



MINISTRY OF HEALTH
OF REPUBLIC OF TAJIKISTAN



World Health
Organization

REGIONAL OFFICE FOR
Europe

Protect your family: make sure your food is safe!

Prevent botulism food poisoning when
processing and preserving foods at home



ADDRESS REQUESTS ABOUT PUBLICATIONS OF THE WHO REGIONAL OFFICE FOR EUROPE TO:

PUBLICATIONS
WHO REGIONAL OFFICE FOR EUROPE
SCHERFIGSVEJ 8
DK-2100 COPENHAGEN Ø, DENMARK

ALTERNATIVELY, COMPLETE AN ONLINE REQUEST FORM FOR DOCUMENTATION, HEALTH INFORMATION, OR FOR PERMISSION TO QUOTE OR TRANSLATE, ON THE REGIONAL OFFICE WEB SITE ([HTTP://WWW.EURO.WHO.INT/PUBREQUEST](http://www.euro.who.int/pubrequest)).

© **World Health Organization 2013**

ALL RIGHTS RESERVED. THE REGIONAL OFFICE FOR EUROPE OF THE WORLD HEALTH ORGANIZATION WELCOMES REQUESTS FOR PERMISSION TO REPRODUCE OR TRANSLATE ITS PUBLICATIONS, IN PART OR IN FULL.

THE DESIGNATIONS EMPLOYED AND THE PRESENTATION OF THE MATERIAL IN THIS PUBLICATION DO NOT IMPLY THE EXPRESSION OF ANY OPINION WHATSOEVER ON THE PART OF THE WORLD HEALTH ORGANIZATION CONCERNING THE LEGAL STATUS OF ANY COUNTRY, TERRITORY, CITY OR AREA OR OF ITS AUTHORITIES, OR CONCERNING THE DELIMITATION OF ITS FRONTIERS OR BOUNDARIES. DOTTED LINES ON MAPS REPRESENT APPROXIMATE BORDER LINES FOR WHICH THERE MAY NOT YET BE FULL AGREEMENT.

THE MENTION OF SPECIFIC COMPANIES OR OF CERTAIN MANUFACTURERS' PRODUCTS DOES NOT IMPLY THAT THEY ARE ENDORSED OR RECOMMENDED BY THE WORLD HEALTH ORGANIZATION IN PREFERENCE TO OTHERS OF A SIMILAR NATURE THAT ARE NOT MENTIONED. ERRORS AND OMISSIONS EXCEPTED, THE NAMES OF PROPRIETARY PRODUCTS ARE DISTINGUISHED BY INITIAL CAPITAL LETTERS.

ALL REASONABLE PRECAUTIONS HAVE BEEN TAKEN BY THE WORLD HEALTH ORGANIZATION TO VERIFY THE INFORMATION CONTAINED IN THIS PUBLICATION. HOWEVER, THE PUBLISHED MATERIAL IS BEING DISTRIBUTED WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED. THE RESPONSIBILITY FOR THE INTERPRETATION AND USE OF THE MATERIAL LIES WITH THE READER. IN NO EVENT SHALL THE WORLD HEALTH ORGANIZATION BE LIABLE FOR DAMAGES ARISING FROM ITS USE. THE VIEWS EXPRESSED BY AUTHORS, EDITORS, OR EXPERT GROUPS DO NOT NECESSARILY REPRESENT THE DECISIONS OR THE STATED POLICY OF THE WORLD HEALTH ORGANIZATION.

WHAT IS BOTULISM?

Botulism is a severe and life-threatening disease characterized by nervous system impairment.

In recent years in the Republic of Tajikistan, botulism outbreaks, due to increasing sporadic cases, are more often reported and this has significantly increased its proportion in the total foodborne diseases prevalence. The increases of botulism cases are associated with the widespread use of not properly or insufficiently sterilized home preserved and storage foods which provide the conditions for the botulism spores to remain viable. During the period 2007 - 2010, the country has registered 40 outbreaks of botulism with a total of 190 affected human, out of which 23 have died. Often, the contaminated products were home-processed salads from vegetables (tomatoes, cucumbers and eggplant) and mushrooms. Some cases have been associated with the use of home-made meat products (stored meat - «qayla» and sausages).

Botulism is an intoxication caused by a potent neurotoxin - botulinum toxin, produced by the vegetative form of the bacterium, *Clostridium botulinum*. Toxins are ingested through contaminated food. Though mainly a foodborne intoxication, botulism can also be transmitted through wound infections, intestinal infection in infants, and by inhalation. Person-to-person transmission of botulism does NOT occur.

Toxin botulinum is the strongest of all known bacterial toxins. The average lethal dose for humans is approximately 1 microgram (0.001 mg). Therefore, absorption of less than 0.001 mg can cause severe illness or death. It is considered a medical emergency since the mortality rate is high if the treatment is not immediate and proper. Overall, mortality rate is 5-10% of botulism cases.



WHAT CAUSES BOTULISM?

Spores of *C. botulinum* are widely distributed in the natural environment, especially in soils, aquatic sediments and in fishes. They can be found in raw materials but can also cross-contaminate food during food processing. The ability of *C. botulinum* to cause food poisoning in humans is directly related to the survival of heat-resistant spores that can survive common food preservation methods, including inadequate heating/sterilization. Under favourable environmental conditions (low oxygen or anaerobic environment, temperature, pH higher than 4.6, water activity), the survived spores can germinate to vegetative forms of *C. botulinum* which are then able to produce neurotoxin (botulinum toxin) and contaminate the food. The vegetative forms of *C. botulinum* bacteria can be destroyed by boiling but the spores can remain viable after boiling even for several hours. However, the spores can be killed by exposure to very high temperatures under pressure. Therefore, cooking with a pressure cooker at 120°C for 30 minutes can destroy the spores. Also, the toxins can be destroyed by high temperatures. Therefore, thorough cooking or boiling of food for 30 minutes is a reliable protection against botulism.

TYPES OF BOTULISM

Botulism is caused by *Clostridium botulinum*, which produces 7 distinct antigenic forms of botulinum neurotoxins. Four of them (types A, B, E and rarely F) cause human botulism. Types of A and B toxins are strong poisons. In composition, they are proteins and cannot be broken down by digestive tract enzymes. The types C, D and E cause illness in other mammals, birds and fish.

Two categories of botulism are relevant for food consumption: foodborne botulism and infant botulism. Foodborne botulism is an intoxication caused by the ingestion of preformed Botulinum toxin in contaminated food. It is especially dangerous because it can affect many people at the same time through exposure to and ingestion of the same contaminated food.



In infant botulism, the gastrointestinal tract of infants under 12 months of age is directly colonized by vegetative form of *C. botulinum* which produce botulinum toxin. This is due to the absence of natural defences that will develop later and typically occurs 3-30 days following ingestion of spores of *C. botulinum*.

WHAT ARE THE SYMPTOMS OF FOODBORNE BOTULISM?

Foodborne botulism results from consumption of food in which *C. botulinum* bacteria have grown and produced toxins. Symptoms generally appear 12 to 36 hours after consumption of the toxin-containing food, but they can occur as early as 4 hours or as late as 8 days after consumption. The symptoms of foodborne botulism include:

- **marked fatigue, weakness, vertigo, nausea, headache**
- **the initial symptoms are usually followed by blurred vision, dry mouth and throat, and difficulty in swallowing and speaking**
- **vomiting, constipation and abdominal swelling may occur**
- **paralysis of muscles**

The disease can progress to weakness in the neck and arms, after which the respiratory muscles and muscles of the lower body are affected. The paralysis may make breathing difficult and even cause death unless mechanical ventilation is provided. There is no fever and no loss of consciousness. The duration of illness ranges from 1 to 10 days or more, depending upon the host resistance, type and amount of toxin ingested, and type of food.



Protect your family

Treatment includes administration of botulinum antitoxin and supportive care, including respiratory assistance.

WHICH TYPE OF FOOD IS AT RISK?

C. botulinum is a natural contaminant, being found in cultivated and forest soils, bottom deposits of lakes, gills and viscera of shellfish, and in the intestinal tracts of fish and animals. Since fruits and vegetables are often in contact with soil, these foods are easily cross-contaminated with spores of *C. botulinum*. Spores of *C. botulinum* have also been detected in honey.

Infant botulism, although rare may occur through honey consumption. It occurs when infants ingest *Clostridium botulinum* spores, which germinate into bacteria that colonize in the gut and release toxins. In most adults and children older than about six months, this would not happen because natural defences that develop over time prevent germination



and growth of the bacterium. Honey should therefore not be given to infants less than 12 months of age.

The botulinum toxin has been found in a variety of foods, including low-acid preserved vegetables, such as green beans, spinach, mushrooms, and beets; fish, including canned tuna, fermented, salted and smoked fish; and meat products, such as ham and sausage. The food implicated differs between countries and reflects local eating habits and food preservation procedures. Occasionally, commercially prepared foods are involved.

The growth of the bacteria and the formation of toxin causing botulism occur in products with low oxygen content and certain combinations of storage temperature and preservative parameters. Food poisoning from botulism is most frequently caused by:

- inadequately processed and inadequately sterilized and stored home-preserved foods, including low-acid preserved vegetables, such as green beans, spinach, mushrooms, and beets;
- lightly preserved foods such as fish, including canned tuna, fermented, smoked and salted fish; and
- preserved meat products, such as ham, chicken and sausages.
- occasionally, commercially prepared foods

It is really difficult to detect a potentially contaminated product. The botulism toxin can be present in foods that seem to be of good quality, i.e. the food product retains its colour, smell and taste specific to the type of products.



Protect your family

In Tajikistan, the leading cause of botulism is the ingestion of improperly prepared food such as home-canned food, especially home-canned vegetables (mainly tomatoes, cucumbers and eggplant) mushrooms and meat products, mainly fried/stored meat – “qayla”. The water which is used by the population for consumption, cleaning and washing food products, jars and dishes for food preservation, plays an equally important role. To date, only 57.2% of the population of the Republic of Tajikistan are provided with centralized water supply system with access to safe drinking water. The remaining 42.8% of the population live in the rural and mountainous areas, using various sources of water, like springs, rivers, channels, ditches, as well as rain and imported water for drinking, cooking and preservation of food products.

PREVENT BOTULISM INTOXICATION

DO NOT:

- ✗ Do not give honey or foods containing honey to infants less than 12 months.
- ✗ Do not serve children with home-preserved products, unless after thorough heat treatment.
- ✗ Do not consume food from containers that represent a potential risk for botulism. These include:
 - jar is swollen
 - jar lid is not firmly sealed and concave
 - something has leaked from jar
 - liquid spurts out when jar is opened



- Unnatural or “off” odours are detected;
- Also remember: Botulism and other deadly foodborne illness causes are not detected in food by sight, smell and taste.
- ✖ Do not taste food from suspected jars! Even a minuscule amount of botulinum toxin can be deadly. Follow the advice “When in doubt, throw it out.”
- ✖ Do not can food with improper equipments (Use jar, lids, pressure canner, etc.)
- ✖ Do not eat foods from home-made cans older than one year

Do not use pig manure to enrich the soil and avoid contact with plants in gardens tainted with faeces of cats, dogs and humans due to the risk of infections

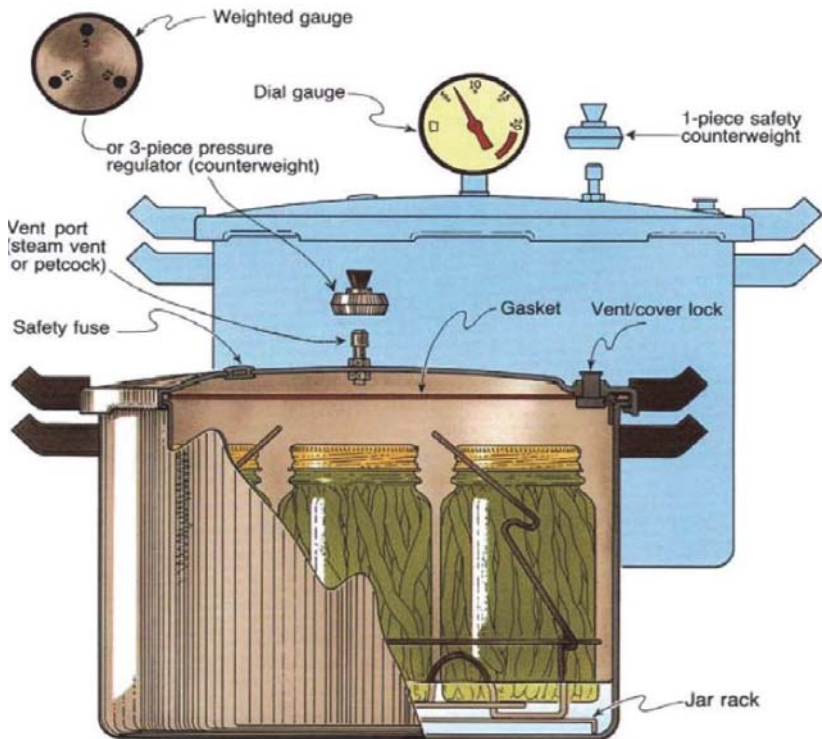
- ✖ Do not use «non-chlorinated» or «not boiled» water for washing hands, jars and food for preservation.
- ✖ Do not buy home-preserved foods and the «fake» meat and canned fish in the streets and markets.

Prevention of Botulism is based on good food preparation practices, particularly preservation, and hygiene. Proper preservation and following of hygiene rules during canning of foods should normally inactivate the bacterial spores in heat-sterilized, canned products or inhibit growth in all other products prepared for immediate consumption.



Protect your family

Pressure canning is the only safe method for processing low-acid food. A pressure canner (a specially made heavy pot with tightly fitted lid which is fitted with a vent and dial or weighted pressure gauge) must be used. Using other methods than pressure canning for low-acidic food IS NOT SAFE. The time of cooking may vary according to the type of food, the size of the jar and the altitude (e.g. boil 10 minutes at altitudes of less than 300m; at higher elevations, boil 1 additional minute for each additional 300m elevation. Follow manufacturer's directions for your pressure canner and test your dial gauge at least once per year.



FOLLOW THE WHO 5 KEYS TO SAFER FOODS

1. Keep clean
2. Separate raw and cooked
3. Cook food thoroughly
4. Keep food at safe temperatures
5. Use safe water and raw materials



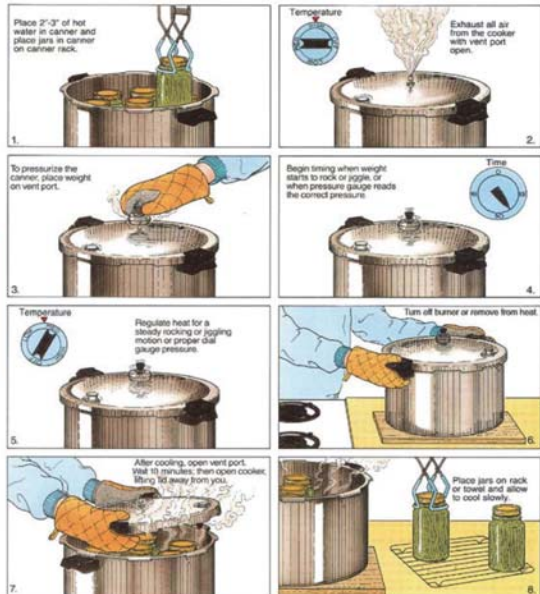
Proper and good practices for home-made canned foods include ALWAYS:

- ✓ Wash your hands with soap before and often during preservation.
- ✓ Use disinfected (chlorinated) or boiled water for washing hands, jars and food products
- ✓ use clean and sterilized jars without flaws and with self-sealing lids
- ✓ Before every use, wash empty jars in hot water with detergent and rinse well by hand, or wash in a dishwasher.
- ✓ Submerge the clean empty jars in enough water and bring the water to the 83°C and keep the jars in the simmering water until is the time to fill them with food.



Protect your family

- ✓ select fresh intact food without signs of deterioration or spoilage and wash them with safe/drinkable water
- ✓ peel some fresh foods before processing (pumpkin, eggplant, tomatoes, melon and water melon)
- ✓ favour the hot-pack method (the practice of heating freshly prepared food to boiling, simmering it 2 to 5 minutes, and promptly filling jars with boiled food by packing in hot state in previously sterilized pots/jars)
- ✓ add acids (lemon juice or vinegar) to some foods, e.g. tomatoes and pumpkins, salads, assorted vegetables
- ✓ maintain the right pressure during the whole process time and respect the cooling time
- ✓ Use the factors that limit the growth of *Clostridium Botulinum* (hurdle concept) for home canning of food, e.g. temperature, acidity (pH), water activity (aW), salt, lactic acid bacteria



ALL LOW-ACID FOODS CANNED ACCORDING TO THE APPROVED RECOMMENDATIONS MAY BE EATEN WITHOUT BOILING THEM WHEN YOU ARE SURE OF ALL THE FOLLOWING:

- ✓ *food was processed in a pressure canner*
- ✓ *gauge of the pressure canner was accurate*
- ✓ *up-to-date recommended heating times and pressures were used for the size of jar, style of pack and kind of food being canned*
- ✓ *respect up-to-date recommended heating times and pressures (depending on the size of jar, style of pack, kind of food being canned, altitude)*
- ✓ *Cooling and storage temperatures ($<3^{\circ}\text{C}$), combined with salt content and/or acidic conditions (addition of vinegar and salt) were followed*
- ✓ *The clean and sterilized jars with metal lid and metal screw band were used*
- ✓ *home-canned food is not older than one year*

Refrigeration is an important control measure for industrially produced perishable vacuum-packed meats. It is recommended to keep them at temperatures below 3°C . Refrigeration above 3°C may not be a complete safeguard against botulism.

Proper refrigeration and frozen storage must be maintained from purchase until consumption of products from commercial settings.



Protect your family

⇒ IF YOU HAVE ANY DOUBTS ABOUT ANY OF THE PREVIOUS POINTS, DO NOT EAT THE FOOD WITHOUT COOKING IT (HEATING AT 80°C FOR FIFTEEN MINUTES, OR MORE THAN 85°C FOR FIVE MINUTES OR BOILING FOR A FEW MINUTES).

⇒ IN CASE OF POISONING SYMPTOMS, YOU SHOULD IMMEDIATELY CALL OR GO TO THE EMERGENCY CARE CENTRE. BEFORE THE DOCTOR COMES, DO GASTRIC LAVAGE AND TAKE ADSORBENTS (SUCH AS ACTIVATED CHARCOAL, ENTEROSGEL OR SMECTA).

