WHO-Facts Sheet

1. Mental And Neurological Disorders
2. Antimicrobial Resistance
3. Climate And Health
4. Crimean-Congo Haemorrhagic Fever
5. Food Safety And Foodborne Illness

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1. MENTAL AND NEUROLOGICAL DISORDERS

One in every four people, develop one or more mental or behavioral disorders at some stage in life, both in developed and developing countries. These disorders can now be diagnosed as reliably and accurately as most of the common physical disorders. Some disorders can be prevented; all can be successfully managed and treated.

The World Health Report 2001 focuses on a number of common disorders. These include depression, substance use disorders, schizophrenia, epilepsy, Alzheimer's disease, mental retardation and disorders of childhood and adolescence.

A) DEPRESSION

What is depression?

Depression, sometimes referred to as unipolar depression, is a common mental disorder characterized by sadness, loss of interest in activities and by decreased energy. Depression is differentiated from normal mood changes that are part of life by the extent of its severity, the symptoms and the duration of the disorder. Suicide remains one of the common and often avoidable outcomes of depression. If depressive episodes alternate with exaggerated elation or irritability they are known as bipolar disorder. Depressive disorders and schizophrenia are responsible for 60% of all suicides. The causes of depression vary. Psychosocial factors, such as adverse living conditions, can influence the onset and persistence of depressive episodes. Genetic and biological factors also play a part.

How many suffer?

It is estimated that 5.8% of men and 9.5% of women will experience a depressive episode in any given year. These prevalence figures can, however, vary across different populations. It is estimated that 121 million people currently suffer from depression.

What can be done?

The first-line treatment for most people with depression consists of antidepressant medication, psychotherapy, or a combination of both. Antidepressants are effective across the full range of severity of major depressive episodes. Other effective interventions include setting up supportive network systems for vulnerable individuals, families and groups. The evidence regarding prevention of depression is less conclusive, only a few isolated studies show that interventions proposed for the prevention of depression are effective.

B) SCHIZOPHRENIA

What is schizophrenia?

Schizophrenia is a severe disorder that typically begins in late adolescence or early adulthood. It is characterized by profound disruption in thinking and perceptions, affecting language, thought, perception, and sense of self. It often includes psychotic experiences such as hearing voices or delusions. It can impair functioning by causing the loss of an acquired ability such as not being able to gain one's own livelihood or disruption of studies.

How many suffer?

Around 24 million people worldwide suffer from schizophrenia at any point in time. Schizophrenia is found approximately equally in men and women. Women tend to develop it later in life, and also tend to have a better course and outcome after treatment.

What can be done?

Primary prevention of schizophrenia is not possible. However, recent research has focused on

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developing ways of detecting people with schizophrenia in the very early stages. Early detection would increase the chance of early treatment, diminishing the risk for recurrence or serious residual damage.

The treatment of schizophrenia has three main components: medications to relieve symptoms and prevent relapse; education and psychosocial interventions to help patients and families cope with the illness and its complications; and rehabilitation to help patients reintegrate into the community and regain even their occupational functioning. Until recently, about one-third of schizophrenia patients recovered completely. With modern advances in drug therapy and psychosocial care, almost half the individuals who develop schizophrenia can expect a full and lasting recovery. However, in the remaining cases, it can follow a chronic or recurrent course with residual symptoms and serious limitations in day-to-day activities.

C) ALZHEIMER'S DISEASE

What is Alzheimer's disease?

Alzheimer's disease is a degenerative brain syndrome characterized by a progressive decline in memory, thinking, comprehension, calculation, language, learning capacity and judgement. It is important, however, to differentiate the symptoms of Alzheimer's disease from normal age-related decline in cognitive functions which is much more gradual and leads to much milder disability.

How many suffer?

There are currently an estimated 37 million people worldwide with dementia, with Alzheimer's disease being responsible for causing the majority of the cases. About 5% of men and 6% of women over 60 years of age are affected with Alzheimer's disease. With the ageing of populations, this figure is projected to rapidly increase in the next 20 years.

What can be done?

There is currently no cure for Alzheimer's disease. The goals of care are to maintain the functioning of the individual, reduce disability due to lost mental functions, reorganize routines so as to maximize use of the retained functions, minimize symptoms such as suspiciousness, agitation and depression and to provide support to the family. Psychosocial interventions, including education, support, counseling and respite care, are extremely important in Alzheimer's disease, both for patients and family caregivers. Some medicines have demonstrated some usefulness in ameliorating cognitive dysfunction and improving attention, as well as reducing delusions.

D) EPILEPSY

What is epilepsy?

Epilepsy is the most common of brain disorders. Epilepsy is characterized by repeated seizures, or "fits" as they are commonly known, which may take many forms ranging from the shortest lapse of attention to severe and frequent convulsions. They can occur several times a day to once every few months. Epileptic seizures are caused by bursts of excessive electrical activity in the brain. The majority of individuals with epilepsy do not have any obvious or demonstrable abnormality in the brain, besides the electrical changes.

What causes epilepsy?

There are many causes of epilepsy, including genetic predisposition, brain damage caused by infections, birth complications, brain injuries, parasites, alcohol or other toxic substances, and tumors. Tapeworm, schistosomiasis, malaria and encephalitis are some of the common infectious causes of epilepsy. However, in half of the cases, the causes remain unknown.

How many suffer?

It is estimated that about 50 million people of all ages around the world are affected by epilepsy. It is estimated that more than 80% of individuals with epilepsy live in developing countries.

What can be done?

Effective actions for the prevention of epilepsy are adequate prenatal and postnatal care, safe delivery, control of fever in children, control of parasitic diseases, and prevention of brain injury such as controlling blood pressure or using safety belts and helmets. Epilepsy therapy aims to prevent seizures and to reintegrate people with epilepsy into all aspects of community life. Up to 70% of people newly diagnosed with epilepsy can be seizure free if treated with antiepileptic drugs. Despite the fact that in most countries the cost of treatment can be as low as $5 per patient per year, the vast majority of those suffering remain untreated. In Africa, for example, more than 80% of people suffering from epilepsy do not receive any treatment.

F) MENTAL RETARDATION

What is mental retardation?

Mental retardation is a condition of arrested or incomplete development of the mind characterized by impairment of skills and overall intelligence in areas such as cognition, language, and motor and social abilities.

Also referred to as intellectual disability or handicap, mental retardation can occur with or without any other physical or mental disorders. In

addition to genetic factors, injuries at birth and brain infections, a common cause of mental retardation in iodine deficiency. Iodine deficiency is the single largest cause of preventable brain damage and severe mental retardation.

How many suffer?

It is estimated that the overall prevalence of mental retardation is between 1% and 3%. It is more common in developing countries because of the higher incidence of injuries and anoxia or deprivation of oxygen at birth and early childhood brain infections, all of which cause retardation.

What can be done?

Mental retardation can be prevented. Actions to prevent mental retardation include iodization of salt to prevent iodine-deficiency mental retardation (cretinism); abstinence from alcohol by pregnant women to avoid fetal alcohol syndrome; dietary control to prevent mental retardation in people with phenylketonuria; and environmental control to prevent mental retardation due to poisoning from heavy metals such as lead.

Also, prenatal genetic testing can detect certain forms of mental retardation such as Down's Syndrome and parents could benefit from prenatal counseling in these cases. Treatment goals are early recognition and optimal utilization of the intellectual capacities of the individual by training, family education and support, vocational training and opportunities for work in protected environments. The training of parents to act as teachers and trainers of daily life skills is central to the care of persons with mental retardation. Parents have to be aware of learning principles and be educated in behavior modification and vocational training techniques. In addition, they can support each other in networks and groups.

G) SUBSTANCE USE DISORDERS

What are substance use disorders?

There are a number of disorders resulting from use of psychoactive substances including alcohol, opioids such as opium or heroin, cannabinoids such as marijuana, sedatives and hypnotics, cocaine, other stimulants, hallucinogens, tobacco and volatile solvents. The conditions include acute intoxication, harmful use, dependence, and psychotic disorders. Tobacco and alcohol are the substances which are used most widely across the globe and which pose the most serious public health consequences.

How many suffer?

Today, approximately one in three adults, or 1.2 billion people use tobacco. By 2025, the number is expected to rise to more than 1.6 billion. Tobacco was estimated to account for 4 million annual deaths by 1998. It is estimated that tobacco-attributable deaths will rise to 8.4 million by 2020. There are an estimated 70 million people who have alcohol use disorders, including harmful use and dependence, 78% of whom are not treated. The rate of alcohol use disorder for men is 2.8% and 0.5% for women. A large number of other substances generally grouped under the broad category of drugs are also abused. These include illicit drugs such as heroin, cocaine and cannabis. It has been estimated that there are about 5 million people in the world who inject illicit drugs. There is a high prevalence of HIV infection among injecting drug users, making it a major public health problem.

What can be done?

The goals of therapy are to reduce illness, disability and death due to the use of psychoactive substances and to help patients achieve a drug-free life. Strategies include early diagnosis; identification and management of risk of infectious diseases as well as other medical and social problems; stabilization and maintenance with pharmacotherapy for opioid dependence; counseling; access to services; and opportunities to achieve social integration. Medical detoxification is only the first stage of treatment for dependence, and by itself does not change long-term drug use. Long-term care must be provided to decrease rates of relapse.

H) DISORDERS OF CHILDHOOD AND ADOLESCENCE

What are disorders of childhood and adolescence?

Contrary to popular belief, mental and behavioral disorders are common during childhood and adolescence. Many of the disorders more commonly found among adults, including depression, can begin during childhood.

There are two broad categories specific to childhood and adolescence. The first is disorders of psychological development characterized by impairment or delay in the development of specific functions such as speech and language (dyslexias) or overall pervasive development such as autism. The course of these disorders is steady, without remission or relapses, though some tend to improve with time. The second category, behavioral and emotional disorders, includes: attention deficit/ hyperactivity disorders (ADHD) also known as hyperkinetic disorders, conduct disorders and emotional disorders of childhood.

How many suffer?

Though the prevalence figures vary considerably between studies, it is estimated that

10-20% of children have one or more mental or behavioral problems. The real dimension of the problem is largely unknown and more research is needed to establish exactly how many children are affected by these disorders and to what extent.

What can be done?

Inadequate attention has been paid to this area of mental health. The diagnosis of childhood and adolescent disorders requires an understanding of normal and abnormal psychological development. This is best done by trained observers with a variety of clinical instruments in addition to parent reporting. Treatment of child and adolescent disorders varies. There are emerging tests involving neuroimaging that hold promise for precise definition of pathological brain function for a variety of disorders that could help improve treatment options.

Currently, outpatient care is preferred to hospitalisation as it represents appropriate least restrictive care. Child and adolescent disorders require a continuum of care over time and services, linking all settings where the child may receive care such as hospitals, out-patient facilities, families and schools. These treatments include both individual and group psychological support such as psychotherapy or counseling. The use of medication to treat ADHD or hyperkinetic disorders is now common, as are behavioral techniques for anxiety disorders.

2. ANTIMICROBIAL RESISTANCE

Since their discovery during the 20th century, antimicrobial agents (antibiotics and related medicinal drugs) have substantially reduced the threat posed by infectious diseases. The use of these "wonder drugs", combined with improvements in sanitation, housing, and nutrition, and the advent of wide-spread immunization programmes, has led to a dramatic drop in deaths from diseases that were previously widespread, untreatable, and frequently fatal. Over the years, antimicrobials have saved the lives and eased the suffering of millions of people. By helping to bring many serious infectious diseases under control, these drugs have also contributed to the major gains in life expectancy experienced during the latter part of the last century.

These gains are now seriously jeopardized by another recent development: the emergence and spread of microbes that are resistant to cheap and effective first-choice, or "first-line" drugs. The bacterial infections which contribute most to human disease are also those in which emerging and microbial resistance is most evident: diarrhoeal diseases, respiratory tract infections, meningitis, sexually transmitted infections, and hospital-acquired infections. Some important examples include penicillin-resistant S*treptococcus pneumoniae*, vancomycin-resistant enterococci, methicillin-resistant S*taphylococcus aureus*, multi-resistant salmonellae, and multi-resistant *Mycobacterium tuberculosis*. The development of resistance to drugs commonly used to treat malaria is of particular concern, as is the emerging resistance to anti-HIV drugs.

Consequences:

The consequences are severe. Infections caused by resistant microbes fail to respond to treatment, resulting in prolonged illness and greater risk of death. Treatment failures also lead to longer periods of infectivity, which increase the numbers of infected people moving in the community and thus ex_pose the general population to the risk of contracting a resistant strain of infection.

When infections become resistant to first-line antimicrobials, treatment has to be switched to second or third-line drugs, which are nearly always much more expensive and sometimes more toxic as well, e.g. the drugs needed to treat multidrug-resistant forms of tuberculosis are over 100 times more expensive than the first-line drugs used to treat non-resistant forms. In many countries, the high cost of such replacement drugs is prohibitive, with the result that some diseases can no longer be treated in areas where resistance to first-line drugs is widespread. Most alarming of all are diseases where resistance is developing for virtually all currently available drugs, thus raising the spectre of a post-antibiotic era. Even if the pharmaceutical industry were to step up efforts to develop new replacement drugs immediately, current trends suggest that some diseases will have no effective therapies within the next ten years.

Causes:

Microbes (the collective term for bacteria, fungi, parasites, and viruses) cause infectious diseases, and antimicrobial agents, such as penicillin, streptomycin, and more than 150 others, have been developed to combat the spread and severity of many of these diseases. Resistance to antimicrobials is a natural biological phe_nomenon that can be amplified or accelerated by a variety of factors, including human practices.

The use of an antimicrobial for any infection, real or feared, in any dose and over any time period, forces microbes to either adapt or die in a phenomenon known as ""selective pressure". The microbes which adapt and survive carry genes for resistance, which can be passed on.

Bacteria are particularly efficient at enhancing the effects of resistance, not only because of their ability to multiply very rapidly but also because they can transfer their resistance genes, which are passed on when the bacteria replicate. In the medical setting, such resistant microbes will not be killed by an antimicrobial agent during a standard course of treatment. Resistant bacteria can also pass on their resistance genes to other related bacteria through "conjugation", whereby plasmids carrying the genes jump from one organism to an_other. Resistance to a single drug can thus spread rapidly through a bacterial population. When anti-microbials are used incorrectly - for too short a time, at too low a dose, at inadequate potency; or for the wrong disease - the likelihood that bacteria and other microbes will adapt and replicate rather than be killed is greatly enhanced.

Much evidence supports the view that the total consumption of antimicrobials is the critical factor in selecting resistance. Paradoxically, under use through lack of access, inadequate dosing, poor adherence, and substandard anti-microbials may play as important a role as overuse. For these reasons, improving use is a priority if the emergence and spread of resistance are to be controlled.

Unprecedented trends: In the past, medicine and science were able to stay ahead of this natural phenomenon through the discovery of potent new classes of antimicrobials, a process that flourished from 1930-1970 and has since slowed to a virtual standstill, partly because of misplaced confidence that infectious diseases had been conquered, at least in the industrialized world. In just the past few decades, the development of resistant microbes has been greatly accelerated by several concurrent trends. These have worked to increase the number of infections and thus expand both the need for antimicrobials and the opportunities for their misuse. Such trends include:

- urbanization with its associated overcrowding and poor sanitation, which greatly facilitate the spread of such diseases as typhoid, tuberculosis, respiratory infections, and pneumonia;
- pollution, environmental degradation, and changing weather patterns, which can affect the incidence and distribution of infectious diseases, especially those, such as malaria, that are spread by insects and other vectors;
- demographic changes, which have resulted in a growing proportion of elderly people needing hospital-based interventions and thus at risk of exposure to highly resistant pathogens found in hospital settings;
- the AIDS epidemic, which has greatly enlarged the population of immunocompromised patients at risk of numerous infections, many of which were previously rare;
- the resurgence of old foes, such as malaria and tuberculosis, which are now responsible for many millions of infections each year;
- the enormous growth of global trade and travel which have increased the speed and facility with which both infectious diseases and resistant microorganisms can spread between continents.

As the number of infections and the corresponding use of antimicrobials have increased, so has the prevalence of re_sistance. In addition, the enhanced food requirements of an expanding world population have led to the widespread routine use of antimicrobials as growth promoters or preventive agents in food-producing animals and poultry flocks. Such practices have likewise contributed to the rise in resistant microbes, which can be transmitted from animals to man.

Factors that encourage the spread of resistance: The emergence and spread of antimicrobial resistance are complex problems driven by numerous interconnected factors, many of which are linked to the misuse of antimicrobials and thus amenable to change. In turn, antimicrobial use is influenced by an interplay of the knowledge, expectations, and interactions of prescribers and patients, economic incentives, characteristics of a country's health system, and the regulatory environment.

Patient-related factors are major drivers of inappropriate antimicrobial use. For example, many patients believe that new and expensive medications are more efficacious than older agents. In addition to causing unnecessary health care expenditure, this perception encourages the selection of resistance to these newer agents as well as to older agents in their class.

Self-medication with antimicrobials is another major factor contributing to resistance. Self-medicated antimicrobials may be unnecessary, are often inadequately dosed, or may not contain adequate amounts of active drug, especially if they are counterfeit drugs. In many developing countries, antimicrobials are purchased in single doses and taken only until the patient feels better, which may occur before the pathogen has been eliminated. Inappropriate demand can also be stimulated by marketing practices. Direct-to-consumer advertising allows pharmaceu_tical manufacturers to market medicines directly to the public via television, radio, print media, and the Internet. In particular, advertising on the Internet is gaining market penetration, yet it is difficult to control with legislation due to poor enforceability.

Prescribers' perceptions regarding patient expectations and demands substantially influence prescribing practice. Physicians can be pressured by patient expectations to prescribe antimicrobials even in the absence of appropriate indications. In some cultural settings, antimicrobials given by injection are considered more efficacious than oral formulations. Such perceptions tend to be associated with the over-prescribing of broad-spectrum injectable agents when a narrow-spectrum oral agent would be more appropriate. Prescribing "just to be on the safe side" increases when there is diagnostic uncertainty, lack of prescriber knowledge regarding optimal diagnostic approaches, lack of opportunity for patient follow-up, or fear of possible litigation. In many countries, antimicrobials can be easily obtained in pharmacies and markets without a prescription.

Patient compliance with recommended treatment is another major problem. Patients forget to take medication, interrupt their treatment when they begin to feel better, or may be unable to afford a full course, thereby creating an ideal environment for microbes to adapt rather than be killed. In some countries, low quality antibiotics (poorly formulated or manufactured, counterfeited or expired) are still sold and used for self-medication or prophylaxis.

Hospitals are a critical component of the antimicrobial resistance problem worldwide. The combination of highly susceptible patients, intensive and prolonged antimicrobial use, and cross-infection has resulted in nosocomial infections with highly resistant bacterial pathogens. Resistant hospital-acquired infections are expensive to control and extremely difficult to eradicate. Failure to implement simple infection control practices, such as handwashing and changing gloves before and after contact with patients, is a common cause of infection spread in hospitals throughout the world. Hospitals are also the eventual site of treatment for many patients with severe infections due to resistant pathogens acquired in the community. In the wake of the AIDS epidemic, the prevalence of such infections can be expected to increase.

Veterinary prescription of antimicrobials also contributes to the problem of resistance. In North America and Europe, an estimated 50% in tonnage of all antimicrobial production is used in food-producing animals and poultry. The largest quantities are used as regular supplements for prophylaxis or growth promotion, thus exposing a large number of animals, irrespective of their health status, to frequently subtherapeutic concentrations of antimicrobials. Such widespread use of antimicrobials for disease control and growth promotion in animals has been paralleled by an increase in resistance in those bacteria (such as *Salmonella* and *Campylobacter*) that can spread from animals, often through food, to cause infections in humans.

The need for a global response: In September 2001, WHO launched the first global strategy for combating the serious problems caused by the emergence and spread of antimicrobial resistance. Known as the WHO Global Strategy for Containment of Antimicrobial Resistance, the strategy recognizes that antimicrobial resistance is a global problem that must be addressed in all countries. No single nation, however effective it is at containing resistance within its borders, can protect itself from the importation of resistant pathogens through travel and trade. Poor prescribing practices in any country now threaten to undermine the potency of vital antimicrobials everywhere.

The strategy recommends interventions that can be used to slow the emergence and reduce the spread of resistance in a diverse range of settings. The interventions are organized according to groups of people whose practices and behaviours contribute to resistance and where changes are judged likely to have a significant impact at both national and international levels. These include consumers, prescribers and dispensers, veterinarians, and managers of hospitals and diagnostic laboratories as well as national governments, the pharmaceutical industry, pro_fessional societies, and international agencies. Global principles for the containment of antimicrobial resistance in food-producing animals were issued by WHO in June 2000.

As much of the responsibility for containing resistance rests with national governments, the strategy gives particular attention to interventions involving the introduction of legislation and policies governing the development, licensing, distribution, and sale of antimicrobial agents. The strategy is sufficiently flexible to be applied in poor and wealthy nations alike. The process for selecting the necessary interventions to limit emerging antimicrobial resistance can be based on the diseases most prevalent in a given country. In advocating widespread adoption of this strategy, WHO aims to encourage the urgent actions needed to reverse or at least curtail trends which have major economic as well as health implications. Moreover, in view of the global nature of the antimicrobial resistance problem, the efforts of any nation to implement the WHO Global Strategy are likely to be felt worldwide.

The strategy builds on a number of WHO activities aimed at both monitoring the global emergence and spread of antimicrobial resistance

and extending direct support to countries. WHO helps countries establish laboratory-based networks for the surveillance of resistance. Specific activities include staff training, support in methods for the quality assurance of laboratory tests, and provision of laboratory reagents. In addition, WHO distributes a computer software program, WHONET. Microbiologists, clinicians, and infection control workers may use this software to improve the systematic monitoring of drug resistance in their hospitals and communities and to share their data in a common format among national networks.

Since 1977, WHO has produced Model Lists of Essential Drugs in order to help governments select the most effective and appropriate drugs in line with priority needs. The lists, which are regularly revised, also contribute to the rational purchasing and use of drugs. Studies have demonstrated that in those areas in which an essential drugs programme is in operation, significantly more essen_tial drugs are available, significantly fewer injections and antimicrobials are utilized, and drug stocks last about three times longer than in regions without such a programme. At present over 120 countries have implemented an essential drugs list. With the first global strategy for containment of antimicrobial resistance now available, WHO is also in a position to advise health policy-makers and managers on the specific interventions needed to safeguard the effectiveness of vital drugs and thus ensure that their life-saving capacity remains available to future generations.

3. CLIMATE AND HEALTH

People have adapted to living in a wide variety of climates around the world – from the tropics to the arctic, both climate and weather have a powerful impact on human life and health.

The extremes of weather (heavy rains, floods, hurricanes) occur over a short period of time (a few days) and can severely affect health. Poorer communities are much more vulnerable to the health impact of climate variability than rich ones. Of approximately 80,000 deaths which occur world-wide each year as a result of natural disasters about 95% of them are in poor countries. In weather-triggered disasters people and animals die; homes, crops and resources are destroyed; public health infrastructure (e.g. hospitals, roads) is damaged. Some recent examples:

- In 1998, hurricane Mitch caused over 7,500 deaths in Honduras, Nicaragua, Guatemala and El Salvador. Half the population was evacuated from their homes and, in Honduras, 75% were left without clean water. Sewage networks and water supplies were disrupted, bringing increases in the incidence of cholera and other diarrhoeal diseases;
- In 1998, China experienced its worst flooding for nearly 50 years that affected 180 million people. Close to 4,000 people lost their lives and nearly seven million houses were totally destroyed;
- In 1999, a cyclone in Orissa, India, caused of 10,000 deaths. The total number of people affected was estimated at 10-15 million;
- In 2000, floods in Mozambique killed 500 people and left 330,000 homeless.

Human physiology can handle most variation in weather, within certain limits. But marked short-term fluctuations in weather can cause acute adverse health effects, leading to a greater number of hospital admissions and even to increased death rate:

- Heat waves can cause heat-related illness and death (e.g. heat stroke). The elderly and persons with heart or respiratory disease are particularly vulnerable;
- Heat waves in India in 1998 were associated with many deaths. In Chicago, USA, more than 500 deaths were caused by a heat wave in July 1995;
- In cities, stagnant weather conditions can trap both warm air and air pollutants – leading to smog episodes which can have significant impact on health;

Climate plays an important role in vector-borne diseases – a major cause of illness and death in tropical countries – transmitted by insects such as mosquitoes, ticks, sandflies and tsetse flies. These cold-blooded vectors are sensitive to direct effects of climate such as temperature, rainfall patterns and wind. Climate also affects their distribution and abundance through its effects on host plants and animals.

Malaria transmission is particularly sensitive to weather and climate. Unusual weather conditions, for example a heavy downpour, can greatly increase the mosquito population and trigger an epidemic. This is what happened in the Wajir district of Kenya in 1998. Under normal weather conditions this region is too dry for the vectors and very little transmission occurs. There had not been a malaria epidemic since 1952 and the local health sector was unprepared for the major outbreak that followed the heavy rains. On the desert and highland fringes of malarious areas, malaria transmission is unstable and the population lacks protective immunity. Thus, when weather conditions (rainfall and temperature) favour transmission, serious epidemics may occur. In some countries, such as India, Colombia and Venezuela, fluctuations in malaria risk over the years have

been linked to changes in rainfall associated with the El Niño cycle.

Global warming

About two thirds of solar energy reaching Earth is absorbed by the Earth's surface which consequently gets warmer. The heat radiates back to the atmosphere, where some of it is trapped by greenhouse gases, mostly carbon dioxide.

The average surface temperature is about 15 °C – about 33 °C higher than it would be in the absence of the greenhouse effect; without such gases most of the Earth's surface would be frozen with a mean air temperature of -18 °C.

Human activities have polluted the atmosphere to the extent of being able to affect the climate. The atmospheric concentration of carbon dioxide has increased by 31% since pre-industrial times, causing more heat to be trapped in the lower atmosphere. Emissions of carbon dioxide are still increasing. Many countries are working to reduce greenhouse gas emissions under the United Nations Framework Convention on Climate Change. Unfortunately, current international agreements are not sufficient to prevent the world facing significant changes in climate and a rise in sea levels.

The scientific evidence for climate change and its impacts is assessed by the Intergovernmental Panel on Climate Change (IPCC). According to IPCC's Third Assessment Report (2001), "there is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities".

Some impacts include:

- The average temperature in many regions has been increasing in recent decades. The global average surface temperature has increased by 0.2°-0.6° C over the last century;
- Globally, 1998 was the warmest year and the 1990s was the warmest decade on record;
- Many areas have experienced increases in rainfall, particularly mid to high latitude countries;
- In some regions, such as parts of Asia and Africa, the frequency and intensity of droughts have been observed to increase in recent decades;
- Episodes of El Niño have been more frequent, persistent and intense since mid-1970s compared with the previous 100 years.

Projections of future climate change are derived from series of experiments with global climate models which, in turn, rely on estimates of future population growth and energy use. Climatologists of the IPCC have reviewed the results of these experiments in order to estimate changes in climate in the course of this century. They predict:

- Global mean surface temperature will rise by 1.4° - 5.8 °C. Warming will be greatest over land areas, and at high latitudes;
- The projected rate of warming is greater than anything humans have experienced in the last 10,000 years;
- The frequency of weather extremes is likely to change leading to an increased risk of floods and drought. There will be fewer cold spells but more heat waves;
- The frequency and intensity of El Niño may be affected;
- Global mean sea level is projected to rise by 9–88 cm by the year 2100. More than half of the world's population now lives within 60km of the sea and some of the most vulnerable regions are the Nile delta in Egypt, the Ganges-Brahmaputra delta in Bangladesh, and many small islands including the Marshall Islands and the Maldives.

Human societies are very vulnerable to climate extremes (droughts, floods, wind storms). A changing climate would entail changes in the frequency and/or intensity of such extremes. This is a major concern for human health. To a large extent, public health depends on safe drinking water, sufficient food, secure shelter, and good social conditions. All these factors can be affected by climate change:

- Fresh water supplies may be affected, reducing the availability of clean water for drinking and washing. Supplies can be contaminated and sewage systems may be damaged, increasing the risk of spread of infectious diseases such as diarrhoeal diseases;
- Food production may be undermined in vulnerable regions, not only directly but also indirectly through pests and plant or animal diseases. Local declines in food production would lead to hunger and malnutrition with long-term health consequences, especially for children;
- Food and water shortages may lead to conflicts in vulnerable regions, with serious implications for public health;
- These and other climate related impacts on human health and well-being may lead to population displacement, creating environmental refugees and consequently further health implications.

Changes in climate may alter the distribution of important vector species (e.g. mosquitoes) and may increase the spread of disease to new areas which lack a strong public health infrastructure.

- Highland populations (such as in East Africa or Papua New Guinea) that fall outside areas of stable endemic malaria transmission may be

particularly vulnerable to increases in malaria due to climate warming;
- It is unlikely that malaria would be re-introduced into developed countries (such as Western Europe or the United States of America) because these countries have well-developed public health infrastructure. However, the risk of localized outbreaks may increase;
- The seasonal transmission and distribution of many other diseases transmitted by mosquitoes (dengue, yellow fever) and by ticks (Lyme disease, tick-borne encephalitis) may also be affected by climate change.

Areport by a WHO Task Group has warned that climate change may have an important impact on human health. Not only will climate change exacerbate various current health problems, it may also bring new and unexpected ones. Response strategies aimed at lessening potential health impact of the anticipated climate changes should include:
- Monitoring of infectious diseases and disease vectors to detect early changes in incidence or geographical distribution;
- Environmental management;
- Disaster preparedness;
- Improved early warning systems and epidemic preparedness;
- Improved water and air pollution control;
- Public education directed at personal behaviour;
- Training of researchers and health professionals.

WHO's Response

As a response to the requirements stated in Agenda 21 and in the United Nations Framework Convention on Climate Change, a number of organizations carrying out significant climate-related activities, jointly established the Inter-Agency Committee on the Climate Agenda. In 1998, the 51st World Health Assembly endorsed WHO's participation in this group.

WHO provides input to the health aspects of the Climate Agenda within the general field of "climate impact assessment and response strategies to reduce vulnerability". WHO has been working with WMO and UNEP in this area since 1999. Joint activities of the three organizations focus on three main areas: capacity building, information exchange and research promotion.

4. CRIMEAN-CONGO HAEMORRHAGIC FEVER

Crimean-Congo haemorrhagic fever (CCHF) is a viral haemorrhagic fever of the Nairovirus group. Although primarily a zoonosis, sporadic cases and outbreaks of CCHF affecting humans do occur. The disease is endemic in many countries in Africa, Europe and Asia, and during 2001, cases or outbreaks have been recorded in Kosovo, Albania, Iran, Pakistan, and South Africa.

The disease was first described in the Crimea in 1944 and given the name Crimean haemorrhagic fever. In 1969 it was recognized that the pathogen causing Crimean haemorrhagic fever was the same as that responsible for an illness identified in 1956 in the Congo, and linkage of the 2 place names resulted in the current name for the disease and the virus. CCHF is a severe disease in humans, with a high mortality rate. Fortunately, human illness occurs infrequently, although animal infection may be more common.

The geographical distribution of the virus, like that of its tick vector, is widespread. Evidence of CCHF virus has been found in Africa, Asia, the Middle East and Eastern Europe. Healthcare workers in endemic areas should be aware of the illness and the correct infection control procedures to protect themselves and their patients from the risk of nosocomial (hospital-acquired) infection.

CCHF Virus

The virus which causes CCHF is a Nairovirus, a group of related viruses forming one of the five genera in the Bunyaviridae family of viruses. All of the 32 members of the Nairovirus genus are transmitted by argasid or ixodid ticks, but only three have been implicated as causes of human disease: the Dugbe and Nairobi sheep viruses, and CCHF, which is the most important human pathogen amongst them.

CCHF Reservoirs and Vectors
- The CCHF virus may infect a wide range of domestic and wild animals. Many birds are resistant to infection, but ostriches are susceptible and may show a high prevalence of infection in endemic areas. Animals become infected with CCHF from the bite of infected ticks.
- A number of tick genera are capable of becoming infected with CCHF virus, but the most efficient and common vectors for CCHF appear to be members of the Hyalomma genus. Trans-ovarial (transmission of the virus from infected female ticks to offspring via eggs) and venereal transmission have been demonstrated amongst some vector species, indicating one mechanism which may contribute to maintaining the circulation of the virus in nature.
- However, the most important source for acquisition of the virus by ticks is believed to be infected small vertebrates on which immature Hyalomma ticks feed. Once infected, the tick

remains infected through its developmental stages, and the mature tick may transmit the infection to large vertebrates, such as livestock. Domestic ruminant animals, such as cattle, sheep and goats, are viraemic (virus circulating in the bloodstream) for around one week after becoming infected.

- Humans who become infected with CCHF acquire the virus from direct contact with blood or other infected tissues from livestock during this time, or they may become infected from a tick bite. The majority of cases have occurred in those involved with the livestock industry, such as agricultural workers, slaughterhouse workers and veterinarians.

Clinical Features

- The length of the incubation period for the illness appears to depend on the mode of acquisition of the virus. Following infection via tick bite, the incubation period is usually one to three days, with a maximum of nine days. The incubation period following contact with infected blood or tissues is usually five to six days, with a documented maximum of 13 days.
- Onset of symptoms is sudden, with fever, myalgia (aching muscles), dizziness, neck pain and stiffness, backache, headache, sore eyes and photophobia (sensitivity to light). There may be nausea, vomiting and sore throat early on, which may be accompanied by diarrhoea and generalised abdominal pain. Over the next few days, the patient may experience sharp mood swings, and may become confused and aggressive. After two to four days, the agitation may be replaced by sleepiness, depression and lassitude, and the abdominal pain may localize to the right upper quadrant, with detectable hepatomegaly (liver enlargement).
- Other clinical signs which emerge include tachycardia (fast heart rate), lymphadenopathy (enlarged lymph nodes), and a petechial rash (a rash caused by bleeding into the skin), both on internal mucosal surfaces, such as in the mouth and throat, and on the skin. The petechiae may give way to ecchymoses (like a petechial rash, but covering larger areas) and other haemorrhagic phenomena such as melaena (bleeding from the upper bowel, passed as altered blood in the faeces), haematuria (blood in the urine), epistaxis (nosebleeds) and bleeding from the gums. There is usually evidence of hepatitis. The severely ill may develop hepatorenal (i.e., liver and kidney) and pulmonary failure after the fifth day of illness.
- The mortality rate from CCHF is approximately 30%, with death occurring in the second week of illness. In those patients who recover, improvement generally begins on the ninth or tenth day after the onset of illness.

Diagnosis

- Diagnosis of suspected CCHF is performed in specially-equipped, high biosafety level laboratories. IgG and IgM antibodies may be detected in serum by enzyme-linked immunoassay (the "ELISA" or "EIA" methods) from about day six of illness. IgM remains detectable for up to four months, and IgG levels decline but remain detectable for up to five years.
- Patients with fatal disease do not usually develop a measurable antibody response and in these individuals, as well as in patients in the first few days of illness, diagnosis is achieved by virus detection in blood or tissue samples. There are several methods for doing this. The virus may be isolated from blood or tissue specimens in the first five days of illness, and grown in cell culture. Viral antigens may sometimes be shown in tissue samples using immunofluorescence or EIA.
- More recently, the polymerase chain reaction (PCR), a molecular method for detecting the viral genome, has been successfully applied in diagnosis.

Treatment

- General supportive therapy is the mainstay of patient management in CCHF. Intensive monitoring to guide volume and blood component replacement is required.
- The antiviral drug ribavirin has been used in treatment of established CCHF infection with apparent benefit. Both oral and intravenous formulations seem to be effective.
- The value of immune plasma from recovered patients for therapeutic purposes has not been demonstrated, although it has been employed on several occasions.

Prevention and Control

- Although an inactivated, mouse brain-derived vaccine against CCHF has been developed and used on a small scale in Eastern Europe, there is no safe and effective vaccine widely available for human use. The tick vectors are numerous and widespread and tick control with acaricides (chemicals intended to kill ticks) is only a realistic option for well-managed livestock production facilities.
- Persons living in endemic areas should use personal protective measures that include avoidance of areas where tick vectors are abundant and when they are active (Spring to

Fall); regular examination of clothing and skin for ticks, and their removal; and use of repellents.
- Persons who work with livestock or other animals in the endemic areas can take practical measures to protect themselves. These include the use of repellents on the skin (e.g. DEET) and clothing (e.g. permethrin) and wearing gloves or other protective clothing to prevent skin contact with infected tissue or blood.
- When patients with CCHF are admitted to hospital, there is a risk of nosocomial spread of infection. In the past, serious outbreaks have occurred in this way and it is imperative that adequate infection control measures be observed to prevent this disastrous outcome.
- Patients with suspected or confirmed CCHF should be isolated and cared for using barrier nursing techniques. Specimens of blood or tissues taken for diagnostic purposes should be collected and handled using universal precautions. Sharps (needles and other penetrating surgical instruments) and body wastes should be safely disposed of using appropriate decontamination procedures.
- Healthcare workers are at risk of acquiring infection from sharps injuries during surgical procedures and, in the past, infection has been transmitted to surgeons operating on patients to determine the cause of the abdominal symptoms in the early stages of (at that moment undiagnosed) infection. Healthcare workers who have had contact with tissue or blood from patients with suspected or confirmed CCHF should be followed up with daily temperature and symptom monitoring for at least 14 days after the putative exposure.

5. FOOD SAFETY AND FOODBORNE ILLNESS

Food safety is an increasingly important public health issue. Governments all over the world are intensifying their efforts to improve food safety. These efforts are in response to an increasing number of food safety problems and rising consumer concerns.

Definition of Foodborne Illness: Foodborne illnesses are defined as diseases, usually either infectious or toxic in nature, caused by agents that enter the body through the ingestion of food. Every person is at risk of foodborne illness.

Magnitude of Foodborne Illness: Foodborne diseases are a widespread and growing public health problem, both in developed and developing countries.

- The global incidence of foodborne disease is difficult to estimate, but it has been reported that in 2000 alone 2.1 million people died from diarrhoeal diseases. A great proportion of these cases can be attributed to contamination of food and drinking water. Additionally, diarrhoea is a major cause of malnutrition in infants and young children.
- In industrialized countries, the percentage of people suffering from foodborne diseases each year has been reported to be up to 30%. In the United States of America (USA), for example, around 76 million cases of foodborne diseases, resulting in 325,000 hospitalizations and 5,000 deaths, are estimated to occur each year.
- While less well documented, developing countries bear the brunt of the problem due to the presence of a wide range of foodborne diseases, including those caused by parasites. The high prevalence of diarrhoeal diseases in many developing countries suggests major underlying food safety problems.
- While most foodborne diseases are sporadic and often not reported, foodborne disease outbreaks may take on massive proportions. For example, in 1994, an outbreak of salmonellosis due to contaminated ice cream occurred in the USA, affecting an estimated 224,000 persons. In 1988, an outbreak of hepatitis A, resulting from the consumption of contaminated clams, affected some 300,000 individuals in China.

Major Foodborne Diseases from Microorganisms
- Salmonellosis is a major problem in most countries. Salmonellosis is caused by the Salmonella bacteria and symptoms are fever, headache, nausea, vomiting, abdominal pain and diarrhoea. Examples of foods involved in outbreaks of salmonellosis are eggs, poultry and other meats, raw milk and chocolate.
- Campylobacteriosis is a widespread infection. It is caused by certain species of Campylobacter bacteria and in some countries, the reported number of cases surpasses the incidence of salmonellosis. Foodborne cases are mainly caused by foods such as raw milk, raw or undercooked poultry and drinking water. Acute health effects of campylobacteriosis include severe abdominal pain, fever, nausea and diarrhoea. In two to ten per cent of cases the infection may lead to chronic health problems, including reactive arthritis and neurological disorders.
- Infections due to enterohaemorrhagic (causing intestinal bleeding) E. coli, e.g. E.coli O157, and listeriosis are important foodborne diseases which have emerged over the last decades. Although their incidence is relatively low, their

severe and sometimes fatal health consequences, particularly among infants, children and the elderly, make them among the most serious foodborne infections.

Pathogenic Escherichia coli strains, such as E. coli O157, which produce a potent (vero-) toxin cause haemorrhagic infections in the colon, resulting in bloody diarrhoea or life-threatening complications such as kidney failure. E. coli O157 outbreaks have been mainly related to beef, but sprouts, lettuce and juice have also caused outbreaks.

Listeria monocytogenes is the cause of listeriosis which has a fatality rate of up to 30%. The most frequent effects are meningitis and miscarriage or meningitis of the foetus or newborn. Many types of foods have been implicated in listeriosis cases. Often a long refrigeration period seems to have contributed to outbreaks.

- Cholera is a major public health problem in developing countries, also causing enormous economic losses. The disease is caused by the bacterium Vibrio cholerae. In addition to water, contaminated foods can be the vehicle of infection. Different foods, including rice, vegetables, millet gruel and various types of seafood have been implicated in outbreaks of cholera. Symptoms, including abdominal pain, vomiting and profuse watery diarrhoea, may lead to severe dehydration and possibly death, unless fluid and salt are replaced.

Other Food Safety Problems: Some major examples are:

- Naturally occurring toxins, such as mycotoxins, marine biotoxins, cyanogenic glycosides and toxins occurring in poisonous mushrooms, periodically cause severe intoxications. Mycotoxins, such as aflatoxin and ochratoxin A, are found at measurable levels in many staple foods; the health implications of long-term exposure of such toxins are poorly understood.
- Unconventional agents such as the agent causing bovine spongiform encephalopathy (BSE, or "mad cow disease"), is associated with variant Creutzfeldt-Jakob (vCJD) Disease in humans. Consumption of bovine products containing brain tissue is the most likely route for transmission of the agent to humans.
- Persistant Organic Pollutants (POPs) are compounds that accumulate in the environment and the human body. Known examples are Dioxins and PCBs (polychlorinated biphenyls). Dioxins are unwanted byproducts of some industrial processes and waste incineration. Exposure to POPs may result in a wide variety of adverse effects in humans.
- Metals: such as lead and mercury, cause neurological damage in infants and children. Exposure to cadmium can also cause kidney damage, usually seen in the elderly. These (and POPs) may contaminate food through pollution of air, water and soil.

Costs of Foodborne Diseases

- Food contamination creates an enormous social and economic burden on communities and their health systems. In the USA, diseases caused by the major pathogens alone are estimated to cost up to US $35 billion annually (1997) in medical costs and lost productivity. The re-emergence of cholera in Peru in 1991 resulted in the loss of US $500 million in fish and fishery product exports that year.

Challenges and Developments in Food Safety

The safety of food derived from biotechnology needs to be carefully assessed. To provide the scientific basis for decisions regarding human health, new methods and policies to assess such food need to be developed and agreed upon internationally. The assessment should consider health benefits as well as possible negative health implications. Crops modified to resist pests, foods with allergens removed or food with an increase of essential nutrients are possible examples of the former, while anti-microbial markers in some genetically modified foods have been suggested to be an example of the latter. The weighing of potential risks and benefits is an important aspect of assessment of foods derived from biotechnology that has not received much attention in the past. Likewise, clear communication of the basis for safety assessment in this area is generally lacking at national and international levels.

If not properly monitored and assessed, changes in animal husbandry practices, including feeding, may have serious implications for food safety. For example, increased use of ruminant bone and meat meal as feed supplement for cattle appear to have played a role in the emergence of BSE.

Adding low levels of antibiotics to animal feed in order to increase growth rate has raised concern about the transfer of antibiotic resistance to human pathogens from this practice.

Modern intensive agricultural practices contribute to increasing the availability of affordable foodstuffs and the use of food additives can improve the quality, quantity and safety of the food supply. However, appropriate controls are necessary to ensure their proper and safe use along the entire food chain. Pre-market review and approval followed by continuous monitoring are necessary to ensure the safe use of pesticides, veterinary drugs and food additives.

Other challenges, which need to be addressed to help ensure food safety, include the globalization of trade in food, urbanization, changes in lifestyles, international travel, environmental pollution, deliberate contamination and natural and manmade disasters. The food production chain has become more complex, providing greater opportunities for contamination and growth of pathogens. Many outbreaks of foodborne diseases that were once contained within a small community may now take on global dimensions.

Future Directions for Food Safety at the World Health Organization (WHO)

In partnership with other stakeholders, WHO is developing policies that will further promote the safety of food. These policies cover the entire food chain from production to consumption and will make use of different types of expertise.

Work of the WHO Food Safety Programme and other WHO programmes and departments includes strengthening food safety systems, promoting good manufacturing practices and educating retailers and consumers about appropriate food handling. Education of consumers and training of food handlers in safe food handling is one of the most critical interventions in the prevention of foodborne illnesses.

- WHO is promoting in-country laboratory-based surveillance of priority foodborne diseases in humans and animals, as well as the monitoring of pathogens in food. In co-operation with its Member States, WHO is working to support the development of internationally agreed-upon guidelines for data collection in countries. WHO is also compiling outbreak and surveillance databases, and is broadening its epidemic surveillance capacity to include foodborne disease outbreaks.
- WHO is expanding its global network of participating institutions to monitor chemical contamination of the food supply, particularly in developing countries.
- WHO is promoting the use of all food technologies which may contribute to public health, such as pasteurization, food irradiation and fermentation.
- WHO has undertaken an important new initiative to strengthen the scientific basis of food safety activities through the establishment of a WHO/FAO (Food and Agriculture Organization of the United Nations) expert advisory body to assess microbiological risks in food.
- WHO is increasing its involvement in the work of the FAO/WHO Codex Alimentarius Commission, whose standards, guidelines and recommendations are regarded as the international reference for food safety requirements by the World Trade Organization. WHO and FAO is initiating a thorough review of Codex primo 2002.
- Biotechnology has become a major public issue in developed as well as developing countries. WHO, jointly with FAO, will convene a series of expert consultations to assess the safety and nutritional aspects of foods derived from genetically modified plants, microorganisms, and animals. WHO has initiated work to establish a knowledge base focusing on a broader evaluation of risks, benefits and other considerations related to the production and consumption of foods derived from biotechnology.