



# Migrant screening: Lessons learned from the migrant holding level at the Greek–Turkish borders

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## KEYWORDS

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**Summary** In March 2011, a migrant health project became operational that aimed to provide medical and psychosocial support to migrants at the Greek–Turkish border. The aim of this study is to describe common syndromes, the communicable disease profile and vaccination patterns in newly arrived migrants through a surveillance system that was based on medical records data as well as screening procedures.

Data were collected prospectively using one standardized form per patient including demographic information, civil status, and medical and vaccination history. A tuberculin screening test (TST) and serological testing for HIV, hepatitis B and hepatitis C were performed after obtaining informed consent.

A total of 6899 migrants were screened, the majority of whom were male (91%) and 18–31 years old (85%), with a mean age of 25.3 years. Of all patients, 2.5% received secondary care. Common complaints and diagnoses included respiratory infections (23%) and myalgia (18%). The tuberculin screening test (TST) was positive in 7.8% out of 1132 patients tested. Out of 632 migrants, 0.3%, 3.2% and 0.8% tested positive for HIV, hepatitis B and hepatitis C, respectively. Overall, 22.3% of adults were vaccinated against poliomyelitis.

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Irregular migrants that enter Greek borders are generally in good health. Nevertheless, the risk of spreading communicable diseases is an important issue to consider among migrants at the holding level due to severe overcrowding conditions. Therefore, there is a need to strengthen surveillance and implement harmonized screening procedures with the aim of providing sustainable and good quality services that are focused on prevention and early treatment.

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## Introduction

The number of international migrants was estimated at approximately 214 million worldwide in 2010 and is expected to exceed 400 million by 2050 [1]. Historically, Europe has faced constant human migratory waves [2–4]. Europe is an increasingly important recipient of approximately one-third of the international migrant population, with an estimated 72.6 million migrants now living there [1,4]. These changes in migration dynamics have increased concern about the potential effect of migration on the transmission of communicable diseases and potential public health implications in the European Union. The term “migrants” refers to a heterogeneous population including refugees, asylum seekers, and economic migrants who originate from countries where the prevalence of infectious diseases, socioeconomic standards and healthcare might be different compared with their European host country [5]. Thus, infectious diseases that are considered to be key health issues for new migrants from high-prevalence countries differ depending on their country of origin [6]. A large proportion of certain infectious diseases are usually reported in migrants after entering their host country, for example, approximately 70% of newly diagnosed UK tuberculosis (TB) and 60% of new HIV cases are reported in migrants, with comparable trends for hepatitis B and C [7–9].

Due to its geopolitical position, Greece has been experiencing increasing mobility of various migrant populations across its borders. River Evros, which flows through Bulgaria, Greece and Turkey, forms a 206-km-long natural border between Greece and Turkey. In October 2010, the European Union Agency for Border Security (FRONTEX) reported that 90% of all detections of illegal border crossings in the EU were through Turkish–Greek borders. While in previous years the average number of migrants crossing borders did not exceed 3500 persons, in 2010, 47,000 migrants without legal documents (“sans-papiers”) crossed these borders [10,11]; 36,000 and 11,000 migrants entered the country territory

by crossing the northern and the southern parts of Evros, respectively. When water levels are high, migrants either swim or ferry over in small boats.

According to Greek legislation, persons without legal identification documents were detained in closed centers for a maximum period of six months until their identity and nationality were validated. Migrants arriving from countries that may not allow or recognize their citizenship/nationality were released after 48 h of detention to travel to Athens and acquire identification papers from their country’s embassy [12]. In March 2011, under the responsibility and coordination of the Hellenic Centre for Disease Control and Prevention (HCDCP), a surveillance system was developed to promptly detect any health issue that could be of public health significance, mainly focusing on the surveillance of communicable diseases, such as respiratory and gastrointestinal illness, as well as psychological conditions, drug abuse and pregnancy.

The aim of this article is to describe common syndromes, the communicable disease profile and vaccination patterns in migrants upon their arrival in Greece, a European member state. Considering the crowding conditions at the holding level and the countries of origin of these populations, in which a variety of communicable and exotic diseases are endemic, public health strategies should be developed to prevent disease dissemination.

## Data

Data were collected from the medical records of migrants who underwent a clinical assessment upon arrival at the holding center. A questionnaire was used by the holding center’s medical staff to gather demographics information (e.g., country of origin, gender and date of birth), civil status and information concerning health conditions, including communicable diseases and the immunization history. In addition, the data included the results

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of screening tests for specific infectious diseases, such as tuberculosis, HIV, hepatitis B and hepatitis C, which were sampled randomly.

## Methods

A surveillance system was developed to promptly record any health issue of public health interest based on medical records data. In parallel, a syndromic surveillance system was established by which information on events of public health interest were collected at the holding level and communicated to the HCDCP on a daily basis. This system was based on data collected during medical staff consultation at the holding center.

Unvaccinated migrants and those with an unknown vaccination status were vaccinated according to the National Hellenic Vaccination Program schedule and available European guidelines [13].

Blood count and tuberculin skin test (TST) screening was performed according to the WHO International standards for tuberculosis care diagnosis and treatment [14].

After informed consent was obtained, randomly selected blood samples ( $n=632$ ) were tested for the presence of antibodies against HIV, hepatitis B and hepatitis C to assess the burden of disease that migrants could represent for the Greek health system.

Seven health stations were installed within the holding facility: two centers served as screening stations for entry assessment and five for providing health care to detainees. Each center was staffed with a medical doctor, a nurse, a psychologist and cultural mediators who provided health assistance 8 h per day on working days. The psychologists screened all of the newly arriving immigrants for psychological/psychiatric disorders or distress, drug use and other psychological issues. Their duties included screening and psychosocial support, performing activities with unaccompanied minors with the assistance of social workers, and debriefing groups in cooperation with the staff and cultural mediators at least once per week. In addition, psychologists were required to offer debriefing sessions to the police guards working at the site. Three social workers assisted the migrants in dealing with administrative matters. Fifteen cultural mediators who fluently spoke the languages of the migrants (Urdu, Pashto, Farsi, Arabic, English, French and Russian) assisted the medical and psychosocial team in their daily work. Ethical approval was provided by the scientific board of the HCDCP.

A descriptive analysis was performed using the elaborated questionnaire and the files issued for the enhanced surveillance system. The demographic characteristics were compared using a chi-square test (two-tailed) and IBM SPSS statistics v.19 software. The chi-square test was used to determine statistical significance between demographic parameters of age, gender, marital status, country of origin and morbidity.

## Results

From March 1 to July 31, 2011, 6899 migrants were screened. Of 4969 of the migrants who stated their nationality, the majority were from Pakistan (25%), Afghanistan (24%) and Bangladesh (8%) (Table 1); 6278 (91%) of them were male and 621 (9%) female. Their mean age was 25.3 years, while 95% of them were between 19 and 23 years old. The majority of men were 18–31 years old, while the majority of women were 32–45 years old (Table 2). Two hundred fifty-eight (6.5%) children or adolescents (age 1–17 years) were recorded.

Among the male population, 80% were single and 15% were married, while 96% of the women were married and 4% were widowed (Table 2); 80% of the migrants had no children, 6% had one child, 7% had two children (Table 2), and 7% of the women were pregnant upon arrival and referred for appropriate obstetrics and gynecology follow-up at the local hospital.

The association between gender and age and marital status was statistically significant ( $p$  value=0.05); men were more commonly younger and single, whereas women were more commonly older and widowed. There was no statistically significant association between the country of origin and age of the migrants at the medical facility.

**Table 1** Country of origin of the examined migrants.

Country of origin	Number (%)
Pakistan	1254 (18.18)
Afghanistan	1217 (17.64)
Bangladesh	397 (5.75)
Algeria	272 (3.94)
Morocco	263 (3.81)
Nigeria	181 (2.62)
India	133 (1.92)
D.R. Congo	127 (1.84)
Iraq	98 (1.42)
Other countries	1027 (14.91)
Undeclared origin	1930 (27.97)
Total	6899 (100%)

**Table 2** Demographical data of the examined migrants.<sup>a</sup>

	Gender <sup>*</sup>	
	Male (%)	Female (%)
<b>Age groups (years)</b>		
1–17	258 (6.5)	0
18–31	3480 (85)	0
32–45	354 (8.5)	303 (80.6)
46–65	0	73 (19.4)
Total	4092 (100)	376 (100)
<b>Marital state</b>		
Unmarried	3277 (83.6)	0
Married	613 (15.6)	408 (96)
Divorced	25 (0.6)	0
Widowed	1 (0.02)	16 (4)
Total	3916	424
<b>Migrants with children</b>		
No child	3613 (82)	0
1 child	281 (6.4)	0
2 children	220 (5.0)	74 (69.8)
3 children	123 (2.7)	32 (30.1)
>4 children	174 (3.9)	0
Total	4411	106

<sup>a</sup> Missing values were excluded from the study.

<sup>\*</sup> The association between gender and age and marital status was statistically significant ( $p$  value = 0.05).

The most common causes for medical consultation recorded at the health stations were upper or lower respiratory tract infections (23%) and myalgia (18%) (Table 3). No outbreaks were detected through the early warning and response system.

Among the 3930 migrants who sought medical care at the holding level, 99 (2.5%) were admitted to a hospital for treatment; 460 (7%) were referred for examination by the detention center psychologist, and 12 were admitted to a psychiatric hospital ward. In total, 1304 sessions were conducted between migrants and psychologists at the holding level.

TST was performed in 1132 migrants, and 88 subjects (7.8%) tested positive. These subjects were further examined in the hospital, where four individuals were diagnosed with active pulmonary tuberculosis and consequently received treatment.

The results of screening tests with regard to HIV, hepatitis B and hepatitis C in a sample of 632 cases revealed only two HIV-positive cases (2/632, 0.2%), originating from Morocco and Iraq. There were 5/632 cases (0.8%) with positive anti-HCV: two originated from Pakistan, one from Iran, one from Algeria and one from Ukraine. For the 20/632 (3.2%) cases that were HBsAg (+), the reported countries of origin included Algeria 3/20 (15%), Nigeria 3/20 (15%), Iran 2/20 (10%), Afghanistan 2/20 (10%),

**Table 3** Physical conditions and symptoms recorded by the migrant health surveillance system.

Reason for consultation/diagnosis	Number <sup>a</sup>	%
Respiratory tract infection	744	
Myalgia	591	22.68
Headache	325	18.01
Epigastric pain	297	9.90
Skin rash	261	9.05
Allergic reactions or skin erythema	248	7.95
Psychological conditions	177	7.56
Injuries	175	5.39
Dental problems	99	5.33
Cardiac disease	92	3.01
Gastroenteritis	51	2.80
Ophthalmic problem	49	1.55
Pregnancy	43	1.49
Fever	35	1.31
Diabetes mellitus	27	1.06
Otitis	24	0.82
Genitourinary system disease	13	0.73
Hypertension	12	0.39
Renal disease	11	0.36
Frostbite	5	0.33
Drug use	1	0.15
Total	3280	0.03

<sup>a</sup> Numbers are not exclusive, missing data were not included. This number represents the symptoms/conditions reported and not the number of migrants.

China 2/20 (10%), the Dominican Republic 2/20 (10%), Iraq 1/20 (5%), Pakistan 1/20 (5%), Albania 1/20 (5%), and Guinea 1/20 (5%); the remaining two cases were of unknown origin.

During this period, 1539 (22.3%) adult migrants with an unknown vaccination status were vaccinated against poliomyelitis. At the same time, 135 (52.3%) children were vaccinated against diphtheria, tetanus, and pertussis and 34 (13.2%) against measles, mumps and rubella. Vaccination was administered according to previous immunization status of the children. There was no significant difference in vaccination status according to region of origin.

## Discussion

During the five months of the program (March–July 2011) 6899 migrants who crossed the Greek–Turkish border were screened in health stations of the area. However, this number does not represent the total migrant entries because the health care centers were not operating on a 24-h basis (this was a limitation of our study). Most migrants in our study were young males originating from Afghanistan, Pakistan and Bangladesh, but the composition of this

**Table 4** Screening test results for HIV, HCV, HBV and TST.<sup>a</sup>

Type of test	No. of positive/total	%
HBsAg	20/632	3.16
Anti-HCV	5/632	0.79
Anti-HIV	2/632	0.20
TST	88/1132	7.8

<sup>a</sup> The 632 migrants tested for HIV/HCV/HBV were asymptomatic, and none were positive for multiple infections.

population was subject to change in accordance with current socio-political circumstances in both Africa and Asia. During 2015, a large number of migrants crossed Greek borders from Syria due to the political turmoil in the area.

Given the continuous influx of migrants, the living conditions at the holding level could not reach WHO standards [15]. Nevertheless, we managed to improve the hygiene conditions by providing appropriate living conditions with daily cleaning of the holding facilities, adequately heating or cooling sleeping areas, providing sufficient bed linen (e.g., mattresses and blankets), and using refrigerators to store drugs and vaccines. Furthermore, the introduction of daily cell cleaning led to the migrants ‘‘yarding,’’ providing them with fresh air and exercises. Staff interviews revealed that migrants had been held in detention without any yarding for up to four months.

The fact that many female migrants were pregnant made the situation more difficult. Pregnancy is a factor of vulnerability requiring specialized medical care, which must be taken into consideration when planning for programs or designing a reception center for migrants. Other factors of vulnerability include unaccompanied minors and victims of trafficking (Table 4).

The syndromic surveillance system was an important tool to detect potential outbreaks occurring among migrants settled at holding centers and could provide timely health data for this population at the national level. The results of the current study show that the most common condition was respiratory tract infection, which was similar to the results of a previous Italian study [16]. Despite the fact that the holding centers were overcrowded, we did not detect any outbreaks of parasitic diseases, such as lice-borne diseases or scabies, nor of gastroenteritis or vaccine-preventable disease (VPD) through the early warning system (EWS), although EWS allowed monitoring of the migrants’ health in real time [16] and proved to be very helpful for the timely management of situations such as pregnancy and injuries. According to a recently published risk assessment by ECDC, an increased

risk for parasitic infections exists in refugee camps in relation to the occurrence of louse-borne relapsing fever (LBRF) among refugees and elsewhere in the EU among vulnerable groups. A recent report of probable locally acquired cases in Italy illustrates the potential for autochthonous transmission in overcrowded settings in Europe [17]. Furthermore, low coverage for some VPDs, along with low or waning immunity for some diseases in vaccinated adults, may result in susceptible refugees acquiring diseases, such as measles, considering the high incidence of VPDs in some areas of the EU [18]. Thus, ensuring appropriate levels of medical diagnosis and treatment services and implementation of vaccination is crucial.

The syndromes that should be monitored at the migrant holding level are not necessarily the same as those monitored during mass gatherings or natural disasters because of the existing differences in age distribution, sex representation, socioeconomic condition and time duration of the gathered people. Therefore, those parameters should be considered when implementing an early warning system for migrants at the holding level. The need for psychological support appeared to be very important. Overall, no major health problems were detected. The majority of migrants were healthy, and among symptomatic migrants, most symptoms were compatible with upper or lower respiratory tract infections acquired during travel. This was not unexpected, as migrants traveled long distances, often on foot, and were temporarily accommodated in poor conditions.

Priority was given to screening for certain communicable diseases considering the public health impact of the disease (the likelihood of occurrence or transmission of the disease and its severity) and the possibility of interventions. Despite the fact that malaria is known to be an imported infection and that *P. vivax* malaria has relapses and late manifestations, it was not included in the health screening because migrants from Pakistan and Afghanistan (the countries of origin of the index cases of the malaria outbreak that took place in 2009 Laconia), [19] were not held at the borders for more than 48 h, and therefore, it would be impossible to administer treatment if malaria was confirmed [19]. Nevertheless, the number of diagnosed *P. vivax* relapses in migrants originating from malaria-endemic countries for the 2015 transmission period (44 patients) who resided in different districts of the country reveals that malaria is a disease that should be accounted for when planning action regarding migrant health. Moreover, the number of locally acquired *P. vivax* cases in certain areas of the country (Laconia and Attica

District) correlates with the number of relapses in patients from malaria-endemic countries, and this reflects that, besides environmental factors of disease transmission, there are existing issues relating to infection transmission that need to be addressed and eliminated [20].

In European countries, it is most common to screen for TB at the holding level [21]. In terms of TB screening, in our study, because these migrant populations originated from highly endemic countries, the percentage of migrants with a positive TST is lower (7.8% of those tested) compared to the percentage reported internationally [e.g., screening in new UK migrants (16.6%)] [22,23]. Although there is significant underreporting of new tuberculosis cases, the data collected through the mandatory reporting system of diseases in Greece suggests that there is an overall decline in tuberculosis incidence. In spite of this, the trend in new TB diagnoses—as well as MDR TB cases—among migrants has been increasing during the past few years [20]. Furthermore, the few cases discovered during our screening could facilitate transmission of the disease in an overcrowded setting and propagation of an outbreak during or after migrant entry and residence in a European member state. Because of their living conditions in destination countries and their limited access to health care, migrants become gradually vulnerable to mycobacterial infections. The “healthy migrant effect” upon arrival that was reported in the past [24] has several implications related to TB screening, diagnosis and prompt treatment. Active TB screening of new migrants in holding centers should be performed routinely and on a daily basis to prevent dissemination of the infection under such conditions. Furthermore, there is a need for enhanced surveillance of TB and timely treatment of the infection, especially in non-natives after country entry. This may be achieved through the establishment of a nationwide primary care TB network whose services will be free of charge and available to every patient, regardless of origin, legal status or social group and sustained by the health system’s capacity for the prevention and control of communicable diseases [25,26].

The results of the screening tests for HIV and hepatitis C also revealed a low incidence of positive antibodies. Hepatitis B surface antigen was found more frequently, as was expected in this population, whose origin is from countries with higher disease prevalence; the incidence was higher compared to that found in other studies, [27] emphasizing the need for intervention with hepatitis-B-specific vaccination in this highly vulnerable population.

## Conclusions

An increasing influx of migrants through the Greek–Turkish border has been observed over the last few years. The results of our study revealed that the vast majority of tested migrants were in good physical condition and presented mainly with symptoms of common problems (e.g., upper respiratory infections); however, most of them required sustained psychosocial support due to the psychological trauma of detention and severe overcrowding conditions. Although the incidence of certain infectious diseases, such as tuberculosis, HIV and hepatitis C, in the study population, as shown by screening, was low, the risk of spreading communicable diseases, especially airborne diseases (e.g., influenza during the winter season), is considered to be an important issue to consider. Moreover, because these populations originate or travel through countries where a variety of communicable and exotic diseases are endemic, attention has to be paid to preventing disease dissemination by including those parameters when planning a syndromic surveillance system. From a public health perspective, migrants with a high burden of infections have both a direct and indirect burdening effect on society, and the prevention of infections can minimize these costs. Direct morbidity due to infections results in high costs of treatment and care among those infected. Therefore, screening procedures should be considered and established for all migrants, especially at a country’s borders, to provide adequate treatment and eliminate the risk of further pathogen transmission. To achieve all of the above in the long term, countries should ensure the sustainability and quality of health care services, with a focus on prevention and early treatment of communicable diseases in this highly vulnerable population [27]. One innovative approach of screening newly arrived migrants is a community-based package of health screening that combines all of the key diseases into one general health check-up to decrease associated stigma. Similar efforts are necessary to develop strategies to assess the health status of migrants who are temporarily detained in centers of Evros prefecture, with the main focus on treating communicable diseases and enhancing the vaccination status to prevent the outbreak of epidemics. However, further research is needed to develop evidence-based, community-focused screening models [22]. Migration is not a temporary issue. The fast-growing movement of migrants, asylum seekers and refugees will lead to surge capacity issues; therefore, to successfully cope with the current crisis at European borders, there is

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an immediate need for relevant organizations and stakeholders to coordinate efforts to manage the challenges associated with refugees, asylum seekers and migrants [27].

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## Competing interests

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## Ethical approval

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