



**Article : Study and enforcement of HACCP (Hazard Analysis and Critical Control Point) to improve hygiene and sanitation standards in Hotels of Nagpur city**

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**Abstract**

Food for human consumption should be protected from contamination at all times especially when there are frequent outbreaks of food borne illnesses. Consequences of food borne illness include adverse effects on trade and tourism, loss of earnings and productivity, unemployment and litigation. The study was conducted to find out the awareness and importance of hygiene and sanitation in 3 star and 5 star Hotels in metro and nonmetro cities, to study the existing hygiene and sanitation procedures and standards being followed, to frame special programme based on HACCP principles and implementation of these programme in selected samples. The analysis of the data collected showed that there was either lack or no training and proper knowledge. The enforcement program comprised of training of staff through presentations, demonstrations on good Manufacturing and Good Hygiene Practices, display of posters and instruction in working areas for principles to be followed during operations. It was concluded that a significant relationship was found between the training and their resultant performance in accomplishing their tasks in operations of food handling.

**Introduction:** Food for human consumption should be protected from contamination at all times especially when there are frequent outbreaks of food borne illnesses. “Cleanliness is next to godliness”. A true saying that needs to be understood by every food handler. People are entitled to expect that the food they eat is wholesome and safe for consumption. Consequences of food borne illness include adverse effects on trade and tourism, loss of earnings and productivity, unemployment and litigation. In the developing countries food safety is still a battle to be won. India, a major destination for international tourists, is a concern because of poor personal hygiene; thus a threat to health. The Food Safety Act has been revised and the check list is now designed on the lines of Hazard Analysis and Critical Control Point (HACCP), to meet international standards.

History of HACCP:

According to **Tara Paster 2007**, the Pillsbury Company, with the cooperation and participation of the National Aeronautic and Space Administration (NASA), Natick Laboratories of the U.S. Army, and the U.S. Air force Space Laboratory Project Group, originally developed HACCP for the U.S. space program in the early 1960s.

### **HAZARD ANALYSIS AND CRITICAL CONTROL POINT (HACCP):**

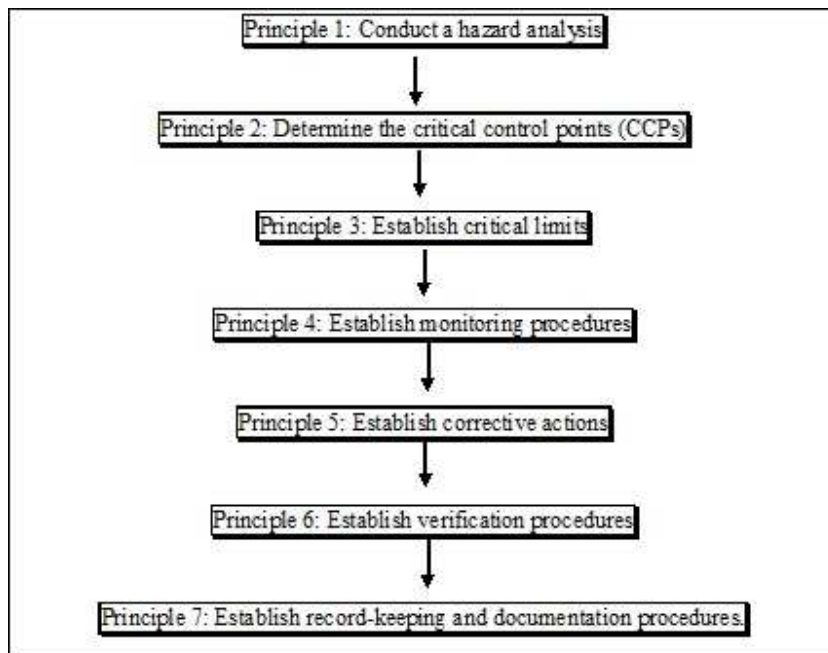
Hazard Analysis and Critical Control Point is an **evaluation system to identify, monitor, and control contamination risks** in food service establishments. It has been adopted at international levels as the basis for all discussions on food safety and prevention of chemical products, presence of foreign bodies, etc. It is a system that ensures the hygiene, safety and quality of all foods and drinks produced and served. Awareness on Hygiene and Food Safety is the need of time for all food handlers catering to masses in various sectors. Imparting correct knowledge, skill and regular training to food handlers is the key to safe food. The managers in the Food Service Industry controlling operations of producing and serving food also need to understand the importance of **good manufacturing practices and good hygiene practices**. Good manufacturing practices could be achieved only if supplemented by proper and correct knowledge and training. If the food service staff maintain good standards of personal hygiene, hygiene of premises and equipments, they could prevent contamination of food.

### **The HACCP System-**

The food safety risk management program is a HACCP based system that presents not only safety but quality and cost concerns also. The HACCP system identifies and monitors specific food borne hazards. The hazard analysis establishes critical control points (CCPs), which identify those points in the process that must be controlled to ensure food safety.

The following **seven** basic principles of HACCP are:

### **Figure No. 1**



**Hazards:** Hazards can be categorized as biological, chemical, and physical.

### **Critical Control Points (CCPs):**

A critical control point is a point or procedure in a specific food system where loss of control may result in an unacceptable health risk. Some CCPs are cooking, chilling, prevention of cross-contamination, and certain aspects of environmental and staff member hygiene.

### **Critical Limits for Preventive Measures:**

A critical limit is a boundary of safety. Some preventive measures have upper and lower critical limits. For example, the **temperature danger zone (TDZ)** is 5°C to 63°C; foods should not be held within this range of temperatures. Both critical limits must be met for this preventive measure.

**AIM:** Study and enforcement of HACCP(Hazard Analysis and Critical Control Point) to improve hygiene and sanitation standards in Hotels of Nagpur city.

### **OBJECTIVES:**

1 To study the concept and history of HACCP.

- ☐ To study the existing hygiene and sanitation procedures and standards being followed in selected 5star and 3 star Hotels .
- ☐ To frame training programs based on HACCP (Hazard Analysis and Critical Control Point) principles for selected samples.
- ☐ Implementation of these programs in selected samples .

### **LIMITATIONS:**

1. The study is limited to the 5 star and 3 star Hotels of the five cities of Maharashtra i.e Mumbai, Nasik, Pune,Aurangabad and Nagpur.
2. The implementation of the program and its enforcement is limited to Nagpur city.

### **Significance of Study:**

The present study was carried out to ascertain awareness about HACCP, and enforcement of HACCP to improve hygiene and sanitation standards in the Hotels .

The three main areas to be covered while enforcement were:

- 1) Personal Hygiene
- 2) Food Hygiene and
- 3) Workplace Hygiene.

Different coloured chopping boards should be used to prevent cross-contamination.

### **Chopping boards**

- |                                 |                                     |
|---------------------------------|-------------------------------------|
| a) <b>RED</b> : for raw meat    | c) <b>BLUE:</b> for fish            |
| b) <b>GREEN:</b> for vegetables | d) <b>WHITE:</b> for dairy products |



Stress should be given on proper hand washing at all times.

### Importance of Hand washing:

Hand washing should be done frequently following the instructions mentioned –

- Every time after using toilet
- Every time before touching food
- Every time after touching bare human body parts.
- Every time after coughing, sneezing, using a handkerchief or disposable tissue, eating or drinking.
- When switching between working with raw foods and working with ready to eat foods.

### Figure No. 2: Safe Hand Washing Technique



## METHODOLOGY:

For the present study the following methodology was used

1) Selection of area: A random survey of 100 hotels from Maharashtra was conducted. Out of those; 50 hotels who showed willingness and gave formal permission for the survey were finally selected for the study.

1. Selection of Sample: The five cities representing metro and non metro were selected by purposive sampling method for the study. They were –

### Metro:

- Mumbai  Pune

**Non Metro:**

- Nagpur
- Nasik
- Aurangabad

**3) Data collection:**

**A) Primary data:** The tool used was questionnaire and the data was collected by questionnaire, visits, (oral discussion & interview technique used ) and observation.

a) Designing questionnaire: A questionnaire was designed which was less time consuming with short and multiple choice questions based on four major departments of the hotel and the hygiene and sanitation practices.

b) Designing enforcement program: An enforcement program was designed on the basis of analysis for the selected samples.

c) Enforcement of the designed program: The specially designed program to improve the hygiene and sanitation in selected samples was enforced.

d) Post enforcement data collection: After the scheduled period of enforcement; post enforcement data collection was done.

**4) Analysis and evaluation of data:** Statistical methods were applied to analyse the collected data to design enforcement program. The collected data was analyzed and evaluated with graphical presentation.

**B) Secondary data:** The data was collected by referring various books on this topic related to hotel management. Other references will be from newspapers, magazines and internet.

“Foodborne illness risk factors” are:

- Food from Unsafe Source
- Inadequate Cooking
- Improper Holding Temperatures
- Contaminated Equipment

- Poor Personal Hygiene .

The safe temperature zone for holding foods are either below 5° C or above 63°C.

**The Food Safety and Standards Act, 2006 of India** consolidates eight laws governing the food sector and establishes the Food Safety and Standards Authority (FSSA) to regulate the sector.

- 1) Ministry of Health and Family Welfare:

Food Safety Act 2008

Prevention of Food Adulteration Act 1954(PFA)

Prevention of Food Adulteration, 1955

- 2) Ministry of Agriculture:

Agricultural produce grading and marketing Act (AGMARK)

Milk and Milk products Order

Life stock and importation Act

Plant Quarantine Order, 2003

- 3) Ministry of Food and Consumer Affairs:

Standards of Weights and Measures Act 1976

Packaged Commodities Rules 1997

Consumer Protection Act 1986

Bureau of Indian Standards (BIS) 1986

Vegetable Oil Products Regulation Order (VOP) 1998

- 4) Ministry of Commerce:

Export Act – Quality control and inspection



Export Rules

Coffee Act

Tea Act

5) Ministry of Food Processing Industries:

Fruit Products Order

Meat Food Products Order

6) Ministry of Forest and Environment

Environmental Protection Act

7) Ministry of Science and Technology:

Atomic Energy Act

8) Ministry of HRD:

Infant Milk Substitutes Feed Bottles and infant foods Act

**Enforcement of the Designed Programme:**

The analysis of the data collected showed that there was lack of training and proper knowledge. Training changes the behavior and attitude of people at work. Training is an important component to the successful implementation of HACCP. Enforcement program was designed for the selected sample of hotels on the basis of observations. The stress was given on hygiene training so as to minimize the risk of food poisoning and food complaints.

**Evaluation of the program:**

It was observed that there was a considerable improvement in the status of hygiene and sanitation of premises. Good hygiene and good manufacturing practices had been adopted by the staff.

S. No	Activity	Tools Used	Impact
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1	Preparing Power Point presentation	<p>Audio Visual Aid –</p> <ol style="list-style-type: none"> <li>1. Causes and Prevention of food contamination.</li> <li>2. Types of Hazards.</li> <li>3. Personal Hygiene, work-place Hygiene and Food Hygiene.</li> <li>4. Food Safety.</li> <li>5. Food Labeling</li> <li>6. Food Spoilage</li> <li>7. Correct maintenance and sanitizing procedures for equipments.</li> </ol>	<p>For better health of employees&amp; customers</p> <p>For preventinary measures.</p> <p>For safety of food, to avoid food contamination and to prevent food poisoning</p> <p>For better usage within usable time-period.</p> <p>For overall hygiene and cleanliness.</p>
2	Demonstrations on SOPs	<ol style="list-style-type: none"> <li>1) Receiving deliveries – Should arrive at designated time, compare delivery invoice against products delivered ,check temp and time during transportation for diff. foods.</li> <li>2) Purchasing – Identifying right supplier, specifications on PO.</li> <li>3) Washing raw fruits</li> </ol>	<ol style="list-style-type: none"> <li>1) For efficient system of operation which controls the entire system.</li> <li>2) To train personnel and develop their skills.</li> </ol>

		<p>and veg</p> <p>4) Storage</p> <p>5) Time/ Date marking Food</p> <p>6) Cooling</p> <p>7) Hot holding and cold foods</p> <p>8) Reheating</p>	
3	Designing boards depicting Dos and DONTs	<p>1) Delivery –Hazards, control &amp; monitoring required while delivery of material in the establishment.</p> <p>2) Preparation- Hazards, control &amp; monitoring required while preparation in the establishment.</p> <p>3) Serving- Hazards, control &amp; monitoring required while service in the establishment.</p> <p>4) Correct cleaning- Hazards, control &amp; monitoring required while cleaning in the establishment.</p> <p>5) Prevent contamination</p> <p>6) How to use different coloured chopping</p>	Boards placed at key locations at eye level at the work place creates awareness of procedures and there is immediate and significant improvement in work practices.

		boards. 7) Butchery Area 8) Receiving Area 9) Correct handwashing technique 10) Foot operated dustbins to be used.	
4	Designing a Handbook	Handbook- Ready guide for safe hand washing, correct use of equipments in the kitchen, Personal Hygiene, workplace hygiene, food hygiene.	Ready reference to improve hygiene and sanitation standards.

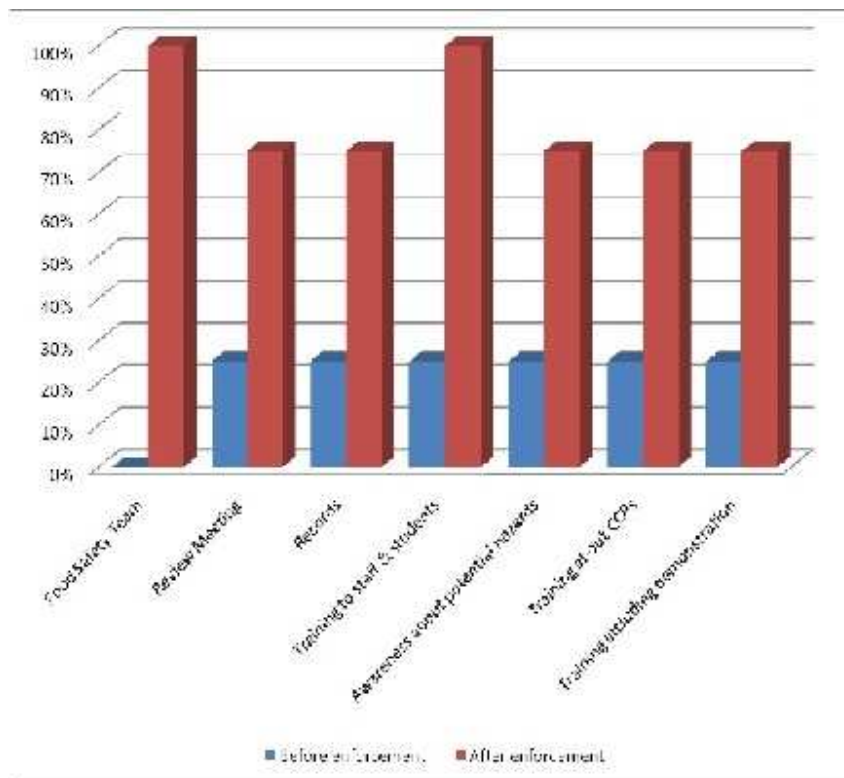
## RESULT AND DISCUSSION :

**Table No1: Enforcement program related to HACCP in Hotels: HACCP Implementation**

S.No	Particulars	Before enforcement	After enforcement
1	Food Safety Team	0%	80%
2	Review Meeting	20%	100%
3	Records	20%	80%
4	Training to staff	40%	100%
5	Awareness about potential hazards	0%	80%
6	Training about CCPs	20%	60%
7	Training Including demonstration	20%	80%

From Table No.1 and Figure No.3, it was observed that that none of the hotels in the selected samples had a food safety team but after the enforcement of the training program 80% of the hotels had a food safety team. Only 20% conducted review meeting but after the enforcement all the hotels conducted review meeting. Only 20% hotels maintained records before enforcement of training program but 80% maintained records after enforcement. Only 40% hotels were giving training to staff but 100% hotels were giving training after the enforcement. None of the hotels were aware about potential hazards but 80% were aware after the training program.

**Fig No. 3 HACCP Implementation in hotels**



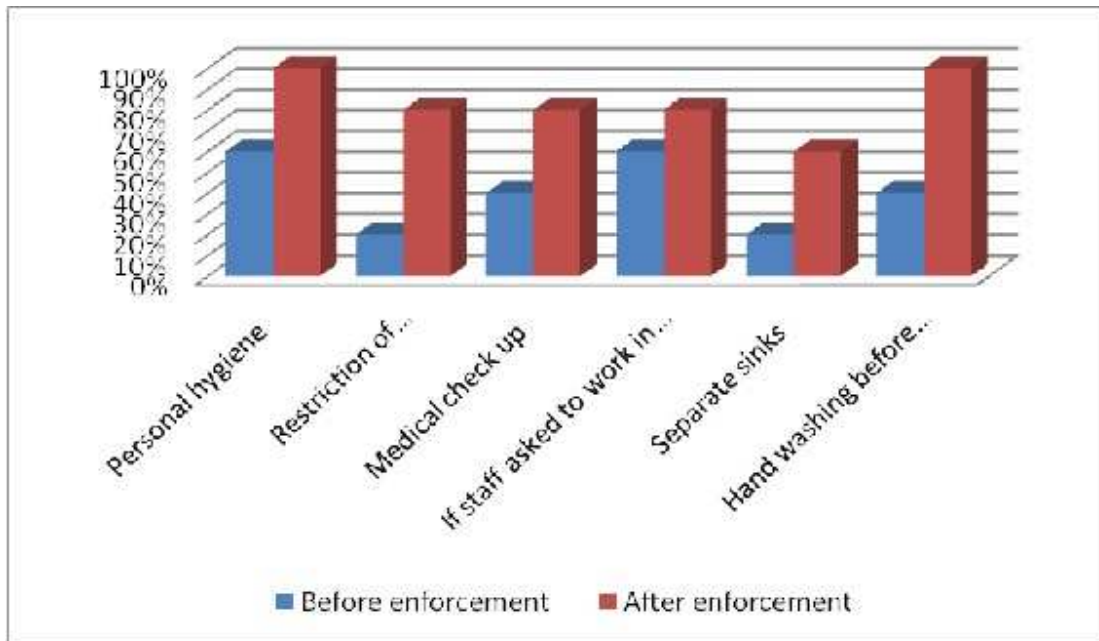
**Table No: 2 Personal Hygiene in Hotels**

Sr. No	Particulars	Before enforcement	After enforcement
1	Attention paid to personal hygiene	60%	100%
2	Restriction of smoking and chewing tobacco.	20%	80%
3	Medical check up for staff & students	40%	80%

4	If staff has cold/ cough is he asked to work in non food areas	60%	80%
5	Separate sinks for washing hands and food material.	20%	60%
6	Safe hand washing every time before handling food.	40%	100%

From Table No2 and Figure No. 4 it was observed that only 60% hotel staff paid attention to personal hygiene but after enforcement 100% hotels paid attention to personal hygiene. 20% of hotel staff restricted from smoking and chewing tobacco but after enforcement of training there was an improvement and 80% restricted from smoking and tobacco. For 40% hotel staff medical check up was done but after enforcement program it was 80%. If staff had cold \ cough 60% were asked to work in non food areas but after enforcement it increased to 80% which was a positive change to avoid contamination. Only 20% were having separate sinks for washing hands and food material but after enforcement programme it increased to 60%. Safe hand washing was done by 40% hotel staff everytime before handling food which increased to 100% after enforcement of training. Safe hand washing was done by 60% hotel staff everytime after using toilet which increased to 100% after enforcement of training.

**Fig No. 4 Personal Hygiene in Hotels**

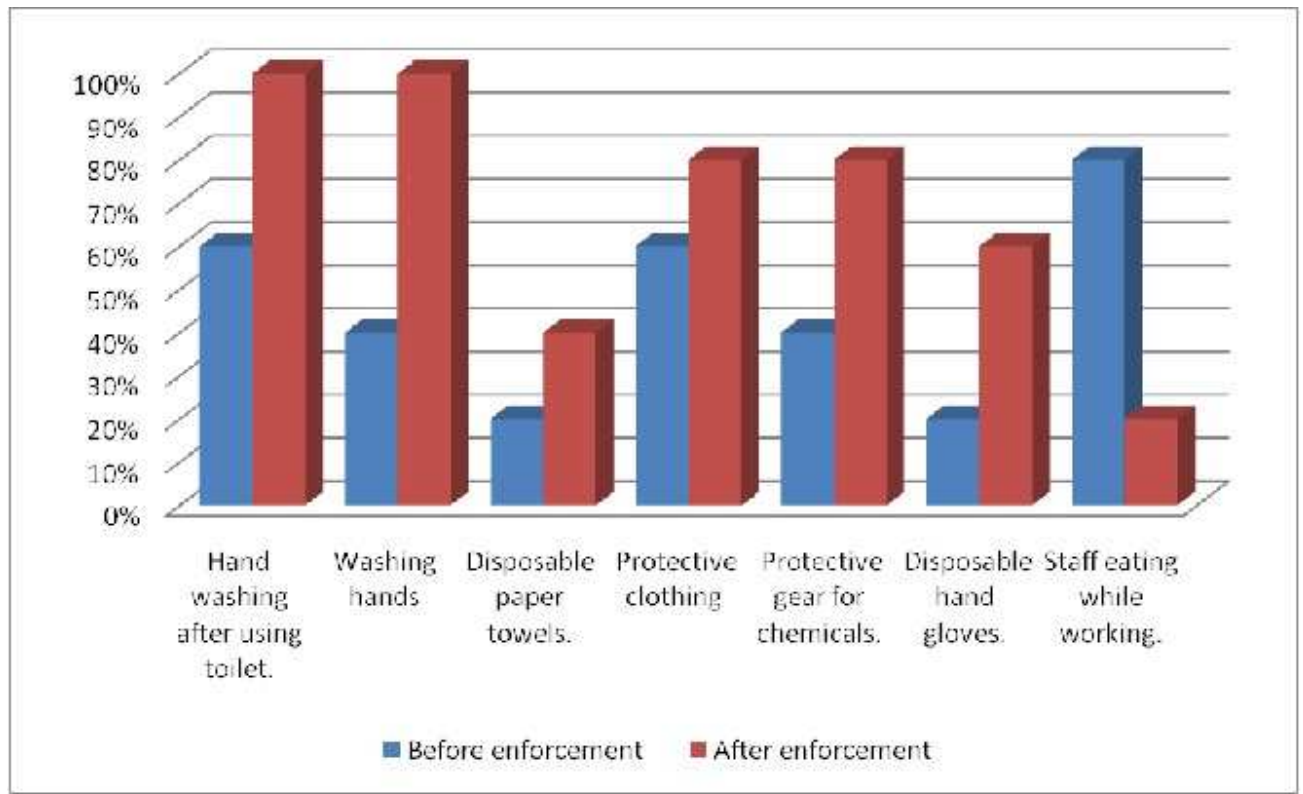


**Table No. 3 Personal Hygiene in Hotels**

Sr. No	Particulars	Before enforcement	After enforcement
7	Safe hand washing every time after using toilet.	60%	100%
8	Washing hands	40%	100%
9	Disposable paper towels.	20%	40%
10	Protective clothing in kitchens.	60%	80%
11	Protective gear for chemicals.	40%	80%
12	Disposable hand gloves .	20%	60%
13	Staff eating while working.	80%	20%

In Table No.3 and Fig No.5 it was observed that before training only 60% washed hands after using toilet but improved to 100% later. Before enforcement 40% were washing hands using correct procedure but after enforcement 100%. Earlier 20% used paper towels now 40%. Earlier 20% used disposable gloves now 60%. 80% staff ate while working now reduced to 20% after enforcement of training based on HACCP.

**Figure No. 5 Personal Hygiene in Hotels**



**Table No. 4 Food hygiene in Hotels**

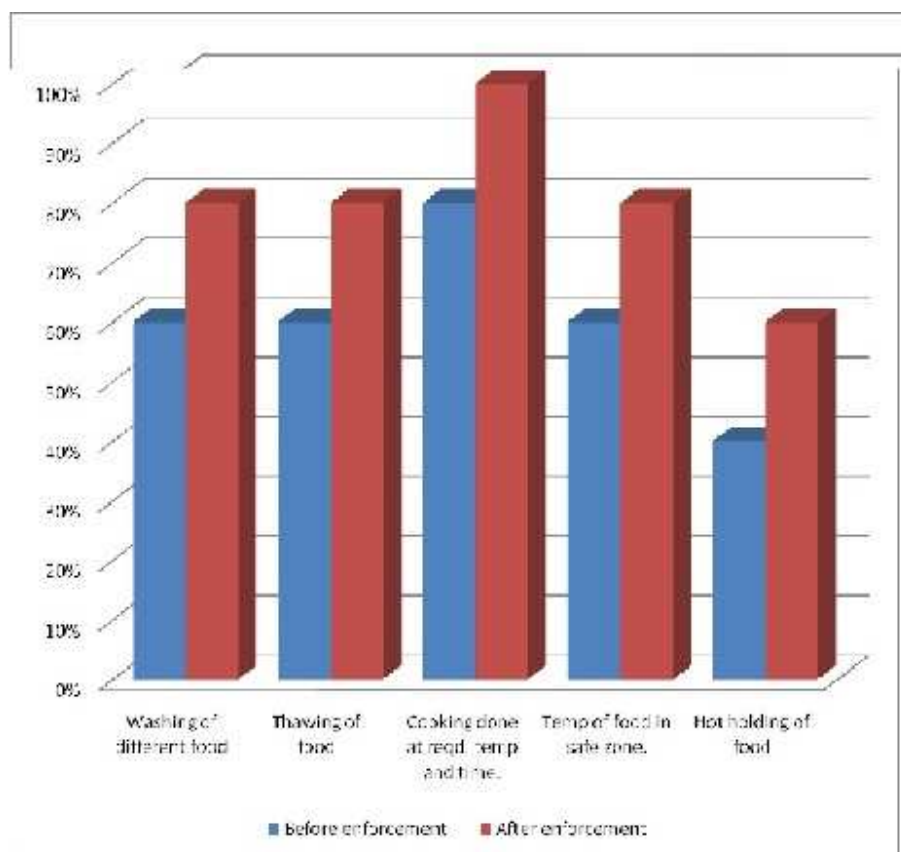
sr. no	Particulars	Before enforcement	After enforcement
1	Washing of raw veg and meat and poultry	60%	80%
2	Thawing of food	60%	80%
3	Cooking done maintaining reqd. temp and time.	80%	100%
4	Temp of food maintained in safe zone.	60%	80%
5	Hot holding of food done at reqd temp in a clean equipment	40%	60%

From Table No. 4 and Figure No.6, it was observed that 60% were washing raw vegetable, meat and poultry separately which improved to 80% after enforcement. Proper thawing of food was done by 60% hotel staff which improved to 80%. Cooking was done maintaining required temperature and time by 80% staff which



improved to 100%. The temperature of food maintained in safe zone ( below 5 C or above 63 C) in 60% hotels which improved to 80%. The hot holding of food done at required temperature in a clean equipment in 40% hotels which increased to 60% after training.

**Figure No.6 Food hygiene in Hotels**



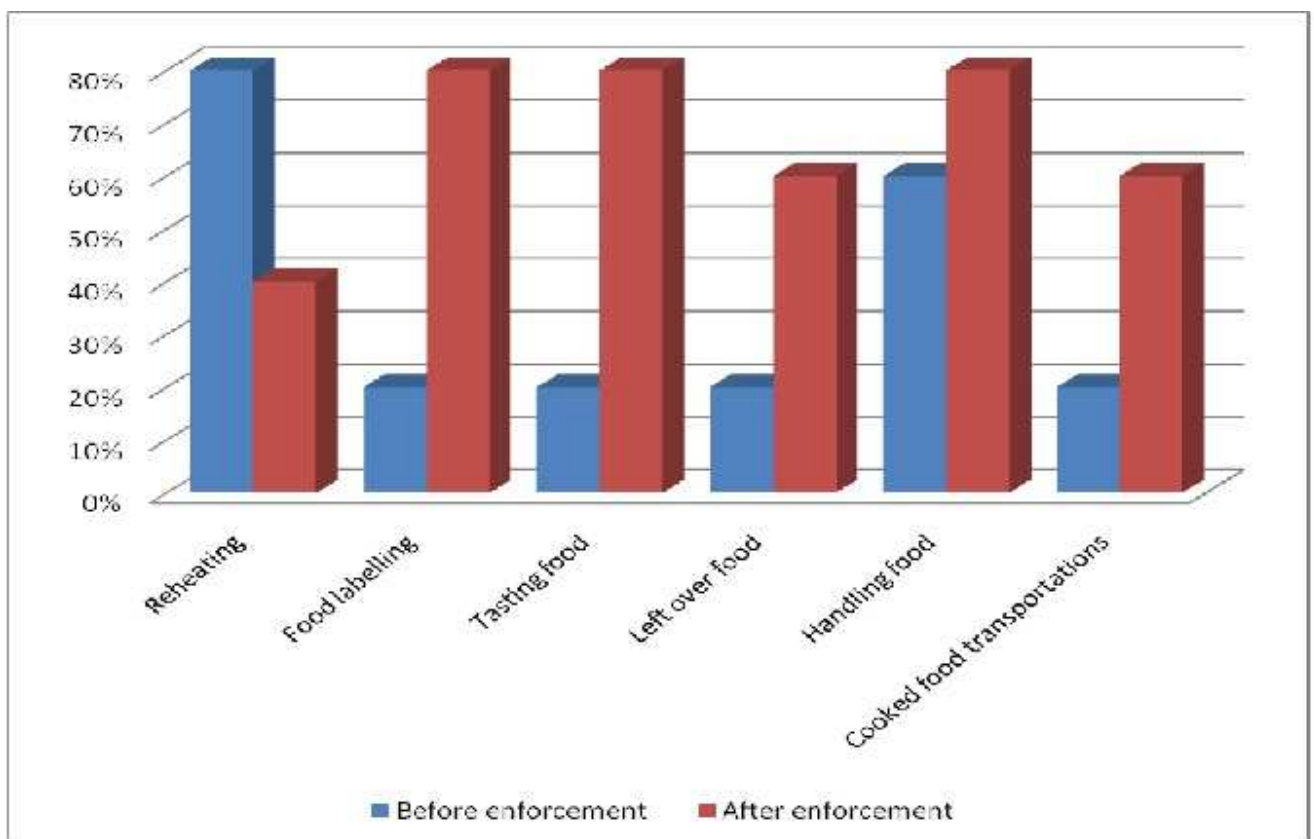
**Table No. 5 Food hygiene in Hotels**

sr. no	Particulars	Before enforcement	After enforcement
6	High risk foods reheated more than once.	80%	40%
7	Food labeled properly after production before cold storage	20%	80%
8	Tasting of food done using separate spoons.	20%	80%
9	Left over food disposed	20%	60%
10	Handling of food minimized	60%	80%

11	Cooked food covered while transporting from kitchens to service areas.	20%	60%
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From Table No.5 and Figure No.7, it was observed that high risk foods were reheated more than once in 80% hotels which changed in a positive way and reduced to 40%. 20% hotels were labeling food properly after production before cold storage which improved to 80%. Only in 20% hotels tasting of food was done using separate spoons which improved to 80% after enforcement. 20% hotels were disposing left over food which improved to 60%. Handling of food was minimized in 60% hotels using tongs and gloves which improved to 80%. The cooked food was covered while transporting from kitchens to service areas in 20% hotels which improved to 60% after the enforcement programme.

**Figure No. 7 Food hygiene in Hotels**

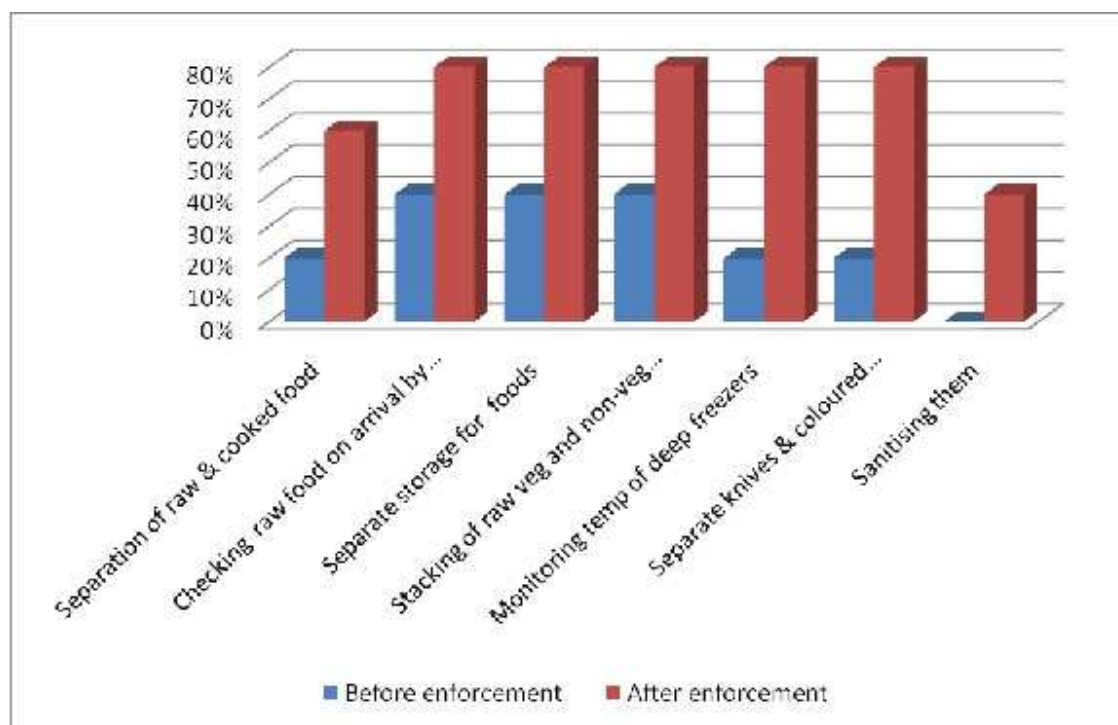


**Table No. 6 Workplace Hygiene in Hotels**

<b>sr. no</b>	<b>Particulars</b>	<b>Before enforcement</b>	<b>After enforcement</b>
1	Separation of raw & cooked food	20%	60%
2	Checking raw food on arrival by supplier	40%	80%
3	Separate storage for foods	40%	80%
4	Stacking of raw veg and non-veg food.	40%	80%
5	Monitoring temp of deep freezers	20%	80%
6	Separate knives & coloured chopping boards for diff. food	20%	80%
7	Sanitising them	0%	40%

From Table No.6 and Figure No.8, it the separation of raw & cooked food was done in 20% hotels which improved to 60% after enforcement. The checking of raw food on arrival by supplier was done by 40% hotels which improved to 80%. The separate storage for foods was done by 40% hotels which improved to 80% after enforcement. The monitoring of temperature of deep freezers was done in 20% hotels which improved to 80% after training. Separate knives and coloured chopping boards for different food was used in 20% hotels which increased to 80%. None were sanitizing them which improved to 40% after enforcement.

**Fig No: 8 Workplace Hygiene in Hotels**



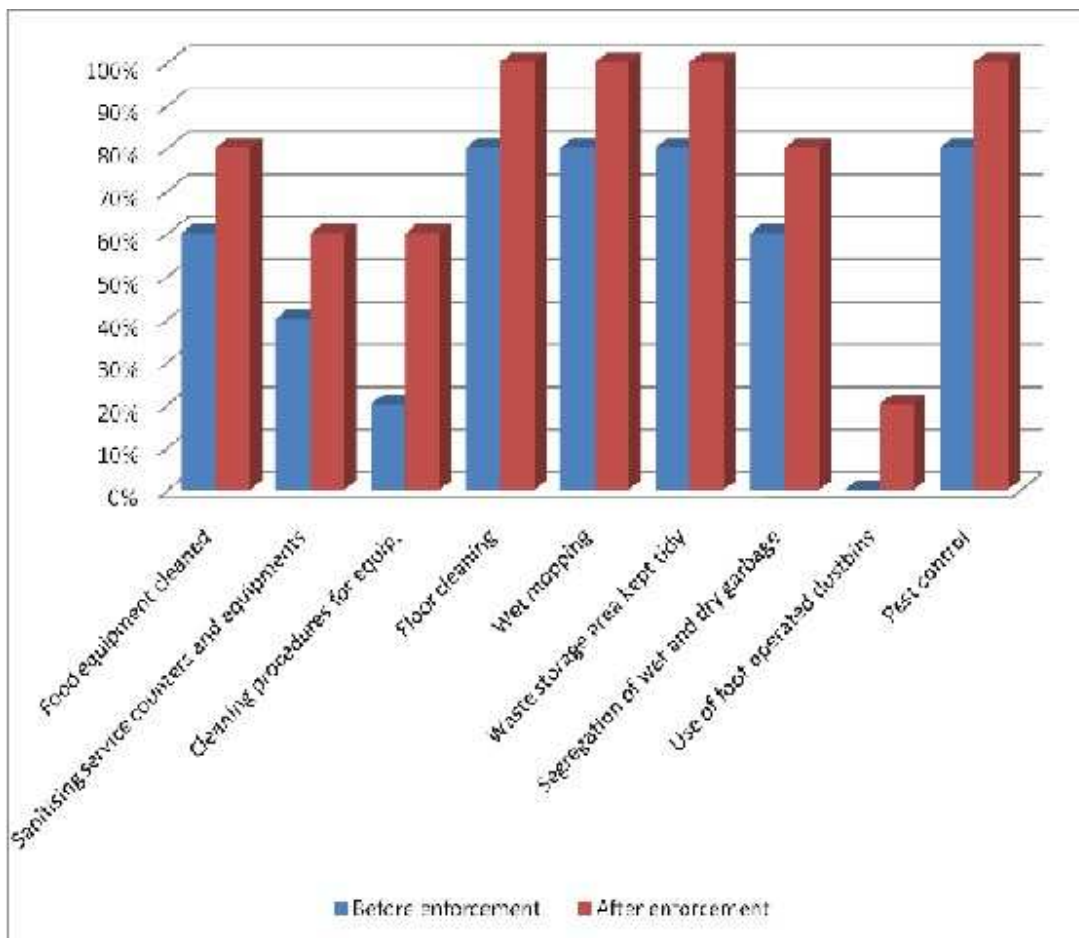
**Table No. 7 Workplace Hygiene in Hotels**

sr. no	Particulars	Before enforcement	After enforcement
8	Food equipment and food contact surfaces cleaned	60%	80%
9	Sanitising service counters and equipments	40%	60%
10	Cleaning procedures for equip.	20%	60%
11	floor cleaning	80%	100%
12	Wet mopping	80%	100%
13	Waste storage area kept tidy	80%	100%
14	Segregation of wet and dry garbage	60%	80%
15	Usage of foot operated dustbins	0%	20%
16	Pest control	80%	100%

From Table No.7 and Figure No.9, it was observed that food equipment and food contact surfaces were cleaned in 60% hotels which improved to 80%. Sanitising service counters and equipments were done in 40% hotels which improved to 60%. There were specific cleaning procedures for equipments in 20% hotels which

improved to 60% . The frequency of floor cleaning increased from 80% to 100%. Wet mopping increased from 80% to 100%. Waste storage area was kept tidy in 80% hotels which improved to 100%. Segregation of wet and dry garbage was done in 60% hotels which improved to 80%. Usage of foot operated dustbins was not done which increased to 20% because the breakage was fast. The pest control which was done in 80% hotels increased to 100% after the training in the enforcement programme.

**Figure No. 9 Workplace Hygiene in Hotels**



**Conclusion:**

Major incidences of food borne illness illustrate the need for improved and continuous education regarding food safety practices. After completing the study it was concluded that offering a foodservice sanitation and safety training course based on HACCP coupled with continuing education, was very important for increasing knowledge and skills of the employees. Reinforcement of training

through techniques such as use of posters and continual monitoring of performance by managers may change employees' perceptions of training that they receive. One of the major problems is that the food workers often lack interest and have a negative attitude towards food safety programmes. Making every direct or indirect food handler aware about HACCP and its principles will benefit the employees and employer to implement the Food Safety Act ideally. The Food Safety And Standards Act 2006 of India will give a new dimension to food service industry and the manufacturing practices being followed. It was found that those employees in hotels who had taken trainings based on HACCP were more capable in performing their tasks and their awareness of hygiene and sanitation practices increased significantly. First conducting a training need assessment for employees was done, then delivery of training programmes to targeted persons and in the end evaluation of the training outcomes in such a way that the performance is checked in accordance to the training programmes already been delivered.

**Suggestions and Recommendations:** A huge gap was felt between knowledge, information and application of HACCP principles. Training staff in selected samples had shown a positive change in the attitude towards HACCP implementation. It is suggested to give or impart formal training on HACCP to staff; to have better hygiene practices in manufacturing food products.

- Since an improvement was visible in hygiene and sanitation conditions after the training was imparted, it is recommended to conduct regular training programs. It is recommended to conduct regular HACCP inspections in premises.
- It is suggested to continue an on-going training program in these selected samples for six months.
- Using different colour coded (Blue) Band-aid, gloves, chopping boards to avoid cross contamination.
- Outside assistance from accredited and registered agency could be sought for documentation and training on HACCP.
- It is suggested to establish an in-house food testing laboratory and monitoring facilities.
- It is recommended that the more job-specific and hand-on training materials for employees should be developed and more continuous implementation of the

food safety training and integration of employee appraisal program with the outcome of safety training is required.

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