

# Population displacements as a risk factor for the emergence of epidemics

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Animal health,  
Conflict,  
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## Summary

Wars and civil conflicts have been terrible experiences since ancient times but, regrettably, they are always present even in the 21<sup>st</sup> century. Their catastrophic effects are still lived by many populations displaced from their native areas. Conflicts, particularly the civil ones, create disruption in most aspects of national structures and populations, which are forced to move to more or less safer or even distant areas, survive under downgraded conditions. They are usually housed in temporary shelters in overcrowded camps and contaminated environment. Water and food are neither safe nor sufficient. Malnutrition, lack or weak sanitary care and long-term stress lead these populations to being vulnerable to severe infections. Under such conditions there are high rates of morbidity and mortality, with elders and children being the main victims. Public health, animal health, municipalities and other inter-related sectors should work on preparedness plans well in advance in order to provide ways and means to face emergencies. Zoonotic and other communicable disease outbreaks should not be left uncontrolled, as their impact would be an additional burden for the country under unrest. Guidance should be provided on how to best articulate an emergency management plan from the early detection of outbreaks up to their control. These aspects are briefly exposed together with the imperative request for alleviation of suffering and of the multitude of hazards conflict-affected populations have to face.

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## Trasferimenti di popolazioni e fattori di rischio per le emergenze epidemiche

## Parole chiave

Conflitto,  
Emergenza,  
Epidemia,  
Infezione,  
Salute animale,  
Salute pubblica,  
Trasferimento di  
popolazione,  
Zoonosi.

## Riassunto

Guerre e conflitti civili sono esperienze terribili da tempi remoti, purtroppo, ancora oggi di attualità. I loro effetti catastrofici sono ancora vissuti da numerose popolazioni costrette a lasciare i propri territori. I conflitti, in particolare quelli civili, sono causa del crollo di molte strutture nazionali. Le popolazioni sono costrette a muoversi verso territori, o altri paesi, non sempre sicuri, a volte lontani, e a sopravvivere in condizioni precarie. Di solito sono alloggiate in rifugi temporanei e inadeguati, in campi sovraffollati e ambienti contaminati. Acqua e alimenti non sono sufficienti e sicuri. Malnutrizione, cure sanitarie scarse o assenti, associate a stress protratti, rendono queste popolazioni vulnerabili a diverse infezioni. In queste situazioni i tassi di morbilità e mortalità sono molto alti. Anziani e bambini sono le principali vittime. Per far fronte a queste emergenze, sanità pubblica, sanità animale, autorità e altre strutture correlate devono approntare specifici piani preventivi per utilizzare vie e mezzi, per quanto possibile, semplificati e appropriati. Focolai di zoonosi e altre malattie infettive, se lasciati senza controllo, avrebbero effetti disastrosi e costituirebbero un peso supplementare per la popolazione del paese. I piani preventivi devono prevedere linee guida sulle modalità più attendibili per articolare e mettere in funzione la gestione delle emergenze epidemiche, dall'identificazione precoce di eventuali focolai sino al loro controllo. L'articolo evidenzia questi aspetti, oltre alla richiesta impositiva di limitare le sofferenze e i numerosi pericoli ambientali e sanitari alle popolazioni vittime di conflitti.

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## Introduction

The reality that we are facing in our times consists of conflicts exploding for different reasons in different countries or even regions, which lead to population displacement into more or less distant areas, in search of security. They are usually housed into temporary settlements or camps with overcrowded and rudimentary shelters, unsafe water, food and sanitation, and increased exposure to disease vectors.

Such situations frequently lead to infectious disease outbreaks usually as a result of substantial and exacerbated synergic risk factors: e.g. changes due to deterioration in the environment, in human living conditions, and in vulnerability to biological pathogens and disease transmission (6, 25).

In long-term emergencies, populations have high rates of morbidity and mortality due to the breakdown of sanitary services, flight of trained staff, failure of existing disease control programs, and destroyed infrastructures. Moreover, high levels of malnutrition, low or absent vaccine coverage and long-term stress make people more sensitive to infection and disease. In addition, long-term conflicts affect entire communities because of chronic lack of investment in public and animal health, education, public works for the development of the environment, etc. These changes in human conditions, in the ecosystem of pathogens, and in the environment facilitate the occurrence and transmission of infectious diseases (epidemiologic

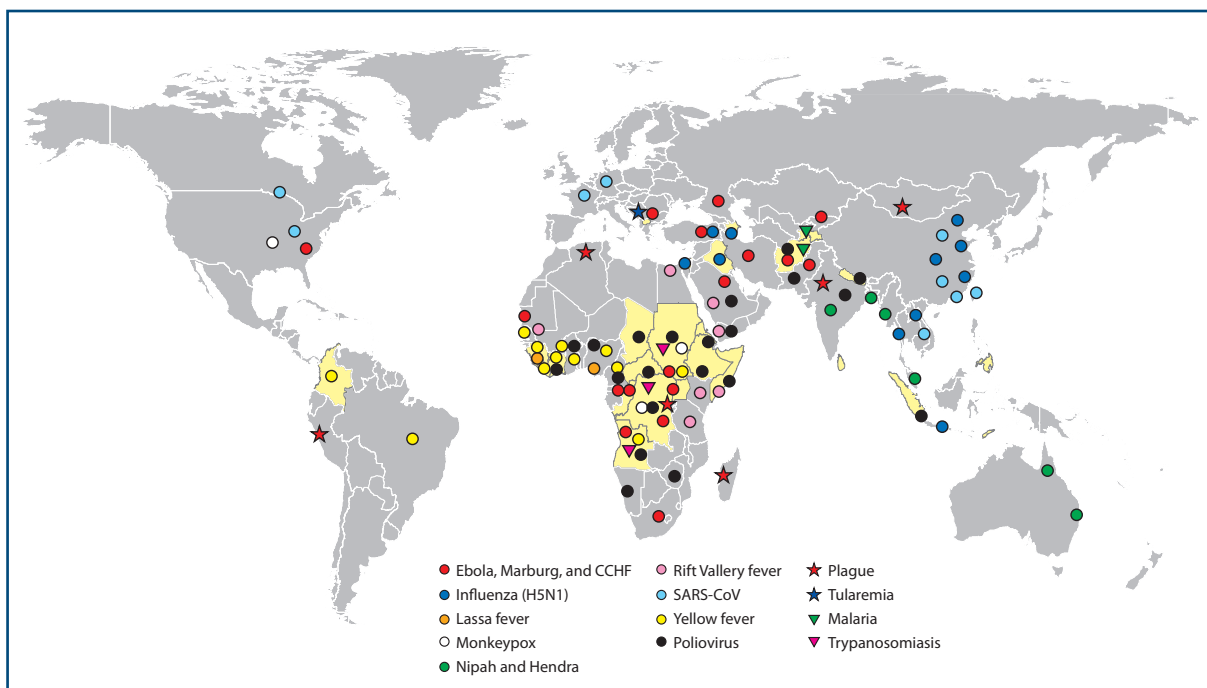
triad). Trans-boundary movements of refugees, relief workers, animals, goods, immigrants, etc. may cause international spread of infectious disease outbreaks and epidemics (14, 15, 25) (Figure 1).

This review aims at a summary description of potential infectious disease outbreaks and/or epidemics frequently manifested during and after conflicts, as well as the disruption conditions created. Prevention and control measures to be considered by animal health and public health services as well as by humanitarian organisations and professionals in addressing public health challenges in countries under unrest, are also summarised.

## Conflict situations and risk factors enhancing disease emergence and transmission

### Environmental deterioration and communicable diseases

Leishmaniasis extension was reduced in Syria at the end of 2009 as a result of the implementation of vector control programs. However, with the onset of conflicts in 2011, which has continued almost without interruption, such a control program collapsed and enabled leishmaniasis re-emergence and the number of cases has been increasing due to the displacement of population in different safer provinces.



**Figure 1.** Distribution of emerging or re-emerging infectious disease outbreaks and countries affected by conflicts between 1990-2006 (indicated in yellow in the map). Circles indicate diseases of viral origin, stars indicate diseases of bacterial origin, and triangles indicate diseases of parasitic origin. Source: Office for the Coordination of Humanitarian Affairs, World Health Organization, 2012.

There was a significant recrudescence of sleeping sickness (human African trypanosomiasis) in the 1990s, predominantly in conflict-affected Angola, Democratic Republic of Congo (DRC), and Southern Sudan. In particular, the DRC has had a dramatic resurgence of this disease as a direct consequence of conflicts. Control measures were interrupted in the 1990s because of conflicts, which resulted in more than 150 000 new cases from 1989 up to 1998, with 26,000 cases during this year. Since 1998, detection and treatment have been reinforced in Africa, and the number of new cases has substantially decreased among the general population. However, despite intensification of control measures, all major outbreaks in 2005 occurred in conflict-affected countries, i.e. Angola, DRC, and Southern Sudan (11, 20, 24, 25).

### **Inadequate surveillance, early-warning response systems and control measures**

Ongoing conflicts are hampering access to human and animal populations for routine monitoring, timely delivery of supplies and implementation of control measures before and during an outbreak. Moreover, vaccination campaigns are also interrupted during protracted conflicts due to long-term inadequate logistic support and/or ongoing insecurity.

### **Treatment ineffectiveness and development of drug resistance**

Pathogens' resistance to drugs and disease complications may develop more rapidly in conflict situations because of inappropriate diagnoses or inappropriate drug regimens and outdated drugs. Treatment compliance may be poor due to purchasing of insufficient quantities of drugs, selling or saving them by patients, or interruption of treatment in sudden displacement or irregular access to healthcare facilities. In addition, private pharmacies, which can flourish in conflict situations because of no implementation of regulations, can compound this problem with drugs of unknown quality and acceptance of prescriptions from unqualified people (7).

### **Improving early detection and response to infectious diseases in conflict situations**

During emergencies, veterinary and public health officers should work together with the communities to create an environment in which public health risks are reduced as much as possible, and the safety and dignity of emergency-affected populations is enhanced. They should focus mainly on the following:

- provision of clean, safe and adequate quantities of water and food;

- improved sanitation and vector control;
- promotion of essential activities towards preserving animal and public health as well as supporting the most acceptable level of environment achievable;
- distribution of items essential for preserving health and hygiene.

Early detection and response of many emerging infectious diseases require the best functional and effective veterinary and public health care systems that can be achieved. These systems involve timely investment in animal health and public health services and primary health care infrastructures, trained human resources and provision of essential drugs, general supplies, vaccines, equipment, etc.

United Nations agencies, international organisations and NGO's are providing crucial humanitarian assistance to many conflict-affected populations in coordination with relevant authorities. However, veterinary and public health services that should investigate for the possible expansion of zoonoses and other communicable diseases are becoming particularly weak and need support (1, 3, 9, 10, 13, 18).

In such settings good hygiene and standard infection control precautions in animal and public health facilities must be planned beforehand in order to reduce the potential for environmental and nosocomial transmission and expansion of diseases, particularly zoonotic ones. Correct guidance must be given on the rationale for infection control and use of protective personal equipment (PPE) as well as isolation where possible.

### **Preparedness and response**

All countries should be prepared to face any emergency situation based upon suitable contingency planning. For example, it is imperative that the technical capacity of all humanitarian health partners together with the ministries of health and agriculture in charge of disease surveillance, prevention, and control should be particularly enhanced in conflict-affected countries, in order to ensure the most feasible effective implementation of infectious disease interventions. This could be achieved through availability of internationally accepted standards, IHR guidelines, and tools adapted to conflict situations. They should be supported by previous specific training of veterinary and public health planners, as well as animal and human health facility staff. Mobilisation of international experts to provide technical field support as required is important. The capacity of national staff must be increased beforehand so that it is readily available, especially in times of heightened insecurity, when some of the staff often

remain behind in an area under conflict and still continue to work (2, 3, 19).

The establishment of surveillance systems in developing countries relies on close partnerships with international organisations, NGOs and community groups. Effective surveillance systems in emergencies involve selection of a small number of syndrome-based priority events, using standard surveillance forms, and simplified case definitions, health facilities' weekly reporting of major importance data, following IHR standards, immediate reporting if set alert thresholds are passed, and establishing community mechanisms for identifying disease clusters (22).

Adequate laboratories for pathogen confirmation must be identified in advance, and support should be provided regarding training and supplying equipment and reagents. Ideally, mechanisms should be formulated beforehand for specimen transport and stockpiling of essential drugs, supplies, and outbreak investigation kits. Data should be analysed locally and regular feedback provided to veterinary and public health partners.

The revised 2005 IHR provide a global legal framework to guide the response to animal and public health events of international concern. Conflict-affected countries represent one of the weakest links in global health security and should be prioritised by the international community in provision of technical and operational support

to implement core capacities for detection and response to epidemics (22).

A consistent, transparent and objective policy is needed wherever and whenever possible, for military humanitarian interventions, as well as extensive civil-military liaisons and close cooperation with other humanitarian agencies.

## Conclusions

War conflicts, particularly civil ones, are creating serious emergencies and disasters in different countries or even regions of the world. The major impact is the vulnerability of displaced populations to different kinds of infections due to the disruption of public and animal health care systems. Poverty, misery and mourns are the inevitable consequences of the use for conflicts needs of resources which could be used otherwise.

Early detection, containment, response and control of emerging infectious diseases in conflict situations are major challenges because of multiple risk factors that promote disease transmission and hinder control even more than those in many resource-poor settings. Beyond the global public and animal health imperatives, to prevent the emergence and international spread of infectious diseases, there is also a substantial and moral imperative to alleviate suffering from the effects of a multitude of hazards on already vulnerable conflict-affected populations (2, 3).

## References

- Brown C. 2004. Emerging zoonoses and pathogens of public health significance – an overview. *Rev Sci Tech*, **23** (2), 435-442.
- Chornel B.B. 2003. Control and prevention of emerging zoonoses. *JVME*, **30** (2), 145-147.
- Cutler S.J., Fooks A.R. & van der Poel W.H.M. 2010. Public health threat of new, reemerging, and neglected zoonoses in the industrialized world. *Emerging Infectious Dis*, **16** (1), 1-8.
- Fisher-Hoch S.P. 2005. Lessons from nosocomial viral hemorrhagic fever outbreaks. *Br Med Bull*, **73-74**, 123-137.
- Gayer M. & Connolly M.A. 2006. Tuberculosis control in refugee and displaced populations. In *Tuberculosis: a comprehensive international approach*, 3<sup>rd</sup> Ed. (M.C. Raviglione, ed.). Informa Healthcare, New York, 907-918.
- Gayer M., Legros M., Formenty P. & Connolly M.A. 2007. Conflict and emerging infectious diseases. *Emerg Infect Dis*, **13** (11), 1625-1631.
- Githui W.A., Hawken M.P., Juma E.S., Godfrey-Faussett P., Swai O.B. & Kibuga D.K. 2000. Surveillance of drug-resistant tuberculosis and molecular evaluation of transmission of resistant strains in refugee and non-refugee populations in North-Eastern Kenya. *Int J Tuberc Lung Dis*, **4**, 947-955.
- Gruthmann J.P., Klovdal H., Boccia D., Hamid N., Pinoges L. & Nizou J.Y. 2006. A large outbreak of hepatitis E among a displaced population in Darfur, Sudan, 2004: the role of water treatment methods. *Clin Infect Dis*, **42**, 1685-1691.
- Jaffry K.T., Ali S., Rasool A., Raza A. & Gill Z.J. 2009. Zoonoses. *Int J Agric Biol*, **11**, 217-220.
- Katara M. & Kumar M. 2010. Emerging zoonoses and their determinants. *Vet World*, **3** (10), 481-484.
- Lutumba P., Robays J., Miaka mia Bilenge C., Mesu V.K., Molisho D., Declercq J. 2005. Trypanosomiasis control, Democratic Republic of Congo, 1993-2003. *Emerg Infect Dis*, **11**, 1382-1388.
- Mantovani A., Lasagna E., Senigallesi A., Comin D., Duque C. 2006. Veterinary public health and war: a neglected chapter of human history. *MZCC Information Circular*, **60**, 2-3.
- Maudlin I., Eisler M.C. & Welburn S.C. 2009. Neglected and endemic zoonoses. *Phil Trans R Soc B*, **364**, 2777-2787.
- Morse S.S. 1995. Factors in the emergence of infectious diseases. *Emerg Infect Dis*, **1**, 7-15.
- Morse S.S. 2004. Factors and determinants of disease emergence. *Rev Sci Tech*, **23**, 443-451.
- Reintjes R., Dedushaj I., Gjini A., Jorgensen T.R., Cotter B. & Lieftucht A. 2002. Tularemia outbreak investigation in Kosovo: case control and environmental studies. *Emerg Infect Dis*, **8**, 69-73.
- Seimenis A. 2012. Zoonoses and poverty, a long road to the alleviation of suffering. *Vet Ital*, **48** (1), 5-13.
- Sharp T.W., Wightman J.M., Davis M.J., Sherman S.S. & Burkle F.M. Jr. 2001. Military assistance in complex emergencies: what have we learned since the Kurdish relief effort? *Prehosp Disaster Med*, **16**, 197-208.
- Tabbaa D. 2008. Control of zoonoses in emergency situations: lessons learned during recent outbreaks (gaps and weaknesses of current zoonoses control programmes). *Vet Ital*, **44** (4), 611-620.
- van Nieuwenhove S., Betu-Ku-Mesu V.K., Diabakana P.M., Declercq J. & Bilenge C.M. 2001. Sleeping sickness resurgence in the DRC: the past decade. *Trop Med Int Health*, **6**, 335-344.
- World Health Organization (WHO) 2006. Vaccine preventable diseases 2006: monitoring system. 2006 Global summary. WHO, Geneva, WHO/IVB/2006.
- World Health Organization (WHO) 2002. Early Warning and Response Network (EWARN), Southern Sudan. *Weekly Epidemiol Rec*, **77**, 26-27.
- World Health Organization (WHO) 2005. International Health Regulations, 2<sup>nd</sup> Ed. WHO, Geneva, 1-74 ([www.who.int/ihr/eu](http://www.who.int/ihr/eu)).
- World Health Organization (WHO) 2006. African trypanosomiasis (sleeping sickness). WHO, Geneva, Fact Sheet No. 259.
- World Health Organization (WHO) 2012. Zoonoses and the Millennium development goals – rationale and context. In *Research priorities for zoonoses and marginalized infections*. WHO, Geneva, WHO Technical Report Series No. 971, 119 pp.