



**GERMAN
NETWORK**
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(DNTDs)

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RURAL DEVELOPMENT – THE UNDERESTIMATED HEALTH HAZARD?

The German Network against Neglected Tropical Diseases (DNTDs) e. V.

is a national platform designed to heighten awareness of this group of diseases and raise the level of commitment in Germany to fighting them. The German network wishes to support the World Health Organization (WHO) in controlling, eliminating or even eradicating at least ten of the 17 neglected tropical diseases. It is consisting of various representatives from the fields of politics, science, civil society and business endeavors.

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CONTENT

When man and beast come into contact...	4
Irrigation and man-made tropical diseases	5
Antibiotic resistance	6
More food, obesity and non-communicable diseases	6
Risks to food safety	6
Work-related health risks in farming	7
Cooperation projects for rural development require a health component	7
Box Malaria, lymphatic Filoriose, Onchozerkose and Schistosomiasis	9
Box Ebola and neglected Tropical Diseases – For Example Sierra Leone	12

RURAL DEVELOPMENT – THE UNDERESTIMATED HEALTH HAZARD?

Rural development and food security once again top the list of priorities for German and international development policy. However, interventions in these fields involve numerous potential health hazards. The promotion of agriculture and fishing has a key role to play in global strategies to combat hunger and poverty. Yet it is often forgotten that this can involve a whole range of specific risks to people's health and lives. For example, local, regional or global epidemics often occur in places where people and animals live close together or come into close contact.

Agricultural irrigation systems readily become sources of infection with neglected tropical diseases (NTDs) and malaria. The use of antibiotics in agriculture and fish farming contributes to the mounting resistance of pathogens to antibiotics used to treat communicable diseases in humans and animals. Simply producing more food can also lead to the further spread of obesity and with this an increase in non-communicable diseases. Food safety has to be taken into account within agricultural value chains. There are also many ways in which working in farming can endanger health. All these risks must be considered when planning and implementing cooperation projects in rural development. Preventing or reducing these risks should be an integral component of such projects from the outset.

When man and beast come into contact...

Weak governments, run-down healthcare systems, specific cultural practices, a belated and initially only half-hearted response from the international community, and a lack of biomedical resources to prevent and treat Ebola – all these contributed to the most recent outbreak of the epidemic in West Africa. 28,500 people in Liberia, Guinea and Sierra Leone have contracted Ebola since December 2013; 11,300 have died. But there is another important factor that should not be overlooked when considering this epidemic: Ebola is a zoonotic disease, an infectious disease that can be transmitted from animals to humans. Although AIDS is not actually a zoonotic disease, all known HI viruses come originally from apes. The further people advance into the wilderness to clear the land for rural development, the closer they come to the virus, perhaps an undiscovered one as yet that could spark the next deadly pandemic. There was never any danger of that in the case of Ebola, on account of its means of transmission. The world – with the exception of those people affected in West Africa – was lucky this time.

SARS and MERS are also zoonotic diseases. The SARS virus – SARS stands for severe acute respiratory syndrome – that in 2002 and 2003 at first rightly caused global panic, but was then rapidly brought under control worldwide using traditional public health measures, i.e. case finding and isolation – had its origin in civet cats, which are eaten as a delicacy in parts of China.

MERS – properly MERS-CoV (Middle East Respiratory Syndrome Coronavirus) – is a virus first identified in Saudi Arabia in 2012. People suffering from MERS-CoV exhibit flu-like symptoms. To date

World Health Organization (WHO) has been notified of 1,400 cases of MERS-CoV – mainly on the Arabian Peninsula. Of these, 40 percent have died. More and more studies point to the fact that dromedaries are the source of the human zoonotic infections. As yet there are no indications of continuous transmission of the MERS virus from person to person in the general population.

The Spanish flu of 1918 to 1920, the most deadly pandemic of the 20th century – besides HIV/AIDS – with its death toll of up to 50 million, was likewise a zoonotic disease. The process by which flu viruses are transmitted between humans and animals, that is to say mainly between birds, pigs and humans, is as dynamic and complex as the mutations that the flu viruses can undergo in passing through these various species. Transmission takes place anywhere that humans and animals come into close contact – therefore including and particularly in small-scale farming. That is why – according to leading experts in this field – it is a question not of “if” but only of “when” a new flu virus originating in the animal kingdom starts to make its way round the world. This virus could be as deadly as the one that once caused Spanish flu.

Irrigation and man-made tropical diseases

“Throughout the tropical world, in Africa, Asia and Latin America, the construction of water impoundments, for irrigation and other purposes, in areas of endemic water-related diseases, has inexorably intensified community levels of infection, and also created new areas of transmission” – so commented J.M. Hunter, the distinguished American tropical medicine specialist, in a groundbreaking publication right back in 1982. He was referring here in particular to diseases transmissible through mosquitos, other insects or small creatures – known as vectors – in combination with water, such as malaria, lymphatic filariasis, onchocerciasis and especially schistosomiasis. While malaria is often fatal, particularly in children, the other three conditions, which are now included in the neglected tropical diseases (see box on page 9), lead if untreated to chronic illness and severe disability. Even then, Hunter warned of a lamentable lack of cooperation between the agriculture and health sectors and called for urgent remedial action.

Then, in 1992, a comprehensive monograph for many regions of Africa, Asia and Latin America published by the World Health Organization (WHO) showed, country by country, how, because of these NTDs and malaria, agricultural irrigation programmes in the previous decades had led to a deterioration in the health of hundreds of thousands, or even millions, of people who settled near these programmes. The report referred particularly to the negative health impacts of small earth dams built in Africa in their thousands in the 1970s and 1980s to irrigate the fields or as animal watering places.

Staff of Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ), the German agency for technical cooperation, reported specific experience of this in German development cooperation programmes in Mali in the 1980s. They found that in the area surrounding agricultural irrigation (<http://www.ncbi.nlm.nih.gov/pubmed/3140361>) projects the prevalence of schistosomiasis was six times higher than in places without irrigation. Because the prevalence of schistosomiasis around natural water sources was three times lower than at artificially created ones, they concluded that schistosomiasis in Mali during the 1980s was essentially a man-made health problem.

In addition, a more recent cost-benefit analysis by the World Bank relating to an agricultural irrigation project in Ethiopia found that almost a third of the project's benefit in terms of enhanced production and household incomes was cancelled out by its health costs – including the increased number of cases of malaria and schistosomiasis and the resulting days of sickness. That is why the report recommends that such programmes should only be carried out in areas where malaria and schistosomiasis are rare or can be easily controlled. The latter is now in principle the case everywhere – unlike in the 1970s and 1980s. Simple, proven and cost-effective methods to achieve this are available (see box on page 9).

Antibiotic resistance

The World Health Organization recently declared the worldwide rise in pathogen resistance to the antibiotics currently available to treat infectious diseases to be one of the greatest global health challenges of our time. Improper and excessive use of antibiotics in healthcare worldwide is contributing significantly to the development of this resistance. However, at the same time there is no question that the use of antibiotics in farming – whether to maintain the health of livestock or as an aid in fattening – drastically encourages the spread of resistant bacteria. This is particularly the case in places where there is little state regulation of the market in antibiotics and other pharmaceuticals.

More food, obesity and non-communicable diseases

However sensible the aim of increasing yields is as part of rural development programmes to tackle poor productivity, especially in African farming, it must of course come with a health warning. Non-communicable diseases are on the rise in Africa as well. Cardiovascular diseases in particular are often diet-related, and obesity is an important risk factor. Although a third of children in developing countries are small for their age – on account of their malnutrition and the prevalence of infectious diseases – there are now more overweight people living there, purely in terms of numbers, than in countries with higher incomes.

For this reason, too, rural development projects designed to increase yields must not focus just on producing more food, but on producing the right food. It is however doubtful whether that alone is enough to make people plan a more balanced diet. That is why additional, evidence-based measures are probably needed to try to influence people's eating habits and lifestyle and encourage them to adopt a healthy diet and way of life.

Risks to food safety

The most significant agricultural sources of food-related illnesses are zoonotic pathogens, bacteria in contaminated water and mycotoxins. Health risks caused by salmonella and campylobacter are especially relevant for food safety in livestock production. These bacteria enter the food production chain from the digestive tract of livestock raised on farms and smallholdings. Contaminated water can also present a risk, for example when inadequately treated wastewater is used to irrigate crops.

In addition, food safety in tropical regions is threatened by the frequent occurrence of mycotoxins, poisons produced by moulds. The most prominent example is that of aflatoxin, produced by the fungus *Aspergillus flavus*, which can contaminate maize and nuts, particularly in hot, humid regions. The consumption of foods contaminated with aflatoxins can cause liver damage and even liver cancer.

Work-related health risks in farming

Every year 170,000 farmers, fishermen and agricultural workers worldwide die as a result of their jobs. Working in farming is one of the most dangerous occupations of all. Agricultural machinery presents the greatest dangers, but using agrochemicals and other toxic or allergenic substances is also hazardous. The WHO estimates that worldwide there are up to 5 million cases of pesticide poisoning each year among farm workers and in the rural population, predominantly in developing countries. Infectious diseases transmitted from animals to humans are especially dangerous for those working in agriculture. Smallholders and their families in particular are often exposed unprotected to these infections. There are also health problems caused by noise, vibration, dust and dirt.

Cooperation projects for rural development require a health component

The examples given highlight a number of potential negative consequences for health from development projects promoting agriculture. They are a burning issue for German development policy, which has recently made rural development a top priority as part of the government's special initiative "One World – No Hunger" (SEWOH).

Therefore, in order to prevent these potentially serious side-effects on human health resulting from rural development cooperation projects, or to mitigate their consequences, it is imperative to:

- actively monitor infectious animal diseases as part of livestock disease information systems and make practical provision for combating epidemics affecting humans and animals (epidemic preparedness);
- ensure that wherever irrigation programmes are carried out infectious tropical diseases are managed appropriately at the same time and brought under control. Of particular importance in this context are schistosomiasis, the filariases (worm diseases caused by threadworms) and malaria;
- regulate markets for pharmaceuticals and especially antibiotics for humans and animals in partner countries and monitor the use of antibiotics in animal and fish farming;
- take coherent steps to guarantee the safety of food "from field to fork", as is the case in German food production, for example;

- recognise and prevent work-related health risks (accidents, infections, poisoning) for small-scale farmers and agricultural workers, and in the case of illness make appropriate healthcare provision for the sick people and their families.

In conclusion, it is essential to determine the health risks of programmes to promote rural development at the planning stage as part of a standardised participatory health impact assessment, so that appropriate countermeasures can be taken when a project is implemented.

A list of references is available at <http://www.rural21.com>

Malaria, lymphatic filariasis, onchocerciasis and schistosomiasis

As a Millennium Development Goal (MDG), the fight against **malaria** has enjoyed high priority during the last fifteen years both in the countries affected and around the world. Today there are 37 percent fewer new cases each year than in 2000. In the same period a 60 percent reduction in the number of deaths has been achieved – thanks to the use of impregnated mosquito nets to prevent infection and to the treatment of sufferers with the combined preparations now commonly available. Despite this, according to figures from the World Health Organization (WHO), of the 214 million people who contract malaria, there are currently still 438,000 deaths every year.



Lymphatic filariasis is also transmitted by mosquitos, but in this case the disease is caused by worms (mainly *Wucheria bancroftii*). Its larvae block the lymph flow of those infected and causes painful local inflammation. In chronic cases filariasis leads to painful and often grotesque swellings of the limbs, which is why it is also known as elephantiasis. In men the scrotum is often affected as well. People with the disease frequently suffer permanent disability and social exclusion as a result. WHO estimates that approximately 1.23 billion people are currently living in areas where filariasis is rife, 120 million are infected and 40 million suffer from severe disabilities caused by the disease. Yet lymphatic filariasis can be controlled with bed nets and by regular preventive treatment of the whole population (MDA: mass drug administration) with worm medication (such as albendazole). If this treatment is carried out over a number of years the transmission of filariasis can be prevented completely and the disease eliminated. In endemic areas around 33 percent of the people affected currently receive this preventive therapy on a regular basis.



Onchocerciasis – or river blindness – caused by the threadworm (*Onchocerca volvulus*) is widespread in 31 countries in Africa, but endemic foci also exist in Latin America. Transmission of the larvae of threadworms from person to person occurs through a bite from a blackfly. This fly breeds in fast-flowing rivers and streams in remote rural areas with fertile agricultural land. After infection takes place, the worm larvae form nodules in the subcutaneous tissue and develop into adult worms. On reaching sexual maturity the adult females produce new larvae, also known as microfilariae, which migrate through the connective tissue and eventually die. The physical symptoms brought on by the infection include severely itchy scaly or thickened skin and inflammation of the eyes which, left untreated, can lead to blindness. Onchocerciasis is tackled by controlling the blackfly and by preventive mass drug administration with the worm medication ivermectin. According to WHO figures, up to 99 million people in endemic countries – mainly in Africa – are now receiving this therapy on



a regular basis, with coverage currently at 76 percent. WHO estimates that this programme prevents around 40,000 cases of onchocerciasis-related sight loss every year. Some Latin American regions have already succeeded in interrupting the transmission of onchocerciasis and eliminating the disease.

In terms of the disease burden, **schistosomiasis (bilharziasis)** is the most significant tropical disease after malaria. It is caused by infection with blood flukes, worms of the genus *Schistosoma*, which are transmitted by infected freshwater snails. The water is contaminated by the excretions (faeces and urine) of humans carrying the infection. These parasites penetrate the skin and migrate through the body. The inflammation resulting from *Schistosoma* eggs mainly damages the intestines and the urogenital system, becomes chronic and is in some cases fatal. Poor hygiene conditions and water-based activities make children particularly vulnerable to infection. Children who have been infected often suffer from malnourishment and therefore frequently lag behind in their physical, intellectual and academic development. A sustained severe attack of schistosomiasis can cause lasting damage such as fibrosis of the liver, bladder cancer and kidney failure. The medication praziquantel is used in mass administration to control schistosomiasis. Figures from WHO show that around 261 million people – mainly in Africa, but also in parts of Asia and Latin America - currently need this preventive treatment on a regular basis; however, only about 14 percent of these are reached.



These last three conditions are among the so-called neglected tropical diseases (NTDs), the infectious diseases which affect the “bottom billion” in particular: the approximately 1.4 billion people in the world who still have to get by on an income of less than 1.25 dollars per person per day. The World Health Organization (WHO) includes seventeen quite separate



diseases transmissible by bacteria, protozoa, worms and viruses in the NTDs and in 2008 developed a realistic plan to tackle them. The fight against the NTDs gained particular momentum in 2012 as a result of the London Declaration on NTDs. Here the CEOs of 13 drug companies, representatives from governments of countries affected by NTDs, from the United States, the United Kingdom and the Gates Foundation, as well as from the World Bank and WHO, together with numerous other health organisations working all over the world, agreed a common platform to control and, where possible, to eliminate ten NTDs.

At present programmes to tackle NTDs are under way in 74 countries, targeting different diseases according to local epidemiological conditions. The medicines needed for this work are donated to the programmes by the drug companies party to the London Declaration.

In 2014 the German Network against Neglected Tropical Diseases (Deutsches Netzwerk gegen vernachlässigte Tropenkrankheiten, DNTDs) was founded in Germany by representatives of academia, NGOs and industry. One of its aims is to raise the profile of NTDs in the media, and especially in research and development cooperation. In January 2015 the organisation warned against neglecting the poverty-related diseases and NTDs in the wake of the fight against ebola.

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For more information: <http://www.dntds.de>*

Ebola and neglected tropical diseases – the case of Sierra Leone

In the wake of the Ebola epidemic it was feared that the efforts to combat the disease would shift the focus away from other major diseases such as malaria, and especially from the neglected tropical diseases (NTDs). This was indeed initially the case in Sierra Leone. As long ago as 2005 the government set up a national NTD programme in partnership with the US Agency for International Development (USAID), whereby 30,000 voluntary community workers helped to organise mass preventive chemotherapy treatment (mass drug administration, MDA) to control schistosomiasis, filariasis, soil transmitted helminths (STH: whipworms, roundworms and hookworms) and onchocerciasis and ensured continuous comprehensive coverage for a number of years. However, with the pressure of the Ebola epidemic all NTD activities had to be halted in 2014. When the epidemic had abated - since the beginning of November the country has officially been free of Ebola - MDA was successfully resumed in 2015. As was recently reported from Sierra Leone, 75 percent of all communities in endemic regions are now being reached again. In a recently implemented MDA campaign 1.4 million people are said to have received preventive chemotherapy for lymphatic filariasis and STH. As things stand, Sierra Leone could be one of the first African countries to successfully control schistosomiasis and geohelminthiasis and to eliminate lymphatic filariasis and river blindness (onchocerciasis).

More information: <http://www.globalnetwork.org>

