2.6035	3.0435
Health	30.262	118	.000	3.00000	2.8037	3.1963
Ingredients	27.410	118	.000	2.85714	2.6507	3.0636
Popularity	22.556	118	.000	2.22689	2.0314	2.4224
Presentation	30.496	118	.000	2.76471	2.5852	2.9442
Surrounding	27.740	118	.000	2.91597	2.7078	3.1241
Cooking	27.452	118	.000	2.58824	2.4015	2.7749
Serving	27.686	118	.000	2.77311	2.5748	2.9715
Dealing	26.896	118	.000	2.65546	2.4600	2.8510
Relations	35.617	118	.000	3.03361	2.8649	3.2023
Price	26.280	118	.000	2.76471	2.5564	2.973
Dedication	25.645	118	.000	2.52101	2.3263	2.7157

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.906
Bartlett's Test of Sphericity	Approx. Chi-Square	1087.313
	Df	120
	Sig.	.000

Values over zero indicate a positive coefficient correlation and values below zero indicates the negative correlation. It tells about the strength of correlation between the variables.

From above data it can be interpreted that Variable 001,005,009,0013,0014 has greater impact on dependent variable(Variable 008) than others. It can be interpreted that the parameter 8 that is popularity of place is not of much concern among people based on above data and the parameters cleanliness, food quality, way of presentation of food, conduct with customers are the variables having maximum impact on

Factor Analysis

Factor analysis was done to extract and club the factors of hygiene of street food. KMO and Bartlett's test is used as correlation matrix.

An examination of the Kaiser-Meyer Olkinmeasure of sampling adequacy suggested that the sample was factorable

Bartlett's Test of Sphericity Approx. Chi-Square used to test if samples have equal variances that is homogeneity of variances. (KMO=.906) which shows that results are reliable. A Principal Axis Factor (PAF) with a Varimax rotation of the 16 Likert scale questions from this attitude survey questionnaire was conducted on data gathered from 120 participants which analyses the shared variance among the variables. Bartlett's

Test of Sphericity Approx. Chi-Square used to test if samples have equal variances that are homogeneity of variances.

DISCUSSION AND CONCLUSION

From the present study it can be concluded that variable cleanliness, food quality, way of presentation of food, conduct with customers affects the hygiene conditions of street food actually. The street foods play a significant socio economic role in terms of employment potential, income for women, and in serving the food at reasonable prices to the lower and middle-income. 70 % of population is bothered about the cleanliness, 68 % of population is aware the sources from which the material is being prepared.

A very lesser percentage of population is bothered about the conduct and health of staff. Being from India a developing country people are more conscious about the pricing of street food, so 80 percentage of population is concerned about the price of street food. As our results are normal, we can generalize and summarize our results that our sample represents the whole population.

Acknowledgements

The researcher undertakes to Thank Mr.SanjeetSingh (Asstt. Director of Research at ChandigarhUniversity) for giving opportunity to conduct research and offer unconditional support, Dr. Tulika Mishra (Associate prof. at Chandigarh University) for guiding throughout the process and all the respondents who provided valuable time to give required responses.

References

Armstrong, R.A., Slade, S.V., Eperjesi, F.(2000).An introduction to analysis of variance (ANOVA) with special reference to data from clinical experiments in optometry. *Ophthalmic Physiol Opt.*20(3):235-241.

Armstrong, R.A., Eperjesi, F., Gilmartin, B.(2002).The application of analysis of variance (ANOVA) to different experimental designs in optometry. *Ophthalmic Physiol Opt.* 22(3):248-56.

Gaddis, M.L.(1998). Statistical methodology: IV. Analysis of variance, analysis of covariance, and multivariate analysis of variance. *Acad Emerg Med*.5(3) :258-65.

Abdalla, M. A., Suliman, S. E. &Bakhiet, A. O. (2009).Food safety knowledge and practices of street food vendors in Atbara City (NaherElneel State Sudan).*African Journal of Biotechnology*, 8:69-71.

Ackah, M., Gyamfi, E. E., Anim, A. K., Oseil, J., Hansen, J. K. &Agyemang, O. (2011). Socioeconomic profile, knowledge of hygiene and food safety practices among street food vendors in some parts of Accra-Ghana. *Internet journal of food safety.*13:191-197.

Abdulsalam M, Kaferstein FK (1993). Safety of street foods.*World Health Forum*.14:191-194.

Bryan FL, Teufel P, Riaz S, Roohi S, Qadar F, Malik Z (1992). Hazards and critical control points of vending operations at a railway station and a bus station in Pakistan. *J. Food Prot*.;55:334-541.

Campbell, P. T. (2011). Assessing the knowledge, attitudes and practices of street food vendors in the city of Johannesburg regarding food hygiene and safety.School of Public Health, University of the Western Cape.

El-Sherbeeny MR, Saddik MF, Bryan FL (1985).Microbiological profile of foods served by street vendors in Egypt. Int. J. Food Microbiol; 2:355-362.

FAO, Food Quality and Standards Service Vialedelle Terme di Caracalla, 00153 Rome, Italy

Fitzgerald, S.M., Rumrill, P., Hart, R.C.2000.Using analysis of variance (ANOVA) in rehabilitation research investigations.*US National Library of Medicine;*15(1):61-65.

Gordon-Davis, L. (2011). The Hospitality Industry Handbook on Hygiene and Safety for South African Students and Practioners South Africa, Juta& Company Ltd.

Janie P, Marie T (2010). Street food in Kolkata- A hygienic perspective Project in practice 400040, Blok 3

Lucca, A., Da Silva, T. &Ferraz, E. A. (2006). Street-food: The hygiene conditions of hot-dogs sold in São Paulo, Brazil. *Food Control;*17:312-316.

Muzaffar, A. T., Huq, I. &Mallik, B. A. (2009). Entrepreneurs of the Streets: an Analytical Work on the Street Food Vendors of Dhaka City. *International Journal of Business and Management*;4(1):80.

Martins, J. H. (2006).Socioeconomic and hygiene features of street food vending in Gauteng.*South African journal of clinical nutrition*, 19:18-25.

Maxwell DG, Levin CE, Armar-Klemesu M, Ruel MT, Morris SS, Ahiadeke C (2000).Urban livelihood and food and nutrition security in greater Accra, Ghana. International Food Policy Research Institute, report 112.

Muinde OK, Kuria E (2005). Hygienic and Sanitary practices of vendors of street foods in Nairobi, Kenya.Afr. J. Food Agric. Nutr.Dev. 5(1).

Nurudeen, A. A., Lawal, A. O.and Ajayi, S. A.(2014) . A survey of hygiene and sanitary practices of street food vendors in the Central State of Northern Nigeria. *Academic journals;*6(5):174-181.

Ohiokpehai, O. (2003). Nutritional aspects of street foods in Botswana. *Pakistan Journal of Nutrition,* 2:76-81.

Steyn, D., Labadarios, L. &Nel, J. (2011).Factors which influence the consumption of street foods and fast foods in South Africa-a national survey.*Nutrition Journal*, 10:2-10.

Snedecor, G. W. and Cochran, W. G. (1980) Statistical Methods, 7th edn.Iowa State University Press, Ames, Iowa.

WHO (2008). Street food vending in the Region: Food Safety Challenges. AFRO Regional Food Safety Newsletter.5-8.

****

How to cite this article:

Sneh Lata *et al*.2016, Descriptive Statistical analysis of Hygienic Conditions of Street food of Chandigarh Region. *Int J Recent Sci Res.* 7(4), pp.10636-10642.