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Epidemiological Disaster Research progress and development trends

Key words: disaster; epidemiology; rapid assessment

Abstract global disaster is a major public health problem. Disaster Epidemiology is the study of epidemiological methods disaster-related reasons, the law, as a result, the burden and disaster mitigation measures and the possible mechanism of science. Epidemiological related disasters in recent years in the definition of disaster, the number of death affected (incidence) of the identification, measurement and disaster exposed the rapid assessment of disasters in areas such as a large number of studies, some progress has been made, but there are still some do not the urgent need to identify and study the issue.

Key words: disaster; epidemiology; rapid assessment

[Abstract] Disaster has been a very important public health problem in the world. Disaster epidemiology is a science which study the causes, characteristics, the results of disaster, and the measures to relief the disaster burden. The disaster epidemiologic study has focused on the definition of disaster, the determining of number of affected population and death resulted from disaster, the measures of disaster exposure, and the rapid evaluation of disaster in recent years; but these questions have not been resolved completely and need to study continually.

Key words: Disaster; Epidemiology; Rapid evaluation

Disasters (disaster) including natural disasters (natural disaster) and man-made disasters (man-made disaster) two categories. Natural disasters also can be broadly divided and geophysical related disasters (geophysical disaster) and climate-related disasters (weather-related disas-ter) [1]. And while a wide range of man-made disasters, people are more concerned about the war, accidents and various production and public safety-related accide
nts. In recent years various terrorist activities increased, the resulting disasters has caused widespread concern. The disaster has since ancient times, although in ancient times people have begun to use some simple approach to the prevention of disasters, such as housing built in a suitable location to prevent flooding, but more people believe that "disaster" is inevitable, is the God human punishment [1,2], so long to disasters lack of a systematic study.

The systematic study the disaster began mid-20th, the beginning is mainly directed against natural disasters studies. The 20th century late 1960s, during the civil war in Nigeria international relief operation, the United States Centers for Disease Control and Prevention (CDC) epidemiological experts, in view of relief food shortages were discovered during an investigation and study on the issue, this is the first application of epidemiology Research on disaster relief, is the beginning of disaster epidemiology. Since the 1970s, epidemiological reports of natural disasters have increased gradually, but most of the affected population is against developing countries the reasons for the food shortage and its impact. To 20 in the 1980s, people began the system of epidemiological principles and methods to study the distribution of disaster, the reasons for, pop factors, preventive measures and disaster-related issues such as health and disease. In the meantime, epidemiological methods in the study of disasters have developed rapidly and, based on this, the birth of the epidemiology branch - an important epidemiological disaster (disaster epidemiology). In 1984, Seaman first published epidemiological expertise of this disaster - natural disasters in epidemiology (epidemiology of natural disaster) [3], the first to natural disasters epidemiological issues related to a systematic exposition. My older generation of epidemiologists Professor Wu Peng, in 1988 in "China Public Health," the first one issued a "natural disaster epidemiology (natural disaster epidemiology)," it [4], the first application of epidemiology at home Methods discussed in detail the causes of natural disasters, laws and preventive measures. From the late 1980s, epidemiological studies disasters were of great concern and are developing rapidly. Over the past 20 years, China's epidemiology workers and associated personnel, and the Tangshan Earthquake in Henan, Hebei, Hunan and major natural disasters such as flood relief, in the disaster investigations, in particular infectious disease epidemic control and prevention, and have scored many successful experiences. This paper on the epidemiology of disasters in recent years, the development and the difficulties faced do reviewed.

1 disaster has become a major public health problem

Because of the wide range of disasters, the high incidence of not only led to great loss of property and caused a lot of casualties, human health and survival of a far-reaching impact on productivity caused severe damage to the huge consumption of health care resources. A large number of casualties and secondary lead to huge economic losses. In addition, the disaster psychological impact on patients is far-reaching, multi-faceted. What is mo
re noteworthy is that the losses caused by disaster groups actually beyond the scope of the victims, but affected the whole community [5]. Therefore, the disaster is not only a major global public safety issue, but has become a major global public health problem.

According to the World Red Cross 1998 World Disasters Report [6], from 1987 to 1996 the 10 years, the average annual occurrence of large global disaster 483, including natural disasters 271 (or 56%), man-made disasters 212 (44%), 078 million people affected, death 5 1,511 people. Disaster highest rate in Southeast Asian countries, in Asia the same period a year because of natural disasters caused losses of 49 billion US dollars. According to the World Red Cross 2003 World Disasters Report [7], in 2002 the global disasters continue to increase the number, 608 million people affected, dead 24500 people, it is estimated that the total economic loss to 24 billion US dollars. They are not including war, famine and disease, and other disasters lead to losses. December 26, 2004 Indian Ocean tsunami a short period of time caused 150,000 people were killed, 20,000 missing and 525,000 injured, 1.6 million people forced to leave their homes [8]. Since the 1990s, disaster incidents have affected the number and the number was constantly rising trend, but the death toll and economic losses are decreasing. The incidence and impact of disasters in different countries and there are vast differences between. In 2002 death toll, only six percent occurred in highly developed countries, less developed countries every death toll from the disaster to 555, a moderately developed country to 133, while highly developed countries is only 18; However, the economy the loss was just the opposite situation, the less developed countries every economic losses from disasters for 61 million US dollars, a moderately developed country to 149 million US dollars, while the developed countries is as high as 47 7 million US dollars.

China is the world's most serious natural disasters one of the few countries [9], the average annual caused nearly 20,000 deaths and direct economic losses of the state's financial income 1 / 4 to 1 / 6, and along with socio-economic development human activities and the increase in the incidence of natural disasters and losses are still in a rapid growth, the arrival of the 1990s, the annual loss has reached more than 1,000 billion yuan, in 1996 reached more than 2,800 billion, in 1998 to 3000 billion.

In the new century, China and the world still continue to disasters increased incidence of the risk of their main reasons [6]: ① deforestation led to soil erosion and landslides; ② the global industrialization, increasing greenhouse gas emissions, temperatures increased causing localized drought, floods,③ and other climate-related natural disasters increased ③ industrial development, resulting in increased technical disaster; ④ racial and economic aspects of conflicts, resulting in localized wars, conflicts, terrorist activity, social order deteriorated; ⑤ population growth and urbanization will increase the number affected. These factors will lead to natural and man-made disasters rate increase.
Although disasters of the available epidemiological methods, but disaster prevention and control with other diseases, but the prevention and control of different, disaster prevention and control is not simply the responsibility of the medical and health workers and obligations, but more important is to all forces in society, the common needs of all sectors participation and efforts, including industry, agriculture, geology, meteorology, health, education, law, public security, traffic, construction, and industry and commerce, but, from a social point of view to take preventive and disaster control measures, the results and benefits are better than simply taken from the field of health measures.

2 disaster epidemiology and the role of use

Epidemiology is the study of disease and health status factors affecting the distribution and disciplines, disaster epidemiology task is to study the distribution of disaster and its impact factors, it will disasters data collection and analysis and decision-making disaster when emergency link. But disaster epidemiology is not disaster management, and disaster management is a methodology or tool, the impact of disasters must use epidemiological methods of research [10]. Along with the development of epidemiological disaster, disaster epidemiology uses are also constantly expanding, can be summarized as the following two aspects [11]: The first was about the causes of disasters and the results of the analysis, the concern here is with the disaster itself and related diseases and deaths, the cause of the disaster-depth study on the development of preventive measures is essential; second in the event of disaster, disaster mitigation burden to study the possible mechanisms and measures at this time epidemiological methods is the most direct application the establishment of sensitive monitoring system, and when the number of casualties accurate understanding of the possible outbreak of infectious diseases and the state of emergency. When disaster disaster epidemiology, including the specific uses [1,2]: ① rapid needs assessment; ② demographic characteristics of the investigation, such as population size and structure; ③ population health status of the investigation, including death, disease, nutrition and immunization and so, the outbreak investigation; ④ public health monitoring and information systems management; ⑤ disaster monitoring and assessment measures.

3 disasters epidemiological methods

Because epidemiological studies cover a wide range of disasters, for different research purposes to be using a variety of research methods, sometimes combined needs of a variety of methods. Major disasters epidemiological methods have the following three [11].

3.1 Description of epidemiological methods described epidemiology of the disease and identify victims in the distribution of health status, describe their frequency and time, the earth and space distribution.
3.2 Analysis of epidemiology for patients and non-patients were compared investigations to ascertain a particular disease or risk factors in protective factors on why certain events happened, why it is continuing. Epidemiological Analysis of doing disaster, the need for application of classical mathematical and statistical methods.

3.3 Evaluation of Epidemiology that the losses caused by disasters and harm to the health of the victims against the preventive measures taken by the role, effectiveness and efficiency of scientific evaluation.

4 disasters epidemiological study the existing problems

4.1 disaster is the definition of disaster epidemiology of the principles and methods of epidemiology study disasters and disaster-related human health and disease, development and the prevention of subjects. However, as the in-depth epidemiological studies disasters, the main hazards epidemiological study - the definition and classification of disasters but there are many places need to be explored. A commonly accepted definition of disaster to disaster epidemiology research is essential, only in disaster accurate definition of the conditions under various disaster data and research results only comparable.

American University of Pittsburgh Professor Thomas definition of disaster is the most difficult one of the academic term [1]. Although many scholars under the definition to the disaster, but always tended to be too broad or too narrow. Most disasters is based on the definition of whether or not the incident based on the need for external assistance, the need for external assistance is disaster incident, the incident could not handle their own disaster. This definition of the international relief organizations is convenient, but such a definition is clearly not enough science, because what circumstances will require external aid with the different countries and regions and different, and also may be subject to political influence.

World Disaster Epidemiology Research Center (the center for re-search on the epidemiology of disaster) in 1999 in Brussels by the annual meeting on the disaster is the definition of [1]: When more than an event or situation of the local processing capacity, needs request national or international level for external assistance, can be defined as disasters. The Pan American Health Organization (the pan american health organization, PAHO) in 1980 will be defined as the disaster [1] "An overwhelming ecological collapse, to the extent of the need for external assistance." World Red Cross to the disaster is defined as [1]: Disaster is a unusual event, and suddenly a large number of human casualties. In the Webster's dictionary definition of the disaster is [1]: "The tragic events of a sudden, causing enormous damage and loss." Italy Gunn Professor [10] In his "disaster medical scientific basis" article on the definition of disaster: disaster in the relationship between human beings and the environment in a kind of enormous ecological imbalance results, is a serious humanitarian, even as the international community the need for external assistance can be spent. All the
se definitions have not achieved the scientific, objective and uniform requirements. Because of this, current global disaster-related statistical information is incomplete, and different institutions may be the result of statistical inconsistencies, the different regions and different comparability of the information may be a problem. Thus the definition of the present disaster is still very concerned about the disaster epidemiologists problems.

4.2 hit with death of (incidence) Determination of the number of disaster epidemiology an important role is to identify victims of disasters on the health effects of the disease and usually measured victims disease morbidity and mortality. But do these rates in the investigation, the determination of the numerator and denominator often encountered difficulties.

Set in the denominator of the difficulties often encountered in [5]: the existing population data incomplete, missing some personnel, because of the extensive disaster victims in the disaster areas and makes more difficult identified. Large areas such as famine caused by drought, the extent to which regions should include drought which should include the victims of the war who nuclear catastrophe (such as the nuclear explosions in Hiroshima, Japan, Russia's nuclear power plant accidents) the victims should include more wide scope and so, there are many options for standard, the findings will be subject to a lot of human factors affected. The authors investigated the floods, the local government confirmed in the disaster areas without chose 15 townships do control in the investigation after the application of the author to establish a comprehensive flood hazard evaluation model this 15 townships evaluation results 13 township was named Light disaster areas, only two townships were rated as non-disaster areas. Two judgment because there is such a difference between the criteria used by different, the government is only whether the standards were flooded, and the author's evaluation model includes economic losses, the increased morbidity and mortality, mental pain and Foci proliferation, and so on.

morbidity or death judgment and complex [12]. If during the floods drowning rightly attributed to the floods, but also non-disaster areas drowning occurred; other diseases and death occur more so. Therefore, the real and The number of required detailed technical reports, or with the corresponding control that can compare.

4.3 disasters exposed the measurement disaster epidemiology from qualitative to quantitative research in the study of the health effects of the disaster at the same time, are concerned about the different levels of disasters and disaster exposure different on the different diseases and health effects. But for disaster exposure assessment is complex. France Verger professor [13] of flood victims in the study the issue of mental health, flood exposure of individual assessment has also been discussed. He, through analysis and documentation of their personal data collected by the floods PCA two ways to set up two floods cumulative exposure index (cumulative exposure indicators, CEI), the results not only two significant correlation between the index and index and the actual losses caused by floods are c
loosely related. Multiple regression analysis showed that the index used as the measuring exposure floods, flood exposure and the symptoms of post-traumatic emergency scores (score of post-traumatic stress symptoms) between good exposure-response relationship. Verger professor's study is to assess individual disasters exposure of the successful examples, but in this area there is still a lot of work to do.

4.4 disasters rapid assessment of the disaster fast comprehensive evaluation, disaster epidemiological studies is the more complex issue. The extent of the disaster to make timely and accurate evaluation of the comprehensive guide disaster relief, reduce losses caused by disasters of great significance. Disasters on human health and environmental impact of survival are many, hence its evaluation should also be comprehensive in nature. Disasters require a rapid assessment to rapid, second, we must comprehensively. Epidemiologists domestic and international disaster to disaster assessment made some evaluation program [14], some of these programs described by a number of natural disasters attribute characteristics, geographical indicators landscape changes, some, such as the total number of casualties absolute figures into economic value disaster losses to measure the loss of [15, 16]; some statistics of the number of casualties directly disasters, infectious diseases, such as changes in indicators [17 to 20]. In recent years, rapid assessment in the disaster of research in the following areas marked progress has been made.

4.4.1 psychological injury to victims in disaster evaluation of the impact of mental health until the 1990s only to attract attention. The first is to examine the military after the war, but gradually expanded to earthquakes, and floods, etc. [21 to 25]. Psychological damage is the most commonly used indicator of post-traumatic emergency obstacles (post-traumatic stress disorder, PTSD) [26]. Different studies on the incidence of PTSD is very different from the 2% to 58% [21 to 25], the incidence of PTSD and disaster type, degree, victims of gender, age and pre-disaster psychological state closely related to [5,27]. American Psychiatric Association in 1994 published the fourth edition of "diagnostic and statistical manual of mental disorders," a new disaster-related emergency diagnosis of acute imbalance - (acute stress disorder, ASD) [26], the current ASD The study also rarely. Future research should strengthen ASD, and its subsequent PTSD with the relationship.

4.4.2 disasters on the lives of victims in the quantity and quality of life impact of disasters on victims impact is the focus of attention of the whole society. The initial study was a direct measurement disasters caused casualties, with the disasters and health research in-depth, and then increase the measurement of the total mortality. However, these indicators measure only reflects the changes in the number of individual life, did not consider the impact of time of death. After the 1990s, indicators of potential life lost - the years of potential life lost (years of potential life lost, YPLL) introducing disaster research, the indicators of response due to disasters caused "premature death" and the potential life the total number of years of losses, more accurately reflects the number of disasters on the lives of the exte
nt of the effect. As science and the development of society, the lives of people not only concern quantity, but also quality of life concerns. To that end, disaster epidemiologists is beginning to pay attention to disasters on the quality of life. Epidemiological studies have introduced disaster in the quality of life indicators [28, 29]: ① restricted activity days (restricted activity days): refers to a person disaster activities restricted, losing the ability to work days; ② bed disability days (bed - disability days): refers to illness (disasters caused by) the number of days in bed, the number of days hospitalized with disabilities should be included in the number of days in bed; ③ disability adjusted life years (disability-adjusted life years, DALY): DALY means from the onset (by the disaster) the deaths (or rehabilitation) the loss of all healthy life years. Due to the premature death caused by years of potential life lost (PYLL) and the loss due to illness due to health caused by the loss of life (years of life lived with disability, YLLD) two parts. These indicators are when disaster led to a serious disease when measured by the disasters on the quality of life. The introduction of disasters in recent years, epidemiological studies of the quality of life (quality of life, QOL) index is even more in-depth response from the sub-clinical level of the disasters on the quality of life. The author studies the impact of the floods on QOL, found flood victims can significantly reduce the level of QOL [30].

4.4.3 Economic losses quantitative measurement of economic loss has always been a disaster the focus of the study, but the economic losses accurate quantitative measurements are extremely complicated. Direct economic losses relatively simple measurements, including loss of property, destruction of infrastructure and disaster consumption. The estimated indirect economic losses are usually encountered two aspects of the [2], first, which should include indirect losses, and the other is spiritual, quality of life and quantity of how the loss of money. Including indirect economic losses should be reduced income and increased financial burden of this disease have formed a consensus, but the environmental impact of disaster and the subsequent could lead to long-term economic losses are estimated difficulties because there are many disputes. Spirit, the loss of quality of life and quantity of the currency has long been regarded as a moral issue. But if we do not monetized these losses will be underestimated disaster losses, disasters and providing certain measures underestimate the cost-effectiveness, adverse disaster management decisions. In recent years, research in this area made the following solutions: ① According to the National Human output and caused illness or death caused by the reduction in working hours for the plot to estimate [No.31]; ② use some of the costs -- effect of indicators, such as life-saving an additional cost (cost of saving an extra life, CSX) [31], the absolute risk reduction index (absolute risk reduction index, ARRI) [33], and save an additional life years costs (cost of saving an extra life year, CSXY) [34], and get a quality-adjusted life-year costs (cost per quality adjusted life years, CQALY) [35]; ③ Quality of Life Index (life quality index, LQI), Nathwani, and so on [36] proposed LQI is based on per capita income (g) and life expectancy (e), are indicators: LQI = g we (1-w) W refers to the participation in economic activit...
ies in the life of the part. The indicators used for security investment decisions, if a safe investment led to an increase in life expectancy and reduced income, as long as LQI increase at this time, then the investment is still acceptable. The disaster led to the indirect economic losses estimated there are still many issues worth exploring.

4.4.4 comprehensive evaluation of the past disasters evaluation program by the majority against disasters is an aspect of a comprehensive program of comprehensive evaluation little. Australia Bradt professor [37] on the health status of residents in disaster areas for rapid epidemiological comprehensive evaluation (rapid epidemiological assessment, REP) program, and such programs by at least the necessary information sets (minimum essential data set, MEDS) requirements. The author of Hunan in 1998 of a serious flood on the basis of in-depth investigation, including the establishment of direct casualties caused by the floods, the floods caused changes in the prevalence crowd, the crowd floods caused death situation changes, floods crowd after the mental and psychological conditions changes in post-disaster media pathogen foci and the changes caused by the floods and economic losses, such as six-level sub-goals and 24 secondary evaluation index floods comprehensive evaluation model, and have achieved good results Classification discrimination. Overall, the real disaster comprehensive evaluation has just begun, there are still many issues that need to be studied.

5 disasters epidemiological studies with the task of direction

The disaster occurred because of the global upward trend, disaster epidemiology study long-term arduous task. According to the specific requirements of disaster prevention and reduction and disaster epidemiology development of the status quo, the current epidemiological disaster on the main direction and mission is: ① strive to explore and develop a clear, consistent and operational disaster definition; On this basis, the establishment of a global disaster monitoring systems, harmonization and effective disaster monitoring. Description on disasters by monitoring the distribution of the disaster, the impact on human health, disasters on the social and environmental impacts of the disaster, caused by socio-economic burden. Here, the need to explore all possible qualitative and quantitative measurement method. The monitoring system should be accurate, effective and cost-effective. ②探讨各种危险因素和保护因素,不但要研究灾害事件发生的危险因素,也要研究灾害导致人员伤亡和其他损失的危险因素,危险因素的研究需要用到各种病因流行病学的研究方法。③提出和评价干预措施,针对第二步查明的主要危险因素,提出有针对性的干预措施,建立“灾害是可以预防的” 的概念。灾害的预防与控制的目的包括两个方面,一是预防灾害事件的发生,二是减少灾害造成的人伤亡和财产损失。对新提出的干预措施应及时进行评价。④开展灾害流行病学的方法的研究,包括各种测量和评价的方法的研究。

【参考文献】


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