

## HEALTH ASPECTS OF DANUBE RIVER FLOODS

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This is a contribution in which some of the views and experience of the author himself gained during different types of floods on the Danube river are presented.

### *Observed main causes of floods :*

- 1) intensive *melting of snow* in high mountains, they occur usually during spring or early summer; they have a relatively « long incubation period », lasting usually several days,
- 2) *profuse rains*, they may occur in any season except winter; they have a relatively « short incubation period », lasting usually less than 24 hours (depending on the length of the river or stream);
- 3) occlusion of the river or stream by *floating ice*; they occur during winter time, they usually have a « very short incubation period », lasting several hours.

During the last two decades several floods have been observed on the Danube and other rivers and streams in Czechoslovakia, e.g. :

- 1) in 1954 with the highest ever recorded level of the Danube; no embankment rupture has occurred, and, health and other emergencies were caused by inundation (back-) waters; emergency lasted several weeks;
- 2) in 1955 — occlusion of the Danube by floating ice; no embankment rupture, emergency lasted several days;
- 3) in late spring 1965 — embankment rupture has occurred on a large territory along the Danube river, emergency, control and relief activities lasted several months;
- 4) in autumn 1974 — floods originating from heavy rains have occurred in Central Slovakia (far from the Danube); control and relief measures lasted several weeks.

In all the mentioned and some other episodes, the strategy of Health Services was almost the same. Just tactics had to be changed according to local conditions

As an example the Danube risk territory will be described briefly. The Czechoslovak sector of the Danube is 190 km long (out of which 25 km both banks, and 165 km the left bank only). Territory at risk : about 140,000 hectares. Population at risk : City of Bratislava (partly), several towns (including two District Centers), about a hundred of villages altogether some 500,000 inhabitants.

*Special operational working groups* have been established from the very beginning of the increased risk at the Central, Regional, District and Local levels. These groups were composed of an experienced Chairman and other competent decision makers (Local Authorities, Army, Interior, Health Services, Veterinary Services, Red Cross, Community Services, Food Supply, Agriculture, Commerce, Transport, Communication Media, Hydrology, Meteorology, and so on).

One of the earliest steps to be taken was the mobilization of qualified manpower from all parts of the country :

- 1) physicians, specialists in epidemiology, therapy, paediatrics, gynaecology, community hygiene, food hygiene, school hygiene, microbiology and so on;
- 2) sanitary inspectors, nurses, laboratory technicians and other paramedical workers,
- 3) economic and administrative staff;
- 4) other, especially Army, Interior, Transport and Communication.

The emergency, control and relief measures can be divided into several phases (according to the phases of the flood and its sequelae).

#### 1) *Acute danger phase*

The measures during this phase have to be carried out in a hurry and under pressure of imminent non-predictable events.

This phase usually does not last longer than several days, but, nevertheless there are many tasks to be implemented.

Among the most important measures the following should be mentioned :

- a) mobilization of manpower and equipment;
- b) special care of water supply and sewage disposal;
- c) selection of suitable and safe places for accommodating and boarding of people (e.g. hotels, hostels, rest houses, weekend houses, etc.);
- d) comfortable transportation of persons who have to be displaced during the floods;
- e) intensifying of health care (with special regards to children, and prophylactic measures);
- f) social and psychological care.

## 2) Phase of return of the displaced population

This phase is characterized by the return of the population, part of which may be shocked to see that their original homes have been damaged or completely destroyed by the floods.

Health education and anti-epidemic measures including permanent proper sanitation are most important during this period.

Social and psychological care is essential.

## 3) Phase of sanitation of the flood-affected territory

This phase requires more hard physical work than managerial art. Almost all necessary measures have been already decided upon, but some variability and necessity of adaptation can be expected under differing individual circumstances.

## 4) Full restoration (or even improvement) of the original conditions of living

Activities of this phase are the duty of local authorities working in cooperation with Health/Epidemiology, Community Hygiene, Health Care/Services.

The operational working groups at all levels held their sessions twice daily, namely, early in the morning and in the evening after sunset (to allow full utilization of the daylight time).

*Information* on the flood itself and measures to be taken is always essential, and, proper involvement of the mass media of communication is a *sine qua non*. A competent and qualified full-time officer is charged with information which can be divided into :

- 1) Information for *decision makers* (all major facts and arguments for decisions should be given regularly, and whenever possible, all unnecessary technical details should be avoided).
- 2) Information for the *population* (broad aspects on the actual flood situation, short-term forecasts, and, especially, problems in which the cooperation of the population is desirable) should be given daily.
- 3) Information for the *technical (professional) personnel* (depending on their post, position and duties; more or less details about the situation and its impact on health should be given daily).

The Information-Officer is also responsible for the documentation and record keeping, as well as for the preparation of a final report which can be used for further planning of effective anti-flood measures.

Here are some orientation data from one of the Danube floods :

### 1) Mobilization of manpower :

100 physicians,

550 other health workers

(all of them reached the affected area within less than 12 hours)

2) Vector Control (from the ground, water and air) has covered (within less than 2 weeks) an area of about 15,000 hectares.

3) Environment sanitation :

An area of about 1,300 hectares,  
5,000 family houses,  
6,000 wells (for individual water supply),  
5,000 latrines,  
4,500 dung-yards, etc.

Public Health measures have been considered from the following aspects :

- a) immediate, urgent measures,
- b) short-term measures,
- c) long-term measures.

Low capacity (about 400 liters an hour) water purification plants have been supplied; they proved extremely useful during emergency for single houses or small groups of people

Chlorination of centralized water supply has been kept under permanent (round the clock) supervision.

The current morbidity from gastrointestinal infections has been followed-up and analysed daily, and, all cases and suspect cases have been reported by phone (or cable) in addition to the usual way of notification to Health Authorities. No epidemic outbreak of gastrointestinal infections has occurred during the floods, and the morbidity was surprisingly low in the affected territories.

Experience acquired during the floods could be successfully utilised during other emergency situations

#### **DISCUSSION**

*B. B. Waddy* : It was stated that some people refused to move. A similar situation arose in what is now Zambia, when the Kariba lake was filling up and some communities refused to move. In such an event, flooding must inevitably take place between the springtime planting of farms and the autumn harvest, and therefore it is axiomatic that the year's crop will be lost. In the Zambezi valley the displaced people looked for the famine foods that they had used customarily in the valley; they found plants that looked very similar but which in fact were not identical, and a number of people were fatally poisoned.

*K. A. Western* : Would you comment on whether the Prague response to floods is part of a regional or national emergency plan

*J. Červenka* : Every district and every locality has got its own emergency plan for the situations which might be expected. There is a regional and district plan of emergency. They were established in the early fifties but

of course they have been always renewed according to the experience which was developed. The flood which got a happy end and where no rupture of the embankment occurred was in Czechoslovakia. This was the first well documented major activity of public health services in co-operation with the government, the army and police forces, the Red-Cross and other voluntary organizations of youth, women, trade unions, etc.

It was really the first great activity and the first time that we learned from the raising Danube level, because we had the historical data which was in Bratislava 948 cm and the Danube level rose up to 986 which is 14 cm below the 10 m mark which is much more, almost 38 cm since the historically highest ever recorded level. This flood in 1954 when nothing had happened, just a very good training and exercise, was the so-called hundred year's flood. Then ten years later with the rupture of the embankment with very huge devastations of the territory, thanks to the experience from the flood which was not a real flood, we could work out an emergency plan. We have a public health service in our country which is a little different from the public health services in other countries in Western Europe and in North America. We have public health laboratories which are part of the so-called district and regional hygiene epidemiological station. There are about one hundred of these public health laboratories all over the country for a population of 14,500,000 and we have a number of several thousands of staff members for a small country like Czechoslovakia. Therefore mobilisation of one hundred physicians is quite feasible.

*F. Friedman* : I have watched your illustration and I thought you were going to add another line and that line is your warning system. I am interested to know the interval between your warning system and the action you take.

*J. Červenka* : I cannot give you the line for the warning system because it's a point. We have three degrees of warning system on the Danube. These are all combined with measures which of course would take too long to explain. On the Danube there are hydrometers which are recording the level of the Danube and also there is a prognosis from Germany or from Austria that the Danube will rise. The warning system is starting from Germany, from Austria, from our neighbours who are giving us all the necessary information by the usual ways like radio and television and of course also by personal communication.

*C. Fisch* : I would like to know whether the hundred physicians were volunteers or specially trained for this ?

*J. Červenka* : The hundred physicians were staff members of the public health services working in different places all over the country. You know that my country is composed of two socialistic republics, the Czech republic in the West and the Slovak republic in the East. These colleagues have been working, for instance, in Pilsen to mention a place that is known all over the world or at the Soviet Union border and they have been invited by phone and this has been done rather without formalities. They were supplied with money and they got shelter and clothing. Some of them

had to bring their equipment with them, for example, the water purification plants, the small ones which can be used for emergency situations, and the disinfectors as far as they were needed. So they were staff members of the public health services, which are in fact called hygiene epidemiological services in my country.

*J. V. M. Worsley* : I would like to know whether you keep any stock of drugs or medications that you keep prepared and ready to send to wherever your disaster area is ?

*J. Cervenka* . I don't know whether we have kept a base of stocks but it's just a problem of giving an order to the medical store to transport it to any place in Czechoslovakia. Our drugs are stocked usually on a regional basis where we have a regional store and some of the drugs are stored in the district also. Some biological preparations of longer expiration are even in the communities.

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