FOOD POISONING AND ITS PREVENTION

PRACTICAL ACTION
Technology challenging poverty

technical brief

Foods can be grouped according to the potential risk from food poisoning into three categories:

- Those in which one or more ingredients are likely to be contaminated with food poisoning bacteria.
- Those in which the processing stage is unlikely to destroy food poisoning bacteria.
- Those in which food poisoning bacteria may grow after processing if the food is not properly packaged or handled.

Table 1 shows the relative risk of food poisoning from different types of food and which of the above categories is most likely to be the cause. The main points from the table are as follows:

Type of food	**Category of risk** (see text) 1	2	3	**Relative risk of food poisoning** (* = Low *** = High)
Baked goods				
Bread			/	*
Cakes	/		/	*
Biscuits				*
Roasted food				
Meat/poultry	/		/	**
Vegetables				*
Nuts	/			**
Pickled food				
Vegetables	/			*
Fish	/			**
Canned foods				
Fruits				*
Vegetables	/		/	*
Meat/fish	/		/	*
Dried foods				
Fruit				*
Vegetables	/	/	/	**
Nuts	/			**
Pluses, beans				*
Herbs/spices	/	/	/	***
Sugar based foods				
Preserves				*
Confectionary				*
Honey				*
Frozen foods				
Meat/fish/poultry	/	/	/	***
Vegetables	/	/	/	**
Dairy products	/	/	/	**
Snack foods				
Dried			/	*
Fried			/	**

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Type of food	Category of risk (see text) 1 2 3	Relative risk of food poisoning (* = Low *** = High)
Fermented foods		
Alcoholic drinks	/	*
Yoghurt	/	*
Cheese		**
Oils and fats		*
Fresh foods		
Fruits		*
Vegetables		*
Meat/Fish	/	***
Milk	/	**
Eggs	/	**
Root crops		*
Cereal grains		*
Prepared foods		
Sausages/beefburgers/ Fish cakes	/ /	***
Desserts	/ /	**
Ice cream	/ /	***

Table 1: Food types and their risk of poisoning

The foods which are most at risk of causing food poisoning are low acid, moist foods such as meat (especially poultry), fish, seafoods, vegetables, milk and eggs. This is especially so if the foods are not heated to high temperatures (eg freezing, drying, chilling and fermentation). Generally, the main risk from heated foods (baked, fried, canned, roasted etc) and dried foods comes after the food has been processed, from poor handling and storage procedures. The main exceptions to this are herbs, spices and some types of nuts (eg groundnuts) where contamination of the raw materials is a major problem. Clearly, any prepared food that contains these products as ingredients is a potential source of food poisoning. In general, acid foods (eg fruit products) are not a source of food poisoning.

Types of food poisoning

Staphylococcus aureus
This bacteria produces a poison in food which can withstand heating. It is also resistant to salt levels that kill many other types of bacteria (eg in pickles) and it can be carried by workers and transmitted into processed food when they handle it.

The symptoms of poisoning are nausea, vomiting, diarrhoea and stomach cramps. They appear within 1-4 hours of eating contaminated food and last for 10-12 hours. Poisoning is rarely fatal. The main sources of poisoning are dairy products, especially cheese, processed meats and pastries. The bacteria are carried by people, in the throat, and in infected cuts and other skin disorders. People should not therefore handle food if they have coughs or skin complaints. This type of poisoning is difficult to trace because the bacteria can produce the poison before the food is processed. Heating can kill the bacteria but leave the poison in the food.

Salmonella
This type of bacteria causes food poisoning when enough are eaten in a food. It is the most common cause of food poisoning in many countries. The main source is foods that are not heated sufficiently or are contaminated after heating. Particular care is therefore needed to

keep raw foods away from cooked foods, carefully clean utensils and equipment, and stop anyone with a stomach complaint from handling processed food. Personal hygiene of the food handlers must be very high.

The symptoms of poisoning are diarrhoea, vomiting and fever. They occur 10-24 hours after eating the poisoned food and last for 48-96 hours. They may be fatal to very old, infirm or very young people. Particular care is therefore needed when making infant foods or weaning foods.

The main sources are poultry and eggs/egg products but dairy products are also a potential risk.

Shigella
This is a bacterium associated with sewage. Poisoning is caused by direct contact of food with sewage or by indirect contact (eg by operators' hands, equipment or by contaminated water). Personal hygiene and correct water treatment are therefore essential to prevent poisoning. Shigella is found where poor hygiene exists.

The symptoms are diarrhoea, fever and nausea which appear from 7 hours to 7 days after eating contaminated food. They may last for a week but are rarely fatal. Any food that requires manual preparation is a potential source.

Escherichia coli
This bacterium is also associated with sewage contamination of foods, water or poor personal hygiene. The bacteria themselves can cause food poisoning or they can produce a poison in the gut. The most common food source is red meat which is contaminated at slaughter. Meat products, eg sausages and dairy products, especially cheese are also potential sources of food poisoning. Other sources (eg pasteurised milk, ice cream, cooked meats) indicate contamination after processing and hence poor hygiene by the food handlers.

Campylobacter fetus
This type of bacteria cause food poisoning when eaten. The most common sources are contaminated water and Unpasteurised milk, although poultry and other meats are also important sources. Proper chlorination of water and heating of foods will destroy these bacteria. Illness occurs 2-5 days after eating contaminated food and consists of diarrhoea, muscle pain and headaches with vomiting. It is usually brief and not fatal.

Clostridium perfringens
The most frequent cause of this type of poisoning is slow and inadequate cooking of meats. The bacteria produce spores which rapidly germinate after eating and produce a poison in the gut. It can be prevented by good sanitation, by heating food adequately and keeping cooked food cool (below 10°C) or hot (above 60°C).

The symptoms are stomach cramps without vomiting and diarrhoea. They appear within 8-24 hours of eating contaminated food and last for 24 hours. The illness is not fatal.

Clostridium botulinum
Though very rare, this is a serious type of food poisoning that has many varied symptoms and is often fatal (in about a third of all cases with prompt treatment, up to two thirds of cases if there is no treatment available or if treatment is delayed).

It is most commonly caused by a poison produced by the bacteria in sealed food containers, which have little air inside (eg canned meat and vegetables) although the poison may also be produced in the gut after eating contaminated food or it may enter a wound directly.

There are four types of poison, each of which is a powerful nerve poison. In fact they are some of the most potent poisons known. They cause blurred or double vision, weakness,

difficulty in swallowing and breathing and, if untreated, paralysis, unconsciousness and death. The symptoms appear with 18-36 hours of eating the poison and should be treated promptly with a botulin anti-toxin.

The poison is destroyed by heating food to 90°C for at least 15 minutes but the bacterial spores survive this processing and higher temperatures are required to destroy them. The most common sources are canned meat, fish and vegetables, preserved meats and fermented fish products. Technical assistance is needed when canning low acid foods or preparing fermented meat and fish products.

Bacillus cereus
This type of bacteria produce two types of poisoning. The first is relatively mild diarrhoea and stomach pains which occur 8-12 hours after eating contaminated food and last for about 12 hours. The second is more serious and causes vomiting and diarrhoea 1-5 hours after eating food. Both are caused by a poison produced by the bacteria and are not fatal. The first type may occur in a wide variety of foods including rehydrated dried vegetables, soya bean sprouts and potato products. The second type is mostly associated with cooked rice. Poisoning can be prevented by good hygiene and by not holding cooked foods for long periods at room temperature.

Hepatitis A
This virus is transmitted from infected people to food. It is easily destroyed by heating and the main sources are therefore raw foods or foods which are contaminated after heat processing. It can be prevented by not allowing infected people to handle food.

Parasites
Trichinella spiralis is a common food poisoning parasite found in meat (especially pork). It can be destroyed by heating the food to at least 60°C. Hygiene and sanitation are not involved as causes of this illness. Other parasites include protozoa on vegetables, intestinal worms in meat and fish and numerous other parasites (eg giardia and amoeba) in contaminated water.

Mycotoxins
There are a large number of poisons produced by moulds, but relatively few are involved in food poisoning. Aflatoxin poisoning is, however, a significant problem associated with cereals and oilseeds, particularly groundnuts, cotton seed, wheat, sorghum, maize and rice. It is a poison produced by two moulds Aspergillus flavus and Aspergillus parasiticus when the cereals and nuts are not dried sufficiently quickly or to a low enough moisture level. This is a particular problem with unshelled groundnuts where the mould can grow on the nut, under the shell and contaminate the nut with poison. These nuts became discoloured and should be thrown away. Poisoning can be prevented by not allowing the mould to grow, ie by drying the food quickly to sufficiently low moisture content.

References and further reading

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