Universe Scientific Publishing

ORIGINAL ARTICLE

Research Progress of Water Safety and Its Health Impact Under Climate Change Conditions

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Abstract: Water Safety is a serious problem.. Frequency, intensity. extreme weather events increased due. climate changesWhich can affect water quality, quantity through water sourcesWater treatment ProcessesWater Supply SystemsDrinking water behavior. residents, Aggravate water safety, Health Problems. residents.. Context. Global Climate Change. Article briefly discussed research progress. Water SafetyWater-related diseases,. adaptive management. different regions. world, Analyzed. relationship ~ water safety, health. residents.It is informed that the main Metalogical factors affecting the water safety and health problems were temperature,Acceptance and evaluation.Meanwhile,Recipe is more likelihood to have a negative impact on water quality,Water Quantity and health than temperature duration or rainstorm.Howover,Differential microbio specialties,Seasons,Water source types,Drinking water behavior of residents and other social factors make the impact more complex due to the interaction of climate change.It is successful that the relationship model between climate change,Water Safety and residents 'health impact should be established.On this basis,Formulated effective water quality risk assessment and management measures will play a crude role in aleviating drinking water safety and health problems in residents of Water-affected areas as used by climate change.

Keywords: Climate change;Water Safety;Health Impact

1. Water Safety

1.1 Rural Drinking Water Security ConceptRural Drinking water security is refers to rural residents can get and economic on the burden to the in line with national, United

Students Standard of enough of Drinking Water.Specific for drinking water security is refers to drinking water quality,Water,Water convenient degree and guarantee rate meet certain of standard and provisions: Water Quality in line with nationalThe 《Life drinking water Health StandardOf(GB5749-85)Requirements of for drinking water security;In lineThe 《Rural implementation〈Life drinking water Health Standard〉GuidelinesOfRequirements of for drinking water basic security.Water: per person every day can get of water don't lower40~60LFor security;Don't lowerNatural 20~40LFor basic security.Convenient degree:Human water from time not more10 minFor security;Not moreNatural 20 minFor basic security.Guarantee rate:Water Supply Water guarantee rate not less95%For security;Don't lower90%For basic security.The4The index as an Drinking Water Security Evaluation of standard as long as which a lower than security or basic security lowest value that is for drinking water don't security.

1.2 Our country rural drinking water security overall situationOur country rural drinking water security problem present regional difference is by many factors cause of Package

Including climate,Water Resources Status,Economic development status,Terrain Landform,Population distribution,Hydrological geological conditions and other factors.Specific for western most serious,Central followed,Eastern better; North China area belongs to high fluorine water disaster Area east central of main prominent problem is for human activities lead to the water[1] Quality Pollution western area main characteristics is for climate conditions,Economic status and terrain topography and other causes of water shortage,Water Quality[2-3] Exceed the standard .

1.3 China's drinking water security in distribution and Related Health InfluenceChina big about2. 5~3Billion farmers do not have security of drinking water for water quality not standard lead to the drinking water security population about total population70%For water,Convenient degree and guarantee rate and other reasons lead to the drinking water security about30%.Water quality exceed the standard including natural water quality exceed the standard(High Fluoride,High Arsenic,Brackish Water and iron,Manganese and the standard indicators) and human water pollution cause of surface water and groundwater exceed the standard.

1.3.1 Natural water quality exceed the standard distribution and human body health long-term drinking high fluoride water will have local fluorosis including dental fluorosis and skeletal fluorosis and; Long-term drinking high arsenic water not only performance for recent the health of damage, is particularly serious of is caused by human body long-term malignant change such as cancer,Mutation and distortion; Long-term drinking brackish water will cause high blood pressure,Cardiovascular and other aspects of disease.High fluorine water drinking population main distribution in Henan,Hebei,Anhui,Inner Mongolia North China,East China,Northeast and western part provinces; High Arsenic water drinking population relative concentrated main distribution in Inner Mongolia,, Hunan,Jiangxi,Jilin and other provinces; brackish water drinking population

Main distribution in North China,Northwest,East China and to such as Shandong,Henan,Ningxia,Xinjiang,Gansu and other provinces.

1.3.2 Human water quality exceed the standard distribution in Human Body Health drinking polluted water the human body health of harm serious in addition to lead to common of water related disease the drinking heavy metal,Nitrite,Organic matter pollution of water also will lead to cancer.Drinking pollution surface water of Population main distribution in Huaihe River Sub-and to such as Yunnan Hubei Zhejiang,Sichuan and other provinces; drinking pollution groundwater of Population main distribution in North China and Central South area such as, Beijing,Guangdong,Hebei,Shandong and province.

1.3.3 Water lack of and health water intake lack of will lead to children nutrition and development adverse,Increase Infectious Diseases,Chronic non-infectious diseases and psychological disease of popular.Mountain rural residents as living Dispersion,Economic Backward and water supply facilities and a lack of drinking water lack of to rural residents of life caused very big of inconvenience.Due to water,Assurance

Rate,Convenient degree and other aspects of drinking water security population main distribution in is located in Tibetan Plateau,Yunnan-Guizhou Plateau,Loess plateau of the province (area).1.3.4Drinking Water convenient degree and rate plain area relative mountain more convenient some but overall for Rural Area Water time still is long and there intermittent water supply situation.

1.4 Our country rural drinking water safety engineering development process according to our country at present the actual situation analysis rural drinking water engineering project can be divided3A different stage: Solve Water Problems main practice is rural drinking water emergency Engineering:Solve Water Quality Problem that let people"Drink security of water"Main practice is rural drinking water safety engineering;Improve tap water penetration rate consolidate drinking water safety engineering effect main practice is rural drinking water security improve engineering.China Rural Water management mode more no unified of management institutions there are the following several mode?[4]: Village-level water plant by village committee management; scale is big of Water Plant by township government management; transfer to the county level government original related department or by government new set up a special department management; auction after private; Other, including benefit farmers self-and.According to the

survey,70%About of the water plant, by village committee management by industry departments Management of only accounted16%.Science and[5] Lin and in water shortage in rural drinking water supply mode of study in investigation the Inner Mongolia Western a typical drought Water Village30Years

4. A drinking water supply mode found the ITS4A Drinking Water Supply Mode:Gong shui supply stage farmers of shortages stage village self-sufficiency stage and rural drinking water project stage.

2. Climate change of drinking water security of influence

2.1 Climate change on water of influenceRural water supply engineering select of water main for surface water and groundwater.Surface water by space-time factors influence obvious when encounter serious drought when surface water will reduce the amount of May will lead to water supply engineering water supply and water supply guarantee rate reduce.

Drought regions have few perennial river and fresh water lake the can use of surface water very limited.Groundwater of water stability and water supply guarantee rate relative is high but industry and agriculture of development makes groundwater overdraft Sewage[7.];

And rivers are more vulnerable to climate change Drinking water production and Effects of Water Supply quality on CHLORIDE ION IN WATER,Total soluble solids[8-10] Body,PHValues affect.In the case of poor water quality, drought has a greater impact on water quality.

There are many studies using theoretical models to study the impact of climate change on water quality:SuchJ schewe[11]Study on Water Resources under climate change Model to Predict and evaluate the impact of drought on water quality.,Model of industrial agriculture and domestic pollution,Water quality management model, which reflects the damage of Water Quality and Environmental industrial development process during drought period, reflects the impact of climate change on water quality through electrical conductivity;A[9.]

MomblanchAn independent water quality analysis based on intervention measures is proposed. A water quality management model is established by water source allocation and water quality evaluation, found the result2004-2008The water quality and water quantity in the drought period are under great pressure, which suggests that we can intervene from the aspect of water quality management according to the specific conditions of drought, so as to improve[10]

Quality.There are also studies on the application of statistical methods in water quality management to predict the Water Quality crisis under climate change.,Conductivity,PHValue,Water quality map was drawn based on the spatial distribution of hardness and nitrate concentration..

Have part investigation by field research climate change under its on Water Quality of influence: Heavy Rain of and intermittent period water quality microbial concentration have difference heavy rain of microbial concentration higher than that drought and drought between also have difference, found drought under with a monitoring points Reaction Water Quality microbial concentration lack of representative[7/];Drought Water QualityPHValue decreased soluble Pollution and bacteria of Spread.

3. Climate change of drinking water security related disease of influence

A number of research show that climate change on human health multiple[16] Influence and climate change related of Rainfall,Drought,Floods and other extreme events are more likely to cause water related disease incidence rise.Climate change will makes precipitation quantity,Density,Frequency and continuous time change lead to water more easy to by manure and other pathogens pollution caused by digestive tract disease of outbreak popular.Poverty Population is climate change water related disease of easy to sense the water supply and food,Health,Toilet and related these are most important of disease burden contributors.Water related disease specific classification have the following5Class:

Mediated water disease: such as typhoid fever,Cholera and because its in water everywhere and the environment factors such as chemical disinfectant have resistance role they may is endemic spread of the main force, immunity low of population or old and weak disease young of population should be key attention such disease.

Water Cleaning disease: lack of health water bring of disease such as conjunctivitis Gynecological Disease and.

Water-borne disease: by water carry of microbial and toxicity material lead to the disease such as Worm,Schistosomiasis most breeding cycle is in water complete.

And water-related of disease: media in water Breeding of disease such as malaria,Trypanosoma disease such.

Water-based disease: Can in fresh water in Breeding of disease by respiratory system into human body such as Legionella disease.

Temperature and water related disease of research a lot:Bhavnani D[17]And study show that temperature and diarrhea incidence was positively correlated relationship Temperature[18]

Each increased1Diarrhea increase3%~11% checkleyStudy display temperature5Of increased will lead to diarrhea related hospitalization rate increased77%(Winter)But summer hospitalization rate only increased21%.

Rainfall and water related disease:Carlton[19]Study display wet moist and arid season double peaks appeared mode Diarrhea Only and wet season related drought after the heavy rain will makes diarrhea rate increase39%Wet of after the heavy rain the diarrhea rate reduce26%;And health facilities,Social cohesion,Health conditions of rainfall and the relationship between diarrhea no influence.

BhavnaniResearch shows that heavy rain after5DLack of health facilities of residents diarrhea the increased risk5DAfter not significant.Rainfall will make water related disease incidence surge; drink well water,Lack of health facilities,Low education degree of family flood disaster on diarrhea of influence more.Heavy rain will lead to surface water quality deterioration eutrophication and water temperature of with increased it would surge but climate change not because water quality of reason lead to disease of new, private Water Supply may will because heavy rain and lead to mediated water infectious diseases risk surge.American Maryland Research[21]

The relationship.

India Chiang Mai a know extreme rainfall and gastrointestinal disease live Model Analysis different age disease incidence and Climate Change of relationship between results display extreme rainfall and gastrointestinal disease significantly related all age cumulative risk is1. 65-Year-Old the following2. 72Elderly 1. 623~5Month correlation higher all age cumulative risk

6.5.American Massachusetts carry out the pipeline and no pipeline Area

Extreme rainfall and gastrointestinal patients with emergency correlation analysis of Study[23] 2003-2007The research collection.2003-2007Years drinking water area of sewage pipeline,Entertainment district sewage system,No sewage department 3A area of gastrointestinal patients with day emergency visits of data and meteorological data use lag Poisson Regression assessment cumulative effect (control temperature and time trend), results display extreme rainfall and gastrointestinal patients with emergency visits in different regional performance different by sewage the influence of pipeline of drinking water area will increase cumulative risk conclusion is extreme rainfall will influence drink With water by sewage the influence of pipeline of area.Norway a on drop[24]

Rainfall,Temperature and mediated water disease related relationship of analysis of review in collection.2001-2013Years published inOvdiMEDLINEEmbaseScopusWeb ofScienceAnd database of on climate change and water related disease research24Article English article most research results confirmed that rainfall and temperature and mediated water disease infection was positive correlation also a few study prove rainfall and mediated water disease negative correlation (Rainfall,Temperature and water spread disease of complex relationship.M Hodges[25]Research by estimation global climate change of temperature,Water,

Environment health facilities and behavior development,Population Change and Trend Prediction climate change the future10~Natural 20Years Water Environment Health facilities related disease of contribution rate results found2030Years climate change will makes, China Rural Area for Environment Health Facilities Related of Infectious

Diseases negative

Take rate Delay8~85A month.

Climate change main by Temperature,Rainfall influence water related disease incidence but qualitative research more quantitative research less.Rainfall and water related disease incidence of correlation research results positive phase relationship also have negative correlation Department of and for pathogenic bacteria different and related relationship between different.Prompt for association analysis for an arcane should be do layered effect research according to specific of microbial category,Regional,Season,Water supply type,Water and water treatment and other information to assessment the relationship.

4. Climate change and drinking water security,Water related disease of intervention and Adaptability Management

Saudi Arabia of a Climate Change and Water Resources lack[26] Of intervention strategy research related measures including surface water,Groundwater of desalination,Wastewater Recovery Use,Outsourcing food and results prove interventions have effect;T Ahmed[27]A Review of the Study on the national and local level under Environment Monitoring in climate change water related disease of intervention measures also display have certain effect; India a on climate change and abdominal [28]

Diarrhea of study display the country's lack of Climate Change of mediated water risk factor, 'said Dr. Kenneth Cooper, the fitness expert who launched the aerobics movement quantitative research more lack of intervention measures of evaluation.The study3A intervention measures (Emergency measures preventive measures National Policy) reduce climate change the diarrhea rate of influence results display preventive measures very effect but take into account in recent years diarrhea rate decreased Limited, recommendations Implementation comprehensive of deal with policy and intervention measures[29]

Cambodia area climate and water related disease research by11A provinces Monthly Weather and diarrhea of data the time sequence analysis at the same time also on the incidence rate of,Population,Social Economic and water supply and health facilities the describe results show that education may is effective of protection

Measures.

Extreme weather after the gastrointestinal disease incidence is affected by many factors influence including previous incidence extreme weather type medical health accessibility Water and Environment Health facilities affected degree and at the same time, geographical and social economic factors of diversity makes its the intervention strategy requirements is high.

5. Built The

Effective of risk assessment and water quality management will be to alleviate climate change lead to the drought problem of water shortage in is very important of Role.Can through the establishment of a sound regulations,Appropriate adjustment water price,Protection Water Resources,Improve water treatment technology and water Effective Use Efficiency,Improve residents drinking water security consciousness and methods to solve drought area drinking water security problem.

Climate change of drinking water security and its related disease of main meteorological factors have temperature,Precipitation and evaporation and in drought or heavy rain of precipitation than temperature more easy to the Water Quality Water and Health Influence, but environment and social factors also will because climate change of each other role and of its produce complex of role need further system in-depth

Of study for China Rural to deal with climate change in setting the water security and[17]Its health influence measures provide more science of evidence.

References

1. Tan liang Zhu color the Fu Wei.2014-2015Years Changsha rural area drinking water health Present Situation and

water quality influence factors [J].Public Health and Prevention medical,201627
2. Wear forward Liu c m, Ms Shelley Lee.Our country rural drinking water security problems and countermeasures[J].Geographical Journal,200762(9):907-916.
3. Zhang FENG Guo Li bridge Liu Xin seedling and.2014-2015Years Xi'an Rural life drinkingWater Quality Monitoring Analysis [J].Public Health and Prevention medical,201627(4):31-33.
4. WU Xiao.Rural Drinking Water Security Current Situation and Countermeasures [J].Product and quality: TheoryStudy,2011(10):4.
5. Yang cheng lin.Water shortage in rural drinking water supply mode of empirical analysis [J].Statistical andDecision-making,2011(12):96-99
6. Make cloud front left its Pavilion.Climate change on Water Resources Research Status and Prospect on the effect
7. Juckers MWatmough SA.Impacts. simulated drought. poreWater chemistry ofpeat lands[J].Environmental2014184(1):73