Review Research on The Literature of Diarrhea Disease in China (1990-2004)

National Center for Rural Water Supply Technical Guidance,

China CDC

December, 2005

Contents

REVIEW RESEARCH ON THE LITERATURE OF DIARRHEA DISEASE IN CHINA 1

(1990-2004) 1

REVIEW RESEARCH ON THE LITERATURE OF CHINA DIARRHEA DISEASE (1990-2004) ..... ERROR! BOOKMARK NOT DEFINED.

CONTENTS 2

1. PREFACE 4

2. THE CLINIC RESEARCH ON DIARRHEA DISEASE 5

2.1. THE DEFINITION OF DIARRHEA DISEASE 5

2.2. THE CLASSIFICATION AND ETIOLOGICAL FACTOR OF DIARRHEA DISEASE 5

2.2.1. The classification according to disease condition 5

2.2.2. The classification according to etiological factor 5

2.2.3. The classification according to disease course 7

2.3. THE CLINIC SITUATION OF DIARRHEA DISEASE: 8

2.3.1. Diarrhea and gastrointestinal tract syndromes 9

2.3.2. Desiccation, acidosis and electrolyte disturbance 9

2.3.3. Symptom of generalizal toxicosis: 9

2.4. THE DIAGNOSIS AND DIFFERENTIAL DIAGNOSIS OF DIARRHEA DISEASES 9

2.4.1. Clinical diagnosis 10

2.4.2. Etiological diagnosis 11

2.4.3. Laboratory examination 11

2.4.4. Screen diagnosis 11

2.4.5. Diagnosis and differential diagnosis of infectious diarrhea 12

2.4.6. Evaluation of diarrhea desiccation 13

2.5. TREATMENT OF DIARRHEA DISEASE 13

2.5.1. Treatment of acute diarrhea disease 14

2.5.2. Treatment of persisting and chronic diarrhea disease 15

2.5.3. Chinese medical science dialectical treatment of diarrhea 16

2.5.4. Other treatment 16

3. EPIDEMIC AND CONTROL OF DIARRHEA 17

3.1. GENERAL EPIDEMIC SITUATION AND PREVENTION AND CONTROL OF CHOLERA 17

3.1.1. Epidemic situation of cholera from 1990 to 2004 18

3.1.2. Prevention and control of cholera 20

3.2. GENERAL EPIDEMIC SITUATION AND PREVENTION AND CONTROL OF TYPHOID-PARATYPHOID 22

3.2.1. General epidemic situation in China. 22

3.2.2. Current problems exist in supervision and monitoring, and jobs need to be strengthened 28

3.3. PREVALENCE OF DYSENTERY AND CONTROL 28

3.3.1. Prevalence and distribution of dysentery from 1990 to 2004 in China 28

3.3.2. Harm of Dysentery 31

3.3.3. Existing problems and protection controls *31*
3.4. PREVALENCE AND CONTROL OF HEPATITIS JIA 33
3.4.1. Prevalence of hepatitis Jia from 1990 to 2004 ..... *33*
3.4.2. Protection and control measures *35*
3.5. CHINESE CURRENT MONITORING SYSTEM CONCERNING DIARRHEA DISEASE IN COMPARISON WITH THAT ABROAD 35
3.5.1. Chinese current monitoring system concerning diarrhea disease *35*
3.5.2. Comparison with abroad *36*
4. PREVENTION AND INTERVENTION OF DIARRHEA 38
4.1. RELATIONSHIP BETWEEN WATER-SUPPLY CONSTRUCTION AND SANITATION OF LAVATORY AND DIARRHEA 38
4.1.1. Measures of Water-supply Construction and Sanitation of Lavatory *38*
4.1.2. Effects of Water-supply Construction and Sanitation of Lavatory *38*
4.2. RELATIONSHIP BETWEEN SANITATION MEASURE AND DIARRHEA 47
4.2.1. Sanitation Measures *47*
4.2.2. Effects of Sanitation Measures *47*
5. STUDY OF DIARRHEA BURDEN 50
5.1. DEFINITION OF DIARRHEA AND THE PURPOSE AND MEANING OF STUDYING DIARRHEA BURDEN 50
5.2. STUDY METHODS OF DIARRHEA BURDEN 50
5.2.1. Death Rate, Cause of Death and Incidence of Disease *51*
5.2.2. Potential Life Lost *51*
5.2.3. Disability-adjusted Life Year *52*
5.3. RESEARCH STATE AND FEATURES OF DIARRHEA BURDEN 53
5.3.1. Broken out and Death of Diarrhea *53*
5.3.2. Treatment of Diarrhea *57*
5.3.3. The expense loss caused by the diarrhea sickness *60*
5.4. PRESENT OVERSEAS RESEARCH SITUATION ON DISEASE BURDEN CAUSED BY DIARRHEA 64
5.4.1. Target of incidence of disease, rate of being hospitalized, and mortality *64*
5.4.2. Target of DALY and social-economic loss *65*
5.5. FORECAST OF DIARRHEA DISEASE BURDEN RESEARCH 66
6. CONCLUSION 67
7. REFERENCE 69

1. Preface

Diarrhea Disease is caused by multi-pathogens and multi-factors. Whatever diseases that cause diarrhea clinically are defined as Diarrhea Disease before pathogen is ascertained in the conference of Diagnosis and Treatment of China Diarrhea Disease in Beijing. It is classified as infectious diarrhea and noninfectious diarrhea.

Diarrhea Disease is widespread all over the world, not only threatens human health but also greatly affects society and economy. The fatality rate by Diarrhea Disease highly ranks fourth among all the diseases, only lower than tumor, Cardiovascular or Cerebral vessels diseases and diabetes mellitus, things are worse in developing countries and low income countries, and it has became one of problems of the global major public health. WHO treats the control of Diarrhea Disease as global strategy, and the scheme of control of Diarrhea Disease was enacted in May, 1978. China also thinks highly of the control of Diarrhea Disease, and participated global CDD activity, enacted the scheme of control of China Diarrhea Disease. In China, death rate by Diarrhea Disease had decreased greatly because of the improvement on the Child nutrition and medical condition, but incidence rate is still high, and also abuse of antibacterial and vein fluid replacement is still a problem. Under the organization and leadership of Ministry of Health, scheme of diagnosis and treatment of China Diarrhea Disease was enacted in 1993, this scheme adapts adult and child, elaborates the classification, clinical situation, diagnosis, treatment and prevention of Diarrhea Disease. The carrying out of this scheme has active impact on strengthening the management of China Diarrhea Disease, improving continuously the capacity of diagnosing and treatment Diarrhea Disease and using reasonably antibiotics.

To prevent, control and eliminate effectively the occurrence and epidemic of Diarrhea Disease, the People's Republic of China enacted < Law of the People's Republic of China on prevention and control of infectious disease > in 6^{th} conference of 7^{th} standing committee of the national people's congress standing committee member, the revised edition of < Law of the People's Republic of China on prevention and control of infectious disease > was enacted in 11^{th} conference of 10^{th} standing committee of the national people's congress standing committee member on 28, Aug 2004, and carried out on 1,Dec 2004. < Law of the People's Republic of China on prevention and control of infectious disease > stipulates Cholera belongs to grade Ⅰ infectious disease, and Dysentery, typhoid-paratyphoid belong to grade Ⅱ infectious disease, the other infectious Diarrhea belong grade Ⅲ infectious disease. Toilet construction and health education is important measures and means to control and decrease Diarrhea Disease.

The range involved in this literature review of diarrhea disease includes research papers published publicly or not in domestic and medical books from 1990 to 2004. The contents of literature review include clinic research on Diarrhea Disease, the epidemic and control of Diarrhea Disease, prevention and intervention of Diarrhea Disease and burden research on Diarrhea Disease. The research has greatly signification on the prevention, control and treatment of Diarrhea Disease, and probing into the disease burden resulted by Diarrhea Disease.

2. The clinic research on Diarrhea Disease

2.1. The definition of Diarrhea Disease

Diarrhea Disease is a common symptom, patient with Diarrhea Disease defecates more frequently than in normal time, and stool is loose and there is more water, the quantity of defecation is more than 200g，or the quantity of defecation is lower than 200g but the defecation is more than 3 times associated with mucus, bloody pus or undigested food. Generally Diarrhea associated with the symptom including defecation urgency, anus malaise and incontinence. The diagnosis denomination of infant Diarrhea had been altered for several times in domestic, which was customarily called “dyspepsia” from 1950s to 1960s, if complicated with desiccation, acidosis and electrolyte disturbance, which was diagnosed as “toxic dyspepsia”, Diarrhea caused by bacteria, virus, parasite, fungi and some uncertain pathogens were all called “infantile enteritis”. Broad Diarrhea includes infectious diarrhea and noninfectious diarrhea. The former is defined a group of intestines infectious disease caused by pathogen (bacteria, virus, parasite and so on), the clinic characteristic of which is diarrhea, also denominated Diarrhea Disease.

The harm of infectious diarrhea to people embodies in the rapid spread, broad infected area and high incidence rate, death will occur if not be treated in time or reasonably.

2.2. The classification and etiological factor of Diarrhea Disease

The classification of Diarrhea Disease hasn’t been unified until now. The classification according to disease condition, etiological factor and disease course usually is used at present, which was suggested by <scheme of diagnosis and treatment of China Diarrhea Disease> in 1993.

2.2.1. The classification according to disease condition

i The mild: without the symptom of desiccation and toxicosis

ii The moderate: with mild symptom of desiccation and toxicosis

iii The severe: with severe symptom of desiccation and toxicosis

2.2.2. The classification according to etiological factor

I The infectious: Cholera, Dysentery and other infectious diarrhea.

In recent years, the episode and epidemic regularity of infectious diarrhea have been mastered basically. From etiology, the viral diarrhea percent accounts for 40%, most of which is rotavirus, then adenovirus and next is small round-structured viruses and astrovirus, etc. the bacillary diarrhea percent accounts for 60%, most of which is enterovirulent E. coli, then Shiga's bacillus

and Salmonella etc. The pathogens that had been found out causing children in rural to diarrhea is enterovirulent E. coli , rotavirus, Shiga's bacillus and campylobacter jejuni in turn; and in city is rotavirus, enterovirulent E. coli , Shiga's bacillus and Salmonella. Most diarrhea is bacillary one in summer and rotavirus enteritis in autumn and winter. The pathogen of cholera includes two biology types of 01 vibrio cholera (classical biotype and El Tor biotype) and 0139 serotype of non 01 vibrio cholera.

In recent years, Ogawa serotype of El Tor biotype accounts for overwhelming majority among the pathogen of cholera then is inaba serotype, and the ratio of 0139 serotype is lowest. Enterovirulent E. coli belongs to the genus of Escherichia, which can be classified pathogenicity and non-pathogenicity, pathogenicity Escherichia coli can cause diarrhea, which also is denominated enterovirulent E. coli . The antigen construction mainly is composed of O antigen, H antigen and K antigen. Enterovirulent E. coli includes 60 serotypes or so, and it can be classified 6 categories according to nosogenesis, that is enterotoxigenic E.Coli, enteroinvasive E.Coli, enteropathogenic E.Coli, enterohemorrhagic E.coli, entero-aggregative E.coli and entero-SLTs-producing and invasive E.coli. entero-SLTs-producing and invasive E.coli was discovered newly by China, and this category and denomination need be confirmed widely by international.

II The noninfectious

i. Dietary diarrhea: that is dyspepsia diarrhea caused by mal-dietary, for example diarrhea of the infant who take cow’s milk instead of mother's milk or caused by adding food.

ii. Symptomatic diarrhea: that is the diarrhea complicated other diseases. For this kind of diarrhea, stool culture is negative, for example, pneumonia and tracheitis are complicated with simultaneously diarrhea.

iii. Allergic diarrhea: that is diarrhea will occur when take some drug or food, for example, somebody will have diarrhea when drinks cow’s milk, if somebody is allergic to cold air, he will have diarrhea after catch cold.

iv. Other diarrheas: all noninfectious diarrheas except for the mentioned above, for example nonspecific ulcerative colitis, glycogen diarrhea and some familial diarrheas, etc.

Experts on the 2004 forum of China diarrhea disease and international seminar of child diarrhea agree to the uniform denomination suggested by the scheme of diagnosis and treatment of China diarrhea disease in 1993, and suggested that “(also called enteritis)” should be supplemented behind “other infectious diarrheas”. “other infectious diarrheas” is coincident with WHO; “enteritis” is coincident with class Ⅲ infectious disease stipulated by law of the People's Republic of China on prevention and control of infectious disease, just need report to China CDC.

In 1997, Ministry of Health of the People's Republic of China enacted < diagnosis standard and treat principle of infectious diarrhea>[5] as the national standard of the People's Republic of China, which begin to carry out on 1, Oct 1998. It elaborates the definition, range, diagnosis standard,

diagnosis principle, clinic situation, laboratory examination and intervention principle, etc.

2.2.3. The classification according to disease course

I Acute diarrhea: the course is less than two weeks

Acute diarrhea can be classified following categories:

A) Infectious diarrhea

a) Viral diarrhea: Gastroenteritis caused by rotavirus, enteric adenovirus adenoviruses, Norwalk group viruses and Astrovirus, etc.

b) Bacillary diarrhea: includes bacillary dysentery, Salmonella gastroenteritis, enteropathogenic Escherichia coli enteritis, enterohemorrhagic Escherichia coli enteritis, enterotoxigenic E.Coli enteritis, enteroinvasive E.Coli enteritis, Cholera, staphylococcus aureus food-poisoning, Bacillus proteus food-poisoning, Yersinia food-poisoning, campylobacter enteritis and vibrio parahaemolyticus food-poisoning, etc.

c) Fungi diarrhea: enteritis caused by Candida albicans, Aspergillus and Blastocystis hominis, etc.

d) Protozoa diarrhea: infected by amebic dysentery, cryptosporidiosis and Giardia lamblia, ect.

e) Vermes diarrhea: infected by schistosomiasis, trichinosis and strongyloides stercoralis, ect.

B) Acute poisoning: some poisoning caused by biotoxin and chemical toxin.

C) Intestinal diseases: Acute hemorrhagic enteritis necroticans, acute episode of chronic nonspecific ulcerative colitis, Crohn's disease and partial intestinal obstruction, etc.

D) Generalized diseases: uremia, hyperthyroidism, acute systemic infection such as typhus, paratyphoid fever, hematosepsis and leptospirosis, etc.

E) Drug diarrhea: the common drug which cause diarrhea are as followed: catharsis agents, cholinergic drugs or cholinesterase inhibitors, digitoras, diuretics, anticancer chemiotherapy drugs, antibiotics, gastric secretogogues, adrenergic never block drugs and biguanides drugs, etc.

II Persisting diarrhea: the course is more than 2 weeks but less than 2 months.
III Chronic diarrhea: the course is more than 2 months.

Persisting diarrhea and Chronic diarrhea can be classified as followed:

A) Intestinal infection: infected by protozoa such as chronicity bacillary dysentery, amebiasis, giardiasis, Balantidium coli, enteral trichomoniasis; Helminth such as schistosomiasis and trichinosis and fungi such as candida albicans

B) Intestinal tumor: such as lymphoma of small intestine, intestinal histiocytic medullary reticulosis, cancer of colon and Colonic villous adenoma.

C) Intestinal malabsorption

a) pancreatic diarrhea: caused by Pancreas Lesion such as chronic pancreatitis, cancer of pancreas, Cystic Fibrosis

b) lack of conjugated cholalic acid: severe hepatopathy such as biliary cirrhosis, chronic obstruction of biliary tract and ileo-disease such as Crohn's disease.

c) bacterial hypertrophy: Blind loop syndrome, multiple intestinal constriction such as Crohn's disease, intestinal tuberculosis, radioactive enteritis, diverticulum of jejunum, gastrocolic fistula, partial intestinal obstruction, systemic cirrhosis and so on.

d) intestinal mucosa congestion: portal hypertension, Obstruction of portal vein and hepatic, right cardiac insufficiency.

e) Primary intestinal mucosal cell abnormality: disaccharidase and monosaccharidase deficiency, β-lipoprotein deficiency.

f) Small intestine mucous membrane lesion: such as celiac disease, eosinophil gastroenteritis, intestinal tractamyloid degeneration, radioactivity enteritis and Whipple disease, etc.

g) Lymph obstruction: intestinal tract lymphoma, tuberculosis of mesenteric glands, tumor transfer, etc.

D) Intestinal tract lesion: chronic nonspecific ulcerative colitis, Crohn's disease, radioactivity enteritis, diverticulitis of colon, familial polyposis coli and partial intestinal obstruction.

E) Generalized diseases: such as uremia, systemic lupus erythematosus, systemic cirrhosis, hyperthyroidism and nicotinic acid deficiency.

F) Drug diarrhea: take thyroxine sodium, anti-acid agent, digitoras, sidero-agent and diuretic, ect.

2.3. The clinic situation of diarrhea disease:

The clinic situation of diarrhea disease can be classified as three categeries: diarrhea and gastrointestinal tract syndromes; desiccation; acidosis and electrolyte disturbance; Generalized toxicosis. The clinic situations characteristic of diarrhea disease caused by different pathogens are different.

2.3.1. Diarrhea and gastrointestinal tract syndromes

Diarrhea symptom embodies the alteration of defecation frequency or (and) stool property. Defecation is more frequent than in normal time, which is less than 5 times one day for the mild diarrhea, and it is more than 10 times one day for the severe, but it is notable that the defecation frequency isn't parallel to patient's condition. The properties of stool may be watery, mucus or bloody pus. Diarrhea usually complicates with other gastrointestinal tract syndromes such as emesis, abdominal pain and abdominal distention, etc. diarrhea with these symptoms should be differentiated with correlative diseases.

2.3.2. Desiccation, acidosis and electrolyte disturbance

Desiccation is the most common and important symptom in diarrhea disease, it also is one of main indexes determine patient to be in a bad way or not, the property and characteristic of desiccation should be examined if patient is in desiccation (see the evaluation of desiccation in diarrhea).Isotonicit, hypoosmotic and hyperosmotic desiccation can be distinguished according to the difference of loss ratio of water and electrolure. Hypoosmotic desiccation is common, in which the loss of water and electrolure is pro rata, the Na content in blood serum is 130-150 mmol/L. Isotonicit desiccation is common when patient is dystrophy or the concentration of electrolure in fluid replacement is too low, so the loss of electrolure is more than water, the Na content in blood serum is less than 130 mmol/L，on the contrary, the loss of water is more than electrolure for hyperosmotic desiccation, and the Na content in blood serum is more than 130 mmol/L. the symptom of electrolyte disturbance is mainly hypokalemia, hypocalcemia and hypomagnesium.

2.3.3. Symptom of generalizal toxicosis:

Symptom of generalizal toxicosis such as Dysphoria, depression, drowsiness, pale face, hyperpyrexia, coldness of extremities and piebald skin will appear because of pathogen toxin or severe disturbance of water and electrolyte.

2.4. The diagnosis and differential diagnosis of diarrhea diseases

The diagnosis and differential diagnosis of primary diseases or etiological factors are on the basis of medical history, symptom, physical sign and routine chemical analysis especially stool examination. If diagnosis is uncertain after above means, X-ray barium enema examination and (or) proctoscop and colonoscopy. If there is still no categorical conclusion, screenage diadynamic methods such as ultrasonic examination, CT and ERCP can be used to examine the diseases of

courage and pancreas, or intestinal absorption test, breath test and Small intestine mucous membrane Biopsy can be used to examine intestinal malabsorption.

2.4.1. Clinical diagnosis

The scheme of diagnosis and treatment of China Diarrhea Disease enacted in 1993 suggests that diagnosis should base on the course of diarrhea disease, the property of stool, the eye and microscopic examination, episode season, episode age and epidemic situation.

I. Analysis according to episode age and episode season

Diarrhea commonly is caused by enterotoxigenic E.Coli in summer, and it is possible that watery diarrhea commonly is caused by rotavirus in autumn and winter. For child diarrhea, there are more possiblities of rotavirus infection, disaccharidase deficiency, con-genitalchloridorrhea，tuberculosis of mesenteric glands and fibrocystic disease of the pancreas. For the youth, functional diarrhea, ulcer intestinal tuberculosis and inflammatory bowel disease are common. And for the adult, it should be considered that human rotavirus causes watery diarrhea in May or Jun, and enterotoxigenic E.Coli is possible in summer. For middle-ager and aged, cancer of colon should be considered; the most possible pathogens causing the aged infectious diarrhea are clostridium difficile toxin, O157 :H7 Escherichia coli and salmonella.

II. Analysis according to the property of stool and defecation situation

The percent of acute watery stool is 70% of infectious diarrhea, which is possibly caused by virus or enterotoxigenic bacteria and bloody pus stool is 30%, which is possibly caused by invasive bacteria. If stool is mult- blood and few-pus or currant-jelly stool, ameba disease is possible. If stool is watery or rice water, diarrhea with out end complicates with emesis and severe desiccation, Cholera is possible. If severe bloody stool without fevrile, O157 :H7 escherichia coli is very possible. Patients with diarrhea caused by chronic dysentery, schistosomiasis, ulcerative colitis and rectal cancer only defecate several times one day, but the stool is bloody pus. The stool of the patients with AIDS complicated with infectious diarrhea is watery and few bloody, and obvious loss of weight is common. If defecation are more than 10 times within 24 hours even several ten times, it is possible secretory diarrhea caused by acute infection such as cholera and bleeding diarrhea such as bacillary dysentery.

III. Analysis according to epidemic situation

Acute diarrhea caused by bacteria or virus can be explosively epidemic; and diarrhea caused by parasite can be sporadic epidemic, which is the important cause of dystrophy. When the peasant and fishermen who dwell in middle and lower reaches of the Yangtze rive are afflicted with diarrhea, the possibility of infection by Schistosoma should be considered.

Ⅳ. Analysis according to sex

Functional diarrhea caused by hyperthyroidism is common to female, and colon diverticula and cancer of colon is common to male.

V. Analysis according to episode and course of diarrhea

The patient with urgent episode complicated with febrile and frequent diarrhea should be

considered to be drug action, chemical intoxication and intestinal infection such as rotavirus infection, salmonella infection, bacillary dysentery, vibrio parahaemolyticus infection, staphylococcus enterotoxin food poisoning and amebiasis, etc. group episode is very possibly food poisoning. 30%-60% of the AIDS patients suffer from infectious diarrhea, most of which is persisting or chronic.

2.4.2. Etiological diagnosis

The scheme of diagnosis and treatment of China Diarrhea Disease enacted in 1993 points out that all diarrheas are called diarrhea diseases before confirming etiological factor, and diagnosis should be based on etiology after confirming etiological factor, such as bacillary dysentery, amebic dysentery, cholera, samonella typhimurium, enterovirulent E. coli, campylobacter fetus subspecies jejuni, rotavirus, enteric adenovirus, small round-structured viruses, coronavirus and adult rotavirus enteritis, giardia lamblia enteritis, cryptosporidiosis enteritis and fungi enteritis, etc. Noninfectious diarrhea can be diagnosed dietary diarrhea, symptomatic diarrhea, allergic diarrhea, nonspecific ulcerative colitis and glycogen diarrhea, etc.

2.4.3. Laboratory examination

I. Routine chemical examination
The check of fresh stool is an important step of diagnosing acute and chronic diarrhea, in which Bleed, phagocyte, leucocyte, protozoa, egg, fat drip and undigested food can be discovered. Occult Blood test can check out invisible bleeding. Stool culture can discover pathogenic microorganism. It is necessary to check the electrolure and osmotic pressure of stool when differentiating secretory diarrhea and hyperosmolar diarrhea. It can be discovered by blood routine examination and biochemical examination whether there are anemia, leukocytosis and diabetes mellitus or no and the balance situation of electrolurea and cid-base.
II. Function of intestinal absorption test

2.4.4. Screen diagnosis

I. X-ray examination X-ray barium enema examination (small intestine and colon) and abdomen plain fil can display lesion of gastrointestinal tract, motor function status and calcification of cholelith, pancreas and lymph node.

II. Endoscopy proctoscope, romanoscope and biopsies have diadynamic value to early cancer and tumor. Romanoscope and biopsies can diagnose the lesion of whole colon and terminal ileum. Small enteroscope can observe the lesion of dodecadactylon and jejunum, and biopsies can be done at the same time.

III. B-ultrasound examination it should prior to be used because it is a method of no trauma and radioactivity to patient.

Ⅳ. Biopsy of small intestine mucous membrane To some parasitic infection and diffuse lesion of small intestine mucous membrane, such as tropical sprue, celiac disease, Weber disease, diffuse lymphoma of small intestine, ect, biopsy of intestine can be used to assist diagnose by sampling small intestine mucous membrane to make pathologic examination.

V. Determinations of hormones of gastrointestinal tract and chemical substance in blood serum.

2.4.5. Diagnosis and differential diagnosis of infectious diarrhea

I. Diagnosis principle

The cause of diarrhea is complex, other factors such as chemical drug besides pathogen such as bacteria, virus, parasite also can lead to infectious diarrhea. So, diagnosis of infectious diarrhea should base on date of epidemiology, clinical situation and routine examination of stool. Final diagnosis must based on the relate pathogen detected from stool or specific nucleic acid or specific antibody detected from blood serum.

II. Diagnosis standard

A) Epidemiology date

People can be infected diarrhea in all seasons, especially summer and autumn, who have touched with unclean food (water) and (or) the patient and animal with diarrhea and bacteria-carrier animal, or gone to undeveloped region. Group episode is very possibly food poisoning. Some salmonella (such as samonella typhimurium), enterovirulent E. coli, Group A rotavirus and coxsackie virus can lead to diarrhea epidemic outbreak in nursery.

B) Clinical situation

a) the frequency of diarrhea and defecation is more than 3 times one day, stool is loose and watery, or viscid, bloody pus and bloody stool, complicated with nausea, emesis, anorexia, febrile, abdominal pain and generalized malaise. The severe patients even will shock because mass loss of water will lead to desiccation and electrolyte disturbance.

b) This standard doesn’t adapt to cholera, dysentery, typhoid fever and paratyphoid fever (it only include the class Ⅲ infectious disease stipulated by <law of the People's Republic of China on prevention and control of infectious disease>)

C) laboratory examination

a) Routine examination of stool: stool is loose and watery, viscid, bloody pus and bloody stool, lots of erythrocyte and leucocyte can be discovered by microscopic examination.

b) Etiology examination: pathogenic microorganism except cholera, dysentery, typhoid fever and typhoid can be detected from stool, such as enterovirulent E. coli,

salmonella, rotavirus or giardia lamblia, etc, or specific nucleic acid or specific antibody detected from blood serum.

Clinical diagnosis: the patient, with clinical situation a) and b) and laboratory examination a), referring to epidemiology date, can be diagnosed as infectious diarrhea.

Final diagnosis of pathogen: according to clinical diagnosis and laboratory examination.

2.4.6. Evaluation of diarrhea desiccation

The grade of desiccation caused by diarrhea was stipulated by scheme of diagnosis and control of China Diarrhea Disease enacted in 1993, which is classified "without desiccation", "mild desiccation" an "severe desiccation", as following table:

Table 1-1 evaluation of diarrhea desiccation

	group		
	A	B	C
1. inspection:			
common status	well	*agitated、irritability	*drowsiness , coma or weak
eyehole	normal	sunken	obviously sunken
tears	with	a little or without	without
mouth and lingua	moisten	dry	very dry
thirstiness	without thirstiness	*thirsty	*drinking a little
2. Palpate:			
skin elastic	retraction after pinch	* slow retraction after pinch (shorter than 2 seconds)	* very slow etraction after pinch (longer than 2seconds)
3. diagnosis:	without desiccation	mild desiccation [a]	severe desiccation [b]
4. treatment[c]:	adapt to scheme A	adapt to scheme B	adapt to scheme C

Commentary: a: Some patients have two or two group B physical sign mentioned above, at least include one physical sign marked *. The percent loss of water is 3-10% of body weight. B: patients with severe desiccation have two or two group C physical sign mentioned above, at least include one physical sign marked *. The percent loss of water is more than 10% of body weight. c: see the treatment of diarrhea disease.

2.5. Treatment of diarrhea disease

The scheme of diagnosis and treatment of China Diarrhea Disease enacted in 1993 suggests the principle of treat is preventing desiccation, correcting dehydration, continuing diet and reasonably

taking drug.

2.5.1. Treatment of acute diarrhea disease

I. Treatment scheme A: adapt to the patient without desiccation, can be used at home. Three principles of home treatment:

i. Patients should take orally enough liquid to prevent desiccation

The prevention and redress of desiccation are very important in the treatment of diarrhea disease because diarrhea lead to mass loss of water and electrolure. So, patients should takes orally enough liquid to prevent desiccation at the beginning of diarrhea.

The following measures can be taken: ① solutions of rice-water added salt ② solutions of sugar and salt ③ take orally ORS ④ take congee and soup added salt if there are no above solution.

ii. Patients should supplement enough food to prevent dystrophy

iii. If patient doesn't recovery or the time and amount of diarrhea increase, can't diet normally, frequent vomit, has fever or thirstiness or bloody stool, he must be send to see doctor in time.

II. Treatment scheme B: adapt to the patient with mild desiccation, use ORS to correct dehydration in time.

i. Use ORS at first four hours (supplement fluid according to physician order of doctor in time)

ii. Observe closely patient's condition to find symptom in time. If edema occurs, patient should stop taking ORS, and take it after edema eliminate according to treatment scheme A.

iii. Re-evaluate patient's desiccation condition after four hours, then select reasonable treatment scheme (A, B or C) to treat.

III. Treatment scheme C adapt to the patient with severe desiccation.

i. Patient with severe desiccation need venoclysis

ii. Supplement kalium and calcium

iii. Patient should take ORS once he can drink, Re-evaluate patient's condition after 6-7 hours, select reasonable schem A, B or C to treat.

In a word, the principle of fluid replacement is " fast at first and then slowly, thick at first and then thin, supplement kalium when patient can urinate.

IV. Drug treatment

WHO suggest 90% of patient with diarrhea needn't antibacterial drug treatment because viral infectious diarrhea and part bacterial diarrhea tend to spontaneous cure. Domestic experts suggest 70% of diarrhea needn't and shouldn't use antibiotic to treat, antibiotic adapts to the patient infected by invasive bacteria (30% or so).

Patient with acute watery stool (70% or so) infected mostly by virus or enterotoxin bacteria, who can spontaneous cure without antibiotic, only need solution treatment. Patient with pus and bloody stool (30% or so) infected mostly by invasive bacteria, who need a effective antibacterial to treat, if patient's condition can't take a turn for the better within 48 hours, it is necessary to change other kinds of antibacterial.

V. Effect evaluation

i. Visible effect: the property of stool and the frequency of defecation recover within 72 hours after treatment, and generalized symptoms disappear.

ii. Efficiency: the property of stool and the frequency of defecation obviously take a turn for the better within 72 hours after treatment, and generalized symptoms have obviously amelioration

iii. Inefficiency: The properties of stool, the frequency of defecation and generalized symptoms have no amelioration even get worse within 5 days after treatment

2.5.2. Treatment of persisting and chronic diarrhea disease

I. Make solution treatment actively and treat desiccation, redress the balance disturbance of water, electrolure and acid-base.

i. Patient without desiccation should take the solution suggested by treatment scheme A to prevent desiccation.

ii. Determine blood gas value and blood biochemical value.

iii. Supplement kalium and calcium; supplement magnesium when hypo-magnesium.

II. Nutrition treatment this kinds of patients are dystrophy, so it is necessary to continue diet, fasting is harm to patient.

III. Drug treatment Be careful to use antibacterial, only when specific pathogen is separated, and select to use according to the result of drug sensitivity test. It is necessary to supplement microelement and vitamin such as zinc, ferrum, Vitp.p, vitamin A, C、B1、B12 and folic Acid, microecology therapy can be considered at same time.

IV. Effect evaluation

i. Visible effect: the property of stool and the frequency of defecation recover within 5 days after treatment, and generalized symptoms disappear.

ii. Efficiency: the property of stool and the frequency of defecation obviously take a turn for the better within 5 days after treatment, and generalized symptoms have obviously amelioration

iii. Inefficiency: The properties of stool, the frequency of defecation and generalized symptoms have no amelioration even get worse within 5 days after treatment

2.5.3. Chinese medical science dialectical treatment of diarrhea

the traditional Chinese medicines have some studies to acute diarrhea, which had been verified have the function of antiviral, removing fever and checking diarrhea. It has good effect to treat persisting diarrhea by Chinese medical science dialectical treatment, which is worth studying further.

2.5.4. Other treatment

Microecology adjustment agent: for example bifid-obacterium, acidophilic lactobacillus and streptococcus faecium, bacillus cereus and bifidus factor, etc.

Intestinal mucosa protective agent: for example dioctahedral smectite, can absorb pathogens and toxin, enhance the barrier function of glycoprotein of intestinal tract mucus by interaction to prevent the attack of pathogenic microorganism.

3. Epidemic and control of diarrhea

In China, infectious diseases, which need routine report and management, are classified three grades, grade Ⅰ and Ⅱ need routine report and can get nationwide monitoring data. Among the two grades of report infectious diseases, those belong to intestinal tract infectious diseases are cholera (grade Ⅰ), typhoid fever (grade Ⅱ), viral hepatitis A (grade Ⅱ) and dysentery (grade Ⅱ), etc.

The report cases of above-mentioned four infectious diseases had gradually decreased to 641 thousand from 1.68 million during 15 years from 1990 to 2004, and the percent to total monitoring case of grade Ⅰ and Ⅱ infectious diseases decreased to 20.15% from 64.05% （as chart 2-1）, which is related with the economy development and lives improvement. The decrease owe to the decrease of dysentery (from 1.416 million in 1990to 498 thousand in 2004) and viral hepatitis A (from 584 thousand in 1990to 94 thousand in 2004)

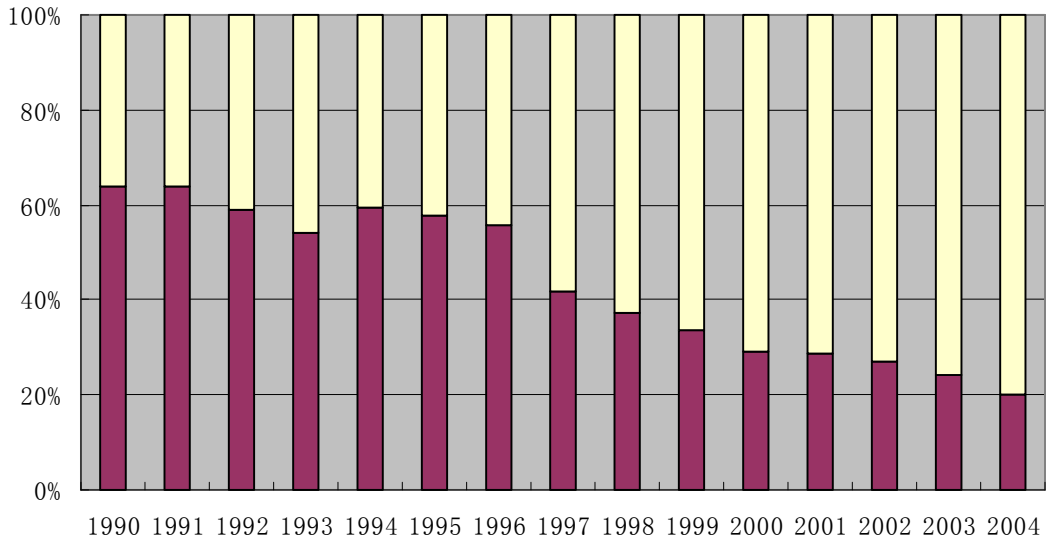

Chart 2-1.the percent of intestinal tract infectious diseases (cholera, typhoid fever viral hepatitis Aand dysentery) of grade Ⅰ and Ⅱ infectious diseases to total report case of grade Ⅰ and Ⅱ infectious diseases

3.1. General epidemic situation and prevention and control of cholera

Cholera is a acute intestinal tract infectious disease, the course is urgent, can rapidly spread, easy to remotely spread and closely diffuse. Once outbreak or spread, it will severely affect people's health, patient's life will be threatened if can't be treat in time, even affect severely social stability and national economy, it belongs to virulent infectious disease thought highly of by all of the world, and it is one of three international quarantine infectious disease, also one of two kinds of grade Ⅰ infectious disease stipulated by < Law of the People's Republic of China on prevention and control of infectious disease>

3.1.1. Epidemic situation of cholera from 1990 to 2004

I. The epidemic situation of El Tor cholera

El Tor cholera began to spread in China in 1961. The epidemic situation of cholera was similar to Asian's, differing from the world. There were two times outbreaks in 1994 and 1998. The epidemic scope was great in 1994, there were 35009 report cases in that year, and cases decreased year by year, that reached 12.221 thousand in 1998 (see chart 2-2), when other Asian and Africa countries were on high rate of episode. The provinces infected by El Tor cholera had increased to 27 in late 1990s from 8 in 1990. This situation was directly related with global abnormal climate and flood, another reasons were large scale of floating population, whose hygiene were relatively bad , so it was easy to cause disease epidemic; some restaurants was dirty; some traditional habit such as dining together also easy to lead to disease epidemic because of bad sanitation. After 2000, cholera decreased year by year, and the pathogens was mainly Vibrio cholerae O139 (see chart 2-2 and table 2-1) in some years. The least report cases were 244 in 2004. Now, epidemic situation of cholera tends to decrease in China, but it is necessary to monitor the increase again.

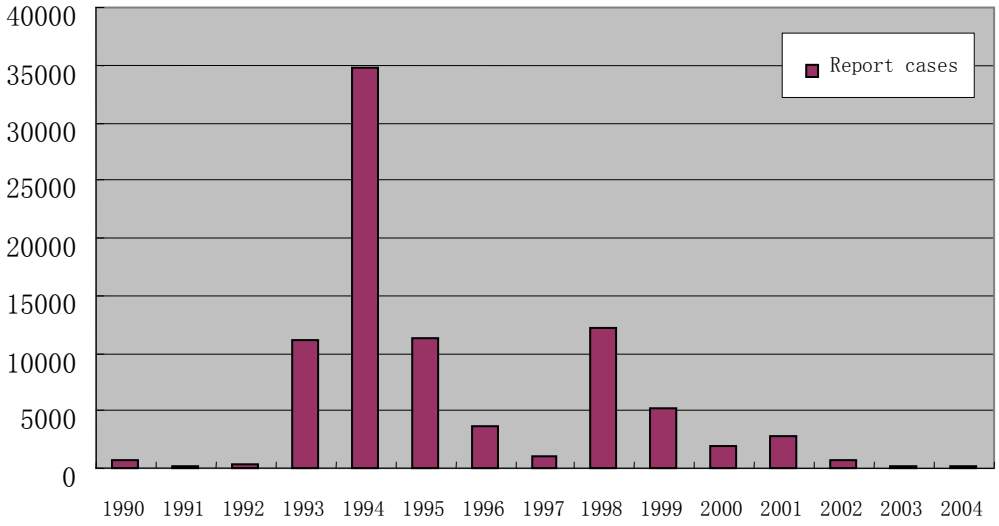

chart 2-2 epidemic situation of cholera monitored by China from 1990 to 2004

II. Vibrio cholerae 0139

Xinjiang of China, after India and Bengal in 1992, began to have a outbreak of cholera caused by Vibrio cholerae 0139 on May, 1993. afterwards, Beijing and southeast regions began to spread or diffuse Vibrio cholerae 0139. Xinjiang had most report cases, which decreased in following years, but increased gradually in 1997, the ratio to total report cases which decreased year by year increased gradually (see table 2-1). up to now, the numbers of province , autonomous region and municipality that report Vibrio cholerae 0139 have reached more than 20. Southeast regions report most cases, but total report cases were only a few. The most cases were over 200 in 1999. Xinjiang reported most cases only in 1993, other years only report a few cases.

Table 2-1 the strain percent of reported cases in China from 1999 to 2004 (%)

strain typing	1999	2000	2001	2002	2003	2004
Inaba	0.9	3.3	77.8	54.2	5.2	24.6
Ogawa	95.1	86.8	5.8	9.8	4.3	11.8
O139	4.0	9.9	16.4	36.0	90.5	63.6

Sporadic cholera caused by vibrio cholerae 0139 mainly distributes at southeast regions including Guangdong, Fujian, Guangxi, Zhejiang and Jiangshu. There is few cases in inland and north region, however, in some inland province such as Sichuan had reported cases of vibrio cholerae 0139 in recent two years. The outbreak main is caused by dinning together by present monitoring, and there are few secondary cases, duing to the custom of dinning together in rural and unclean food processing.

III. The vicissitudes and epidemic tendency of dominant cholera strain in recent years.

a) El Tor cholera had changed strain. Inaba sharply increased in 2001, which had disappeared about 10 years, the following three years had fluctuation, part of provinces increased obviously in 2005; seventh Cholera broad epidemic began at 1961, then introduced into China, which had three epidemic summit in 1960s, 1980s and 1990s up till now. and it was in successive low incidence since 2002. Each epidemic strain was simple, strain will change in different epidemic. The change of dominant cholera strain portends a new epidemic summit according to the epidemic characteristic of 40 years in our homeland. epidemic situation began to increase in 2005, and the strain will the change, comparing with the epidemic last time, which portends there possible is a new epidemic.

b) The region newly infected by vibrio cholerae 0139 are enlarging, the percent of cases are increasing (90.5% in 2004 from 4% in 1999, decrease in recent two years, see table 2-1), however, because cases caused by 01 serogroups are decreasing and total cases are decreasing, so the ratio of vibrio cholerae 0139 are increasing, but the cases number is relatively steady. The outbreak of vibrio cholerae 0139 mainly due to dinning together, there are few secondary cases after outbreak, hence, the prevention and control of vibrio cholerae 0139 should avoid to eat polluted marine products.

c) The outbreak of cholera mainly due to diet in recent year. Owing to the improvement of water quality and sanitation, the watery outbreaks are decreasing. But in some undeveloped region, especially mountain area of bad drink water condition, it is notable to the outbreak of cholera due to drink polluted water.

d) The social factors led to the epidemic of cholera are more and more complex, such as the increase of floating population, the frequent communication, the increase of sea food such as green turtle which is common food in the dinning together in rural with the improvement of people’s lives, the development of transportation, all of the above-mentioned factors are propitious

to spread of cholera; the retroactivity to infectious source of cholera outbreak will become difficult in cities.

3.1.2. Prevention and control of cholera

I. present trouble

a) At present, epidemic situation of cholera is mainly related with dinning together in our homeland, the outbreaks of cholera concentrate on the region and crowd of bad sanitation condition, such as remote rural country and floating population, so the prevention and control of cholera should lay particular emphasis on this region and high-risk group, strengthen crowd protection, think highly of health education and consciousness, try our best to redress some unhealthful customs, enhance the people's self-protection ability.

b) Outpatient clinic of hospital should examine every suspected patient during the high incidence of cholera.

c) Laboratory examination of CDC should be made in time, the ratio of laboratory final examination is high, but the retroactivity to suspect food still have some trouble, some examination methods and consciousness should be improved.

d) Some regions haven't made public the epidemic situation of chelora in time, so the people's protection consciousness can't be enhanced in time.

II. the suggestion of prevention and control of chelora

a) The work of pathogen monitoring should be done perennially at southeast region of China. The places where vibrio cholera exists mainly are sea water of coastal area and the entrance of river to sea. The epidemic of cholera had closely relation with surface temperature of sea water and the area of chlorophyll in Bengal gulf according to foreign monitoring, the two factors are indirect index of propagation vibrio cholera in sea. vibrio cholera propagate largely in outer environment can lead to the broad epidemic among crowd, and the diffusing coverage caused by dinning together is limited. We should systematically monitor sea water perennially, this monitoring data may have no effect within one or two years, but it has great significance to forecast large scale epidemic of cholera.

b) it is evaluated that severe epidemic of cholera may not occur like the past because the improvement of people's lives and the change of life pattern according to the development situation of our country, but maybe there are new epidemic especially at southeast region. In addition, the bad sanitation condition and consciousness of floating population will lead to high-risk group easy to infect and spread. Some remote region and rural are main region of cholera, such as Sichuan, Chongqing, Guizhou and Yunnan, the prevention and control of cholera should lay particular emphasis on this region.

c) During cholera are epidemic, food and water should be investigated, pathogen should be separated in time, vibrio cholera in river and lake which closely relate with people's lives should be detected. These measures are useful to discover infection source and the pollution situation of water in order to make effective measures.

d) It should be paid great attention to combine laboratory monitoring and epidemiology monitoring. The outbreak of cholera is caused by vibrio cholera, which survives in external environment and spreads among crowd mediated by water and food, so etiology information can't be lack in the course of monitoring cholera. Laboratory monitoring which can analyze the characteristic of vibrio cholera should provide rich and comprehensive information for cholera monitoring, enhance the accuracy of forecast, find out infection source in order to strengthen the efficiency of prevention and control of choera.

e) Outpatient clinic intestines should pay an important role in find early the patient with cholera, especially in high-risk regions.

3.2. General epidemic situation and prevention and control of typhoid-paratyphoid

Typhoid had been epidemic until 1950s all over the world. After the middle of 20th century, large-scale epidemic decreased gradually owing to people's master of the characteristic of this infectious disease, development of social economy, improvement of sanitation and abroad apply of antibacterial. Up to now, typhoid-paratyphoid had been control effectively in European and North American, but not in Southeast Asian and African, where public health still is a severe problem. The conservative estimate reveals there are least 16 million increased cased of typhoid every year in the world, about 600 thousand patients will die. Incidence of a disease had decreased to 2 of 100 thousand cases in American, but it is 198 and 980 of 100 thousand cases in Meigong River of Vietnam and Delhi of Indian respectively, even 1021.07 of 100 thousand in African. WHO still regard typhoid as infectious disease that needs to emphasize particularly on prevention and control. Besides, paratyphi A hadn't broken out since 1996 in India, Malaysia and Indonesia, which was caused by Salmonella paratyphi A, and the symptom is more alleviative than typhoid.

3.2.1. General epidemic situation in China.

I. General situation

Incidence of typhoid-paratyphoid fluctuates between 10 and 50 of 100 thousand in different regions of China before 1990, which decreased after 1990, average incidence of typhoid-paratyphoid between 4.0843 and 10.45 of 100 thousand, report cases are between 51 and 120 thousand, dead cases are between 33 and 347, death rate had been decreasing year by year. But there are new problem on the epidemic of typhoid-paratyphoid, paratyphi A spread rapidly into some regions in recent year, it,instead of typhoid fever, had become predominant strain, which may be epidemic in more larger region.

The report cases of typhoid-paratyphoid are between 50 in 2004 and 114.7 thousand from 1990 to 2004, average incidence is between 3.850 in 2004 and 10.318 in 1990 of 100 thousand, which had obviously decreased comparing with the past, which is between 10 and 50 of 100 thousand before 1990(See chart 2-3). Death cases are between 19 and 276, death rate also had decreased to 0.038% in 2004 from 0.241 in 1990, but it increased to 0.200% in 1998.

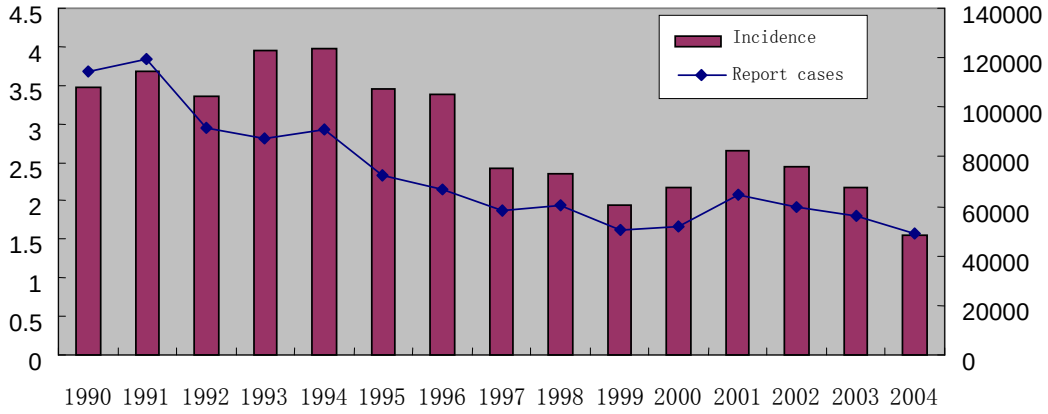

Chart 2-3 report cases and incidence of typhoid-paratyphoid from 1990 to 2004

II. Change of age group constituting in report cases

Chart 2-4 show the change of age group in report cases annually, in which the youth account for most of cases. According to the tendency during ten years, we can see that the percent of age group of 15-19, 35-39, 50-54 and 65-79 years old are increasing , and the percent of age group of 6-9 and 25-29 years old are decreasing, the percent of other age group is fluctuating. There are no investigation and analysis on infectious factors in specific age groups. The percent of age group of 15-19 years old are increasing gradually, which is related with outbreak in middle school.

III. Change of occupation constituting in report cases

Peasants and students were main population infected typhoid-paratyphoid, account for 56.9-68.8% of report cases during the ten years (see chart 2-5). The percent of peasants had began to decrease since 1998, but the percent of students, teachers and peasant workers had increased year by year, which is possibly related with unclean school drinking system, and the sanitation condition of peasant workers need improve.

IV. The region distribution of report cases

All over the country have reported cases of typhoid-paratyphoid, but the number of report cases in different regions is highly discrepant, ten provinces had reported most cases are Guizhou, Xinjiang, Yunnan, Guangxi, Zhejiang, Hunan, Jiangxi, Guangdong, Hubei and Jiangshu in turn (see chart 2-6), where typhoid-paratyphoid are high incidence, but incidence in Jiangshu, Hubei and Xinjiang tend to decrease, which is most obvious in Jiangshu. The number of total cases is decreasing since 2001.

The epidemic of typhoid-paratyphoid is by means of polluting water and food and touch of daily life, which can cause sporadic epidemic, generally, the outbreak epidemic is by means of polluting water, which had been verified by the investigation during the ten years. There are relative more

outbreak epidemic in high incidence place owing to slow development of economy, bad sanitation condition , unhealthy habits and delay of case report, there are relative severe problem of epidemic typhoid-paratyphoid especially at school. Monitoring analysis in Guizhou shows that drinking water in most rural is insanitary, the resident have bad habit of drinking crude water, which will lead to the high incidence of typhoid-paratyphoid. The analysis to 557 cases of typhoid-paratyphoid in Guizhou province showed watery outbreak accounted for 64.82%, which was higher than other factors. That improving the quality of water and managing stool are important measures to decrease the incidence of typhoid-paratyphoid.

It is notable that southeast regions such as Zhejiang is high incidence all along, and so did Jiangshu, the epidemic factors in this regions are different from west regions such as Guizhou and Yunnan or not? What cause make low incidence in Sichuan? Chronic bacteria-carriers will cause high incidence of typhoid-paratyphoid in the regions or not? These problems need contrastive investigation and analysis further.

V. More and more paratyphoid A epidemic in China.

Paratyphoid A began to increase in China since 1990, it, instead of typhoid fever, had become predominant strain in some regions. There were many report cases of paratyphoid fever in all regions except Tianjin and Xizang in 2004.Jiling and Ningxia only report one case. Paratyphoid fever began to spread in Jiangxi since 1995, afterwards, there were many outbreaks of paratyphoid A in Guizhou, Guangxi and Guangdong, the separated strains were all Salmonella paratyphoid A, the incidence reached 91.88 of 100 thousand in some place. Monitoring report in Guizhou show the incidence of typhoid and paratyphoid was 95% and 5% respectively before 1998, which was 79.46 % and 20.54 % respectively after 1998, the percent of the cases of paratyphi A to the cases of paratyphoid was 98.58%. Guangxi had separated 216 strains, which were all salmonella typhi from 1994 to 1998; but there were 50 salmonella typhi and 630 salmonella paratyphoid A in 680 separated strains from 1999-2001. There were 22 outbreaks of epidemic situation from 1993 to 2002, among which there were 9 outbreaks caused by salmonella typhi, 11 outbreaks by salmonella paratyphoid A and 2 outbreaks by the two pathnogens. There were 14 outbreaks after 1999, and salmonella paratyphoid A had still being epidemic in recent year, Indian, Singapore and Japan began to occur salmonella paratyphoid A from 1996, so it is very important to monitor the epidemic of typhoid especially paratyphoid A for the control of infectious disease. Because sensibitity of detection is restricted and many symptoms hard to distinguish, the precise date of constituent ratio of typhoid to paratyphoid is lack in recent years.

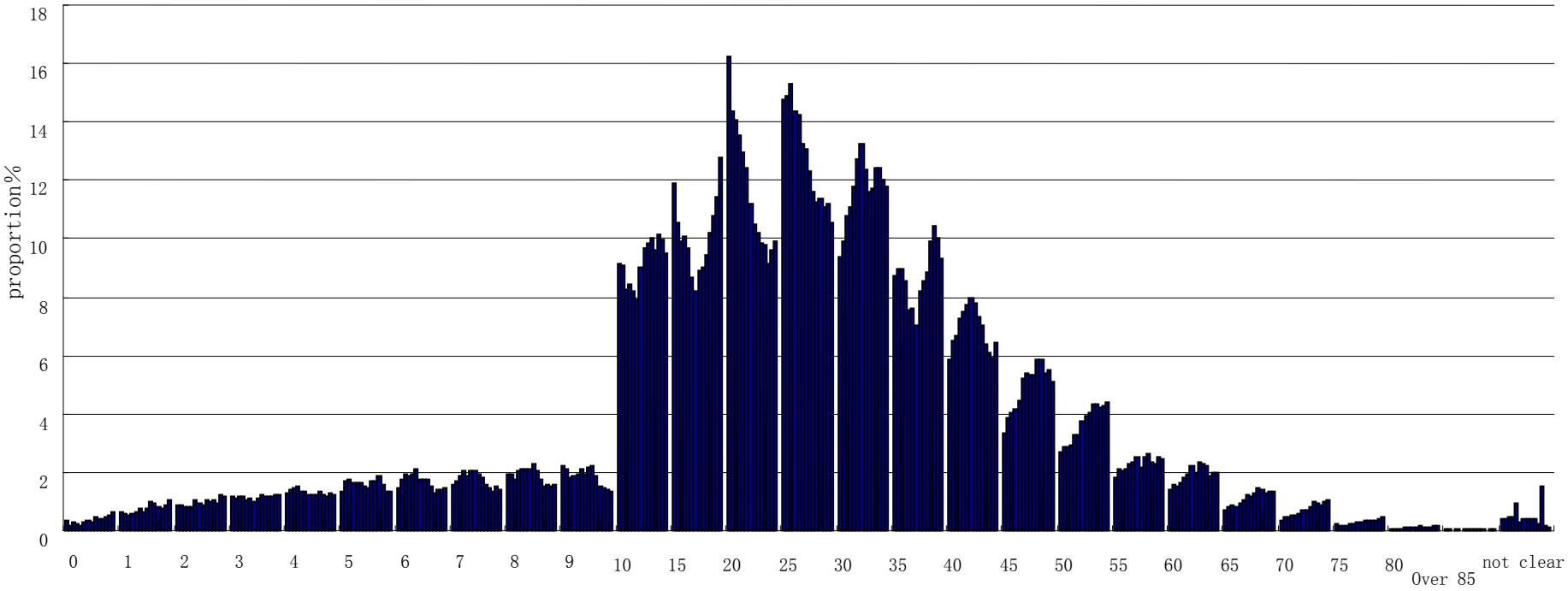

chart 2-4 change of proportion of different age group in report cases infected typhoid-paratyphoid from 1990 to 2004.

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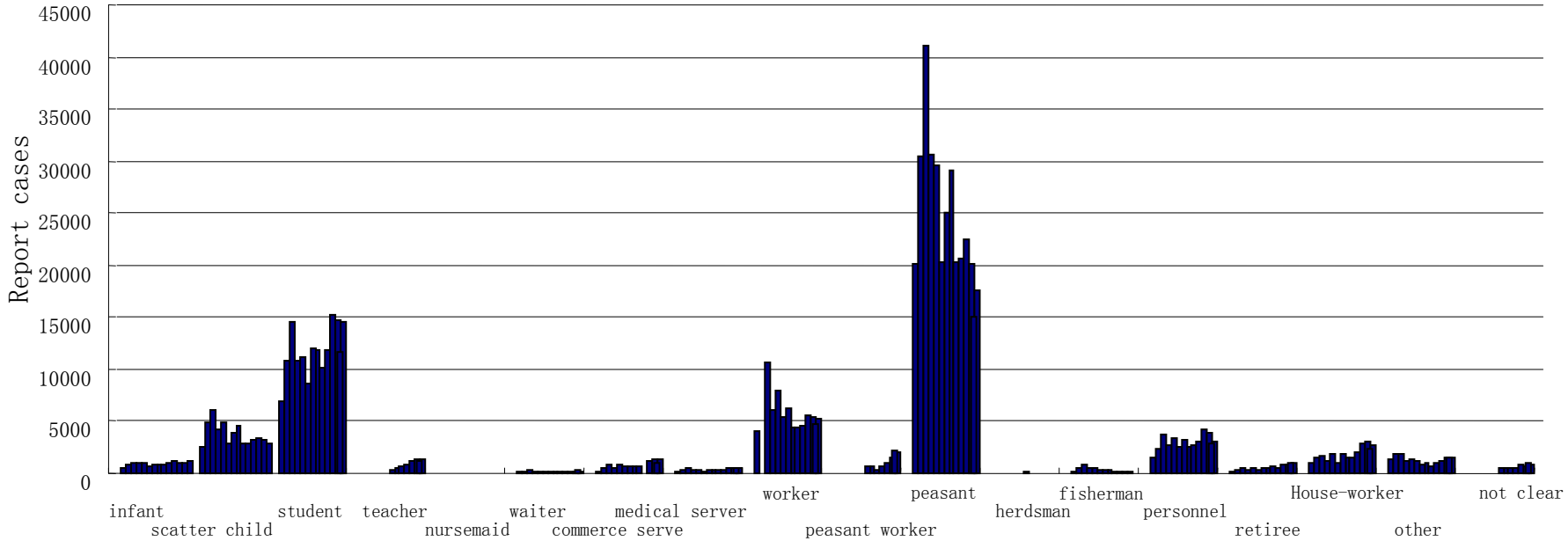

Chart 2-5 change of proportion of different occupations in report cases infected typhoid-paratyphoid from 1990 to 2004.

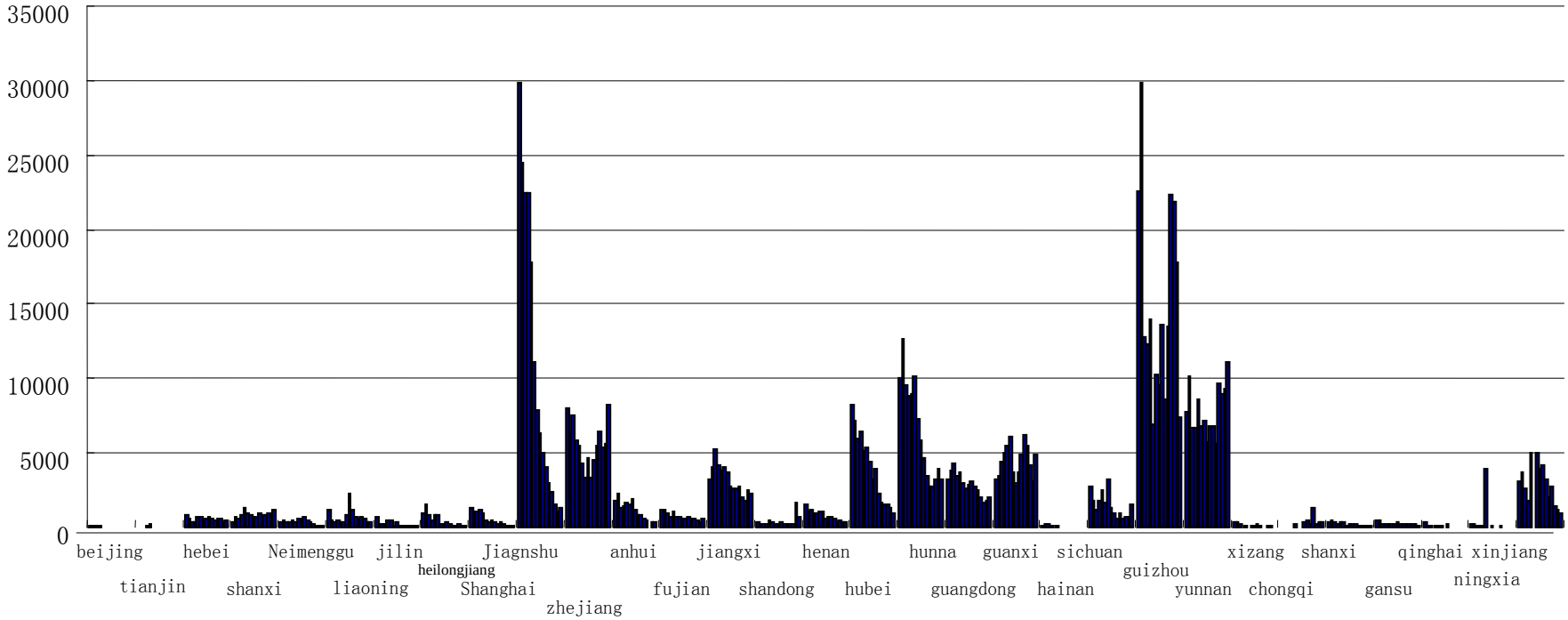

Chart 2-6 The number of report cases of infected typhoid-paratyphoid in every province.

3.2.2. Current problems exist in supervision and monitoring, and jobs need to be strengthened

I. The protection and treatment of style Jia paratyphoid are the new problems now. But in many areas typhoid and paratyphoid cannot be distinguished clearly for lack of data. Exact numbers concerning paratyphoid cannot be obtained in reports during monitoring. Therefore, experimental practices on bacterial separation cannot be done. Clinical diagnoses are made with no pathogenic basis. No more evidences can be provided for further monitoring, problems finding, analysis and making control strategy for contagions. On differing typhoid from paratyphoid, we are still using the old WR method which is less sensitive and particular.

II. Delayed reports on new contagion cases are the major cause for the spread of contagion. In some areas, first case is rarely found for lacking of diagnosis knowledge, short of fund and responsibility. Sometimes, reports are not received even if disease has spread. Moreover, reports shall be objective, without human interference. And it is hard to control for lacking of exact numbers.

III. In China typhoid and paratyphoid occurred in many focal areas. To enhance protection in these focal areas can effectively decrease the spread level around the whole nation. As a result, to make necessary studies, check reasons, analyze characters in different areas, outline spread manner can help to contain the spread of paratyphoid Style Jia.

IV. Right now in China, typhoid and paratyphoid normally appear in poor areas with poor health environment, less experimental equipment, less vaccine. Also with bad economic ability and bad habits, people there are even less conscious on health problems. Normally in these areas transportation and communicaton are not very convenient, thus case report cannot be delivered on time. Water may not clear enough to drink. In summary, it is a comprehensive project to control typhoid and paratyphoid in these places.

3.3. Prevalence of dysentery and control

3.3.1. Prevalence and distribution of dysentery from 1990 to 2004 in China

It is estimated that about 165 million people around the world infect Shigella, and 1.1 min died of it. The incidence rate in developing countries reaches 1.8-6.5/0.1 million.

I. Geographical distribution

Area difference is obvious in China. Incidence rate top 5 cities remain relatively stable. Tibet, Beijing, Gansu, Ningxia, Qinghai, Guizhou, Tianjin, Anhui, etc. are all focal areas. Data shows that incidence rates in Beijing (economic prosperous) and Tibet (less prosperous) are obviously higher than other areas like Fujian. This is not in adherence to the global principle that the incidence rate of dysentery is decreased by better sanitary environment. And this may because our

case report standard and veracity of dysentery in different areas may differ from each other.

II. Time distribution

The report cases of dysentery has decreased from 1.4163 to 0.4905 million from 1990 to 2004. The national incidence rate decreased from 127.438/0.1 million to 39.4 / 0.1 million, with an overall decrease trend annually (see chart 2-7 and 2-8). But in different areas, incidence rate differ annually. Annual death toll is from 144 to 1867 cases, about 0.05-0.132%, a trend of slow decrease in 15 years (see chart 2-9). But in all areas, spring and summer (5th to 10th month, especial July to September) are focal seasons. The incidence can occupy 52.28% of total cases the whole year.

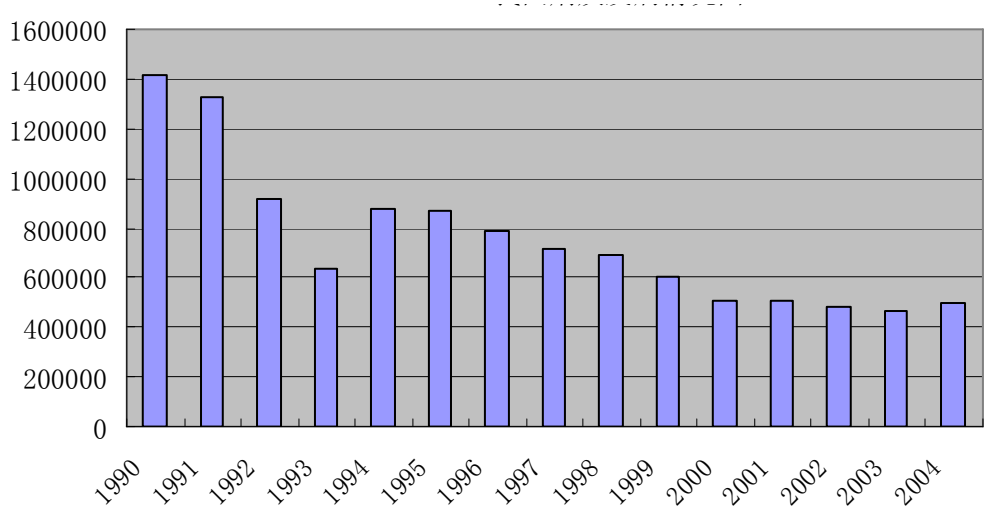

Chart 2-7. 1990-2004 national report cases of dysentery

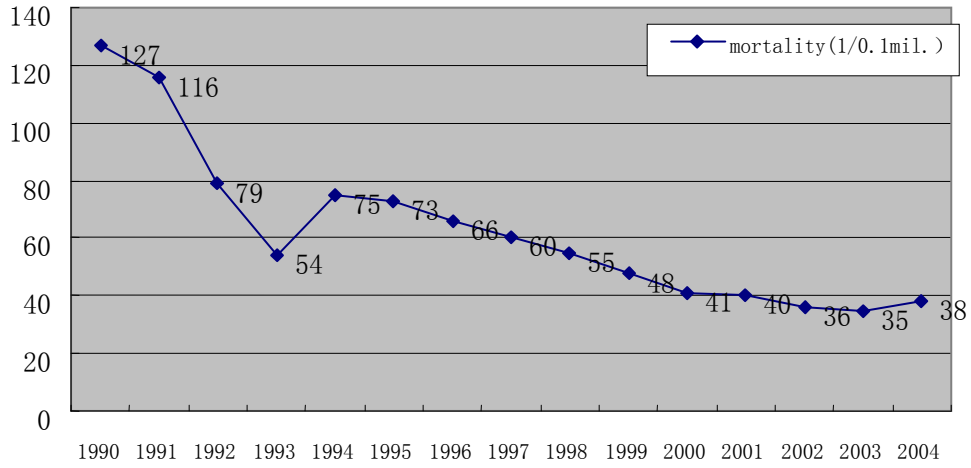

Chart 2-8. 1990-2004 case numbers and trend of dysentery

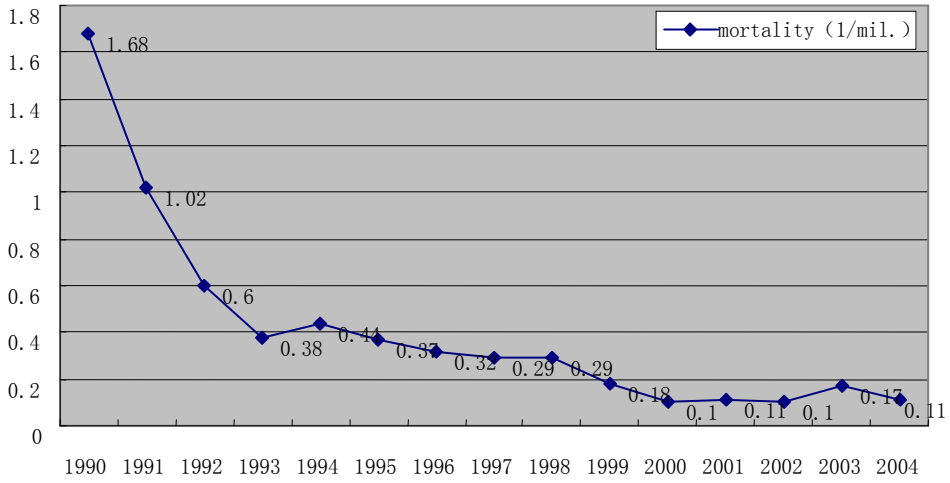

Chart 2-9. 1990-2004 death toll of dysentery

III. Group distribution

Children of 0-10years were the most liable groups of dysentery, and incidence rate in 2002 to 2003 was between 42.81% and 42.58%. Children who lived scattered were about 61% in cases of dysentery.

IV. Analysis of fluctuation and break out

For 15 years, the incidence rate was gradually decreased due to the changes of
Report system standards and increased sanitary status by economic development. But whether pathogen and drug endurance have something to do with the fluctuation is still a question remained for lacking of pathogenic data.

For decades of years, dysentery broke out during high seasons in small scales at times. Food and water pollution are the main cause. Especially in some rural areas with poor sanitary conditions and bad health habits, and in crowded cities, dysentery is hard to control.

V. Analysis of bacteria style changes

According to different characters shown by biochemical reactions and different bacteria antigens, Shigella shigae can be divided into ABCD four groups. In group A Shigella shigae is further divided into 12 sub-groups. Group B Fushi Shigella has 13 sub-groups. Group C Baoshi Shigella has 18 sub-groups. Group D Songshi Shigella has only one style, with smooth or rough colonies, total 44 sub-groups.

Different serum styles have reached 47, found and reported by abroad. And there are still some new styles which cannot be classified. Different styles with different biological characters cause different symptoms. Group A has the greatest power, while group D the weakest.

Different styles have no immunity among each other; therefore, immunity after infection is weak and can only last for a short time. Second infection may appear. Group D Songshi Shigella has weak resistance against heat, dryness and sunshine, but strong against coldness and wetness. Songshi Shigella is in strongest resistance against environments, Fushi strong and Baoshi weak. Shigella shigae has the weakest power. Shigella could live 10 to 20 days on contaminated items, fruits and vegetables. It can thrive in water and food under certain temperature, and can cause the breakout via food and water. Normally heating by 60℃ or sunshine of 15 or 30 minutes can kill the bacteria. It is sensitive to acid and disinfector can kill it. The style changing of Shigella can not only affect diagnosis, but usage of vaccine. Therefore, study on the dynamics of styles is an important part of epidemiology.

As our monitoring system of pathogen is not mature enough, we obtained some data under limited conditions. In 2000, we made a serum analysis of 142 samples and the study show us that Fushi represents 59.90%, and Songshi 33.80%. According to a study of 83 Fushi samples, Fushi 2a style occupies 44, 53.00%, style x 7， 8.4%，1a 11, 13.3%. An experiment made in Shanghai in 2004 found that Fushi 4c style has increased dramatically. Before that Fushi 2a dominated in China, while in developed countries Songshi takes the top position. But in many areas in China a trend of increase of Songshi has been reported recent years. Therefore the style changing of Shigella can not only affect diagnosis, but usage of vaccine. Study on the dynamics of styles is an important part of epidemiology.

3.3.2. Harm of Dysentery

According to reports from 1990, DALY positioned second in the list of all causes affecting human health, while respiratory infection the first. In China, dysentery is the major cause of diarrhea, with incidence rate of 39.4 / 0.1 million, much higher than 1.8-6.5/0.1 million in developed countries. Annual reported cases reach nearly 0.5 million, and children incidence occupies over 40%. Yearly death toll shows 200-500 cases. Small scale breakout because of contaminated water and food is common. Antibiotic treatment is necessary, but drug endurance is a more difficult problem to solve.

Now that the standards of our case report systems in China may differ in areas, the incidence rates in the capital and in poor western areas are similar, much higher than other areas. It is estimated that the fact would be ten times of that reported. The high incidence rate makes a great effect on the health of people, especially children. In addition, annual death toll of 200 cases shall be paid much attention, and this number does not include those died of shock or cerebral symptoms because of delayed diagnosis on acute toxic dysentery. Therefore, as a developing country, we still need to pay enough attention and decrease the incidence rate.

3.3.3. Existing problems and protection controls

I. Protection controls

According to the spread channel and characters of dysentery, the major strategy is to cut the spread line and control the contaminated sources of infection. Focus will be made on areas with potential infection possibilities, such as children's group, food and water pollution areas. Intense monitoring shall be put in those groups and areas.

Protection measures include: first, supervision on contaminated sources. Thorough treatment of acute and chronic patients and supervision of bacteria carriers are needed. Second is to cull the channel of stool to mouth. Comprehensive protection measures shall be put force, including water source, food, and environmental control, and fly and cockroach killing. That is to control water, stool, and food and kill flies. Third is to strengthen supervision of focal groups, such as children. Fourth is to improve report and diagnosis system. Quarantine, antisepsis and in time therapy to acute toxic dysentery shall be put forward.

II. Existing problems

i. Problems exist in the veracity of case reports; confusion between dysentery and diarrhea; misinformation; report failure; and lack of pathogenic data to ensure a dynamic analysis of the disease.

ii. Not enough attention was paid to the disease, most probably due to the characters of the disease itself, high incidence but low death rate.

iii. Sanitary environment and habits in some areas are poor, especially in some rural areas. Scattered cases are common, and the infection channel is not cut. These are highly potential areas for the breakout.

iv. We are still lacking a mature monitoring and supervising system of the breakout and pathogen. Diagnosis without pathogenic basis has to be made. Therefore, treatment and therapy are less targeted. Drug endurance is still a hard problem. Furthermore, we are less capable of analyzing the dynamics of the disease and finding its sources.

v. Lacking of serum for diagnosis is a common problem in many areas around the nation. In some reported cases, some uncategorized styles are found and even dominate in some areas. It is hard to diagnose. In reality, the quality of serums and style problems has affected the work of style separation and shall be quickly solved. Nowadays, national CDC contagion institute has collected those uncategorized and hope to sub group them in order to get further familiar with their harm and develop corresponding diagnosis serum and set classification standards. Management of contaminated sources is affected by lacking of pathogenic test and diagnosing cases with antibiotics taken already.

III. Problems and work need to be solved and done next step

According to the above mentioned problems, the following measures will be taken.

i. Veracity of case report shall be strengthened. Fundamental work from rural areas shall be improved to ensure a dynamic analysis of the disease.

ii. Because we are lacking of pathogenic study and analysis in China, it's hard to find whether popular styles have in variance and changes in drug endurance. Lab monitoring network shall be established and intestine outpatient service shall be strengthened. Pathogenic and sub group work shall be pushed. Moreover, improving the ability of diagnosis and source tracing shall also be done.

iii. To improve the quality of serum diagnosis, collect uncategorized styles, develop new diagnosis serum for dominating styles, quicken report for acute cases, make pathogenic analysis, are all the measures to be taken. Right now some controlling measures require fast pathogenic test, in order to make pathogenic separation, and supply diagnosis basis for those patients already taken antibiotics.

iv. As it prevails in China and China hasn't paid enough attention to it, we need to especially focus our work during high seasons, children under 10, and those rural areas with poor sanitary conditions. We will also strengthen our health education and food supervision, especially in high seasons.

v. To protect and control dysentery, it is very important to cut the infection channel and strengthen our control on contaminated sources. To improve public health conditions, prevent stool-mouth infection, etc. are all the practical measures to prevent and reduce incidence.

3.4. prevalence and control of hepatitis Jia

Hepatitis Jia is a virus infected digestative disease with strong infectivity. People are universally liable to it. Global yearly cases reach about 1.5 million. Because of hidden infection and report failure, the fact may exceed 10 times of the reported. In U.S. more than 1/3 of the disease infected the youth and children under 15; In France, Hepatitis Jia is the main reason for liver function failure among children. The disease prevalence in China reaches among top level in the world, which is indeed a serious condition. According to study in 1992 on 29 provinces, municipalities and automats regions, the average incidence rate in China is 80.9%。By "Disease Monitoring" of 1993-2001, data shows that annually about 0.24 million Chinese (21.4/0.1 million) was infected by hepatitis Jia in average. But fact shall reach far beyond this number. It is estimated that about 2.4 million was infected by hepatitis yearly, among which hepatitis Jia represents about half, 1.2 million/year. Test shows that about 80% Chinese are hepatitis antibody positive. Even in prosperous large cities, infectors are increasing. Breakout is potential and this possibility lasts long.

3.4.1. Prevalence of hepatitis Jia from 1990 to 2004

See table 2-2 and 2-10 for the incidence from 1990 to 2004. The overall trend is in decrease.

Table 2－2　　Prevalence of hepatitis Jia from 1990 to 2004

year	cases	death	Incidence rate（1/0.1mil.）	death（%）	Death rate(1/0.1mil.)
1990	584353	416	52.579	0.071	0.037
1991	637717	383	55.688	0.06	0.033
1992	602591	307	52.076	0.051	0.027
1993	457895	248	39.487	0.054	0.021
1994	353388	195	30.252	0.055	0.017
1995	254242	155	21.466	0.061	0.013
1996	238331	132	20.022	0.055	0.011
1997	226599	169	18.793	0.075	0.014
1998	200337	135	16.003	0.067	0.011
1999	211501	111	17.029	0.053	0.009
2000	134094	74	10.802	0.055	0.006
2001	122896	74	9.669	0.062	0.006
2002	111068	84	8.294	0.076	0.006
2003	99383	70	7.37	0.07	0.005
2004	93585	40	7.2	0.043	0.003

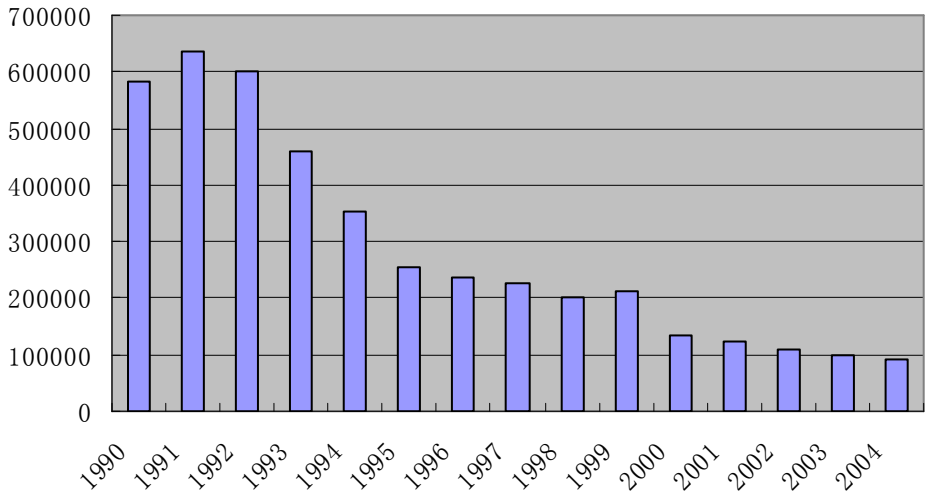

Table 2-10. reported cases of hepatitis Jia from 1990 to 2004

Distribution characters：Gansu, Xinjiang, Ningxia, Tibet, Qinghai provinces are focal areas. Generally speaking, rural areas are higher than urban, north of Yangtze river higher than southern part, western China higher than mid and eastern part.

Group distribution：People less than 15 years old in rural areas and less than 25 years old in urban areas are the most liable groups. Under different ages, men incidence is obviously higher than women, with statistic meaning. Professional liable group includes workers disposing polluted

water or wastes, food industry staff, children, school staff and medical staff.

Time distribution：In areas where people enjoy high immunity, including urban and rural areas, the prevalence shows to be quite seasonal. Autumn and winter are high seasons and spring and summer are dead seasons. It prevails at an interval of 5-7 years. The infection was mainly via life contact, and it is less possible for large-scale breakout. In areas where people enjoy low immunity， including large and middle sized cities, lower reaches of Yangtze river, and Hu Hang triangle district, scattered cases appear throughout the year. End of winter and start of spring is the high season. It prevails at an interval of 3～5 years. The liable group is children and youth. If exposed together, large-scale breakout is highly possible.

3.4.2. Protection and control measures

I. Heath education and personal protectism shall be strengthened. To prevent infection from mouth is always the basic and practical measure.

II. Effective monitoring system, test measures, and standard report system shall be established. By providing an early and exact report, we can take prompt measures accordingly.

III. To strengthen food and water control, gain support from government, improve environments, and control aquatic products are to be done. Water control from pollution must be made, especially in fishing and breeding parts. Efforts shall be made to prevent stool from polluting water. Regular check shall be made on local fishers and health education will be strengthened. Infected cases shall be separated promptly. People will be prohibited from eating raw aquatic products.

IV. Inject vaccine. As it mostly attacks in children and youth, the anti virus level in this group is much lower. Therefore, children under 15 are the main targets of vaccine. In addition, food manufacturing staff, service sections, and close contacts to hepatitis Jia, animal feeders should all receive vaccine. Infected areas shall be dealt with regulations, and close contacts shall take the vaccine. Furthermore we should also extend the inoculation, especially among youth in rural areas to ensure effective immunity ability among people. It is one of the most effective measures in preventing and reducing incidence.

V. Stools must be made harmless, a major way to cut the infection channel. In hospitals, stools must be dealt with hypochlorite. Local preventive departments shall report promptly and if necessary, cooperate with environmental protection bureau to sanitize stools on a regular basis, furthest controlling the environmental contamination by hepatitis virus.

3.5. Chinese current monitoring system concerning diarrhea disease in comparison with that abroad

3.5.1. Chinese current monitoring system concerning diarrhea disease

Now in China reports on style Jia contagion (Cholera) and style Yi (typhoid, paratyphoid, dysentery and hepatitis Jia) are made through national clinical and preventive agencies on network. As for style Bing intestine contagions, reports are not required. As for the breakout of group diarrhea, Disease Prevention and Control Center shall be responsible for investigating, reporting and controlling.

The national network report system is newly established in China to substitute the old file card system. Reports are filled in forms on net and reported directly by local medical and health agencies. In areas without computers, file card is still used and sent to the superior preventive center which is capable of reporting cases online.

3.5.2. Comparison with abroad

Theoretically, our report system collects information fast and completely. Compared with voluntary report system abroad, our system collect full information, but reports may have problems in veracity. Problems exist in the followings.

I. Some patients with diarrhea symptoms do not go to see doctors, which surely affect the statistics.

i. First, patients with light symptoms may refuse to go to hospitals, especially patients with light symptoms of diarrhea, typhoid and paratyphoid.

ii. For fear of expensive medical charge.

iii. Lacking of medical staff, especially in rural areas. It's not convenient for patients to see the doctor. But these areas are normally the most vulnerable ones.

II. As there are so many patients with intestine contagions, less attention is paid on controlling and medical treatment.

III. Social progress and economic development are unbalanced. In rural areas, especially western and mountain areas, waters are not clear enough to drink. No drinking safety is secured.

IV. Some unhealthy habits, like holding large parties, eating raw aquatic products, poor conditions in public WC, will all cause the breakout.

V. Food in China is supplied by large numbers of small peddlers, and a large portion of it is self-made. Therefore it is hard to supervise the quality of food. While collective manufacturing and quality control are used abroad.

VI. Pathogenic tests are seldom used in diagnosing, because there are so many patients. Some pathogenic data are obtained according to some simple and indirect lab tests, with poor veracity, causing failure in reporting some breakout.

VII. To improve the report system, medical staff shall be more responsible. And with a complete and mature set of facilities and management measures, the quality and number of case reports will surely be increased.

Incidence rate among areas can be quite different due to economic development at variant paces, different sanitary conditions, etc. Agricultural population in China enjoys a large portion. Under poor natural and living conditions, diseases concerning diarrhea remain to be our main target of protection and treatment.

4. Prevention and Intervention of Diarrhea

Up to the end of 2003, the reform of rural water-supply has benefited 92.71% people. The number of water-works in country reaches 630,903, and the population of using tap-water is 548,370,000, which takes 58.18% of rural population and gain 2.96% more than that of 2000. The popularization rate of rural tap-water using arrives 99.95%, 97.32%, 85.97%, 84.18% and 80.24% in Shanghai, Peaking, Tianjing, Chekiang and Jiangsu, respectively. The popularization rate of sanitation increases to 50.92%, which is 6.44% more than that of 2000. The emergence of rural diarrhea has been effectively controlled. Safe water supply and popularization of sanitation have actively improved the prevention and intervention of diarrhea.

4.1. Relationship between Water-supply Construction and Sanitation of Lavatory and Diarrhea

Diarrhea is one of the global sanitation problems and also the most popular urgent infectious disease in China which affects the life of rural population badly. For the control of diarrhea in rural area and especially faraway mountain area, it's very important to study the water-supply construction and sanitation of lavatory in such area and evaluate the effectiveness of water-supply and sanitation of lavatory construction rightly.

4.1.1. Measures of Water-supply Construction and Sanitation of Lavatory

Before the water-supply construction, the water supply of rural population is mainly from pool, river, lake, open well and conduit which is polluted in different degree. After the water-supply construction, water supply has become tap water and manual pump well. There is no contamination origin such as lavatory, hogpen, daily junk, puddle and etc. in the area of 30 meters around the new well. Other measures are also taken up to prevent water pollution such as deepen the well, rebuild the well system, airproof the well desk, block up the leakage to prevent infiltration, add fence, cover to well and increase public water container. Chlorine will be added timely, quantity of bacillus will be counted and coliform will be tested.

Before sanitation of lavatory, rural people mostly use simple delve lavatory without dejecta dispose facility which easily brings environmental pollution. After sanitation of lavatory, the lavatory has been changed to leakage proof double-earthen/ firedamp/three- case lavatory with Coliform dispose facility and covered manure pit.

4.1.2. Effects of Water-supply Construction and Sanitation of Lavatory

China is a country of agriculture with 80% population in rural area. Water-supply construction and sanitation lavatory is important work for rural environment. After many years' efforts, water-supply construction and sanitation lavatory has achieved great success. Water-supply

construction provides safe and sanitary drink water for rural population and sanitation of lavatory brings clean lavatory for them which not only take convenience to the life and work of rural population, but also lowers the incidence of diarrhea and promote the healthy level of them. Thus, water-supply construction and sanitation lavatory can increase the living and heath standard of rural population and can promote economic development and society advancement which is good for our people and our country. Now we conclude the effects of water-supply construction and sanitation lavatory according to literature reports.

Case 1

In Hunan Province, water-supply construction resolves the drink water problem of rural population.

I. Improvement of the quality of drink water. Water quality test before and after water-supply construction shows: eligibility rate of water increased from 2.86% to 33.86%; superscale rate of water bacteriology index decreased from 80.71% to 17.76%, $P<0.01$;

II. Lowered the incidence of intestine infectious disease caused by water. The incidence of four major intestine infectious diseases decreased from 37.32% to 17.76% which is an evident decrease: hepatitis A decreased 2.15‰, typhoid decreased 0.39‰, diarrhea decreased 2.76‰ and enteritis decreased 14.26‰. It can be seen that water-supply construction has significant effects to decrease diarrhea and related economic loss and to improve the development of social economy.

Case 2

In Puyang area of Henan Province, water-supply construction received great achievements through the efforts of local people who contribute most capital and local government.

I. Improvement of water quality: 189 water origins have been chosen to make water quality analysis before and after water-supply construction. After the construction, 92.06% (175/189) of them match the national rural drink water standard of first class and 0.53% (1/189) of them don't meet the standard. Before the construction, only 15.3% (28/189) meet the standard and 51.9% don't meet. Sanitation statistics shows $P<0.0001$.

II. Decrease of incidence of diarrhea: After the construction, microorganism index of water attends the standard and incidence of diarrhea decreased obviously. With the overspread of water-supply construction, the incidence of diarrhea decreased every year that is 26.87% in 1990 and 1.90% in 1999. Such can prove that the quality of drink water in rural area is the vital cause of diarrhea and water-supply construction is a key measure. (See table 4-1)

Table 4－1　Water-supply Distribution & Diarrhea

Year	Quantity of water-supply construction	Add-up Construction Rate（%）	Member of Diarrhea	Rate of Diarrhea（%）
1990	212	6.0	886755	26.87
1991	249	13.0	729301	22.10
1992	286	21.2	594421	18.01
1993	212	29.5	528672	16.02
1994	322	38.6	524360	15.89
1995	345	48.4	455460	13.80
1996	262	55.9	293713	8.90
1997	195	61.4	168311	5.10
1998	165	66.1	125438	3.80
1999	163	70.7	62775	1.90

Case 3

In the rural area of Huaibei, Anhui Province, the measure of digging deep wells achieved great success in water-supply and diarrhea prevention. Diarrhea, enteritis and dysentery are mainly investigated in three villages. The results show that the incidence of diarrhea has decreased obviously after water-supply construction. The range of diarrhea decrease is from 19.24% to 59.56% with an average rate of 40.26%. Compare to constrac village, the range of diarrhea decrease in the three villages is from 44.19% to 67.54% with an average rate of 57.56%. (See table 4-2 and 4-3)

Table 4－2　Comparison of Incidence of Diarrhea between Observed Village and Contrast Village before and after Water-supply Construction in Xuyu County

	Observed Village				Contrast Village			
	Diarrhea	Dysentery	Enteritis	Total	Diarrhea	Dysentery	Enteritis	Total
Observed members before construction	1676	1676	1676	1676	2353	2353	2353	2353
Number of sick people	179	16	29	224	310	16	10	336
Incidence（%）	10.6	0.95	1.73	13.36	13.1	0.67	0.42	14.27
Observed members after construction	1341	1341	1341	1341	1285	1285	1285	1285
Number of sick people	95	5	7	107	163	1	7	171
Incidence（%）	7.08	0.37	0.52	7.98*	12.6	0.07	0.54	13.30

*Compared with the information before water-supply construction, P<0.01

Table 4－3　Comparison of Incidence of Diarrhea between Observed Village and Contrast Village in Guanyun County

	Observed Village				Contrast Village			
	Diarrhea	Dysentery	Enteritis	Total	Diarrhea	Dysentery	Enteritis	Total
Observed members	1869	1869	1869	1869	1568	1568	1568	1568
Number of sick people	96	1	11	108	161	3	50	214
Incidence（%）	5.14	0.05	0.59	5.78*	10.27	0.19	3.19	13.65

* Compared with the information before water-supply construction, P<0.01

Case 4

In Xinxin, Jiangsu Province, the incidence of virus hepatitis and dysentery before water-supply construction is separately 23.54/100000 and 22.99/100000. After the construction, the incidence is

separately 4.03/100000 and 7.23/100000. P<0.05 shows that water-supply construction can lower the incidence of intestine infectious diseases.

Case 5

In Zibo, Shandong Province, the incidence of diarrhea has greatly lowered after water-supply construction and sanitation of lavatory. (See table 4-4)

Table 4-4 Comparison of Incidence of Diarrhea between Observed Village and Contrast Village

	Tested Area			Contrast Area		
	No. of Observed people	No. of sick people	Incidence（%）	No. of Observed people	No. of sick people	Incidence（%）
Water-supply Construction	2154	608	28.23	843	392	46.50
Sanitation of Lavatory	2455	772	11.08	850	309	36.35

Case 6

In Hulu Island, Zhoushan, the investigation result of water-supply construction and water infectious disease showed:

(1) Check result of water quality: after construction, all of the bacterium and coliform in water meet the standard and 83.3% of the dissociate chlorine meets the standard. However, before the construction, only 15.0% of the bacterium and 40.0% of coliform meet the standard. The difference is clear (P<0.01).

(2) Before water-supply construction, hepatitis and diarrhea broke out in continuous 6 years with an incidence of disease from 1.5% to 28.4%. After the construction, only a few patients were found. This is also a great difference.

Case 7

The effectiveness of water-supply construction in 6 counties of Hunan Province:

I. After the construction, the bacteria index of drink water dropped greatly and quality of water improved accordingly. But the content of remained chlorine is still very low which make it clear that disinfect of chlorine still need to be improved.

II. After the construction, the incidence of intestine infectious disease has been greatly lowered. (See table 4-5 and table 4-6)

Table 4－5　Drink Water Quality of Rural Area in Hunan Province before and after Water-supply Construction

Check Item	Before Construction			After Construction		
	No. of sample Water	Range of Check	Middle Number	No. of sample Water	Range of Check	Middle Number
Gross No. of Bacterium（body/ml）	70	10～640000	763	141	1～80000	86
Coliform（body/L）	70	3～2400	252	141	0～2400	18
Dissociated remained Chlorine（mg/L）	49	0～0.01	<0.01	95	0～0.05	<0.01

Table 4－6　Comparison of Incidence of Intestine Infectious Disease in 6 Counties in Mountain Area, Hill Area and Lake Area before Water-supply Construction

Group	No. of Observed People	Before Construction		After Construction	
		No. of Sick People per year	Rate（%）	No. of Sick People per year	Rate（%）
⑴Mountain Area	4205	95	22.5	45	10.7
⑵Hill Area	3360	133	39.6	72	21.4
⑶Lake Area	4037	205	50.9	89	22.0

Note: Compare ⑴ and ⑵: before construction, P<0.01, after construction, P<0.01;
Compare ⑴ and ⑶: before construction, P<0.01, after construction, P<0.01;
Compare ⑵and ⑶: before construction, P<0.01, after construction, P>0.05.

Case 8

In Haian County, Jiangsu Province, from 1995 to 1999, the analysis of rural water-supply construction and water-medium infectious disease showed: With the development of water-supply construction in Haian, the incidence of water-medium infectious disease decreased obviously. From 1995 to 1999, U inspection of stylebooks of water-medium infectious disease shows great difference before and after water-supply construction (P<0.001). From 1995 to 1999, make a relative comparison between the rate of people benefited from water-supply construction and the incidence of disease, r=-0.9，P<0.001，which showed a negative relationship. Compare the incidence of water-medium disease of 1999 with that of the 1995, the rate decreased 55.05%. (See table 4-7)

Table 4－7　Haian County: People Benefited from Water-supply Construction & Incidence of Water-medium Infectious Disease

Year	Total Population	Benefited Population	Beneficial Rate (%)	Total No. of Sick People	Incidence of Disease (1/100000)
1995	986620	400523	40.60	2865	290.39
1996	990287	531347	53.66	2039	205.90
1997	990205	714612	72.17	2244	226.62
1998	989045	917321	92.75	1530	154.69
1999	986798	923850	93.62	1288	130.52

Case 9

The research report of sanitation of lavatory in Hunan rural area displayed the effects of such sanitation on controlling of intestine infectious disease and parasite infection.

I. Parasite infection: Among 5780 people 4 main parasites were checked out. 614 persons infected with bellyworm egg, 38 were infected with hookworm egg, 17 were infected with scourgeworm egg and 5 were infected with pinworm egg. The infectious rate of the four main disease is separately 1O.62%、O.66%、0.47% and 0.43%. Only 578 persons were infected with one parasite and 93 persons were infected with 2 parasites which accounted for 83.14% and 13.17% in all the infected persons (see table 4-8). In the village without sanitation of lavatory, a case infected with ginger piece egg was found.

II. People with diarrhea: 11586 people were examinedd and the total incidence of diarrhea is 23.56%. The dada of village with sanitation of lavatory was 16.38% while the data of village without sanitation of lavatory is 29.03%. The former is especially lower than the latter ($P<O.001$). As for the intestine infectious disease, the total incidence of hepatitis A, diarrhea and typhoid in the village with sanitation lavatory was 5.99% while the incidence of such disease in the village without sanitation lavatory was 10.94% and infectious diarrhea was 14.76% which took a part of 62.64% in the total incidence of disease (see table 4-9). In the 5 years before and after sanitation of lavatory, the incidence of infectious intestine disease was separately 10.59% and 5.39% which showed a clear decline ($P<0.05$). (See table 4-10)

Table 4－8　People Infected with Parasite Egg in Village with and without Sanitation of Lavatory

Observation spot	No. of examined people	No. of Checked out	Positive Rate（%）	Bellyworm		Hookworm		scourgeworm		pinworm	
				Positive	Positive Rate	Positive	Positive Rate	Positive	Positive Rate	Positive	Positive Rate
Village with Sanitation Lavatory	2659	175	6.58	157	5.90	5	0.19	7	0.26	6	0.23
Village without Sanitation Lavatory	3121	531	17.01	457	14.64	33	1.06	22	0.70	19	0.61
Total	5780	706	12.21	614	10.62	38	0.66	27	0.47	25	0.43

Table 4－9　Incidence of Main Intestine Infectious Diseases and Infectious Diarrhea in Village with and without Sanitation Lavatory

Observation spot	No. of examined people	No. of Checked out	Incidence of disease（‰）	Intestine Infectious Disease（hepatitis A, diarrhea and typhoid）		Infectious Diarrhea	
				No. of sick people	Rate（‰）	No. of sick people	Rate（‰）
Village with Sanitation Lavatory	5007	82	16.38	30	5.99	52	10.38
Village without Sanitation Lavatory	6579	191	29.03	72	10.94	119	18.09
Total	11586	273	23.56	102	8.80	171	14.76

Table 4－10　Incidence of Main Intestine Infectious Diseases and Infectious Diarrhea before and after Sanitation Lavatory

Observation spot	No. of examined people	No. of Checked out	Incidence of disease (‰)	Intestine Infectious Disease (hepatitis A, diarrhea and typhoid)		Infectious Diarrhea	
				No. of sick people	Rate (‰)	No. of sick people	Rate (‰)
Before Sanitation of Lavatory	5007	56	11.18	21	4.19	35	6.99
After Sanitation of Lavatory	5007	26	5.19	9	1.80	17	3.40

Case 10

The analysis of the results of sanitation of lavatory in Jian'an rural area 10 years ago showed: With the spread of sanitation of lavatory and safe treatment of dejecta, the incidence of intestine infectious diseases (diarrhea, typhoid and hepatitis) and helminth egg infection has decreased yearly since 1991 to 2000, from 175.14/100000 namely 76.88% to 57.78/100000 and 22.16% and each dropped 67.01% and 71d.17% (see table 4-11). It showed a negative relationship between the incidence of disease and sanitation of lavatory and safe treatment of dejecta. Sanitation of lavatory is one of he rival measures in rural area to control intestine infectious diseases and parasite diseases.

Table 4－11　Relationship between Incidence of Intestine Infectious Disease and Infection Rate of Parasites

Year	Rate of Sanitation Lavatory (%)	Rate of Safe Treatment (%)	Diarrhea (1/100000)	Typhoid (1/100000)	Hepatitis (1/100000)	Helminth Egg Infection Rate (%)
1991	8.02	4.70	13.42	4.07	157.65	76.88
1992	8.32	5.62	16.72	4.13	140.42	73.20
1993	16.05	13.78	9.41	1.56	152.24	65.76
1994	32.20	28.20	15.50	1.56	101.34	49.83
1995	40.63	36.34	14.35	1.57	67.86	47.24
1996	48.14	42.10	12.04	1.40	57.91	48.02
1997	58.03	47.68	10.91	1.22	56.03	36.26
1998	69.07	52.02	8.62	1.22	54.06	28.56
1999	72.06	58.76	9.03	1.21	52.27	23.07
2000	80.22	66.62	8.50	1.22	48.06	22.16

4.2. Relationship between Sanitation Measure and Diarrhea

Diarrhea is the most popular infectious disease in our country which threatens the health of people especially the growth and safety of children. According to the imperfection analysis of WHO, there were 4,500,000 children under 5-year-old died from diarrhea every year in developing countries. The causes of diarrhea are various and the vital factors are quite a lot, so it's important to improve health education and advance the sanitation measures to control diarrhea. With the research of the control results, more scientific supports can be found to make the control work better in the future.

4.2.1. Sanitation Measures

Sanitation education has been taken up to help people establish good sanitation habits. As for students, lectures, video tapes and booklets of sanitation knowledge are used to help them establish well sanitation habits such as washing hands before eating and after going to the lavatory and not buying dirty food in some small personal shops near school. As for rural population and other population with little education, measures such as washing fruit and vegetable before eating, washing hands before eating and after going to lavatory and cleaning buffet frequently are suitable. Improve the environmental sanitation is good for controlling disease and keeping fit. As for school, sanitation of lavatory and safe treatment of dejecta are necessary measures. What's more, establishing and toughening sanitary control system, cleaning corners, killing fly and controlling the growing of mosquito and fly are also important. More washing fittings should be provided for students to wash hands before eating and after going to lavatory. Rebuilt water supply to provide drink water to students and where there is no water-supply students should bring drink water from home and don't drink tap water. Teach students to know the spread way of disease and help them to establish health habits to protect themselves from disease. Health education should spread over all the country and supervision should be taken out regularly. Improve the sanitation in home and living environment and give publicity to sanitation education regularly.

4.2.2. Effects of Sanitation Measures

Case 1

The effects of sanitation measures on controlling diarrhea among students in Shanghai showed: The acknowledgment of sanitation in the observed student group was 74.36% while in the contrast group it was 37.78% which provide a clear statistic data ($P<0.001$). The supervision work was taken out quite well. Effects of controlling over diarrhea:

I. During the research period, 33 students (6.94‰) in the observation group caught diarrhea while 52 students (11.26‰) in the contrast group caught diarrhea which showed an obvious difference ($P<0.05$). (See table 4-12)

Table 4－12　Incidence of Diarrhea of Two Groups of Students

Group	No. of Persons	No. of Sick Person	Incidence of Disease (%)
Observation Group	4756	33	6.94
Contrast Group	4619	52	11.26
Total	9375	85	9.07

II. Comparison of incidence of diarrhea before and after sanitation measures were taken: Before the measures were taken, incidences of diarrhea of observation group and contrast group were separately 11.30% and 10.60% which showed no clear difference (P>0. 05). After the measures were taken, such data was 6.95% and 11.28% separately which showed obvious difference. There was no statistic significance of the data of contrast group (see table 4-13).

Table 4－13　Comparison of Incidence of Diarrhea between Two Groups

Group	Before Sanitation Measure			After Sanitation Measure			X^2	P
	No. of Observed People	No. of Sick People	Incidence of Diarrhea (%)	No. of Observed People	No. of Sick People	Incidence of Diarrhea (%)		
Observation Group	4756	53	11.30	4756	33	6.95	4.61	<0.05
Contrast Group	4619	48	10.60	4619	52	11.28	0.16	>0.05
Total	9375	101	10.77	9375	85	9.07		

Conclusion: The research results of sanitation measure over controlling incidence of diarrhea among students was consistent with the reports oversea which tells us that through education of sanitation habits students can get over bad habits and the incidence of diarrhea can be lowed. Sanitation education is a useful measure.

Case 2

Research of causes of diarrhea and results of sanitation measure over controlling disease had been taken out in rural area of Zhumadian. The main threats of catching diarrhea in this area were: don't wash hands after going to lavatory, wash dishcloth with river water and don't clean the buffet regularly. Such threats were common in the individual and family. Thus it can be seen, to lower the incidence of diarrhea in rural area it's not enough only through developing economy, improving water-supply condition. Sanitation education, acknowledge of health among rural population, establishment of good daily habits and sound social spirits are also important to lower the incidence of diarrhea. Experience inside and outside country shows that health education can help people to alter bad sanitary habits, can effectively lower the incidence of diarrhea and thus bring great economic progress for our country.

Case 3

In Qinhai province, incidence of diarrhea was lowed efficiently by carrying out sanitation education and measures. In 1978, incidence of diarrhea caused by bacterium was 2304.49/100000 which reached the peak of 70s while the incidence declined to 123.36/100000 in 2001. Death rate of diarrhea was 5.82% in 1952 which was the peak point and it was lowed to 0.05% in 2001. Compare the incidence and death rate of diarrhea between the 1991-2000 and 1981-1990, the incidence was lowered 70.90% and the death rate was lowered 84.92%. The decline speed ranked 10^{th} in all fatal diseases. The incidence of typhoid and paratyphoid was lowered 27.59%. But there is still much to do to control the diarrhea. Studying the analysis reports of epidemic situation in our province from 1991 to 2000, we can see that the incidence of intestine infectious diseases was 68.25%, incidence and death rate of diarrhea was the highest in all diseases and the incidence of typhoid and paratyphoid was 2.265/100000.

Case 4

In Zibo, Shandong Province, diarrhea was controlled well though sanitation measures and the incidence of diarrhea was obviously lower than that of the contrast area.(See table 4-14)

Table 4－14　Comparison of Incidence of Diarrhea between Examined Area and Contrast Area

Area	Population	Sick Population	Incidence of disease (%)
Examined Area	1122	316	28.16
Contrast Area	1003	392	39.08
Total	2125	708	33.32

Note: Compare the incidence of diarrhea between examined area and contrast area $P<0.01$.

Case 5

In Liuhe County, Jiangsu Province, sanitation measures taken up in schools effectively lowered the incidence of diarrhea among students. Comparison of incidence of diarrhea in summer and autumn: Before sanitation measures were taken out, average incidence of diarrhea of examined school and contrast school was separately 18.5% and 29.49% and the latter was a litter higher than the former. After sanitation measures were taken out, the incidence of diarrhea of examined school decreased from 18.5% to 3.33% while that of the contrast school was still 16.33% which was at a quite high level. Incidence of diarrhea of examined school before and after sanitation measures were taken out showed a great difference ($P<0.01$). Incidence of diarrhea of examined school and contrast school after sanitation measures were taken out also showed a great difference ($P<0.01$). Sanitation measures do prevent diarrhea. Carry out sanitation measures to help students to form good sanitary habits when they are young and to help them to know how to prevent disease. Meanwhile, pollution origin should be cut off and students should be forbidden to drink pipe water. Such measures will bring benefits to students and also rural population and will be the fundamental measures to prevent intestine infectious disease.

5. Study of Diarrhea Burden

5.1. Definition of Diarrhea and the Purpose and Meaning of Studying Diarrhea Burden

Diarrhea Disease is a group of diseases with all kinds of causes. In a wide scope, diarrhea includes infectious diarrhea and un-infectious diarrhea. Infectious diarrhea is a group of diseases caused by pathogeny organisms including bacterium, virus, parasite and etc. and its main clinic feature is diarrhea. It can be simply called diarrhea.

Diarrhea is easy to spread and infect which is popular all over the world. It not only threatens the health of people, but also brings great loss to society and economy. It is listed as one of the global most important sanitation problems by the WHO. According to the research of the WHO, death rate of diarrhea is the fourth of all the diseases just inferior to tumor, heart and brain blood vessel disease and diabetes. The damage is especially high in developing countries. The WHO estimated that in 2001 1,350,000 children died of diarrhea. In developing countries, 13% of the children under 5-year-old died from diarrhea. Diarrhea is the second cause of disease of children all over the world.

Diarrhea is also a murder of health of our people. In July 2005, second international wheel-type virus bacterin research meeting was held by Chinese CDC and American CDC in Beijing. On the meeting, it was point out that in the children under 5-year-old in China, one out of 28 would go to hospital because of wheel-type virus, one out of 120 would be treated in hospital because of wheel-type virus and one out of 2100 would die of wheel-type virus. The cost of treating wheel-type virus disease is quite large in China that is nearly 800 million every year.

Study of diarrhea burden refers to the test of economic loss of society and family caused by diarrhea. It is a integrate method to study the loss caused by diarrhea.

Study of diarrhea burden will help people to calculate the impacts to health, life and social economy caused by diarrhea. So people can make right decision and accession and evaluate the impacts of diarrhea correctly. At the same time, it can help people to chose suitable measures to prevent diarrhea efficiently. Consider the burden of sickness thoroughly is also the emphases work of programming area sanitation and is the foundation of locating sanitation resource reasonably.

5.2. Study Methods of Diarrhea Burden

After 20 years development, the test of diarrhea burden has formed well-rounded theory and test methods which played import role in sanitation construction. There are three steps of the developing of test of diarrhea burden.

5.2.1. Death Rate, Cause of Death and Incidence of Disease

Before 80s in the 20th century, disease burden was mainly showed by death instance. Measure index included death rate, cause of death and incidence of disease.

Death Rate = (total population of death in certain area during certain period (caused by diarrhea)/ average population at the same time in the same area)×K

K=100%, 1000‰ or 10000/10000……

Incidence of Disease = (new case of diarrhea in certain population during certain period/ population exposed at the same period) ×K

K=100%, 1000‰ or 10000/10000……

Also such indexes reflected the situation of disease and the worst results brought by the disease, but they didn't embody the impacts to health brought by disease, especially the influence to life quality caused by wide-spread chronic disease.

5.2.2. Potential Life Lost

American CDC brought forward the index of YPLL (years of potential life lost). The index used life loss caused by disease to evaluate the burdens of different diseases. YPLL was more corrective and reasonable than traditional index. However, this index just considered the impacts of death, didn't consider the burden brought to patients by un-fatal diseases.

Calculation method of YPLL is as follows:

$$PYLL=\sum_{x=0}^{L} d_x(L-x)$$

Note: dx = population died when they are x-year old
L = potential upper limit of life

There are different opinions to define L. Dempsey considers L should be calculated from the birth date of person while Romder & Mcwhinnie consider YPLL should be calculated from 1 year old.

5.2.3. Disability-adjusted Life Year

In 1993, experts from Public Sanitation College of Harvard and International Sanitation Organization pointed out an index disease to analysis disease burden, namely DALY (Disability-adjusted life year) with the help of World Bank. This index discloses the impacts of life loss caused by disease death, healthy life loss caused by deformity after disease, healthy life age and the relative importance of time. It is calculated and tested in three points of view including life expansion, life quality and sense of life. DALY is the best measure method of disease burden till now.

Calculation method of the DALY of a certain disease:

$$DALY=YLLs+YLDs$$

Note: YLL = DALY loss caused by death of disease

YLD = DALY loss caused by deformity

Calculation method of YLL and YLD:

$$\int_{x=a}^{x=a+L} Dcxe^{-\beta x}e^{-r(x-a)}dx =$$

$$-\left[\frac{DCe^{(-\beta x)}}{(\beta+r)^2}\left[e^{(-(\beta+r)L}\left[1+(\beta+r)(L+a)\right]-(1+(\beta+r)a\right]\right]$$

Note: D = disability- adjusted index, D=1 when died

r = 0.03 (usually), discount rate

C = 0.1658 (usually), age regulation index

β= 0.04 (usually), age function parameter

a = age when death of disability happens

L = life span or loss of death time under disability state

DALY considers the value of the loss of health life in some degree, but it still only evaluates the impacts on the patients but doesn't evaluate the economic loss of the family of patients and the economic loss of society. Some scientists point out that disease burden should include three parts: the burden of patients, the burden of patients' family and the social burden. Family burden refers to the difficulties, problems or negative impacts brought to family by the disease of family member. Such impacts can be that the relatives have to look after the patients at home or at hospital which may influence their own work, that the family members may affected in their psychology and etc. Social burden includes economic burden of the society, the impacts on social function of patients, the psychology impacts on social members, the economic impacts on social economy, the influence brought to the government, the influence on stabilization of society and etc.

As discussed above, disease especially that can affect the health greatly and widely should be studied from many orientations. Disease burden should be evaluated by manifold methods.

Diarrhea is a popular disease with multi features and can influence the health and life of patients greatly. So the evaluation of diarrhea should be integrated with the indexes mentioned above.

5.3. Research State and Features of Diarrhea Burden

The especial reports on diarrhea burden in our country are not very many now. The study of diarrhea burden only took out in the scope of epidemiology, pathogeny, clinic treatment, treat methods or analysis of the effects of sanitation measures. Some indexes such as incidence of disease, death rate, treat period, treat method and according expenses were pointed out. Such indexes can embody the effects of diarrhea burden in some way. The studies were mostly carried out in a certain area and the research population was child under 5 years old.

5.3.1. Broken out and Death of Diarrhea

The study data of diarrhea epidemiology came mostly from a long term test over a certain group of people in a certain area. Such data included information of incidence of diarrhea, treatment in hospital and death and reflected the harm brought to local people by diarrhea. Inspection or research of epidemiology focused on a certain diarrhea caused virus and mostly during the period before diarrhea broke out which took a long cycle. Since the level of economic development is different everywhere, the incidence and death rate of diarrhea is different accordingly. But as a rule, children under 5-year-old are easy to get diarrhea and men are easy to get diarrhea than women.

The inspection data over country from 1998 to 2004 showed: The number of children in hospital caused by diarrhea was 20.8% of the total number of children in hospital. The number of children caused by wheel-type virus was 48% of the total number of children in hospital caused by diarrhea. Among the samples of children with acute diarrhea in examined hospital, 23.8% had wheel-type virus. Analysis of the information of children with diarrhea under 5-year-old nationwide showed: In the samples of children aged from 12 months to 17 months wheel-type virus were most easily detected that was 52.3%. The second age group was 18 months to 23 months with the data of 51.7%. The dada of other age groups such as 18 months to 23 months and 6 months to 8 months was also very high that was 46.0% and 42.4% separately. According to estimation, among the children under 5-year-old, 13,000,000 would catch wheel-type virus diarrhea every year and 2,500,000 of them would go to hospital, 230,000 of them had to stay in hospital and about 38000 to 47000 of them might die.

According to the research information of 40 inspection spots of children nutrition nationwide and the analysis information of “Spot Check of Chinese Children in 1992” (Fu Zhenying), among the children under 6-year-old incidence of diarrhea of male was higher than that of the female ($P<0.05$) and the incidence was higher in rural area than in the downtown ($P<0.01$), especially in the undeveloped rural area the incidence was 10.36% which is 2.4 times of that of the downtown area. See Table 5-1.

Table 5－1　Incidence of Diarrhea in Two Weeks of the Children under 6-Year-Old

Area	Male	Female	Total
Downtown Area	4.97	3.59	4.31
Rural Area	7.26	6.70	7.00
Normal Rural Area	5.35	5.06	5.21
Undeveloped Rural Area	10.67	9.96	10.36

From July 1999 to June 2001, Tang Jingyu investigated the diarrhea of children under 5-year-old in Lulong County, Hebei Province. The inspection results showed: During 2 years about 676 children average were inspected, 8113 children were inspected, among which 818 children had diarrhea. **The incidence of disease was 10.08%, at an average rate of 1.21 person per year,** and through every year. From January to December (see Chart 5-1), the incidence of diarrhea is highest in June and July which is 20.54% and 13.23% separately and the incidence in January is higher which is 14.12%. Incidence of October and November is the lowest which is 6.81% and 6.99% separately. The research results also show that **the death rate of diarrhea of children under 5-year-old is the third in all fatal diseases to children that is 13.04%.**

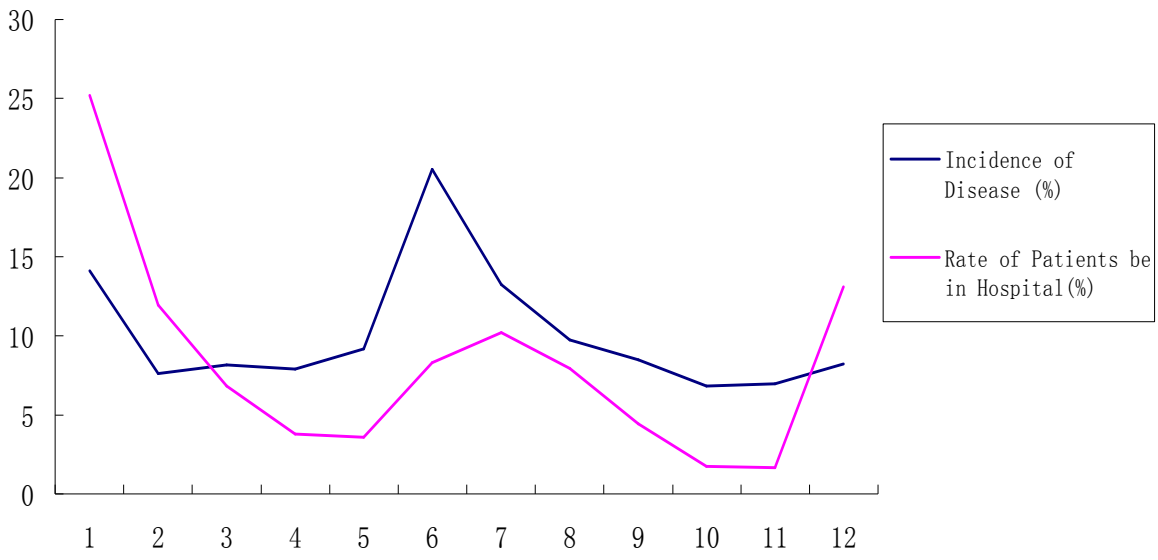

Chart 5-1 Incidence of Diarrhea of Children under 5-Year-Old from January to December

Beijing Youyi Hospital inspected the affection and spread of wheel-type virus in the children under 5-year-old in hospital. In this investigation, the definition of diarrhea was sample with several unusual quantity of virus or unformed dejecta. The definition of in hospital was treated in hospital no less than 24 hours. The results showed: **During 3 years of inspection, 36 children under 5-year-old died, among which 10 children died of diarrhea with the rate of 27.78%.**

From 1986, people infected with diarrhea in rural area in Rudong County, Shandong Province were detected for 11 years. The results showed: During the 11 years, average incidence of diarrhea

per 10 days was about 2% (see Table 5-2) and the incidence was smooth through the whole year. The incidence of diarrhea was highest in the children under 5-year-old that was 8.95%. The incidence was second higher in the children from 5 to 10- year-old that was 2.74%. The average incidence of all the population is 1.95% (see Table 5-2).

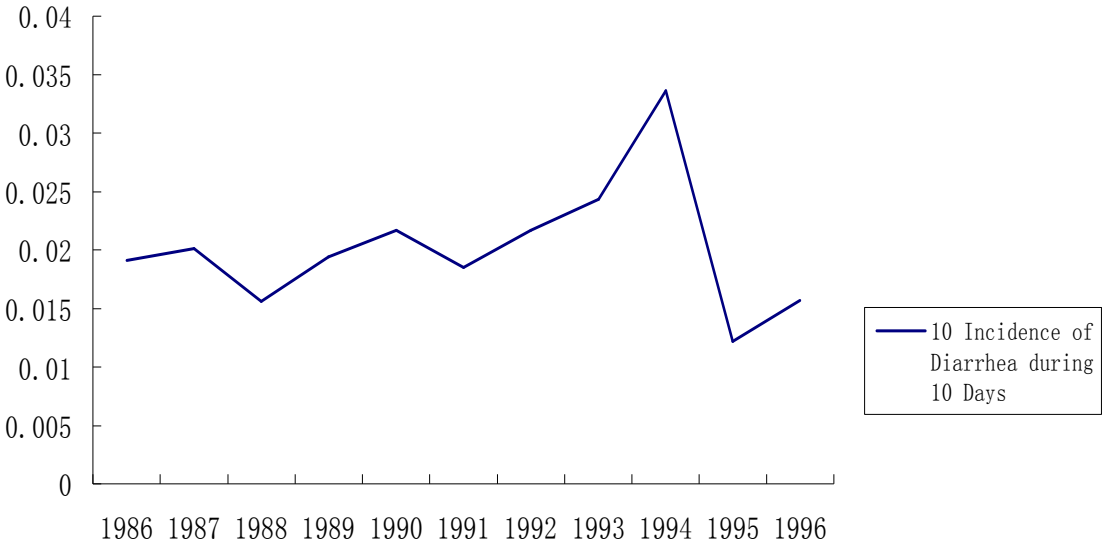

Chart 5-2 Incidence of Diarrhea during 10 Days in Rudong County,

Shandong Province from 1986 to 1996

Table 5－2　Distribution of Age of People with Diarrhea
In Rudong, Jiangsu Province and in Zichuan, Shandong Province

Age Group	Rudong County			Zichuan County		
	Investigated Population	Sick Population	Incidence of Disease（%）	Investigated Population	Sick Population	Incidence of Disease（%）
0-	1464	131	8.95	2143	167	0.8192
5-	1236	34	2.75	1985	48	0.2542
10-	1088	16	1.47	4505	132	0.3080
15-	1223	12	0.98	6234	123	0.2074
20-	4937	69	1.40			
30-	3730	53	1.42	4960	121	0.2564
40-	2541	34	1.34	3272	113	0.3630
50-	2233	31	1.39	2819	94	0.3503
60-	2730	33	1.21	3597	150	0.4384
合计	21182	413	1.95			

Note: Inspection data of Rudong County was taken from 1986 to 1996.
Inspection data of Zichuan County was taken from 1989 to 1996.

Situation of diarrhea in Zichuan County, Shandong Province was detected from 1989 to 1996. The results showed: Incidence of diarrhea of all population was 0.3376/ person every year, incidence of men was 0.3672/person every year and incidence of women was0.3103 /person every year. Incidence of children was 0.8085/person every year, incidence of male was 0.8327/person every year and incidence of female was 0.7835/person every year. No children died of diarrhea. Incidence of children under 5-year-old was the highest that was 0.8192/person every year and the second highest was among old people over 60 that was 0.4384/person every year. Details see Sheet 1. In the detected patients, 94.09% were caused by enteritis and 5.91% were caused by dysentery. While in the detected children, 94.69% were caused by enteritis and 5.31% were caused by dysentery.

The investigation (Wang Zhentao) in certain mountain area in Shanxi Province showed: The incidence of CDD of two weeks was 110.11‰, among which the incidence of male was 115.43‰ and the incidence of female was 103.06‰. 99.37% of the sickness of children was caused by enteritis and 0.63% was caused by dysentery. CDD of children under 5-year-old declined with the increase of age. The peak appeared in 0 – group that was 225.56‰ (see Table 5-3).

Table 5－3　Incidence of Diarrhea of Children under 5-year-old in Two weeks in Shanxi Province

Age	Total Patients	Child Patients	Incidence of Diarrhea (‰)
0-	266	60	225.56
1-	322	45	139.75
2-	271	24	88.56
3-	323	19	58.82
4-	262	11	41.98
Total	1444	159	110.11

Investigation (Fang Jianping) of five national undeveloped county (Jintai, Tianzhu, Dingxi, Jingning and Qinshui) Showed: Incidence of diarrhea of children under 1-year-old of rural area was 3.03 times that of the downtown area (see table 5-4). No matter male or female children, incidence of diarrhea would declined with the grow of age.

Table 5－4　Incidence of Diarrhea of Children under 1-year-old in Undeveloped Rural Area of Gansu Province (%)

Area	Male	Female	Total
Downtown Area	4.97	3.59	4.31
Rural Area	11.75	11.32	11.56
Undeveloped Rural Area	14.82	10.66	13.06

Wang Yan analyzed the report of Wei-Ⅵ Project in 1997 and found that among the died children under 5-year-old 22.3% were died of diarrhea.

From June, 1998 to May, 1999, in the Fund to Help Women and Children Project developed by Nanhua County, Yunnan Province, children under 3-year-old with diarrhea were the object to be helped. The data of the project showed: One year before the project began, the average incidence of diarrhea of the children in Nanhua County was 154.81% and such incidence declined with the development of economy. While in the progress of the project the incidence was150.86% (see Table 5-5).

Table 5－5　Incidence of Diarrhea of Children under 5-Year-Old
In Nanhua County, Yunnan Province from June, 1997 to May, 1999

Economy Development	June, 1997—May, 1998 Inspection Data when the Project didn't Develop			June, 1998—May, 1999 Inspection Data after the Project Developed		
	No. of Children	No. of Sickness	Incidence of Diarrhea（%）	No. of Children	No. of Sickness	Incidence of Diarrhea（%）
Most Undeveloped	205	354	172.68	383	681	177.81
Undeveloped	119	184	154.62	728	1152	158.24
Developed	320	459	143.44	6981	10315	147.76

The report (Qiu Yiteng) of the investigation on the flowing children in two Counties in Guangzhou Province in 1998 showed: The incidence of diarrhea of flowing children was 13.60% which was much higher than the incidence of diarrhea of the local children that was 3.24%.

5.3.2. Treatment of Diarrhea

Different causes of diarrhea will bring different clinic features. Diarrhea can be divided by its cause into cholera, enteritis, dysentery, typhoid, paratyphoid, virus diarrhea and etc. Dysentery and enteritis caused by bacterium and virus are the most common. Since the courses of disease are different and the children are easy to dehydrate, so more children go to hospital than the adult. Rate of going to hospital, the degree of hospital and time in hospital can be the calculation indexes to evaluate the economic loss of family and society because of diarrhea burden.

I. Rate of Going to Hospital and the Situation of Hospital

Diarrhea is the most common symptom of diarrhea disease and may be accompanied by vomit and high fever. The course of normal acute bacterium infectious diarrhea is 1 to 3 days. Without the serious vomit and water like dejecta, patients can recover after resting, having medicine and other simple family treatment. So the diarrhea patients especially the adult without serious symptoms will have oral medicine in home other than go to hospital. Even if they go to hospital, they will choose community hospital, rural hospital or other fundamental hospitals. Only when the symptoms are serious they will go to the formal hospital. Children have weak resistance of disease and accompanied symptoms. Especially children under 5-year-old are easy to dehydrate and have to go to better hospitals. The inspection reports of some scientists on diarrhea embodied the situation written above.

The investigation (Yang Jie) in rural population in Rudong County, Jiangsu Province showed: The rate of gonging to hospital of diarrhea disease was only 16.7%. This rate of children from 0 to 4-year old was 50% and the rate of patients over 5-year-old was only 6.3%. The rate of patients without going to hospital is 83.3% (see Table 5-6).

Table 5－6 Situation of Treatment of the Patients in Rudong County in 1992

Age	No. of Tested People	No. of Sick People	Go to Hospital				Don't go to Hospital		
			Village Hospital	County Hospital	Better Hospital	ORS	Take Medicine By Oneself	Without Treatment	ORS
0-	104	10	4	1	0	0	2	3	0
≥5	1835	32	2	0	0	0	11	19	0
Total	1939	42	6	1	0	0	13	22	0

The inspection results in Zichuan County showed: Among the 948 investigated patients, 516（54.43%）went to village hospital, 67（7.07%）went to County hospital or better hospital, 210（22.15%）and the other 155（16.35%）didn't have any treatment. As for the children, 57.50% went to village hospital, 8.15% went to County hospital or better hospital, 17.00% had family treatment and the other 17.36 % didn't have any treatment. The inspection in Xuyu County of HuaiBei and Guanyun county of Lianyugang showed: 48.28% of the diarrhea patients went to village hospital, 6.38% went to county hospital, 1.89% went to better hospital, 43.45% didn't have any treatment and 0.43% were treated in hospital.

The research of Beijing Youyi Hospital showed: Among the children under 5-year-old in their hospital 20.1% were acute diarrhea. The research of Lulong County, Hebei Province showed: The rates of children under 5-year-old with diarrhea were in hospital in January and February were the highest that were 25.18% and 13.09%. The rates of October and November were the lowest that were 1.76% and 1.67% (see Chart 4-1).

The data of Fund to Help Poor People Project showed: Before the project, the average rate of going to hospital of the children in this area was 73.31% and the rate after the project was 82.03% (see Table 5-7).

Table 5－7　The Treatment Situation of Children under 3-Year-Old with Diarrhea

Economy Development	June, 1997—May, 1998 Inspection Data when the Project didn't Develop			June, 1998—May, 1999 Inspection Data after the Project Developed		
	No. of Children	No. of Sickness	Incidence of Diarrhea（%）	No. of Children	No. of Sickness	Incidence of Diarrhea（%）
Most Undeveloped	354	238	67.23	681	552	81.06
Undeveloped	184	139	75.54	1152	904	78.47
Developing	459	354	77.12	10315	8510	82.50

II.　Methods of Treatment

Normal treatments of diarrhea include: prevent dehydration, treat dehydration timely, adjust the pH, supply food and use antibiotic appropriately. But according the research, whether in the self treatment or going to hospital antibiotic is used too much which brings many unnecessary economic burdens.

The inspection results of Rudong County showed: Whether being treated or not, ORS is a good treatment. ORS is simple, convenient and economic and it's commended by WHO as a cheap and effective treatment method to diarrhea.

The inspection data of Zichuan County showed: Among all the diarrhea patients, 27.27% were treated with mainline. Among all the treated patients including going to hospital and self treating in home, 91.05% were treated with antibiotic and only 2.02% used ORS. Among the diarrhea children, 12.23% received mainline, 87.71% used antibiotic and 2.57% used ORS.

III.　Time of Being Sick and Treated

The index of time of being sick and treated is used to calculate the loss of family and society because the patients and their family members can not go to work. The index is used to evaluate the indirect economic loss of disease and can be used to calculate DALY index when course of diseases are needed. Since the cause of disease, the type of diseases, the methods of treatment and the condition of health are different, the time of treatment is different from 1 day to 1 month. There are some reports about the time of sickness and treatment of certain population in certain area.

The research of Fu Zhenying showed: The average incidence of diarrhea in 2 weeks was higher in rural area than in downtown area. The longest time of sickness of the population in the most undeveloped rural area was 3.7 days (see Table 5-8).

Table 5－8 Average Time and Frequency of Diarrhea of Children under 6-Year-Oldin tow weeks（$\bar{X} \pm s$）

Area	Times of Diarrhea	Days of Diarrhea
Downtown Area	1.12± 0.44	3.28± 2.77
Rural Area	1.27± 0.66	3.40± 3.34
Undeveloped Rural Area	1.13± 0.41	3.74± 2.84

Investigation of undeveloped rural area in Gansu Province showed: The longest sick time of children under 1-year-old with diarrhea was 3.6 days (see Table 5-9).

Table 5－9 Average Days and Frequency of Diarrhea of Children under 1-Year-Old（$\bar{X} \pm s$）

Area	Times of Diarrhea	Days of Diarrhea
Downtown Area	1.12±0.44	3.28±2.77
Rural Area	1.27±0.66	3.41±3.52
Undeveloped Rural Area	1.29±0.40	3.65±2.71

The research of Chen Libo showed: Simida could be used to treat acute and water-style diarrhea of baby under 2-year-old and the period of treatment was 3 to 8 days at an average of 4.7 days. The period of treatment of virus Cuojingdi was 4 to 8 days at an average of 5.3 days. In an accident of the broke out of cup-type virus in Guang'an County, Sichuan Province, the longest period of diarrhea was 28 days, the shortest was 2 days and the average was 5.6 days. Research of Chen Xiaodong showed : The length of the period of diarrhea was : dysentery (4.5 days) ＞ enteritis(3.44 days) ＞diarrhea(2.87 days). The research (Hong Caoxin) data of diarrhea patients in paediatric departments of Anfu Overseas Chinese Hospital in Caozhou Guangdong and Second Accessory Hospital of Shantou Medicine College showed: Normal treatment (such as fill water, modify electrolyte and acid toxicosis, microzoology regulator, intestine film protector and etc) could cure diarrhea of child in hospital in an average of 3.24（±1.02）days and the total average period of treatment was 7.19（±1.65）days.

5.3.3. The expense loss caused by the diarrhea sickness

There are three kinds of research about economic burden caused by the diarrhea sickness: the first is about treatment expense of the diarrhea sickness; the second is about the cost effect analysis of the treatment measures for the diarrhea sickness, which reflects the economic burden of some disease; the third is about the treatment expense of part of the diarrhea sickness which will be calculated when a new drug for diarrhea sickness is tested clinically. The following economic burden are caused by the diarrhea sickness according to existing literature materials:

Fu Zhengying and other reserchers calculated the two-week-economy-loss caused by the diarrhea

sickness of 400 children who are below 6 years old, in each nutrition monitor place. The result manifests that the average loss of each city family is 1383 Yuan(the loss of parents out of work is 895, the treatment cost is 488), the average loss of each village family is 1141 Yuan (the loss of parents out of work is 688, the treatment cost is 453).

Fang Jianping and other reserchers did a research about 300 children below 1 year old in impoverished villages of Gansu province, and the result manifests that the loss caused by the child diarrhea sickness in two weeks is 716.71 Yuan, including the treatment cost 414.1 and the loss of parents' out of work 302.61. Li Yuqing analyzed the cost effect of treatment measures by taking orally three microecological preparations including Golden Bifido piece, Peifeikang capsule, and Mother Love granule, at the Children Hospital of Anhui province, and the costs of three treatments are 24.60、35.00 and 40.00 Yuan。Another research about the treatment of baby diarrhea by taking orally drugs such as ZhengChangSheng, Peifeikang and Mother Love at Women's and children's dispensary in the Middle District of Leshan city, in Sichuan province, manifests that the corresponding costs are 24.75、33.75 and 27.00 Yuan 。

A research about diarrhea sickness epidemic condition of children below 5 in Lulong County, manifests that there are 818 patients during the monitored two years at 6 places monitored for diarrhea sickness, who are treated by village doctors, and the per capita cost is about 15 Yuan. At the same time, there are 1081 children patients below 5 years who receive hospital treatment for diarrhea sickness, during 2 years, with the per capita cost for treatment is about 600 Yuan, according to research data of 8 hospitals.

Xu Shuyun carried out a economics analysis about different drugs administrations for treatment of acute infectious diarrhea, and the result manifests: the direct treatment cost by taking Ciprofloxacin is 180.43—402.3 Yuan，the indirectly loss is 59.02—110.31 Yuan, and the total cost is 239.51—542.70 Yuan。The cost will be the least if taking orally drugs after a day of vena treatment (see Table 5-10).

Table 5－10 Treatment cost of acute infectious diarrhea, with three administrations of Ciprofloxacin（unit：Yuan）

	Group A	Group B	Group C	P
Treatment cost	37.2 ±3.2	72.84 ±6.9	118.03 ±25.60	
Drug cost	104.13 ±10.6	175.75 ±23.56	234.75 ±28.9	
Test cost	39.10 ±6.7	56.84 ±17.23	49.52 ±16.1	
Out-of-work cost	40.79 ±11.36	73.48 ±9.8	77.53 ±31.2	
Accompany cost	7.82 ±10.6	15.8 ±1.6	13.75 ±2.9	
Traffic cost	10.41 ±7.7	15.48 ±5.9	19.03 ±7.8	
Total cost	239.51 ±40.84	409.87 ±87.73	542.70 ±180.15	<0.001

Notes：

The patients of group A should take Ciprofloxacin pin (NanXin drugs manufacture limited company, Guang zhou, Ciprofloxacin) 0.2g iv q12h，after treating for a day, take Ciprofloxacin piece(NanXin drugs manufacture limited company, Guang zhou, Ciprofloxacin) 0.2g tid treatment.

The patients of group B should take Ciprofloxacin pin 0.2g iv q12h for 2 days, then take Ciprofloxacin picec 0.2g tid for treatment.

The patients of group C should take Ciprofloxacin pin 0.2g iv q12h for 3days.

Deng Fei and other researchers analyzed the cost of Outpatient service and hospital treatment for diarrhea sickness of children below X years in Nanjian county, Yunnan province, and the result manifests: The majority of outpatient service costs on diarrhea sickness of local special difficult children, is supported by towns public health center and village clinic (approximately comprises 89% of the total). The outpatient service cost consists of inspection expense, injection expense, charges for medicine and other expenses, of them the charges for medicine are the Main sub-item expense, approximately comprises over 90% of the total cost. The per capita charges for medicine of outpatient service on children diarrhea sickness at NanJian County Hospital is 17.80 Yuan, approximately 91.40 % of the total cost; the cost in Women's and children's dispensary of NanJian County is 14.84 Yuan, approximately 93.50 % of the total cost; the cost in Villages and towns public health center is 15.85, approximately 94.51% of the total cost; at Village clinic, the cost is 14.56, approximately 96.15% of the total cost (see Table 5-11)。

Table 5－11 Expense constitution of outpatient service for diarrhea sickness of special difficult children at different medical establishments in Nanjian County ,Yunnan Province

（June,1998－－May,1999, Unit：Yuan）

Expense constitution	County hospital		County health care courtyard		Country public health center		Village clinic	
	per capita expense	constitution rate（%）	per capita expense	constitution rate（%）	per capita expense	constitution rate（%）	per capita expense	constitution rate（%）
Inspection cost	0.48	2.45	0.20	1.24	0.00	0.00	0.00	0.00
Injection cost	0.62	3.20	0.50	3.15	0.53	3.15	0.32	2.14
Needle charges for medicine	17.80	91.40	14.84	93.50	15.85	94.51	14.56	96.15
Other	0.57	2.95	0.33	2.11	0.39	2.34	0.26	1.71
Total	19.48	100.00	15.87	100.00	16.77	100.00	15.14	100.00

DengLin and other persons' research also reports different costs on moderate diarrhea and hard diarrhea of children below 3 years at different medical establishment of this area. And the result manifests that each hospital treatment expense is 187.54 Yuan at County health care courtyard, 101.45 at Country public health center（see Table 5-12）.

Table 5－12 Expense constitution of hospital treatment for moderate and hard diarrhea diarrhea sickness of special difficult children (below 3 years old) at different medical establishments in Nanjian County ,Yunnan Province.

（June,1998－－May,1999, Unit：Yuan）

Expense constitution	County health care courtyard		Country public health center	
	Per capita expense	constitution rate （%）	Per capita expense	constitution rate （%）
Hospitalization expense	7.2	3.84	4.96	4.89
Treatment expense	12.17	6.49	3.31	3.26
Inspection cost	2.50	1.33	0.00	0.00
Needle Charges for medicine	157.07	83.75	90.76	89.46
Nurses spends	4.3	2.29	2.17	2.14
Other	4.29	2.29	0.25	.25
Total	187.54	100.00	101.45	100.00

Chen Xiaodong and others analyzed the cost effect of measures of changing the water (rebuilds to supply water centrally) in Xuyi County, Huiying city, (governing the dirt and changing the water are carried out as a pivot in Huai Bei), as well as in Guanyun County, Lianyungang City. It manifests that the investigated area obtained direct and indirect economy benefits of 19,623,450 Yuan by reducing diarrhea sickness, which attribute to the tax change, and the ratio of put and deliver reaches 1: 5.43, refer to chart 4-13 for economic burden of diarrhea sickness (see Table 5-13）

Table 5－13 Analysis of economic benefits by reducing **diarrhea sickness after** rebuilding to supply water centrally in Huai Bei villages

	The reduction of diseased population in two weeks （person ）	The reduction of diseased population in a year （person ）	The reduction of diseased days in a year （day）	The reduction of days out of work in a year （day）	The reduction of accompanying the patients in a year （day）	The reduction of direct economy loss in a year （Yuan）	The reduction of indirect economy loss in a year （Yuan）	The reduction of economy loss in 15 years （Yuan）
Professional crowd	508	6968	20904	13936	6968	348400	418088	11497200
Non －professional crowd	359	4925	14775	9850	4925	246250	295500	8126250
Total	867	11893	35697	23786	11893	594650	713580	19623450

Hong Chaoxin and others did a research on diarrhea patients treated by the AnBu Overseas Chinese hospital and the department of pediatrics of second affiliated hospital of Shantou Medical college, it manifested that the average cost of the conventional treatment for child diarrhea sickness was 298.2 Yuan(298.2±82.2)，including the bed spends 79.2（±21.9）Yuan, the treatment spends 42.0（±11.3）Yuan，the material spends 16.3（±4.6）Yuan，the charges for medicine 132.2 （±43.5）Yuan, other expenses 28.1（±7.7）Yuan.

5.4. Present overseas research situation on disease burden caused by diarrhea

The aims of overseas articles available about the burden caused by diarrhea are very clear. The outstanding feature of these articles different from domestic articles is that the research and account embarks from the special disease burden angle in both titles and contents aspects. These articles are similar with domestic research in research object aspect, taking focus on children below 5 years old, calculating and analyzing separately according to the classification of etiology. Regarding the concrete research content, the disease burden is calculated according to the target of different development stage of disease burden calculation. It includes following targets:

5.4.1. Target of incidence of disease, rate of being hospitalized, and mortality

There are 4000000000 children below 5 years old who have acute diarrhea a year in developing countries, that is, a child contacts diarrhea sickness three times a year. According to the research by Chang and others, in New York, 13% of the patients hospitalized below 5 years old have a diarrhea. Over 30% of the hospitalized children are caused by the **Rota Virus** diarrhea. According to the estimate by Streatfield and others, in Bengal, the disease burden caused by diarrhea is as following: 11% of total casualty is caused by diarrhea, 12.1% of DALYs loss is also caused by diarrhea. The research by Mead on food-borne disease manifests that there are more than 200000000 acute diarrhea events a year in America, nearly a person has a diarrhea a year, and 36% of the diarrhea events is caused by food, the other majority is probably caused by water-borne factor, and the most majority is caused by unclear reason. There are 5200 casualties of 76000000 patients who have diarrhea a year in USA.

According to the research by Ehrenkranz P and others on the disease burden caused by **Rota Virus** in Peru, regarding children below 5,there is one of 1.6 children has a **Rota Virus** diarrhea, one of 9.4 receives a medical examination, one of 19.7 needs the hospital treatment, one of 375 dies of this disease. There are 384000 sufferers a year, 64000 of those receive medical examinations, 30000 receive hospital treatment, and 1600 die.

In USA, regarding the children below 5 years old who have diarrhea, there is nearly 5%—10% of them caused by **Rota Virus, over** 500，000 receive medical examinations, nearly 50，000 receive hospital treatment. During the 5 years' life process of these children, 4/5 of them have a diarrhea, 1/7 of the sufferers need medical examination or emergency medical treatment, 1/78 of the sufferers need hospital treatment; and it is estimated that there is one of 200，000 sufferers will die of complication.

The research on the disease burden of infants infected with coli diarrhea in village of Egypt manifests: the incidence of large intestine infectious diarrhea is 1.54/person/year, and 66% of the first diarrhea infection after birth is caused by this disease. Of the 6-month-old infants, the incidence of diarrhea caused by coli is 1.7/person/year, which rises to 2.3/person/year and drops with the age increases.

5.4.2. Target of DALY and social-economic loss

The diarrhea may be acute, may also be procrastinated chronically (continues above two weeks). Because that its reducing the appetite, changing the way of feed, and reducing the absorption of nutrition ingredient, diarrhea is considered as the most serious disease to the growth of all the child infectious diseases. The infection of diarrhea in children below 2 may not only affects child's growth, but also affect child's ability to adapt to environment, the sensation ability and the performance in school.

According to the account by World Health Organization, the diarrhea was the fourth reason of DALYs in 1990. The DALYs loss caused by diarrhea in China occupies 1.6% of the male total disease burden, and 2.8% of the female.

According to the estimate by Streatfield and others, the disease burden caused by diarrhea occupies 12.1% of total DALYs in Bengal. The research on diarrhea burden caused by **Rota Virus** in Peru by Ehrenkranz P and others manifests that: the cost of medical treatment of child below 5 who has Rota Virus diarrhea is nearly 2600000 American dollars, except the indirect cost and social burden caused by disease and death. In USA, there are estimated direct medical expenses of 264000000 American dollars, and total social burden of 1000000000 American dollars caused by enteritis of **Rota Virus.**

5.5. Forecast of diarrhea disease burden research

In summary, at present the epidemiology research in our country on the diarrhea sickness has included part of content and target of diseases burdens. But these research are only restricted to some specific crowd in the single region, exclude systemic discussion on the overall national situation or the entire crowd situation, and don't have the widespread representation. In addition, these researches on disease burden is merely limited to such unidimensional angle as the traditional incidence of disease, the target of mortality rate as well as the economy loss of the patients and their family caused by disease, without the account of the total disease burden. There is not a unified and comprehensive target scale for the disease burden of different areas and different crowds because these targets are various and cannot be analyzed and the judged comparatively.

Therefore, the future research on diarrhea disease burden should be scientific, systematic, comprehensive, and integral. We may calculate disease burden of various place, various crowds according to target of DALY so as to calculate comprehensively the degree, the duration, the harms to health of diarrhea sickness. What's more, using identical quantification target, it may make disease burden of various place and various crowds comparable, and it also can be a effect target for different treatment and different control measures for diarrhea, which makes it easy to analyze and compare the cost effect.

In addition, considering that there are a lot of sufferers who couldn't receive a medical examination or couldn't have a self- medical examination, it is necessary to monitor the diarrhea sickness throughout the country so as to grasps accurate epidemiology material of the diarrhea, and calculate the burden. Simultaneously, it provides the reference information for preventing and controlling infectious diarrhea.

6. Conclusion

Premier Wen Jiabao points out in Government Work Report of 2005:" Our goal is that: Let the people drink the clean water, breath fresh air, has even better work and environment.” Safeguarding the village water supply safely and improving the village’s environmental sanitation are the main contents to construct comprehensive well-off society, and solve " three questions about village ", which manifests the necessary requests of “Human-orientation” and “construction of harmonious society”. Supplying water safely and the environmental sanitation in village directly relates to peasants’ health, therefore, to improve the village’s water supply, to construct the hygienic installation are the vital duty which the current China village public clinic faces; it is also one of the key content of 11th five-year plan of our country health works. Our government has made pledges: by the end of 2015, the proportion of village population who are unable to obtain the security tap water and the environmental sanitation installation should be reduced one half.

The diarrhea sickness is a question of the world public health, whose harm is more serious especially in the developing nation and the low-income country. For 20 years, China has done massive work to prevent and control diarrhea sickness, and obtains remarkable effect. Especially in 1989,China promulgates " Law of preventing and controlling Infectious Disease in the People's Republic of China ", which makes it legal to prevent and control the infectious disease including the cholera, the dysentery, the typhus and paratyphoid, and so on. Four kinds of the infectious disease are infected through the intestinal tract, such as the cholera, the typhus and paratyphoid, the armor hepatitis, and the dysentery. The diseased population reported gradually drops from 1680000 examples in 1990 to 641000 examples in 2004, the number of the dysentery drops from 1416000 examples in 1990 to 498000 examples in 2004, and the armor hepatitis is also under the effective control, dropping from 584000 examples in 1990 to 94000 examples in 2004.

At present the main strategy in China for preventing and controlling the diarrhea is as following: (1) Under the government unified leadership, to persist in developing hygienic capital construction, including controlling the water, the excrement, and the diet, and the concerned various departments should be on the duty and work in phase to guarantees each item be carried out. (2) To establish monitor point, so as to inspect key crowd and outside epidemic focus. (3) To establish perfectly all levels of faculty outpatient service of intestinal tract, so as to discovery and deal with the infection focus early, and reduce the overlapping infection. (4) To carry out more reasonable and effective treatment. (5) To carry out vigorously the hygienic propaganda education, to enhance unceasingly the broad people's hygienic knowledge and the self- health care consciousness, to shape a social climate in which everybody emphasizes the health, each family loves clean and participates positively in the practice to prevent disease.

Our country’s work of changing water in village obtains a good result through these years endeavor. The facts proves that, the work of changing water provides to the village inhabitants safety health tap water, which not only facilitates masses' produces and lives, but also could effectively reduce the incidence of disease, and enhance the peasant masses' health standard.

The work of changing water in village is a Sweet Water project，which is favorable to both country and people. At the same time, we should widely carry out the health education and the hygienic propaganda work, so as to establish good personal hygiene custom. We should perfect environmental sanitation control system, strengthen the hygienic management, eliminate the dead angle of campus health, kill and extinguish the musca, control the breed of mosquito and musca. We should also improve environment and family health condition, develop regular masses patriotic health campaign.

With the medical technology and the condition improved unceasing, diagnosis and the treatment to the diarrhea sickness are remarkably enhanced, which effectively reduced the mortality, and enhanced the cure rate. At present the people pay more attention to the diarrhea' influence on child, because it may not only bring the child higher disease incidence rate and mortality rate, create economical burden to the family and the society, but also cause certain negative consequence to child's growth.

At present, there are a few domestic special study literatures on diarrhea sickness disease burden. There are some target results may weigh or manifest the diarrhea sickness disease burden, which could be obtained only when analyze the epidemiology cost effect of diarrhea sickness, the etiology, the clinical treatment, the treatment measure or the intervention measure. These targets include the disease incidence rate, the mortality rate, the treatment time, the medical expense of patient receives certain treatment plans and others. However, many of these studies are regional, and the research object concentrates only to child below 5 years old. There are a lot of research in overseas on diarrhea disease burden, whose reality pointed is very strong. Both the topic and the research content of these articles are embarked from the special disease burden angle, which is prominent compared with the domestic correlation research. These articles are similar with domestic research in research object aspect, taking focus on children below 5 years old, calculating and analyzing separately according to the classification of etiology. Regarding the concrete research content, the disease burden is calculated according to the target of different development stage of disease burden calculation. It includes not only traditional target of incidence of disease and the mortality rate; moreover the calculation of its DALY loss is also involved. The future research in China on diarrhea disease burden should be scientific, systematic, comprehensive, and integral. We may calculate disease burden of various place, various crowds according to target of DALY so as to calculate comprehensively the degree, the duration, the harms to health of diarrhea sickness. What's more, using identical quantification target, it make disease burden of various place and various crowds comparable, and it also can be a effect target for different treatment and different control measures for diarrhea, which makes it easy to analyze and compare the cost effect.

Thank the World Health Organization' management of the research on Chinese diarrhea disease literature review!

7. Reference

1. Fang Hesong. China diarrhea sickness diagnosis treatment plan. *Beijing Medicine*. 1994; 16 (3):4
2. Fang Hesong, Duan Sucheng and others. China diarrhea sickness diagnosis treatment plan (implementation). *Intermediate Medical Publication*,1992;27(11): 51-53
3. Zhu Qirong. The infectious diarrhea. *Clinical Department of Pediatrics Journal*. 2002;20(3):187-188
4. Dong Zhongqi, Fang Hesong (Reduction). The summary of China diarrhea sickness summit meeting and the international seminar of child diarrhea (in 2004)
5. Diagnosis standard and processing principle of infectious diarrhea (GB17012-1997) National Technology Surveillance Bureau (1997)
6. 6. Chief Editor: Yu Aihua. Diagnosis and treatment of diarrhea. People's military doctor publishing house. First edition. 1998: 24-27
7. Zheng YueJie. Clinical performance of the child diarrhea. *China Clinical Doctor*. 2004; 32 (8):16-17
8. Chief Editor: Chen Zhu. Practical Internal Medicine. People's Medical Publishing House. 11th edition. 2003: 1713-1717
9. Chen Jie. The child diarrhea treatment. *China Clinical Doctor*. 2004; 32 (8): 20-21
10. Huang Haihui. Experienced treatment for infectious diarrhea. *China Clinical Doctor*. 2002; 30 (7): 4-5
11. National diarrhea sickness preventing and controlling academic seminar organization committee. The summary of national diarrhea sickness preventing and controlling academic seminar conference (1998)
12. Yu Jiaxi, Zhao Guangfa, Yang Jin Chuan. Epidemiology research and analysis of a infectious diarrhea explodes. *China primary health care.* 2004, 18 (2): 48-50
13. Wu Huixu, Li Binglong, Xi Yunzhen, and others. Epidemiology investigation of an infectious diarrhea event. *People's Liberation Army Prevention Medicine Journal.* 2004, 22 (4): 304
14. Jiang Renjie, Chen Yinzhong, Xie Liexi, and others. Research report on the explosion of the bacillary dysentery and the infectious diarrhea caused by centralized water supply pollution. *China Primary Health Care*, 2004, 18 (9): 68-69
15. Liang Dabin, Lin Mei, Li Cuiyun, and others. Epidemiology analysis of infectious diarrhea in Guangxi in 1995-2001. *Guangxi prevention medicine,* 2003, 9 (1): 18-21
16. Xia Lipin, Wang Yanhou. Research report on a popular water borne **Rota Virus** diarrhea. *Environment and health magazine*, 2000, 17 (1): 50
17. Wang Lianjiang, Lu JianLing, Fu GuangJin, and others. Investigation of popular infant infectious diarrhea in Tancheng county, Shandong Province. *China primary health care,* 2000, 14 (1): 43-44.
18. Liu Shuilian, Wu Ming Shou. Analysis of popular cholera in LianJiang city In 1994. *Medicine literary selections.* 1995, 16 (4): 323-324
19. Huang Lanyu, Li Zongdi, Jiang Deng Biao. Epidemiology research report on cholera in Lingling area In 1994. *Practical prevention medicine.*1996, 3 (1): 12-13

20. Ma Hongbo, Xu Shao Fan. Our country ’s popular cholera survey and control measure in 1997. *China border health quarantine magazine.* 1999, 22 (2): 124-126
21. Gao Duanyun, Li Shuqin, Feng Zhuo Ling. Research report on popular cholera in Zichuan county in 1999. *Occupation and health.* 2003, 19 (4): 77.
22. Chen Jiezhi, Guo Fengqiu, Guo Zhizong, and others. Characteristic and analysis of popular cholera in Changde city. *Practical prevention medicine.* 2000, 7 (6): 440-441
23. ZhaoYong, Nai Tianran. Epidemiology diagnosis of cholera in Fuzhou in 1994. *China border health quarantine magazine.* 1997, 20 (2): 70-72.
24. Lin Mai, Tang Zhengzhu, Li Cui Yun. Characteristic and monitor result of popular cholera in Guangxi in recent 5 years. *Modern prevention medicine.* 2005, 32 (5): 478-450
25. Pan Xian Hai. Epidemiology analysis of cholera in Hainan Province in 1998. *China public health.* 1999, 15 (6): 559-560
26. Zhou Ru. Epidemiology analysis of cholera in some city of Hainan Province in 1998. *China tropics medicine.* 2003, 3 (1): 74-75
27. Wu Zhen Huan. Epidemiology diagnosis of cholera in Huaihua area during 1994-1995. *Practical epidemiology diagnosis*. 1998, 5 (2): 90-91
28. Li Weiming, Xu Changxi, Zhang Weihan, and others. Analysis of popular holera characteristic review in Jilin Province. *China border health quarantine magazine.* 2005, 28 (1): 9-12
29. Bai Zhuanji. Epidemiology analysis of cholera in Jining city, during 1977-2001 . *Modern prevention medicine.* 2003, 30 (4): 562-563
30. Mou Huide, Chen Xia, Jiang ZhengBin. Epidemiology analysis of cholera in Leshan city during 1990-2000 . *China public health management.* 2002, 18 (1): 63-64
31. Xie Xianqing, Liu Qu. Characteristic and monitor result of popular cholera in Longgang area, Shenzheng. *Modern prevention medicine.* 2002, 29 (4): 512-513
32. LinYaping, Li Yanting, Gu Bao Ke. Characteristic analysis of popular bacillary dysentery in Shanghai . *Disease monitor.* 2004, 19 (7): 252-255
33. Liu Yuanhen, Hou Huizheng, Chen FuYuan, and others. Rule and molecular epidemiology research of popular bacillary dysentery in Xinjiang. *Disease monitor.* 1999, 14 (8): 291
34. Chen Yalin, Luo Xinjian, Wang Xinli, and others. Dysentery popular characteristic analysis in Chongqing section, SanXia Reservoir area during 1997-2002 . *Prevention medicine information magazine.* 2004, 20 (3): 316-317
35. Yan Xiujuan, Ha Jie, Gao Yaqin, and others. Acute bacillary dysentery popular tendency forecast in Jilin area in 1999. *Occupation and health.* 2000, 16 (4): 73
36. Chu Yong. Comparable analysis between the measuring point infectious diarrhea and the bacillary dysentery popular characteristic at Hefei supervision spot. *Disease monitor.* 2003, 18 (6): 217-218
37. Liu Shuguang,Shi Jianchun, Yang Qichun, and others. Bacillary dysentery popular situation in Nanyang city during 1996-2000. *South China prevention medicine.* 2003, 29 (4): 37-38
38. Huang Jinying, Hua Weiping, Sun Xiaokang. Analysis on bacillary dysentery popular

situation in QingYuan city during1988-2001. *China primary health health care.* 2002, 16 (9): 26-27

39. Yin Kexiang,Wang Maoci,Yu ZhiYuan, and so on. Analysis of bacillary dysentery popular characteristic in Rizhao city during 1989-1999. *Occupation and health.* 2001, 17 (3): 76-77

40. Xie Rendong, Wang Zenqun, Zhu Xiaoping, and so on. Analysis of typhus epidemiology in Sichuan during 1950-1995. *Prevention medicine information magazine.* 1997, 13 (2): 79-82

41. WangMei, Guan Bin, Zhai Wen Ji, and others. Analysis of typhus popular trend in Shandong Province during 1989-2000. *Prevention medicine information magazine.* 2002, 18 (3): 241-242

42. Dong Hongjun, Wang Haibo, Cui Jun. Analysis of typhuses popular characteristic in Ningpo city in recent 13 years. *Modern prevention medicine.* 2002, 29 (1): 60-62

43. Liu Min, Guo Junqiao, Men Zhaojie, and others. Dynamic Analysis of popular typhus in Liaoning Province during 1990-1999. *Disease monitor.* 2002, 15 (8): 290-291

44. Ou Qiuying, Wu Chuanye, Zhang Zhaoqiang, and others. Analysis of typhus popular characteristic and preventing and controlling measure in Hunan Province in 1996-1998. *Practical prevention medicine.* 2001, 8 (6): 423-424

45. Tang Zhengzhu, Lingmai, Yang Jinye. Present situation of popular typhus and its preventing and controlling measure in Guangxi. *Guangxi prevention medicine.* 1997, 3 (4): 211-213

46. Peng Guowen, Mo Meiyi, Tan Hailing. Typhus epidemiology analysis in Guangdong Province in 1992. *Guangdong health guard.* 1994, 20 (1): 37-38

47. Liang Xian, Cao Jia Qiong. Typhus epidemiology analysis in Chengdu during 1950-1993. *Modern prevention medicine.* 1996, 23 (3): 172-173

48. Yu Jie. Typhus popular characteristic in Anyang city during 1982-2003. *Modern prevention medicine.* 2005, 32 (4): 358-359

49. Li Changhai, He Hui Ping. Analysis on popular characteristic of typhus in QingYuan city in 1998. *Guangdong health guard.* 2000, 26 (1): 29-31

50. Wu Dengke, Wu Ge, Shi Jinquan. Analysis of popular characteristic of typhus in western Hunan autonomous prefecture duing1995-2002. *Practical prevention medicine.* 2004, 11 (2): 306-307

51. Mai Hao. Popular characteristic analysis of typhus in urban district of Guilin during 1990-1998 . *Guangxi prevention medicine.* 2000, 6 (2): 126

52. Liu YuFei. Popular trend analysis of typhus in Guangzhou during 1950-1998 . *Guangdong health guard.* 1999, 25 (3): 27-30

53. Shi Xiuping. A research report of popular hepatitis. *Shanxi staff medical college journal.* 1997, 7 (4): 45

54. Chen Zengli, Li Ruilan, Shen ZhenYuan. A trend analysis and forecast of popular hepatitis in Henan Province. *Henan prevention medicine magazine.* 2004, 15 (5): 257-258

55. Wu Guogang, Zhuo Shen, Tang Guangpeng. Research report of a popular hepatitis caused by the water borne pollution. *Disease monitor.* 2005, 20 (2): 76-77

56. Chen Fengjuan. Popular situation of hepatitis and the effect of preventing and

controlling in Yihua area during recent 10 years. *Jiangsu health care.* 2001, 3 (2): 18-19

57. Li Shoubang, Hu Guanwei, Wu Yanping, and others. Popular condition investigation of hepatitis in flood area, Jilin Province, in 1998. *China public health.* 1999, 15 (2): 123

58. Zhao Xiuhua, Zhang Jingyao, Liu DianYong, and others. Analysis of hepatitis characteristic in the Jinan area in 2001. *Shandong medicine*. 2002, 42 (4): 68-69

59. Luo Jiayou, Tang Mingde, GaoZexuan, and others. Analysis of society benefit by changing the water in the village of Hunan Province. *Environment and health magazine,*1995,12 (5):200-202

60. Cui ShunLing. Memoir of the effect by changing the water healthy to controls the diarrhea sickness. *Henan prevention medicine magazine.* 2001,12 (2): East 71-72

61. Chen Xiaodong, LinPing, Cheng Ming Hua, and others. Research of the effect of rebuilding the deep well into simple centralism water supply to guard against the system diarrhea sickness in the village in Huai Be. *Jiangsu health care,*1999,1 (1):16-19

62. Zhang Minliang, Xiang Hua, Zhang Huaicheng. Investigation of the hygiene condition in the village of Xinyi city before and after changing the water. *Modern prevention medicine.* 2003,30 (2):143

63. Xing Li, Si Mingxia, Wang Jiarong. Investigation of the diarrhea prevention and control. *The occupation and the health.*2002,18 (8):87-88

64. Wu Shian, Wang Dianxiang, Li Yanhong. Analysis of present situation and the benefit of changing the water in village of China. *China health engineering magazine.*1994,3 (1):8-13

65. Chen Lv, Tang Mingde, Gao Zexuan. The environment epidemiology investigation around the water change of 6 counties in Hunan Province. *China public health,* 1995,11 (1): 22-24

66. Wei Jianxun, Zhao Qijun. Effect of popularizing unboiled security health water to prevent and control endemic disease in impoverished area of national minority. *China primary health care,*1995,9 (12):36-37

67. Gu Xiaoming, Zhang Qiuju, Zhao Hong, and others. Question and the countermeasure of changing the water condition in the village of Kashi area in Xinjiang. *Prevention medicine literature information,*1995,1 (2):274-275

68. Gao Quanling. Present situation and hygienic countermeasure of village tap water kiln. *China sanitary supervision magazine.*1996,3 (6):279-281

69. Li Fangjun, Ou Qiuying, Huang Dejian, and others. Research of preventing child from diarrhea with the improvement case of illness management in Hunan Province. *Disease monitor,*1997,12 (3):87-89

70. Li Zhaohui, Tang Yilin, Wang Dong. Related analysis of infectious disease in changing the water and delivering the water in village in Hai'an County duing 1995 ~ 1999. *Environment and health magazine* 2001,18 (5):273

71. Yang Yun, Li Aibin, Wen Zhenkui, and others. Effect appraisal of changing the restroom to control the intestinal tract infectious disease and the worm infection in the village of Hunan Province.

72. *Practical prevention medicine.* 2005,12 (2):222-224

73. Pan Yuqin, Zhang Meixia. Analysis of the effect of changing healthy the restroom and preventing disease in village. *Environment and healthy magazine.* 2002,19 (3): 223-224
74. Gu Baoke, Lin Yaping, Jin Huiming. Effect observation of the elementary student diarrhea sickness controls by behavior intervention. *Shanghai prevention medicine magazine.* 2004,16 (1):3-4
75. Song Luping. Research of diarrhea sickness cause in village of ZhuMaDian city. *Henan prevention medicine magazine.*2003,14 (5): 259-261
76. Zhu Yonglin. Present situation and control countermeasure of preventing and controlling diarrhea sickness in our province. *Guards against animal with medicine*,2002,8 (18):422-423
77. Han Xiufang, Fu Xiaomei, Xin Li. The prevention of diarrhea sichness. *Modern prevention medicine*,2002,29 (5):711
78. Wei Xiaonong, Shao Bangcai, Fang Changhua. Effect appraisal of preventing the diarrhea and the roundworm sickness by health intervention measure in village school. *China public health*,1998,14 (4):228
79. Xiao Shusheng, Ling Liuying, Shi Xiaoqin. Discussion of diarrhea sickness control measure in the village of East Fujian Province. *China public health*,1995,11 (6):257
80. Lin Shuicheng, Chen Kangchuan, Lin Yongqiang. Effect analysis of diarrhea sickness control measure in MengYuan village. *China public health journal, 1994,13* (2): 98
81. Wang Zhenglun, Wang Ruotao, Ren ZhongYuan. Epidemiology investigation of child diarrhea sickness in Ji county, Tianjin. *China public health,* 1994,10 (8):348-349
82. Wang Zengsui. The preventing and controlling countermeasure and measure for diarrhea. *Shanghai prevention medicine magazine*,1994,6 (5):3-4
83. Lin Chenshui, Xie Yijun, Zen Linmei, and others. Monitor report of diarrhea sickness in Lianjiang county. *Channel prevention medicine magazine*,1995,1 (1):28-29.
84. Wu Junqing, Yang Yutian, He Shuxin, and others. Dangerous causes of infant diarrhea and the influence on child body weight growth in the village of Shanxi Province. *China child health care*,1996,4 (4):202-205
85. Guqing, Gao Pai, Ji Chunfang, and others. Intervention measure of diarrhea sickness dissemination way after flood. *The disease monitor,* 1999,14 high (11):411-413
86. Gao Lianyong, Tang Jinbo. The health education and the scientific management is the key to prevent and control acute diarrhea. *North China national defense medicine,* 2003,15 (3):226
87. Wei Chengyu. Basic condition and countermeasure of intestinal tract infectious disease in China. *China public health 2004,* 20 (1): 126-127
88. Chief Editor:Li Liming. Infectious disease study (the fifth edition). The People's Medical Publishing House
89. Healthy environment beneficially to child, the 56th session of world health congress, on April 25th, 2003
90. *Health Newspapers,* on July 13th, 2005
91. Lu Fan, Zen Guang. The theory frame and its development of disease burden appraisal. *China epidemiology magazine,* 2001, 22 (4): 261
92. Xia Yi, Gong Youlong, Gu XingYuan and others. Disease burden survey target - DALY.

China Hygienic Statistic, 1998, 15 (4): 54-57

93. Fu Zhengying, He Wu, Chen Chunming.The situation and the economical loss caused by respiratory system disease and the diarrhea of child below 6 years old in China. *Hygienic Study*, 2000, 29 (5): 283-287

94. Tang Jingyu, Fang Zhaoying, Hu Haikuan and others. Research of the popular condition and treatment burden for diarrhea of child below 5 years old in Lulong County. *China public health*, 2003, 19 (1): 70

95. Tong Zhili, Ma Li, Zhang Jingdeng. Analysis of sentry monitor of **Rota Virus at** Beijing Friendship Hospital during 1998-2001. *China epidemiology magazine*, 2003, 24 (12): 1100-1103

96. Yang Jie, Sun Dequan, Chen ZhiAo and others. Study of diarrhea sickness in east village crowd of Rudong County during 1986-1996. *Modern prevention medicine*, 1998, 25 (2): 164-166

97. Song Xiufeng, Han Xiufang, Zhang Lingzhu. Analysis of monitor result of diarrhea sickness in Zichuan area during1989-1996. *Prevention medicine literature information*, 1998, 4 (1): 14-15

98. Wang Zhuqing, Guo Yan. Analysis of infections and causes of acute respiratory tract infects and diarrhea (continues for two weeks) among child below 5 years old in some area of Shanxi Province.

99. Fang Jianping, Zhao Qi, Liu Wendong and others. The infection situation and influence on family economy of patients who is below 1 year old in the impoverished village of Gansu. *Hygienic occupation education*, 2004, 22 (8): 83-85

100. Wang Yan, An Lin, Shi Ling. Analysis of death of child below 5 years old in the partial impoverished area of China.

101. Qiu Yiteng, Li Ronghan, Zhong XiXia and others. Child health condition investigation among transient population.

102. Chen Xiaodong, Lin Ping, Cheng Minghua, and others. Analysis of economic efficiency of rebuilding the deep well for the small centralism water supply to control diarrhea sickness in the village of Huai Bei. *China public health*, 2000, 16 (11): 979-981

103. Chen Libo,Zhou Lankun, Zhao Ying. Observation of SiMiDa curative effect of 75 examples of infant acute and water sample diarrhea. *China primary health care*, 2002, 16 (1): 53-54

104. Li Wenzhang, Xie Huaping, Wu Haiyan, and others. Epidemiology investigation of an estimated cup shape virus diarrhea explosion. *China test and clinical virology magazine.* 2003, 17 (3): 251-253

105. Hong ChaoXin, Chen Genben, Chen Ruzi, and others. Analysis of preventing antibiotic abuses and cost-benefit on child diarrhea sickness. *Practical department of pediatrics clinical magazine,* 2001, 16 (4): 228-229

106. Li Yuqing, Wu Cheng. The cost - effect analysis of three-microbiology preparation on child acute diarrhea. *Anhui traditional China medicine college journal.* 2004, 23 (5): 53-54

107. Xu Shuyun, Qiu Li, Wei Yingjian. The economic research of treating acute infectious diarrhea with Ciprofloxacin of different ministration. *Sichuan medicine*, 2004,

25 (2): 206-207

108. Deng Fei, Zhang Ping, Sun Meiling and others. Case analysis of outpatient service and hospital treatment expense on child below 3 years old who has diarrhea in Nanjian County. *China primary health care*, 2001, 15 (7): 30-31

109. Kosek, M., Bern, C., and Guerrant, R. L. (2003) Bull World Health Organ 81, 197-204

110. CHANG, HWA-GAN H.; GLASS, ROGER I.; SMITH, PERRY F.; etc.. Pediatric Infectious Disease Journal. 22(9):808-814, September 2003.

111. Streatfield K, Persson LA, Chowdhury HR, Saha KK. 2001. Disease Patterns in Bangladesh: Present and Future Needs. Dhaka, Bangladesh:International Centre for Diarrhoeal Disease Research, Bangladesh.

112. Mead, P.S., et al. Food-Related Illness and Death in the United States. Emerging Infectious Diseases. Vol 5. (October) Pgs 607-625. 1999.

113. Ehrenkranz P, Lanata CF, Penny ME, etc. Rotavirus diarrhea disease burden in Peru: the need for a rotavirus vaccine and its potential cost savings. Rev Panam Salud Publica. 2001 Oct;10(4):240-248.

114. http://www.cdc.gov/nip/diseases/rota/rotavirus.htm

115. Malla R. Rao, Remon Abu-Elyazeed, Stephen J. Savarino, etc. J Clin Microbiol. 2003 October; 41(10): 4862–4864

116. Guerrant, R. L., et al. (2002) Arch Med Res 33, 351-355

117. Global disease burden. World Health Organization, 1996