FLOODS AS DISASTERS - PUBLIC HEALTH CHALLENGES

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ABSTRACT

According to WHO data, floods are the most common natural disasters. Every year about 1 billion people in more than 150 countries are at risk. In Bulgaria over 280 000 people live in flood-prone areas (4%). According to NSI and MoI data after 2010, about 3000 floods are registered in Bulgaria, the damage is over 160 000 leva, and for recovery - over 170 million. *The purpose* of the study is to analyze the public health challenges due to floods. *Methods*. Statistical survey about disasters on the territory of the country. Analysis of the database for flooding in Bulgaria from 1990 to 2014. *Results*. In the last three decades, an average of more than 100 million people in the world are affected by floods. The frequency of floods and their mortality rate for the country over the specified period is over 47%. *Conclusions*. According to the analysis, the number of floods is increasing. Primary, secondary and long-term health effects are significant. Casualties are mainly: hypothermia, traumatism, drowning. There is a risk of infectious diseases. Flood risk reduction, optimization of protection and good practical training for teams is the effective direction for the development of public health.

Key words: floods; disasters; casualties; public health; Bulgaria

INTRODUCTION

According to WHO data, floods are the most common natural disasters. Every year about 1 billion people in more than 150 countries are at risk. At present, about 20 million people are at risk of flooding (90 billion Euro). (1-16) The new risk assessments show that only 15 years (by 2030) the estimated growth is 50 million affected (470 billion Euro). In Bulgaria over 280 000 people live in flood-prone areas (4%). According to NSI and MoI data after 2010, about 3000 floods are registered in Bulgaria, the damage is over 160 000 leva, and for recovery - over 170 million. (Tables 1, 2) (1-5, 7, 9-15) Flooding is the No. 1 natural disaster in the United States. (14-16)

PURPOSE

The purpose of the study is to analyze the public health challenges due to floods.

METHODS

A database of NSI, MoI for *catastrophic floods* (CF) has been applied and analyzed. Scope - CF on the territory of the country. The medical casualties analysis covers a period from 1974 to 2016 (1974-2006; 2010-2016)

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Statistical units of the study - the CF, medical casualties. *Unit of measure* - number and relative share. *Frequency* - annual report. The study is exhaustive and no estimates are made. A descriptive, retrospective and comparative analysis of the share of medical casualties among the population in the country

RESULTS

In the last three decades, an average of more than 100 million people in the world are affected by floods. According to *NSI data*, the significant floods in the country (2010-2013) occupy the third place after the fires and crashes during the last five years and prevail in the Black Sea region (15% of the country). (7, 11, 15) The statistics presented in *the National Program for Protection of Disasters 2009-2013* show that in Bulgaria the highest relative share of natural disasters are the floods (54.2%), followed by landslides (22%), storms, tornadoes, smirch, whirlwind (18.2%). (Table 1) (1-6, 14)

In 2014, more than 18 people died in the flood. Between 25 May and 25 September 2005, more than 80% of the country's territory is affected by floods, with more than 3 200 000 inhabitants, of which 2 million people are directly affected. *Human victims are over 20*, and the damages amount to 890 million Leva. (Table 2) (7, 11)

Table 1. Absolute flood numbers in Bulgaria for 2010 - 2016 (NSI)

Crisis events	Crisis events - in numbers						
	2010	2011	2012	2013	2014	2015	2016
Total	4571	8268	10826	2728	4356	4008	3577
Fires	1630	2185	3010	764	2245	2474	2448
Landslides	59	76	72	51	75	125	71
Earthquakes	12	4	22	6	4	1	2
Droughts	6	30	23	3	1	-	-
Floods	651	382	692	547	360	266	184
Storms, tornado, windspout, whirlwind	47	48	528	89	14	12	29
Hailstorms	16	13	14	13	8	21	5
Snowstorms (snowfall)	103	94	93	50	26	56	87
Icings, frosts	18	134	186	20	3	7	2
Accidents	7	24	312	314	76	33	1
Accidents with vehicles	1937	5218	5858	841	1530	994	734
Pollutions (with chemical materials, dangerous waste, municipal waste and other)	45	42	7	19	3	8	5
Epidemic human diseases	12	7	7	6	3	5	4
Epidemic animal diseases (incl. birds)	5	2	-	1	6	2	3
Calamity	21	9	2	2	1	2	-

¹The data are obtained on the basis of the annual reports submitted by the municipal administrations, as follows: for 2010 from 119, for 2011 from 127, for 2012 by 128, for 2013 by 100, for 2014 by 141, for 2015 by 115 and for 2016 - of 83 municipal administrations.

Table 2. Losses by crisis events in 2016 – total for the country¹

Indicators	Crisis events - in numbers	Damages determined - thousand BGN	Funds for recovery - thousand BGN				Expenditures on REW ² - thousand BGN
			Total	of which: from Government commission	from EC	from other sources	
Total	3 577	65 243	20 709	17 635	1 583	1 242	23 177
Fires	2 448	1 061	11	-	-	-	6
Landslides	71	9 632	3 791	3 357	234	200	468
Earthquakes	2	-	-	-	-	-	-
Droughts	-	-	-	-	-	-	-
Floods	184	30 617	5 778	4 175	1 349	242	2 215
Storms, tornado, windspout, whirlwind	29	3 267	186	-	-	-	117
Hailstorms	5	10	-	-	-	-	-
Snowstorms (snowfall)	87	351	-	-	-	-	157
Icings, frosts	2	2	-	-	-	-	-

Table 2. Losses by crisis events in 2016 – total for the country¹

Indicators	Crisis events - in numbers	Damages determined - thousand BGN	Funds for recovery - thousand BGN				Expenditures on REW ² - thousand BGN
			Total	of which: from Government commission	from EC	from other sources	
Accidents	1	9	-	-	-	-	9
Accidents with vehicles	734	20 052	10 943	10 103	-	800	20 204
Pollutions (with chemical materials, dangerous waste, municipal waste and other)	5	1	-	-	-	-	-
Epidemic human diseases	4	-	-	-	-	-	-
Epidemic animal diseases (incl. birds)	3	1	-	-	-	-	-
Calamity	2	240	-	-	-	-	1
Other crisis, natural disasters and events	-	-	-	-	-	-	-

¹ Data are based on the annual reports presented in NSI by 83 municipal administrations.

² R E W - rescue and emergency work.
30.11.2017

Annually, 40% of the victims of natural disasters are from the CF according to WHO. The frequency of floods and their mortality rate for the country over the specified period is over 47%. (1, 7, 11, 12, 15)

Over the past two weeks due to the heavy rainfall (for the day to 30-50 l/sq.m) of Athens and Sithonia in Greece; in Sofia, Montana, Roman (orange code in 9 regions of the country) in Bulgaria are subject to local floods with serious material damage.

The consequences of catastrophic floods among the affected population are: short-term and long-term; primary and secondary; secondary disasters - landslides, epidemics. Compromise adjacent ecosystems. Among the injured people stand out: drowning; ARF; hypothermia; traumatism; shock; electric shock; vector transmissible diseases, cholera, etc. (3-6, 8, 9)

DISCUSSIONS

Due to the serious nature of flood damage, health impacts and to optimize prevention and reduce risk, 163 simulation models of floods in catchments and settlements in the country have been prepared. Risk management is planned in three stages (7, 14, 16):

Phase I - Preliminary Flood Risk Assessment (PFRA)

Stage II - Threat and flood risk maps

Phase III - Flood Risk Management Plans

The National Flood Program aims to reduce the impact of flooding on private and public structures. It does so by providing affordable plan to property owners, renters and businesses and by encouraging communities to adopt and enforce floodplain management regulations. (14-16) Data is used to improve general understanding of flood risk perceptions, inform community engagement strategies, and evaluate the Risk Mapping Assessment Planning (Risk MAP) program's

progress in the identification, mitigation, and communication of risk. (15, 16)

CONCLUSIONS

According to the analysis, the number of floods is increasing. Primary, secondary and long-term health effects are significant. Casualties are mainly: hypothermia, traumatism, drowning. There is a risk of infectious diseases. Flood risk reduction, optimization of protection and good practical training for teams is the effective direction for the development of public health.

Abbreviations

MC - Medical Casualties

GD"FSKP" - General Directorate "Fire Safety and Civil Protection"

MoI - Ministry of Interior

NSI - National Statistical Institute

MH - Ministry of Health

HL - Health Law

ARF - Acute Respiratory Failure

CF - Catastrophic Floods

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