Health dilemmas at the borders – a global challenge
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The health and safety of border crossers and people who live in border areas are widely neglected. The remoteness of many communities living near international borders makes it difficult to provide them with services, and if a country’s border controls are inadequate there is an increased risk from communicable diseases for its entire population. Substance abuse and associated behavioural problems can be more common in border regions for the same reason. Armed conflicts, economic pressures and natural disasters can precipitate the movement of refugees across borders and the disruption of local infrastructures. Environmental hazards tend to be heightened in border regions because of the dumping of waste, the pollution of the atmosphere by slow-moving vehicles, and the contamination of water by sewage. Furthermore, dangers may arise because of unsafe implementation of trade agreements and the movement of unregulated materials. There is an urgent need for health education and the promotion of family and individual health care in many border regions. A global initiative on health and safety at international borders is clearly needed. It should include needs assessment, new policies and action programmes.

Communities near the borders of countries are often regarded by national policy-makers as peripheral in relation to social programmes but, paradoxically, as very important in terms of national security. In many situations, national policy is at odds with the needs and priorities of these communities. Access to health care is often difficult because of the nature of the terrain and shortages of services.

The present article highlights the neglect of and increasing threats to the health of people living near or crossing international borders, and outlines the implications for the wider population.

Diseases do not respect boundaries

More than 75% of patients in whom tuberculosis is diagnosed in El Paso, Texas, identify contacts in Ciudad Juárez, Mexico. Some 50% of the residents of Ciudad Juárez have passes allowing them to remain in El Paso for 72 hours. Many United States citizens live in Ciudad Juárez and work in El Paso, and the reverse is also true. Some families have members living in El Paso and others
living in Ciudad Juárez (1). The 16 border counties of Texas have twice the national rate of tuberculosis. Health problems are also carried from the USA to Mexico, since large numbers of United States citizens regularly cross the border, taking with them their social, physical and behavioural ills.

Malaria, cysticercosis, typhoid, leprosy, schistosomiasis, viral hepatitis and Chagas disease also occur in populations on the Mexico/USA border (2). Overcrowding, poor sanitation and explosive population growth have led to outbreaks of diseases that are virtually unknown elsewhere in the USA, often carried by travellers from Mexico and Central America. The incidences of hepatitis and Shigella dysentery are five and three to four times the national average respectively. The rates of syphilis, other sexually transmitted diseases and teenage pregnancy are also high (3).

Observations have been reported on the spread of multidrug-resistant falciparum malaria at the Cambodia/Thailand and Myanmar/Thailand borders, and factors influencing the situation have been discussed (4). The control of malaria in border regions requires specific approaches and control strategies appropriate to the prevailing circumstances. Intersectoral collaboration, community participation, training, operational research and health education are all vital for effective malaria control in this context (5).

Three states of north-eastern India which are contiguous with Myanmar, where opium and its derivatives are produced, have experienced very rapid transmission of human immunodeficiency virus (HIV) among large numbers of drug-injecting individuals. Populations with a common language and culture move freely across the long international border (6).

*Chlamydia trachomatis* infection occurs among Hispanic women in the border region of California and Mexico, although the prevalence and transmission patterns are unknown. There is a need to establish screening criteria in primary care settings. An effective screening programme could be devised with the help of easily obtainable demographic data on, for instance, age, marital status and clinical signs, principally cervicitis (7).

**Emergency medical services and health care delivery**

Health services on the Mexico/USA border are fragmented and uncoordinated. Ten of the 24 border counties in the USA are both economically poor and medically underserved. Many people, especially members of the Mexican American population, lack health insurance. Health professionals and hospitals are not conveniently located, primary care services are scarce, transport is inadequate, there is a lack of bilingual health information and providers, and systems of care are culturally insensitive. Hepatitis A is two to three times more prevalent than in the USA as a whole, and the prevalence of tuberculosis is twice the national average. Prenatal care is often given at a late stage and sometimes is not given at all. There is an urgent need for assistance and coordination in the primary care services.

In response to population growth and increases in manufacturing activity, tourism and other social and cultural activities in the border region of Sonora, Mexico, and Arizona, USA, there has been an expansion of exchanges concerning emergency medical services, occupational and environmental health, border health coalitions, immigration, drug control, and law enforcement. The Mexican emergency medical services are in crisis because of an increase in border crossings and emergency transportation of persons in both directions. The situation is worsening because of high mortality resulting from collisions of motor vehicles, unsafe transport to and from emergency sites, and limited binational data on resources, sites, staff, training and equipment. A better
understanding of and response to the effects of increased economic activity on the emergency services are required. The emergency medical services are a core component of the public health service on a par with community sewage systems, municipal wastewater treatment facilities, and clean drinking-water systems (8).

People along the border have been using health care providers in either country for many years. The first step towards understanding and organizing health care services in the border region should be to study patients’ movements and how they affect the practices of providers. If there is to be an improvement in the efficiency of health care delivery, immediate attention needs to be given to such matters as communication between providers on both sides of the border, the establishment of health care protocols with quality assurance programmes, and the creation of suitable financing mechanisms.

It should be noted that statistical biases can develop as a result of patients crossing national borders for hospital care. Biased statistics misrepresent what is needed and can affect the adequacy of health care planning and delivery. Mexican immigrant women in the USA apparently underutilize the health services, especially those of general preventive care. Of the births to Mexican mothers who are illegally present in the USA, 11.5% apparently take place without any prenatal care having been obtained or after care has been sought only in the third trimester, whereas the corresponding figure is 3.6% for births to Mexican women who are legally in the country (9).

The large numbers of young Mexican women who cross the border are increasing the demand for maternity services in California. As yet there has been no attempt to determine how births to Mexican women in the USA are distributed between stable, permanent residents and transient migrants such as residents in the border region of Mexico who enter the USA and remain for long enough to use the health services. Monitoring is necessary in order to determine what changes in demand for maternity care in the USA have occurred consequent upon legislative and other developments (10). In Arizona, undocumented pregnant Hispanic women without provision for private care have no recourse but to use emergency services after labour begins.

Immigration into the USA undoubtedly affects the roles of Hispanic women. They have to contend with language difficulties, gender bias, limited skills, physical dangers, the absence of family or other social support networks, and so on. Overcoming these barriers requires them to make numerous adjustments to their roles. Research should be conducted in this area and clinicians and planners should be encouraged to consider socioeconomic issues when health programmes aimed at women are being developed.

**Substance abuse and behavioural problems**

There are lasting consequences for behavioural health and the quality of daily living conditions in populations forced to cross borders and settle in new areas. Vietnamese refugees face special problems in getting access to the health care system in Victoria, British Columbia. Unemployment, depression, the after-effects of torture, and lack of assistance present particular difficulties for refugees living in a small urban centre with too few people of their own ethnic background to assist in providing services. The problems of refugees living in comparatively small communities might be alleviated if
community-based counsellors were available and if hospital staff could receive special language training.

In the Mexico/USA border region a special approach to the delivery of behavioural health services is necessary because of cultural diversity, language barriers, unemployment and a limited tax base (11). The two countries have widely different priorities and expectations but inseparable concerns about health, the environment, and economic and cultural matters. A coalition of community partnerships in Sonora and Arizona gathers information on the following aspects of substance abuse.

- Use of emergency services in connection with substance abuse and violence in different age groups.
- Perceptions of substance abuse and the extent of use among young adults.
- Perceptions of substance abuse and the extent of use among persons aged 11–15 years.
- Statistics on school drop-outs, suspensions, expulsions and probation.
- Drug and alcohol use as a factor in domestic violence.
- Alcohol-related motor vehicle accidents.
- Community acceptance of alcohol and attitudes towards its availability and use.
- Empowerment and community involvement as indicated by voter registration.
- Demographic, economic and health profiles.

This kind of information is vital for clarifying trends in border communities so that interventions capable of addressing public behavioural and health problems can be planned and implemented on a basis of needs assessment.

Environmental, occupational and trade factors

A prime example of how health hazards can cross international boundaries is provided by the nuclear explosion that occurred at Chernobyl in the Ukraine, only about 25 km from the border with Belarus, a country now suffering more after-effects than any other part of the former USSR. Over two million Belarusians live in contaminated areas. In 1991 the Ukrainian and Belarusian governments challenged a report of the International Atomic Energy Agency which suggested that serious international health problems resulting from the explosion were minimal. Local and regional health problems had not been taken into consideration. In order to obtain humanitarian aid, Belarus continues to draw attention to the consequences of the disaster on its territory.

In El Paso, Texas, as in most cities close to the Mexico/USA border, many health problems are fuelled by a steep rise in population which has placed an enormous strain on the ability to provide potable water, sewage treatment, health care and even metalled roads. Residential areas called colonias have developed along both sides of the border because of the population increase. In El Paso there are 350 of them with about 68 000 inhabitants. Some homes have been constructed from wood and bricks, others from cardboard. Shallow wells provide water for some people but the absence of proper waste disposal causes contamination of water supplies (12). Most of the colonias draw water from the flood plain of the Rio Grande, which is heavily contaminated with human, animal and industrial wastes. Many of them also have illegal or sub-standard outhouses, cesspools or latrines that add to the contamination. The absence of reliable health
data presents serious difficulties in this situation.

The border county of Santa Cruz in Arizona is plagued by high rates of lupus erythematosus and cancer. Residents are considering the possibility that air and water pollution from Mexico is responsible for this state of affairs (13). The atmosphere is certainly contaminated by the exhausts of thousands of trucks that ply between the two countries and queue for long periods at the frontier. There is a widespread belief among the population that one causative factor is a burning landfill across the border. Pollution also comes from unsupervised industries established at the borders during recent years.

Canada, Mexico and the USA, the signatories of the North American Free Trade Agreement, have focused attention on its potential consequences for the environment and health. It is presented as an opportunity, through impending structural changes, to improve both occupational and environmental health in Mexico. Working conditions in the maquila industry along the Mexico/USA border are still reminiscent of those in sweatshops in the USA during the 19th century.

The Aral Sea disaster has been a significant border-related issue in Central Asia. The two major rivers of this region, the Syr Darya, rising in Kyrgyzstan, and the Amu Darya, rising in Tajikistan, were diverted for agricultural purposes during the Soviet period. The Aral Sea, situated between Uzbekistan and Kazakhstan, consequently lost over two-thirds of its water. Large quantities of chemically polluted dust from the dried bed of the sea were blown over wide regions of Central Asia, poisoning crops and threatening public health. A similar situation has developed on the coast of Turkmenistan in the Caspian Sea, where the Kara Bogaz Gulf, dammed in 1980, is drying up. Salt carrying industrial pollutants is being carried by the wind to agricultural land in the Russian Federation.

**Refugees and migrant workers**

The mass displacement of populations across borders presents a global challenge in the fields of health care delivery and public health. In recent years an upsurge in wars and civil strife has produced millions of refugees. High rates of communicable disease, malnutrition and mortality have accompanied these developments. Crude death rates among refugees arriving in Ethiopia, Kenya, Malawi, Nepal, and Zimbabwe since 1990 ranged from 5 to 12 times the baseline values for the countries of origin. Among refugees, death rates for children aged under 5 years were far higher than those for older children and adults.

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Deaths among refugees are predominantly caused by preventable conditions such as diarrhoeal disease, measles, and acute respiratory infections, often exacerbated by malnutrition. The international community should therefore intervene at an early stage in the evolution of complex disasters involving civil war, abuses of human rights, food shortages and mass displacement. Relief programmes should be based on reliable information about health and nutrition and should focus on the provision of adequate shelter, food, water, sanitation and public health programmes that prevent mortality from diarrhoea, measles and other communicable diseases, especially among women and young children (14).

Between March and May 1991 the displacement of large numbers of people in
Iraq as a result of military and civil strife brought enormous public health consequences. Some 400,000 Iraqi Kurds and other minorities sought refuge in the mountains on the border of Iraq and Turkey, while approximately 1.3 million Iraqi refugees crossed into the Islamic Republic of Iran (15). Significant public health problems developed, necessitating a rapid and accurate medical assessment that helped to mobilize appropriate humanitarian and medical aid (16).

Tens of thousands of persons cross illegally from Mexico into the USA each year in order to seek improved economic opportunities and/or to join relatives. Impoverished, without medical insurance, and ineligible for welfare, they usually ignore non-urgent health problems. Alternatively, they may return to Mexico where health care is cheaper, more accessible and culturally friendlier. There is an urgent need for the USA to learn how to cope with social and health problems in the border region.

Significant interactions between disease and population mobility have been demonstrated in tropical Africa. For example, the civil war that devastated Burundi in 1993 led to more than 300,000 refugees settling in neighbouring Rwanda. An outbreak of dysentery caused by *Shigella dysenteriae* type 1 developed in a camp sheltering some 20,000 refugees. The overall attack rate was 32.3%, and 6122 cases of bloody diarrhoea were notified between November 1993 and March 1994. Less than half the ambulatory patients completed the five-day nalidixic acid regimen. Of the seven strains of *S. dysenteriae* type 1 isolated from stool samples, three were resistant to nalidixic acid. A clinical classification of cases according to the risk of dying was devised in order to improve the management of patients in large outbreaks of *S. dysenteriae* type 1 where resources are limited (17). There is clearly a need for further studies of problems arising from health hazards associated with and exacerbated by forced movements of populations across borders (18).

Many difficult circumstances at the borders of countries affected by the recrudescence of human African trypanosomiasis hinder coordinated prevention. Moreover, internal political disturbances and local conflicts lead to the mismanagement of health care departments and the migration of populations, which subsequently have no access to medical services. Human behaviour, risk estimation by the authorities, and the physical perception of the disease by the population are additional factors with an important bearing on the situation. The slightest failure allows a rapid increase in parasite transmission, and control has to be restarted.

The flight of over half a million Rwandan refugees into Zaire in 1994 overwhelmed the world’s capacity to respond. The average crude mortality rate of 20–35 per 10,000 per day was associated with explosive epidemics of diarrhoeal disease caused by *Vibrio cholerae* 01 and *Shigella dysenteriae* type 1. Three to four weeks after the influx, acute malnutrition rates of 18%–23% were reported among children under 5 years of age. On the basis of rapidly acquired health data a well-coordinated relief programme produced a sharp fall in death rates to 5–8 per 10,000 per day by the second month of intervention (19). That many deaths nevertheless occurred was thought to be attributable in large measure to the slow rate of rehydration, the inadequate use of oral rehydration therapy, the use of unsuitable intravenous fluids, and insufficient experience of health workers in the management of severe cholera.

In 1992, civil strife in Somalia disrupted agriculture so seriously that a third of the population faced starvation. Following the setting up of a volunteer nursing project in Mandera, Kenya (20) by AmeriCares, a non-profit organization, in order to cope with the difficulties in Somalia, about a million Somali refugees crossed the borders of Djibouti, Ethiopia, Kenya and Yemen.

The long-term impact of trauma and confinement on functional health and mental
Health status is evident in Cambodian displaced persons living in camps on the Cambodia/Thailand border. More than 80% of interviewees said they were in fair or poor health, felt depressed and had a number of somatic complaints despite good access to medical services, suggesting a poor outlook for future morbidity and mortality. The health needs of Cambodian displaced persons and their influence on social and economic behaviour required attention while repatriation was occurring (21).

In Sweden a survey revealed clear ethnic segregation in housing, in that refugees from Latin America and labour migrants from southern Europe and Finland lived in rented flats whereas Swedes lived in privately owned one-family homes. All immigrants had low material standards and meagre economic resources in comparison with Swedes. Being a Latin American refugee or a southern European or Finnish labour migrant was a risk factor for poor health of equal importance to ones more usually cited, such as those connected with lifestyle. Feelings of insecurity in everyday life and unsatisfactory leisure opportunities were also independent risk factors for poor health (22).

Research and action

The widespread neglect of communities in border regions and of border-related issues is reflected in the lack of basic information and statistics on the populations concerned. If a worldwide awareness of the health problems of border regions can be created, this should lead to needs assessment and research, policy changes and programmes of action. Clearly, because of the immense scale of the problems, a global initiative is urgently needed for health and development in border regions, starting at the national and regional levels. The following steps are essential.

- Identification of health problems of communities in border regions and among populations crossing borders, the establishment of baseline data, and the periodic monitoring of trends.
- Prediction of trends in health problems affecting border regions.
- Selection of priorities in accordance with limitations on resources.
- Securing policy changes and legislation as necessary.
- Initiation and implementation of action programmes.

Because of the immensity of the problems in border areas and their worldwide dimensions, there is a need for international leadership in establishing a global initiative for health and development in these areas.

Food security and malnutrition

Further research is needed on the relationship between the health risks of malnutrition and situations of famine and food insecurity. There appears to be a close association between high rates of malnutrition and excess mortality among refugee and famine-affected populations living in camps. Community-based prospective studies indicate that as nutritional status declines the risk of disease increases, although the discriminating power of different nutritional indices and the strength of the association vary between locations and times. This has important implications for nutritional assessments and interventions.

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