

## STATUS OF FOOD SANITATION KNOWLEDGE AMONG FOOD SERVICE WORKERS\*

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This article reports upon an investigation carried on by the author and his staff among restaurant owners and food workers in Minnesota. The object of this investigation was to determine how much food service personnel knew about, and understood, the basic principles of safe food handling. Owners and their employees were questioned in a casual manner during the course of routine inspections, and in addition some two hundred others were tested through the use of multiple choice questions prior to the operation of food handler classes. The data presented demonstrates the need for more emphasis by sanitarians upon basic principles of food hygiene and a constant program of explanation and instruction of personnel within the restaurant industry.

THE INSTRUCTION AND EDIFICATION of food service personnel in the fundamentals of good sanitary practice should be a basic objective in every program intended to insure the safety of food. With the mechanization of the food business there is a tendency to become so concerned with apparatus and equipment that the personnel who use and operate it may be overlooked. To bring about maximum public health protection the necessity of getting to the people who work in the industry is a matter of vital significance.

A review of the latest published reports on food-borne outbreaks reveals that by far the majority of them were caused by failure to appreciate and to practice basic san-

itary principles. Had elementary food protection methods been understood and practiced many of the outbreaks would not have occurred.

To substantiate this premise, table 1 has been prepared which lists the alleged causes of food-borne outbreaks reported in 1950.

TABLE 1

### ALLEGED CAUSES OF OUTBREAKS REPORTED IN 1950

1. Failure to use refrigeration.....	68
2. Contamination or infection by persons.....	31
3. Insanitary handling — faulty methods.....	27
4. Chemicals introduced.....	4
5. Indefinite, miscellaneous causes .....	4
6. Insanitary equipment.....	2
7. Insects and rodents.....	1
8. Causes unknown or undetermined .....	204
Total	341

From table 1, it will be noted that the causes, through item 6 at least, demonstrate a lack of understanding of good sanitary practice. In fact, of the 341 outbreaks reported, 156 or slightly better than 40 percent were attributable to persons either through their acts of omission or commission. In addition it is undoubtedly safe to assume that at least 40 percent of the cases listed as "causes unknown or undetermined" had their origin in ignorance of good food-handling methods or a failure to carry out protective procedures.

With facts of this nature in mind, the writer, with the assistance of



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his staff and that of several of the city health departments in Minnesota, drew up a series of questions which could be used in the field to determine how much or how little food service personnel know concerning some of the basic sanitary principles of restaurant operation and food sanitation. As is well known to those working in the field of food sanitation, one constantly encounters persons in the industry who demonstrate, time after time, a lack of knowledge of good sanitary practice. On the other hand, to the writer's knowledge, no precise figures have been assembled to verify what the level of understanding is among food workers. This brief study is an attempt to reach some tangible conclusion so that strengths as well as weaknesses can be demonstrated.

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In planning this survey, instructions were issued to food sanitarians to ask, during the course of routine inspections, certain pertinent but elementary questions of owners, cooks, waitresses, dish-machine operators, and bartenders. The questions were asked in a casual manner so the person interrogated would not feel he was being tested or quizzed. The instructions were to engage the person in conversation and attempt to have him express his opinions freely and without any prompting. A study of the answers revealed that the method was quite successful, and in many instances the question served to raise other points upon which the subject volunteered additional information, even though irrelevant.

#### OWNERS AND PROPRIETORS

The first questions were directed to owners and proprietors. The first of this series attempted to elicit information from owners or proprietors concerning the training of a waitress in food-handling techniques. The question was asked, "When you hire a new waitress what points about sanitary food handling do you teach her?" The results derived from using this question among forty-four owner-proprietors is shown in table 2.

Credit was given under major points if such items as hand washing, clean uniforms, hairnets, and handling of food and utensils in a satisfactory manner were mentioned. Under minor points, credits were given if general cleanliness, clean dishes, and serving techniques were covered. Such statements as "We hire only experienced help", or "Our older waitresses show the new ones how to wait on customers", accounted for the number credited with "no instruction".

From table 2 it appears that only 22.7 percent of proprietors gave adequate instruction in important food service procedures to new waitresses, that 36.4 percent did give some consideration to these

points, but nearly 41 percent made no attempt to cover fundamentals.

#### WAITRESS AND SERVICE PERSONNEL

The next question used was designed to ascertain first, from waitresses, how much and what kind of instruction they received in sanitary food handling, and second, to serve somewhat as a cross-check against answers contributed by proprietors in regard to the training or instruction of a new waitress. Consequently, this question was asked of waitresses and similar service people.

"How much instruction or training in food handling did you get from the boss when you first took this job?" An analysis of responses to this question is given in table 3.

The results shown in table 3 compare favorably with those shown in table 2. In both cases the percentage of waitresses and service personnel receiving adequate instruction was less than 25 percent, 22.7 in table 2 and 20.6 in table 3. In the case of no instruction given, the percentages were 40.9 and 53.0 respectively.

#### QUESTIONS TO OWNERS AND PROPRIETORS

Next a question aimed at determining some general knowledge

concerning food poisoning was asked of owners and proprietors. This was the question used: "what kinds of food do you think are most likely to cause food poisoning?" The results obtained from this question are shown in table 4.

Credit as a correct answer was given if the subject mentioned such foods as meat and meat products, poultry, custard-filled pastries, meat and fish salad, or certain creamed foods. Partial credit was given if left-overs, unrefrigerated foods, ground meat, or food kept too long were mentioned. Some typical answers in the "wrong" category were: food left in open cans, spoiled food, fish, and the use of aluminum utensils. As a further interesting fact it was determined that the average estimated age of the forty-two persons interviewed was forty-five years and the length of time in business averaged ten. Yet with ten years average experience the facts reveal that over one-third of those interviewed did not know or did not name the kinds of food most likely to cause outbreaks of food poisoning.

Two other questions were asked of proprietors. The first attempted to determine whether the owner or proprietor knew the brand name of the dish washing compound used in his place of business. The second

TABLE 2 — OWNER-PROPRIETORS INTERVIEWED — 44  
INSTRUCTIONS TO A NEW WAITRESS

A. Major points		B. Minor points		C. No instruction	
No.	percent	No.	percent	No.	percent
10	22.7	16	36.4	18	40.9

TABLE 3 — WAITRESSES OR SERVICE PERSONNEL INTERVIEWED — 34  
WAITRESS STATEMENT ON INSTRUCTION

A. Major points		B. Minor points		C. No instruction	
No.	percent	No.	percent	No.	percent
7	20.6	9	26.4	18	53.0

TABLE 4 — OWNERS AND PROPRIETORS INTERVIEWED — 42  
CAUSE OF FOOD POISONING

A. Correct		B. Partly correct		C. Wrong or did not know	
No.	percent	No.	percent	No.	percent
16	38.1	10	23.8	16	38.1

TABLE 5 — COOKS AND CHEFS INTERVIEWED — 20  
TEMPERATURE FOR REFRIGERATED FRESH MEAT

Didn't know		Below 32°F		34 - 38°F		38 - 40°F		40 - 50°F	
No.	percent	No.	percent	No.	percent	No.	percent	No.	percent
3	15.0	4	20.0	6	30.0	5	25.0	2	10.0

question was general in nature and attempted to elicit reaction to the question, "What do you figure is the toughest sanitation job you have in running this business?"

In regard to the question about dish-washing compounds it was found that only one-half of those questioned knew the brand name of the compound in use and in the majority of instances the familiar and highly advertised detergents were the ones mentioned. In no case could these proprietors name any of the constituents that would generally be present in commercial dish washing powders.

In response to the second question, that is, the one involving the "toughest sanitation job", the answers varied depending upon the viewpoint of the proprietor. General cleanliness, floor cleanliness, and equipment were mentioned most frequently. Such items as insect control, toilets, garbage, and waste disposal were not frequently mentioned. Cleaning to most proprietors seemed to involve the maintenance of appearance and such things as dismantling equipment, cleaning under and behind equipment, or rodent and fly control were not mentioned. However, the wording of the question was general, and as might be expected the answers were given in that vein.

COOKS AND CHEFS

The next series of questions was directed to cooks and chefs. The first of the series was, "How cold should your refrigerator be for storing fresh meat?" The answers to this question are given in table 5.

A study of these results indicate that 30 percent stated that the preferred temperature range was 34 - 38 degrees F which generally is considered satisfactory. In 15 percent of the cases, the subject did not know, and 20 percent mentioned below 32 degrees F. These last two percentages combined showed that 35 percent did not mention a temperature for fresh meat storage which is commonly accepted in the "trade" as satisfactory.

The next question asked the chef-cook group had to do with the serving of pork. The question was stated as follows: "Do you serve much pork here? Do you think it is all right to serve pink pork?" The

first part of this question was used only as a lead to the next portion and the answers are not of particular significance. Interestingly enough however, every cook or chef interviewed condemned the serving of pink pork. Two typical answers were, "It is all right to serve beef rare, but pork must be well done," or "Pork doesn't look right unless it is well done; mother was very fussy and saw to it that the pork she cooked was well done." In not one instance was there any hesitancy or indecisiveness about the undesirability of serving insufficiently cooked pork. The consistently correct answers to this question prompts the query, "Why was a correct answer to this question given every time". Somewhere in the early training or experience of these people they learned that pork must be well done and that fact had remained steadfastly with them. Perhaps if we knew the answer to this question many of our food-handling difficulties could be more readily solved.

DISH-WASHERS

The next question of this series was directed to persons in the dish-washing section. Both hand and machine dishwashing were being done by those interviewed. The question asked was this: (a) "How hot is the water here?" and, (b) "How hot should the rinse water be to disinfect dishes and utensils?" The results are expressed in tables 6 and 7.

From a study of tables 6 and 7 it is apparent that the generally acceptable sanitizing temperature of 170 degrees F is a figure which had not been adequately impressed

TABLE 6 — DISHWASHERS INTERVIEWED — 42  
Question — (a) How hot is the water here?

Did not know	Gussed Temperature F at:								
	140 — 149		150 — 165		170 — 180		Over 180		
No.	percent	No.	percent	No.	percent	No.	percent	No.	percent
32	76.3	2	4.7	2	4.7	4	9.6	2	4.7

TABLE 7 — DISHWASHERS INTERVIEWED — 42  
Question — (b) How hot should rinse water be?

Did not know	Temperature in degrees F			
	140 — 159	160 — 169	170	Over 170
No. percent	No. percent	No. percent	No. percent	No. percent
16 38.1	5 11.9	5 11.9	2 4.8	14 33.3

TABLE 8 — WAITERS, WAITRESSES, SERVICE PERSONNEL INTERVIEWED — 27  
(a) Place of hand washing

Rest room		At kitchen sink	
No.	percent	No.	percent
20	74.0	7	26.0

  

(b) Time of washing				
Start work	Toilet	Soiled articles	Food	Other
No. percent	No. percent	No. percent	No. percent	No. percent
1 3.7	8 29.6	8 29.6	3 11.1	7 26.0

upon the minds of persons who work at dishwashing. Table 6 reveals that 76.3 percent of those interviewed did not know what the temperature of hot water was in their establishment. Table 7 shows that 38.1 percent did not know what the temperature should be. Only 4.8 percent stated 170 degrees F while 33.3 percent felt the rinse water should be over 170 degrees. While there would be no dissatisfaction on the part of control officials of the temperature was above 170 degrees, the fact remains that the significance of water temperature does not appear to be understood by persons whose everyday duties involve the washing and sanitizing of dishes.

Next among the questions used was one pertaining to hand washing. This question was asked of waiters, waitresses, and similar service people. The question was divided into two parts as follows: (a) "Where is the place you wash your hands around here", and (b) "How often should you wash your hands?" The replies are given in table 8.

While part (a) of table 8 reveals that hand washing is done in the kitchen sink by 26 percent of persons interviewed, a study of the answers to this question demonstrates that the necessity for frequent hand washing is well understood. Answers were positive and emphatic on this point.

Part (b) of the table shows that hand washing after using the toilet, after handling soiled articles, and within the scope of the item given as "other" accounted for a combined total percentage of 85.2. Only 14.8 percent mentioned hand washing before beginning work or after soiling the hands with food. It does seem apparent, however, that the importance of hand cleanliness is very generally appreciated and this

is further borne out by the facts that in many instances the person interviewed made a statement about as follows: "I wash my hands twenty times a day, in fact I don't keep track of the number".

#### BARTENDERS AND TAVERN OPERATORS

The final question used was directed to bartenders and tavern operators. The question used was designed to determine if the subject knew "why" a chemical sanitizer was required for the disinfection of bar glasses. The question asked was this: "I notice you are (or, are not) using a disinfectant on your glasses; why do you think the department requires one to be used?" The results obtained through the use of this question are set forth in table 9.

The tabulation of these results indicates that 72 percent understood that germicidal action was the underlying reason. In all but five establishments where this question was used a sanitizer was found present in the bar sink and the operators at these five places were included in the group that stated that they did not know why a sanitizer was required.

#### FOOD HANDLERS

To further determine the status of sanitation knowledge among food workers a series of questions was drawn up and distributed to persons attending food handlers' institutes in three medium-size Minnesota cities. After the food worker registered and while waiting for the instruction period to start, he was asked to select the correct answer to a series of nine questions. The question sheet is reproduced

TABLE 9 — BARTENDERS AND TAVERN OPERATORS INTERVIEWED — 57  
Question — Why is a disinfectant required?

To clean the glass		To kill germs		Did not know	
No.	percent	No.	percent	No.	percent
5	8.8	41	72.0	11	19.2

TABLE 10 – HOW WELL DO YOU KNOW YOUR JOB?

(A few questions to check on your knowledge)

Please put a cross (x) in the space before the right answer.

EXAMPLE: The safest kind of meat to serve is that which has been:

- Killed fresh on the farm
- Aged for 30 days
- Government inspected

THESE ARE THE QUESTIONS.

TOTAL FOOD WORKERS QUESTIONED - 207

1. The <i>most</i> important time to wash your hands is:				
<input type="checkbox"/> After peeling vegetables		Right	Wrong	
<input type="checkbox"/> After handling money		No. Percent	No. Percent	
<input checked="" type="checkbox"/> After using the toilet	170	82	37	18
2. The kind of food most likely to cause food poisoning is:				
<input type="checkbox"/> Catsup, spices and seasoning		Right	Wrong	
<input checked="" type="checkbox"/> Meat and meat products		No. Percent	No. Percent	
<input type="checkbox"/> Fresh raw vegetables	198	96	9	4
3. The best temperature for storing fresh meat is:				
<input type="checkbox"/> 54 – 60 degrees F		Right	Wrong	
<input type="checkbox"/> 41 – 48 degrees F		No. Percent	No. Percent	
<input checked="" type="checkbox"/> 34 – 38 degrees F	151	73	56	27
4. Which one of these chemicals must be used in place of hot water for disinfecting dishes and eating utensils:				
<input type="checkbox"/> Tartaric acid		Right	Wrong	
<input checked="" type="checkbox"/> Chlorine		No. Percent	No. Percent	
<input type="checkbox"/> Sodium bicarbonate	168	81	39	19
5. The <i>main</i> reason for keeping displayed food covered is:				
<input type="checkbox"/> To protect it from odors and smoke		Right	Wrong	
<input type="checkbox"/> To keep it from going sour		No. Percent	No. Percent	
<input checked="" type="checkbox"/> To protect it from cough and sneeze droplets	137	66	70	34
6. The best way to store fresh ground meat in a refrigerator is:				
<input type="checkbox"/> In a deep container with a tight cover		Right	Wrong	
<input checked="" type="checkbox"/> In thin layers in a shallow pan		No. Percent	No. Percent	
<input type="checkbox"/> Wrapped tightly in waxed paper	88	43	119	57
7. Minnesota regulations require water to be at a certain temperature for disinfecting dishes. Which one is the temperature required?				
<input checked="" type="checkbox"/> 170 degrees F		Right	Wrong	
<input type="checkbox"/> 215 degrees F		No. Percent	No. Percent	
<input type="checkbox"/> 155 degrees F	108	52	99	48
8. The most important item in clean restaurant operation is:				
<input type="checkbox"/> Stainless steel equipment		Right	Wrong	
<input checked="" type="checkbox"/> Careful methods		No. Percent	No. Percent	
<input type="checkbox"/> Air-conditioned premises	151	73	56	27
9. The most common cause for complaint by restaurant customers is:				
<input type="checkbox"/> Lack of ventilation		Right	Wrong	
<input checked="" type="checkbox"/> Careless food handling methods		No. Percent	No. Percent	
<input type="checkbox"/> Floors not kept clean	153	74	54	26

What is your job where you work

(owner, waitress, cook, dishwasher, etc.)

herewith and the results for each question are shown giving the number of correct and incorrect answers and their respective percentages. (See Table 10).

A number of conclusions can be drawn from these data. Tables 2 and 3 prove beyond question of doubt that among proprietors and workers interviewed, relatively little time and attention is directed toward the training of a new worker in fundamentals of personal hygiene and sanitary food handling methods. It is too often taken for granted that because an employee has worked at some other food establishment no additional training by the next employer is necessary. The regulatory agency does not have the means or personnel to assume responsibility for the training of all food workers, but it is felt that the regulatory agency should train the employer and urge him to establish "house rules" and then train his employees to follow them. Numerous instances are on record where in-service training courses for employees are given by restaurant management. This is a policy that should be actively encouraged by the regulatory agency.

#### SUMMARY AND DISCUSSION

A brief review of these data point to certain definite facts. In connection with causes of food-borne outbreaks, thirty-eight percent of owners and proprietors could not or did not name types of foods most generally involved and nearly twenty-four percent gave answers which were only partially correct. In terms of public health protection this is serious. It demonstrates that the food sanitarian must devote more time to those features of food control which will

alert proprietors to inherent dangers which arise when sound food handling principles are violated.

From table 5 results indicate that cooks and chefs lack precise knowledge concerning the preferred temperature for fresh meat storage. Only thirty percent of those interviewed gave the range 34-38 degrees F. Considerable confusion seems to exist in this category and it again demonstrates the need for personal instruction among these workers.

The minimum temperature for hot water used in sanitizing dishes was a figure not generally well known by those interviewed in this study. Seventy-six percent did not know what the hot water temperature was in their place of business (table 6) and thirty-eight percent (table 7) did not know what it should be. A total of thirty-eight percent of those answering gave the correct temperature, namely, 170 degrees F, or over 170 degrees F. Obviously it will be difficult to obtain sanitized dishes if correct temperatures are not known.

Concerning the matter of hand-washing (table 8) it appears that the importance of this is quite well recognized. The answers as to time of washing were somewhat mixed in that washing after the toilet, after handling soiled articles, and at other times when necessary were always mentioned. The one weakness appeared to be that few admitted the need for washing prior to starting work or when first coming on duty.

The reason for using a chemical sanitizer for the disinfection of glasses at bars and taverns was known by seventy-two percent of

those questioned. This was a higher percentage than had been anticipated. It is presumed that this result may be attributable to the fact that regulatory agencies have stressed sanitized bar glasses repeatedly. In addition bartenders are frequently visited by representatives of detergent manufacturers who stress clean and sanitary glasses as a business as well as a public health asset.

In connection with the questions used at food-handler institutes, a study of the question sheet indicates the greatest lack of knowledge involved questions 5, 6, and 7, where incorrect answers were the most frequent. While this type of study was confined to Minnesota alone it does reveal and emphasize again the important fact that regulatory agencies must get to the people who prepare and serve food at public places. A continuous program of counseling and education must be carried on. While the physical properties of a public cafe are definitely important, food sanitarians must be constantly mindful of the fact that personnel are of even more significance.

Space does not permit a detailed discussion of the manner in which this instruction can best be accomplished, but suffice it to say that every device available will be needed to impress upon the minds of all food service workers that public health may be impaired if basic sanitary principles are neglected.

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