Krzysztof Korzeniewski

THE PRESENT-DAY EPIDEMIOLOGICAL SITUATION IN THE HORN OF AFRICA ON THE EXAMPLE OF SOMALIA

AKTUALNA SYTUACJA EPIDEMIOLOGICZNA ROGU AFRYKI NA PRZYKŁADZIE SOMALII

Zakład Epidemiologii i Medycyny Tropikalnej w Gdyni,
Wojskowy Instytut Medyczny w Warszawie

STRESZCZENIE

Celem pracy jest przedstawienie informacji na temat zagrożeń środowiskowych występujących w Somalii, a także propozycji profilaktyki zdrowotnej w związku z możliwymi działaniami stabilizacyjnymi Polskiego Kontyngentu Wojskowego w wyżej wymienionym regionie świata.
Somalia, kraj położony we wschodniej części kontynentu afrykańskiego, w tzw. Rogu Afryki, od ponad dwóch dekad uwikłany w konflikt zbrojny, ze zniszczoną infrastrukturą komunalną i przemysłową, klęską głodu, ograniczonym dostępem ludności do opieki medycznej, należy do państw o najtrudniejszych warunkach do życia. Somalijczycy mają najgorsze na świecie wskaźniki epidemiologiczne, są uzależnieni od międzynarodowej pomocy humanitarnej. Na terenie kraju oraz na somalijskich wodach terytorialnych działają obecnie trzy operacje wojskowe pod egidą organizacji międzynarodowych (European Union Naval Force Somalia – *Operation Atalanta*, NATO *Operation Ocean Shield* i największa, misja pokojowa ONZ AMISOM z udziałem 9,5 tys. żołnierzy afrykańskich, głównie z Ugandy i Burundi). Mimo ich obecności sytuacja ludności cywilnej w dalszym ciągu przedstawia się dramatycznie. W przypadku zwiększenia aktywności międzynarodowych sił pokojowych i stabilizacyjnych w Rogu Afryki, istnieje prawdopodobieństwo udziału w operacjach wojskowych także polskich żołnierzy.
WNIOSKI: wobec możliwości skierowania kolejnych europejskich kontyngentów wojskowych do wykonywania zadań mandatowych w Afryce Wschodniej, w związku z występowaniem ciężkich warunków klimatycznych i niskich standardów sanitarnych, niezbędne jest podjęcie odpowiednich działań prewencyjnych przed wyjazdem (obowiązkowe/zalecane szczepienia, chemioprofilaktyka przeciwmalaryczna, zapasy leków przyjmowanych przez żołnierzy chorujących przewlekle, zestawy profilaktyczno-lecznicze), w trakcie pobytu (aklimatyzacja, unikanie spożywania alkoholu, uzupełnianie niedoborów wodno-elektrolitowych, stosowanie chemioprofilaktyki przeciwmalarycznej i repelentów), i po powrocie z rejonu operacji (terminalna chemioprofilaktyka przeciwmalaryczna, zgłaszanie się do placówek służby zdrowia z wszelkimi problemami zdrowotnymi).

SŁOWA KLUCZOWE: *Somalia, zagrożenia zdrowotne, epidemiologia*

ABSTRACT

This article presents information on the environmental hazards prevailing in Somalia and recommends a health prophylaxis in connection with a potential deployment of Polish Military Contingent to this part of the world.
Somalia is a country located in the eastern part of Africa, in the so-called Horn of Africa. The country has been continuously at war for over two decades. Because of its much-devastated municipal and industrial infrastructure, widespread famine and limited access of the local people to healthcare it is considered one of the countries where living conditions are extremely difficult. Epidemiological indexes in Somalia are the worst in the world, and the Somali citizens are entirely dependent on foreign humanitarian assistance. At present, three different military operations, under the auspices of international organizations, have been carried out on the soil and the territorial waters: the European Union Naval Force Somalia – *Operation Atlanta*, the NATO *Operation Ocean*

Shield, and the biggest of the three – the UN peacekeeping mission AMISOM with 9,5 thousand African troops, mainly from Uganda and Burundi). Despite their presence, the situation of the civilian population is critical. If the number of peacekeeping and stabilization troops deployed to the Horn of Africa is increased, it is very likely that Polish soldiers will also get involved in the military operations in Somalia.

CONCLUSIONS: because of a strong possibility that following European military contingents are going to be relocated to East Africa to carry out the mandatory tasks, in relation to the occurrence of difficult climatic conditions and low sanitary standards, it is necessary to undertake appropriate preventive measures before the departure (compulsory/recommended vaccinations, antimalarial chemoprophylaxis, stocks of medicines to be taken by soldiers for an extended period of time, prevention and treatment kits), throughout the deployment (acclimatization, avoiding alcohol, water and electrolytes replenishment, using antimalarial chemoprophylaxis and repellents), and after returning from the area of operation (terminal chemoprophylaxis of malaria, reporting any health problem to health care facilities).

KEY WORDS: *Somalia, health hazards, epidemiology*

GENERAL INFORMATION

Somalia is a Muslim country located in the eastern part of Africa. It is often referred to as the Horn of Africa. The official capital of the country is Mogadishu (1,35 million population); however, both the government and parliament have been established in Baidoa and Jowhaar. The entire population of the country is estimated at 9,92 million people (July 2011). The territory of Somalia is over two-fold bigger than the territory of Poland (the area of 637 657 km^2). The central and southern parts of the country consist mainly of plains with an average height of 180 m above sea level; the northern parts of Somalia are dominated by highlands - 900-2000 m above sea level and rocky mountains reaching more than 2000 m above sea level. Farmland constitutes merely 1,64% of the country's total area, and regular crops are grown only on 0,04% of its territory. Somalia is bordered by Ethiopia (1600 km), Kenya (682 km) and Djibouti (58 km). Somalia also borders with the Indian Ocean and its coastline is as much as 3025 km long (fig. 1).

The country is regularly affected by a number of natural disasters, such as droughts and dust storms in the dry season. Less frequently, the southern parts of Somalia are struck by floods during the wet season. Water scarcity, erosion and desertification are all commonplace (1).

In 1991, President Mohammad Siad Barre was overthrown and the Somali Civil War broke out; the conflict has not been resolved as yet. Internal stability of the country was threatened and therefore, the UN decided to intervene. United Nations peacekeepers, mostly the U.S. Forces, were soon deployed to Somalia. In October 1993, American troops launched a major combat operation in Mogadishu intended to capture a local warlord, Mohammad Aidid (the operation ended tragically, 19 American soldiers and as many as 1,000 Somalis, mainly civilians, were killed). Over the next several years, the country collapsed into complete anarchy and it has been gradually losing statehood. In 2006, Islamic fundamentalists, members of the Islamic

Source: Jarosław Talacha. Mapa Somalii. March 2012

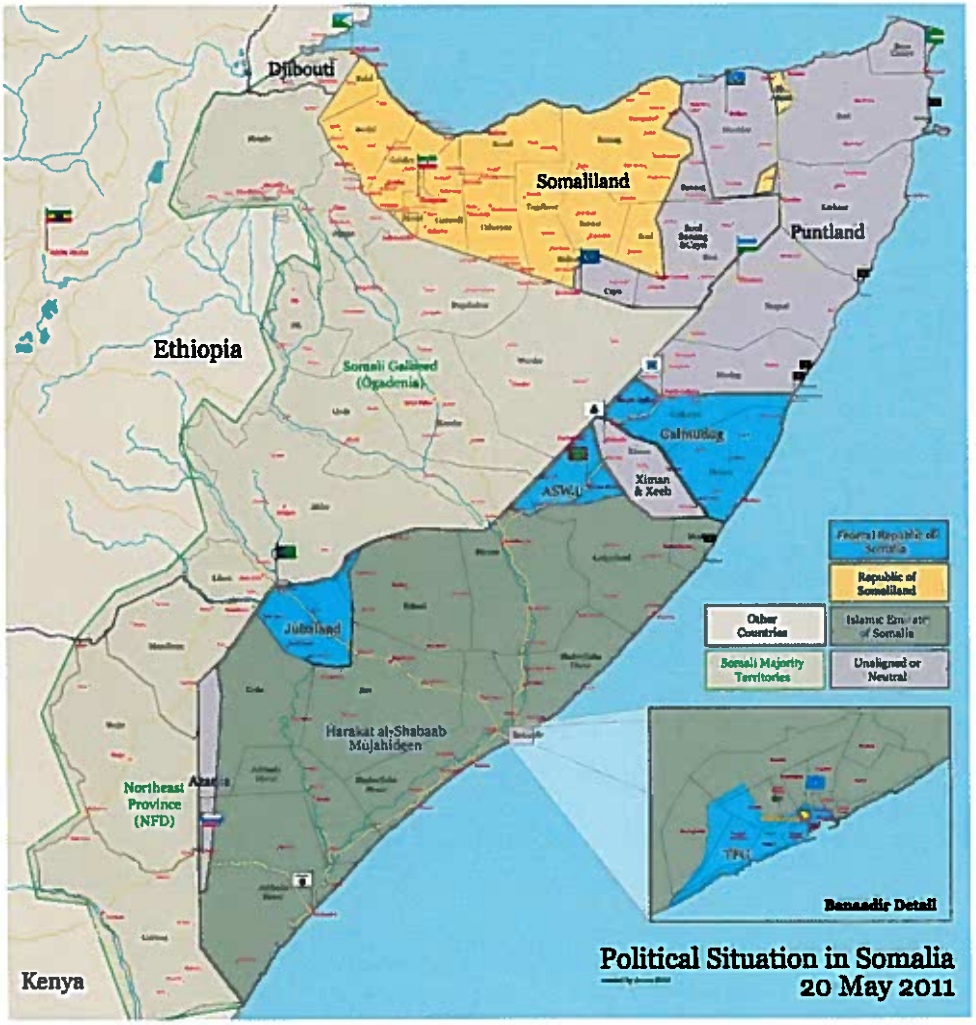
Fig. 1. Physical map of Somalia
Ryc. 1. Mapa fizyczna Somalii

Courts Union (ICU), assumed power in the country. Six months later, Ethiopian troops supported by the Somali government launched a large-scale offensive against the Islamic Courts Union. As a result of the Ethiopian intervention, Mogadishu and most of the country's territories controlled by the ICU were liberated.

Currently, Somalia has been undergoing a disintegration process. The government only controls a small area in central parts of the country. In fact, Somalia has been divided into several autonomous states: Somaliland, Puntland (where the main pirate bases are located) and Galmudug. Large areas of the country are controlled by a fundamentalist group Al-Shabab, which is linked to Al-Quaeda (2).

Countries established on the territory of Somalia following the outbreak of the civil war (fig. 2)

- Somaliland – a territory in the north coast, bordering the Gulf of Aden; it is a region with the most stable situation. Inhabitants of Somaliland voted for independence in a referendum held in May 2001. Yet, Somaliland remains unrecognized as a sovereign country by both the international community and the UN.
- Puntland – it declared independence in 1998. At present, it is recognized as an autonomous republic.
- Galmudug – it declared secession in August 2006. At present, it has the status of an autonomous republic.
- Islamic Courts Union – In June and July 2006, Islamists assumed control over the vast territory of the central and southern parts of Somalia, including Mogadishu, the country's capital. As a result of the Ethiopian offensive launched in December 2006, Muslim fundamentalists retreated from the occupied territories and engaged in guerilla warfare. In 2008, Islamic Courts Union forced President Yusuf to resign; he was replaced by a former ICU leader Sharif Ahmed. Islamist militias Al-Shabab and Hizbul Islam declared war on the ICU (2).



Source: James Dahl. Political situation in Somalia. May 2011

Fig. 2. Countries established in the territory of Somalia
Ryc. 2. Państwa powstałe na terenie Somalii

Climatic conditions

Somalia lies in the intertropical convergence zone near the equator. Hot and dry desert climate prevails in the northern and central parts of the country, whereas in areas close to the Indian Ocean, especially in the south, equatorial climate prevails. There are four main seasons in Somalia – two of them dry and two rainy:

- the first dry season – it lasts from December until March, the average temperatures range from 27°C at higher altitudes in the north of the country to 43°C in the south,
- the first rainy season – it lasts from March until May, the season is characterized by heavy rains and storms, especially in the south; the temperatures range from 27°C in the south to 38°C in the north,
- the second dry season – it lasts from May until October, it is characterized by intermittent rain showers, especially in the south, strong wind, sand and dust storms; the normal temperatures reach 27°C in the south and 38°C in the north – along the Gulf of Aden,
- the second rainy season – it lasts from October to November, the rain is less intense compared to the first rainy season.

The annual rainfall in the southern areas of Somalia is 700 mm. In the northern parts of the country the arid climate prevails and thus the annual rainfall does not exceed 50 mm. Central regions are characterized by low humidity and a lack of rainfall. In areas alongside the Indian Ocean humidity exceeds 70% (3).

Demographic indexes of the population

In 2001, Somalia took the first place in an international ranking of countries with the hardest living conditions. In July 2011, Somalia declared a state of famine. The famine was the effect of a prolonged drought, a plaque of locusts and warfare. More than ten thousand people have died from hunger within the recent months and nearly 12 million people living in the Horn of Africa (Somalia and the neighboring countries) are starving. Only in Somalia itself, the number of people in need of humanitarian assistance has reached 3,7 million. The average annual income per person is merely 600 USD and 60% of the population survive on less than 1 USD a day (4-6).

The country is ethnically and religiously unified, 97,3% of the population are Somalis, 1,2% are Arabs; 99,9% of the people are Sunni Muslims. Somalis are divided into 6 clans: Dir, Darod, Isaaq, Hawiye, Digil and Rahanweyn. The first four represent pastoral communities while the other two belong to agriculture communities. The clans are further divided into sub-clans and then into tribes (lineages). Past and present conflicts have occurred between sub-clans and tribes. 60% of the country's population leads a nomadic lifestyle; they breed cattle, camels, sheep and goats. The other 40% live in town and cities or in rural areas between Juba and Shabelle Rivers – the only two permanent rivers flowing across the southern parts of Somalia.

The fertility rate is estimated at 6-7 children per one woman. The Somali population is exceptionally young, the average age is below 18 years, and the average life expectancy is estimated at 50 years of age. Infant mortality rate under 1 year of age (106 deaths/1000 live births), the under-5 mortality rate (224 deaths/1000 live births) and labor-related mortality rate (1044/100 000 live births) are among the highest in the world. Only 38% of the country's population over 15 years of age is literate (4).

HEALTH HAZARDS PREVALENT IN SOMALIA

Somalia is commonly regarded as a high-risk country; the incidence rates of infectious and invasive diseases are exceptionally high. Increased morbidity is largely determined by contamination of soil and water (sewage, excrement, pesticides, industrial waste), limited access to uncontaminated drinking water (30% of the entire population; 9% in rural areas and 67% in urban areas), limited access to toilets which meet basic sanitary standards (23% of the entire population; 6% in rural areas and 52% in urban areas), limited access to medical facilities, a lack of basic medications and medical equipment, a large number of asymptomatic carriers of contagious and parasitic diseases, mass migrations and overpopulation in refugee camps. Contamination of soil and water increase the incidence of food and water-borne diseases, infectious diarrheas, cholera, viral hepatitis A and E, helminthic and protozoan infections. Vector-borne diseases, which are spread by mosquitoes (malaria, Dengue fever, West Nile virus, yellow fever, lymphatic filariasis) or by flies (cutaneous and visceral leishmaniasis, sand fly fever), are all widespread in the territory of Somalia. Other commonly reported diseases include air-borne diseases (tuberculosis, invasive meningococcal disease, measles, pertussis), sexually transmitted diseases or blood-borne infections (AIDS, syphilis, chlamydiosis, viral hepatitis B and C), as well as diseases transmitted via contaminated soil and water (tetanus, schistosomaisis, leptospirosis). Some enzootic diseases have also been reported (brucellosis, Q fever, rabies) (7,8).

Acts of violence with the use of firearms are yet another serious problem. 1190 casualties from weapon-related injuries, with 85 cases under the age of five (including 13 deaths) were treated in 4 hospitals in the country's capital, Mogadishu in the period January-March 2012 (9).

Food & water-borne diseases

Diarrheal diseases. The diseases are widespread in the territory of the whole country. Research conducted in the population of children in Mogadishu in the 1980s (n=1667) revealed infections caused by the following agents: *Rotaviridae* in 25% of the study population, enterotoxic *Escherichia coli* in 11%, *Shigella* sp. – 9%, *Campylobacter jejuni* – 8%, *Vibrio cholerae non-O1* – 6%. In 1993, 16% of 381 soldiers serving in the U.S. Forces involved in the operation *Restore Hope* were hospitalized for diarrheal diseases. Fecal specimens, collected from 61 service members were tested. The tests revealed *Shigella sp.* infection in 33% of the patients; another 16% were diagnosed with the enterotoxic *Escherichia coli* (7).

Cholera. The disease is endemic in the following districts: Baidoa, Bardera, Belet Uen, Bossaso, Bur Hakata, Jowhaar, Kismayo, Marca and Mogadishu. The incidence of cholera increases in the late November to early December, and then decreases in the late May to early June. 3510 cases of cholera, including 103 deaths, were reported in Somalia in 2010. In 2011, 4272 cases of the disease, including 181 deaths, were registered, mainly in camps for internally displaced people (10).

Intestinal helminthiases. The most common diseases of this type are ascariasis, enterobiasis, trichuriasis, and ancylostomiasis. Strongyloidiasis and taeniasis are less common. Screening tests carried out in the population of mothers and children inhabiting rural areas (n=517) which were conducted in the 1980s revealed the following infections: trichuriasis – 45%, ascariasis – 17%, ancylostomiasis – 15%. Another test, which was conducted among Somali citizens living in rural areas, demonstrated parasitic infestations in 72,5% of the study group, 32% of the examined population were infected with ascariasis and 14% with ancylostomiasis. It has been estimated that as much as 75% of the country's entire population are infected with at least one parasite of the gastrointestinal tract (7).

Intestinal protozoan diseases. In the 1980s, the number of Somalis inhabiting rural areas infected with giardiasis was estimated at 16%, and with amebiasis – 7,5%. Screening tests conducted in the same period among 1667 children living in Mogadishu demonstrated giardiasis in 8% of the studied group. Other tests, which were carried out in the 1990s among nomadic people as well as among women and children from rural areas, revealed infections with *Entamoeba histolytica* in 20-50% and *Giardia intestinalis* in 15-40% of the study populations (7).

Viral hepatitis A. Tests conducted in the population of 596 children demonstrated anti-HAV antibodies in as much as 96% of the study group.

Viral hepatitis E. 78-94% people inhabiting rural areas in the Shabelle province (South Somalia) are seropositive. In the late 1980s, there was an outbreak of the disease in the same region; 11 413 cases of viral hepatitis E, including 346 deaths, were reported at the time.

Poliomyelitis. 1,5 million Somali children were vaccinated against the disease in the period 1998-1999. The action was part of a worldwide vaccination campaign aimed at eradicating the disease. However, in the period 2005-2006, 199 new cases of poliomyelitis were diagnosed (all of them imported from abroad). The most recent cases of the disease were reported in 2007. Somalia was officially declared polio-free in 2008. Unfortunately, the vaccination program has collapsed, merely 36% of Somali children were immunized in 2010 (7).

Vector-borne diseases

Malaria. Transmission of the disease lasts from November to May in the northern parts of the country and all year round in the south of Somalia. Approximately 12 000 – 200 000 people contract malaria every year. New cases of the disease are mainly reported in the south, i.e. in the river basin of the only two permanent rivers – Juba and Shabelle. The vectors of infection are typically *Anopheles arabiensis and An. gambiae*, which occur in the whole territory of the country and may survive the dry season in wells and other water reservoirs. Another infection vector found in Somalia is *An. merus*, which breeds in the vicinity of salt-water reservoirs (the gulfs along the coast of the Indian Ocean). Four distinct *Plasmodium* species are found in Somalia: *P. falciparum – 95%, P. vivax, P. ovale, P. malariae* – 5% in total. Resistance to chloroquine has been confirmed and is widespread. 56 153 cases of malaria, including 45 deaths, were reported in 2009. Malaria was diagnosed among American service personnel engaged in the operation *Restore Hope* in the period 1992-1993. There were 48 cases of the disease throughout the given period, mainly in the south, i.e. in the Bardera and Jilib districts, another 278 cases were imported into the United States by the U.S. Army soldiers and Marines returning home from this overseas operation (7).

Dengue fever. In January 1993, more than 60 U.S. Marines (8% of the battalion deployed to South Somalia near the Juba river) were medically evacuated to their home country (fever of unknown origin). Laboratory tests confirmed 41 cases of Dengue fever and 16 cases of malaria. A survey conducted among the sick soldiers revealed that merely 20% of them had used repellents and bed nets (11).

Leishmaniasis. During the operation *Restore Hope* carried out in Somalia, preventive services of the U.S. Forces reported breeding grounds of *Phlebotomus* flies – vectors of leishmaniasis, in the region of Afgooye, 30 km north of Mogadishu. Cutaneous leishmaniasis is endemic in the southern parts of the country, in the

vicinity of the Shabelle and Juba rivers. Cases of visceral leishmaniasis have also been recorded in the area. In the period 2000-2001, an outbreak of leishmaniasis occurred in Wajiir and Mandera regions along the border with Kenya and Ethiopia (a total of 904 cases of the disease were diagnosed) and in the Bakool district (230 cases) (7).

West Nile Virus. Two cases of the disease were diagnosed in the U.S. Forces in the period 1992-1993. 114 cases of WNV, including 51 deaths, were diagnosed in the population of Somalis inhabiting the province of Doble and in the areas along the Juba River (which was linked to the outbreak of the disease in the neighboring Kenya).

Yellow fever. There is a potential risk for transmission of the disease in Somalia.

Filariases. 24,5% of the country's population lives in areas, where there is a risk for transmission of wuchereriosis, especially along the coast bordering with Kenya (7).

Air-borne diseases

Tuberculosis. 24 807 cases of TB were reported in 2009. 5 483 Somali citizens died of tuberculosis in 2007. Such high incidence of the disease is primarily influenced by the low vaccination rate of the population (46% in 2010).

Invasive meningococcal disease. 508 cases, including 15 deaths, were reported in 2002. Serogroup A was identified as the etiological agent of the disease.

Measles. 71% of the child population was vaccinated against measles in 2010. 115 cases of the disease were reported in the same year. The incidence of measles surged in 2011. By August 2011, as many as 9,000 cases of the disease have been diagnosed in central and south Somalia and among Somali refugees in Kenya (462 cases, 11 deaths) and Ethiopia (47 cases, 3 deaths).

Pertussis. 66% of the child population was vaccinated against pertussis in 2010. 665 cases of the disease were diagnosed in the same year (7).

Sexually transmitted and blood-borne infections

HIV/AIDS. 0,7% of the Somali population aged 15-49 are HIV-positive or suffer from AIDS (39 000 inhabitants). 1600 Somalis died of AIDS in 2009. 5,5% of the female sex workers living in the country's capital, Mogadishu, are HIV-positive; in Hargeisa and Somaliland the number is estimated at 5,2%.

Syphilis. Studies carried out in the 1990s, demonstrated that 30% of the female sex workers and 10% of males reporting to health care facilities with symptoms of the STD were infected with syphilis.

Chlamydiasis. Studies conducted in rural areas in the 1990s revealed chlamydia infection in 6% of the examined males and 18% of females.

Viral Hepatitis B. The number of people with HBsAg is estimated at 10-27% of the entire population. HBsAg was detected in 19,1% of blood donors as well as in 5,6% of children and 21,3% of adults hospitalized in Mogadishu.

Viral hepatitis C. Infections caused by the HCV virus was diagnosed in 6,6% patients treated for cirrhosis, 0,6% blood donors and 40,3% of patients with a chronic liver disease (7).

Diseases transmitted through infected soil and water

Tetanus. 53 cases of the disease were reported in adults in 2009 and 74 cases were reported in infants in 2010. Back in 1995 the number of neonatal tetanus was estimated at 9 200 cases (20/1000 live births).

Leptospirosis. Screening tests for leptospirosis conducted among 105 Somali citizens living near Mogadishu confirmed the infection in 37% of the studied cohort. Another study, carried out among 107 people living in villages along the Shabelle River, who had been diagnosed with schistosomiasis, revealed leptospirosis in 64% of the surveyed cohort.

Schistosomiasis. Schistosomiasis caused by *Schistosoma haematobium* is endemic in the rivers in the south of Somalia, where the incidence rate of the disease exceeds 50% among the local people (7).

Zoonoses

Brucellosis. 49 cases of the disease were diagnosed in camels in Somaliland in 2009. The cases diagnosed in humans are caused by *Brucella abortus* and *B. melitensis.*

Anthrax. Cases of the disease are only diagnosed in cattle, sheep and goats. As yet, anthrax has not been diagnosed in humans.

Other endemic zoonoses, which occur in the Horn of Africa, are rabies (transmitted from dogs, foxes and cats) and Q fever (diagnosed in cattle breeders) (7).

Other diseases

Trachoma. More than 24 000 cases were diagnosed in 2003.

Myasis. Five cases caused by *Cordylobia anthropophaga* (tumbu fly) were reported among soldiers serving in the U.S. Forces deployed to Somalia in 1993.

Leprosy. 109 cases in 2009 (7).

RECOMMENDATIONS

Due to the ongoing military conflict raging across Somalia, which may threaten the geopolitical stability in the Horn of Africa activities of the international coalition forces in this region of the world will likely increase. Polish soldiers, citizens of a NATO member

state actively engaged in liquidating trouble spots on the international arena, are likely to get involved in this military operation. Because of a strong possibility that the Polish Military Contingent is going to be relocated to East Africa to carry out the mandated tasks, it is necessary to undertake appropriate preventive measures before the departure, throughout the deployment, and after returning from the operation.

1. Preparations to be taken before the departure:
- compulsory/recommended vaccinations for yellow fever, viral hepatitis A, viral hepatitis B, typhoid fever, tetanus, rabies, cholera, meningococcal disease,
- antimalarial chemoprophylaxis with atovaquone/ proguanil or doxycyclinum,
- compiling of a stock of medicines to be taken by military personnel for an extended period of time (allergies, contraception),
- preparing a health prevention and treatment kit (repellents, sunscreen SPF >30, lipstick with SPF, sunglasses, in cases of visual impairment 2 pairs of spectacles NOT contact lenses!),
- sanitary training (personal hygiene, food and feeding hygiene, accommodation, work and leisure hygiene),
- first aid training.

2. Rules of conduct during the operation:
- adaptation to the new environmental conditions during the acclimatization process (work/leisure),
- avoiding alcohol, coffee and fizzy drinks,
- drinking a lot of water (3-4 liters/24 hrs),
- using antimalarial chemoprophylaxis, repellents, and bed nets,
- avoiding contact with wild/ domesticated animals,
- avoiding swimming in fresh water reservoirs.

3. Precautions and conduct after return from the operation:
- receiving terminal chemoprophylaxis of malaria,
- reporting any health problem to health care facilities, especially the cases of fever of unknown origin, or all types of non-healing skin lesions that are unresponsive to treatment.

REFERENCES

1. World Factbook. Country profile: Somalia. Available at: http://www.bartleby.com. Accessed: 01 March 2012.
2. Wikipedia. Somalia. Available at: http://www.en.wikipedia.org. Accessed: 01 March 2012.
3. U.S. Army Research Institute of Environmental Medicine. Walter Reed Army Institute of Research. Sustaining soldier health and performance in Somalia. U.S. Army Medical Research and Development Command. Fort Detrick: Maryland, December 1992.
4. World Health Organization. Country Fact Sheet: Somalia. Available at: www.who.int/whosis/en. Accessed: 01 March 2012.
5. Carbol J.C. War, Drought, Malnutrition, Measles – A Report from Somalia. NEJM 2001;365:1856-1858.
6. Centers for Disease Control and Prevention. Notes from the Field: Malnutrition and Mortality – Southern Somalia, July 2011. WMWR 2011;60(30):1026-1027.
7. GIDEON. Disease info: Somalia. GIDEON Informatics, Inc. Available at: www. gideonline.com/web/epidemiology. Accessed: 01 March 2012.
8. Wakabi W. Health and humanitarian situation worsens in Somalia. Lancet 2007;370(9594):1201-1202.
9. World Health Organization. Somalia Emergency Weekly Health Update. Bulletin Highlights, 3-9 March 2012.
10. World Health Organization. Horn of Africa – Health Emergency Response. Epidemiological update No. 8, 19 November 2011.
11. Armed Forces Pest Management Board. Disease Vector Ecology Profile: Somalia. 4th Ed. U.S. Forces, 15 September 1993.

Received: 10.05.2012
Accepted for publication: 5.07.2012

Address for correspondence:
Płk dr hab. med. Krzysztof Korzeniewski, prof. nadzw. WIM
Wojskowy Instytut Medyczny
Zakład Epidemiologii i Medycyny Tropikalnej
ul. Grudzińskiego 4
81-103 Gdynia
tel. +48 665 707 396
e-mail: kktropmed@wp.pl