RAPID RISK ASSESSMENT

Shigellosis among refugees in the EU

26 November 2015

Main conclusions and options for response

The current influx of refugees in Europe is increasing the pressure on healthcare and public health systems in the transit and destination countries. Refugees are vulnerable to infectious diseases because of the specific circumstances under which they live and therefore they require special attention.

The occurrence of shigellosis among refugees is not unexpected because shigellosis is endemic in the countries they originate from, as well as in some of the countries they travel through. Furthermore, poor hygiene conditions in refugee reception facilities promote the spread of the disease. Therefore, additional cases may occur in the EU within this vulnerable group.

The threat to the general population of acquiring *Shigella* infections from refugees is considered low. Cleaners of the hosting facilities for refugees, in particular those possibly coming into contact with faeces or traces of faeces, as well as other people working in refugee reception facilities should be considered to be at increased risk of *Shigella* infection. This is in particularly relevant when diarrhoeal illnesses occur in a refugee reception facility.

Prevention of spread and control of shigellosis in reception facilities in the EU/EEA countries requires the capacity to detect cases in populations at risk and strengthened surveillance systems.

Therefore, options to consider for the prevention and control of shigellosis among refugees include:

- where possible, preventing or minimising overcrowding in reception facilities for refugees;
- promoting and enabling adequate hygiene for residents in those facilities – for example, providing sufficient toilet and hand washing facilities, soap, paper towels and toilet paper;
- raising awareness among refugees concerning personal hygiene to prevent the spread of Shigella infections and other enteric diseases, particularly at points of entry into the EU and in reception facilities;
- raising awareness among clinicians in transit and destination countries of the possibility of shigellosis in refugees and workers or volunteers at hosting facilities for incoming refugees;
- antimicrobial resistance of Shigella species is a growing problem in the treatment of shigellosis and therefore antibiotic susceptibility testing is indispensable for the management of patients with suspected Shigella infection;
- timely notification of cases and outbreaks among refugees within the EU/EEA may contribute to increased awareness and preparedness for the disease.

Source and date of request

ECDC internal decision on 24 November 2015 and request from DG SANTE C3 on 26 November 2015.

Suggested citation: European Centre for Disease Prevention and Control. Shigellosis among refugees in the EU – 26 November 2015, Stockholm: ECDC; 2015.

Public health issue

- To assess the risk of *Shigella* infection among refugees entering the EU;
- To assess the public health significance for the EU of *Shigella* cases reported among refugees by the EU.

ECDC has published the following documents related to the subject of migrant health:

- Communicable disease risks associated with the movement of refugees in Europe during the winter season [1].
- Infectious diseases of specific relevance to newly-arrived migrants in the EU/EEA [2].
- Expert opinion on the public health needs of irregular migrants, refugees or asylum seekers across the EU's southern and south-eastern borders [3].

Consulted experts

ECDC internal response team

Internal experts in alphabetical order: Sergio Brusin, Denis Coulombier, Josep Jansà, Teija Korhonen, Diamantis Plachouras, Emmanuel Robesyn, Marc Struelens, Johanna Takkinen, Wim Van Bortel, Therese Westrell.

External experts consulted

The following experts contributed to this risk assessment:

- Franz Allerberger, Österreichische Agentur für Gesundheit und Ernährungssicherheit (AGES), Austria
- Saara Salmenlinna, National Institute for Health and Welfare (THL), Finland
- Bettina Rosner, Robert Koch Institute, Germany
- Georgia Mandilara, National Reference Centre for Salmonella, Shigella, VTEC, Greece
- Eva Grilc, National Institute Javno Zdravje (NIJZ), Slovenia
- Marika Hjertqvist, Folkhälsomyndigheten, Sweden
- Ingrid Friesema, National Institute for Public Health and the Environment (RIVM), the Netherlands.

ECDC acknowledges the valuable contributions of all experts. All experts have submitted declarations of interest which have been reviewed by ECDC and found not to present any conflict of interest in relation to the comments and suggestions made. It should be noted that opinions expressed by individual experts do not necessarily represent the opinion of their institutions.

Disease background information

Shigellosis is a diarrhoeal disease caused by *Shigella*, a group of Gram-negative, non-motile bacteria belonging to the family *Enterobacteriaceae.* Humans and some primates are the only reservoir of *Shigella* [4,5].

There are four different species of the genus *Shigella*: *Shigella sonnei*, *Shigella boydii, Shigella flexneri* and *Shigella dysenteriae*. The first two species usually cause a relatively mild illness. *S. flexneri* is the main cause of endemic shigellosis in developing countries. *S. dysenteriae* serotype 1, producing Shiga toxin, causes more severe, longer-lasting illness and can therefore give rise to epidemics with high mortality [4-6].

Symptoms of shigellosis typically appear one to four days after exposure. The symptoms include diarrhoea (sometimes bloody), fever, abdominal pain, and tenesmus. Symptoms usually last for five to seven days and often resolve without antibiotic treatment. Patients shed the bacteria for about four weeks after illness [4-6].

Patients with mild shigellosis may only need fluids and rest. Antibiotic treatment is useful for severe cases of shigellosis and can reduce the duration of illness as well as the duration of pathogen excretion. However, *Shigella* is often resistant to many antibiotics and therefore antibiotics need to be selected based on the antibiotic sensitivity pattern. Resistance to traditional first-line drugs such as ampicillin and trimethoprim-sulfamethoxazole is common and therefore ciprofloxacin and azithromycin are often used to treat infections [4,5,7].

Shigellosis is transmitted via the faecal-oral route, by ingesting material contaminated by faeces, via hands, fomites, or food and water. It is estimated that up to 80% of all infections are transmitted from person to person [8]. The infective dose of *Shigella* is low, since as few as 10–100 viable organisms are sufficient [4-6].

Outbreaks of shigellosis have been reported in the EU in relation to food vehicles [9-12], sexual transmission among MSM [13,14], and transmission in institutions with poor hygiene practices [15,16].

Shigellosis can be routinely diagnosed by standard stool culture for enteric pathogens, which includes the use of selective culture media for *Shigella*. Stool specimens are preferred to rectal swabs as culture detection has a threshold of approximately 10^6 bacteria/ml. Because *Shigella* survives for only a short period of time in faecal specimens, these should be promptly processed for culture (within six hours) or placed in an appropriate sample transport medium,

such as Cary-Blair. Polymerase chain reaction (PCR) assays targeting virulence-associated invasion loci (*ipa* or *ial*) can be used as part of commercial enteric PCR detection panels to detect *Shigella*-specific DNA in stool samples with a sensitivity equivalent to 10^2 bacteria/ml. However, enteroinvasive *E. coli* cannot be distinguished from *Shigella* based on the *ial* and *ipa* PCR.

Shigellosis is endemic in most developing countries and is the most important cause of bloody diarrhoea worldwide [6]. It is estimated to cause at least 80 million cases of bloody diarrhoea and 700 000 deaths each year, with 99% of infections occurring in developing countries. The majority of cases and deaths occurs among children under five years [6]. Surveillance data on shigellosis are not readily available from many countries. An assessment of the incidence of shigellosis by geographical region was made by Ram et al (2008) by reviewing published literature from 1984 to 2005. They concluded that there were large data gaps on the occurrence and burden of shigellosis in low human development index countries, particularly for sub-Saharan Africa [17].

In the last five years, between 6 200 and 7 200 shigellosis cases have been reported to TESSy annually by 29 EU/EEA countries, resulting in an EU/EEA reporting rate of 1.4 cases per 100 000 in 2014. Cases were most common among 25–44 year-olds (37%) and 45–64 year-olds (21%). The most common species among cases was *S. sonnei* (59%), followed by *S. flexneri* (34%), *S. boydii* (5%) and *S. dysenteriae* (2%). More than half (57%) of the infections were reported to be travel-associated among cases where travel status was provided (66%). Among travel-associated cases, the five most common travel destinations were, in descending order, Egypt, India, Morocco, Pakistan and Turkey. Travel-associated cases in the EU have been reported in the past five years from the countries of origin of refugees identified with shigellosis: Pakistan 299 cases, Afghanistan 161, Ethiopia 111, Iraq 60, Eritrea 53, Somalia 38, Syria 28, Georgia 23 and Iran 9. However, travel patterns of EU/EEA residents to these countries contribute to the number of travel-associated cases reported.

Event background information

Austria. On 13 November 2015, Austria reported four confirmed cases of shigellosis among refugees transiting Austria, believed to be on their way to Germany. They were hospitalised on 30 October 2015 in Austria where they received treatment, but left the hospital before confirmation of the infection. They were not registered in Austria and are believed to be in Germany.

Austria reported a cumulative total of 23 cases of *Shigella* infection associated with refugees: 21 among refugees and two among Austrian citizens working with refugees during the period July–November 2015. The refugees were from Afghanistan (13), Syria (6) and Iraq (2). The shigellosis cases were caused by *S. sonnei* (n=14), *S. flexneri* (n=8) and *S. boydii* (n=1).

Greece. On 23 November 2015, Greece reported 15 laboratory-confirmed cases of *Shigella* infection in refugee children hosted in the Elaionas refugee camp in Athens. The cases were diagnosed between August and October 2015, with the onset of symptoms between 20 August and 7 October 2015. The children, accompanied by their families, came via Turkey and were from Afghanistan (12), Iraq (1) and Iran (1), although for one child the country of origin was unknown. Some children were hospitalised or attended the emergency departments of paediatric hospitals in Athens. *Shigella flexneri* was identified in nine cases and *S. sonnei* in six. No adult family contacts reported symptoms. The cases received treatment and their families were given instructions on the hygiene measures required. Syndromic surveillance of gastroenteritis cases is ongoing in the Athens refugee camps Athens.

Eleven samples were sent to the Greek National Reference Centre for *Salmonella* and *Shigella*. Five isolates were serotyped as *S. flexneri* 2b (not a common serotype in Greece), one isolate as *S. flexneri* 2a, one isolate as *S. flexneri* 1, two isolates as *S. sonnei* S (I) and two isolates as *S. sonnei* F (II). All *S. flexneri* 2b isolates and one *S. sonnei* S (I) isolate were resistant to third generation cephalosporins and blaCTXM-1 was identified as group gene.

Germany. As of 24 November 2015, Germany has reported 494 shigellosis cases during 2015. Of those, at least 30 (6.1%) were among refugees from one of the following countries: Ethiopia (n=6), Syria (n=5), Afghanistan (n=4), Eritrea (n=1), Georgia (n=1), Iran (n=1), Iraq (n=1), Pakistan (n=1), Somalia (n=1). For nine cases the country of origin was unknown. Eighty percent (24/30) have been reported since July 2015. Sixteen cases (53%) were in children aged six years or younger. The most frequently notified *Shigella* species were *S. sonnei* (n=17) and *S. flexneri* (n=6).

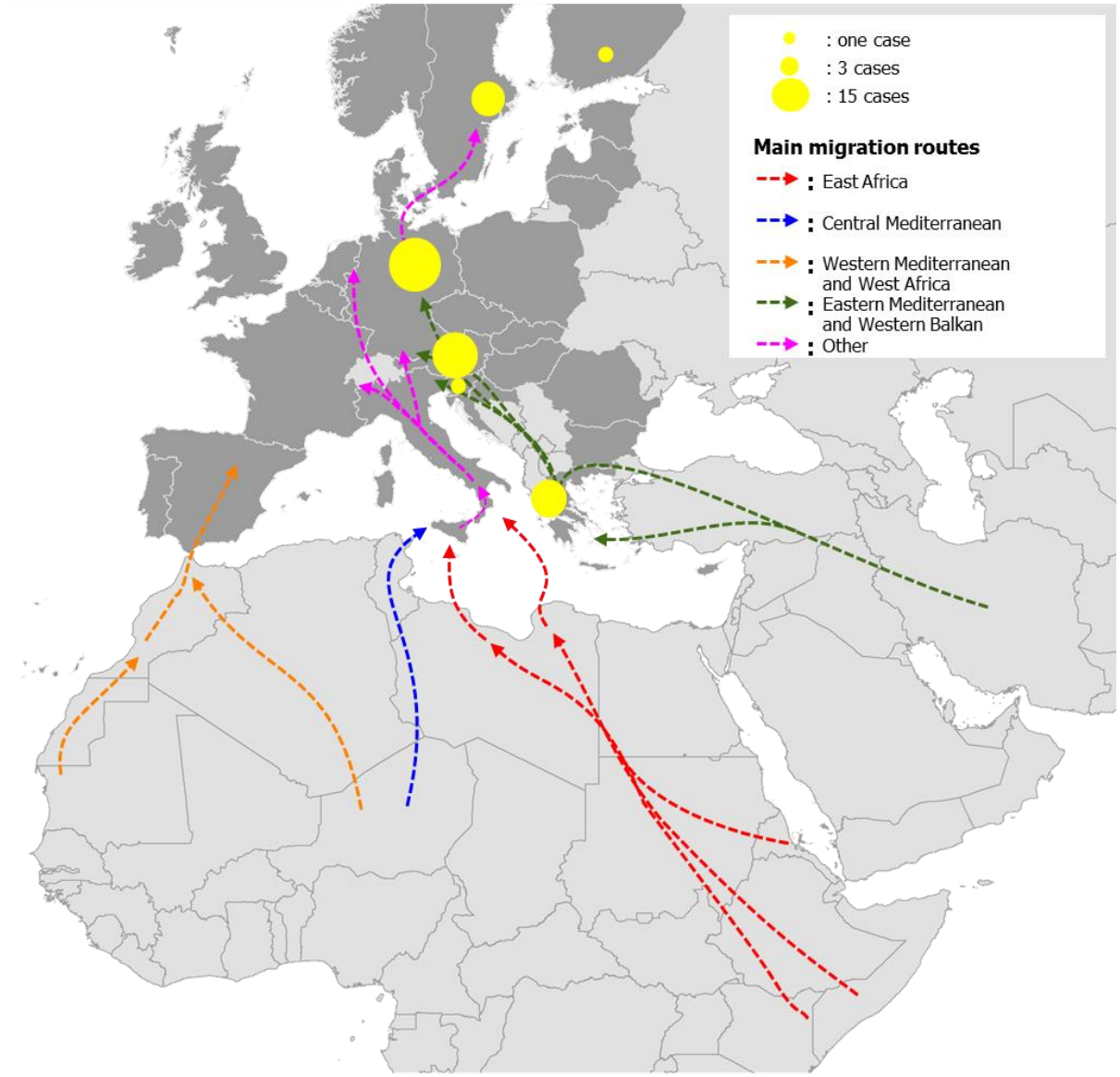
Netherlands. In 2015, four shigellosis cases (*S. flexneri*) were reported between June and August among refugees from Eritrea and Syria.

Finland. On 25 November, Finland reported two cases of *S. sonnei* infection among refugee children.

Slovenia: As of 27 November, the Slovenian Public Health services reported three cases of *S. sonnei,* ESBL positive, among migrants from Syria, and one case in a cleaner of mobile toilets in a migrant camp in Slovenia.

Sweden. In Sweden, 12 shigellosis cases in refugees have been reported in October and November 2015. A majority of the cases are children. Six of the cases were caused by *S. sonnei* (1 ESBL-A producing), five by *S. flexneri* and one by an unknown *Shigella* species.

Figure 1. Distribution of shigellosis cases among refugees in 2015 and migration routes to and in Europe, as of 26 November 2015



ECDC threat assessment for the EU

More than 80 cases of shigellosis were diagnosed among refugees in the EU countries between July and November 2015. These refugees originated from Afghanistan, Iraq, Iran, Syria, Ethiopia, Eritrea, Georgia, Pakistan and Somalia. The occurrence of shigellosis among refugees is not unexpected as the disease is endemic in these countries as well as in some of the countries they travel through. Cases have been identified over a period of at least three months in different EU countries along the migration path. Given the mobility of refugees towards their intended final destination in Europe, and the fact that *Shigella* shedding persists for up to four weeks after onset, it is likely that the cases currently observed are related to transmission from one location to another through infected refugees and will continue to occur.

Transmission of shigellosis often occurs via the faecal-oral route. Person-to-person transmission of *Shigella* is effective in crowded conditions where personal hygiene is poor. Therefore, refugees are at risk of a *Shigella* infection because personal hygiene is difficult to maintain during travel and they often encounter overcrowding during their journey and at reception facilities. Since *Shigella* is well adapted to low temperatures and transmission can also occur in the coldest months of the year, the number of shigellosis cases among refugees is not likely to decrease over the next few months.

Shigella is not the only enteric pathogen to which refugees and people who work in refugee facilities could be exposed. Other enteric diseases include hepatitis A and E, norovirus infection, salmonellosis, campylobacteriosis, cholera, and soil-transmitted helminthic infections [18,19].

Cleaners of the hosting facilities for incoming refugees, together with other workers and volunteers, have to be considered as vulnerable to shigellosis, particularly once a case is detected.

The risk to the general population in Europe of being affected by single cases or outbreaks of shigellosis among refugee populations remains low since contributory factors to transmission, such as compromised hygiene, overcrowding and limited access to clean water, are specific to refugee reception facilities. However, shigellosis is prone to transmission once introduced into institutions, such as nursing homes and day-care centres or in specific communities such as MSM.

Shigella dysenteriae has not been detected so far among refugees in the EU. Often during outbreak situations, the different *Shigella* species are detected concurrently. Therefore the likelihood exists that *Shigella dysenteriae* may be isolated and this would be of concern as the clinical presentation is usually more severe.

Conclusions and options for response

The current influx of refugees in Europe is increasing the pressure on healthcare and public health systems in the transit and destination countries. Refugees are vulnerable to infectious diseases because of the specific circumstances under which they live and therefore they require special attention.

The occurrence of shigellosis among refugees is not unexpected because shigellosis is endemic in the countries they originate from, as well as in some of the countries they travel through. Furthermore poor hygiene conditions in refugee reception facilities promote the spread of the disease. Therefore, additional cases may occur in the EU within this vulnerable group.

The threat to the general population of acquiring *Shigella* infections from refugees is considered low. Cleaners of the hosting facilities for refugees, in particular those possibly coming into contact with faeces or traces of faeces, as well as other people working in refugee reception facilities should be considered to be at increased risk of *Shigella* infection. This is particularly relevant when diarrhoeal illnesses occur in a refugee reception facility.

Prevention of spread and control of shigellosis in reception facilities in the EU/EEA countries requires the capacity to detect cases in populations at risk and strengthened surveillance systems.

Therefore, options to consider for the prevention and control of shigellosis among refugees include:

- where possible, preventing or minimising overcrowding in reception facilities for refugees;
- promoting and enabling adequate hygiene for residents in those facilities – for example providing sufficient toilet and hand washing facilities, soap, paper towels and toilet paper;
- raising awareness among refugees concerning personal hygiene to prevent spread of *Shigella* infections and other enteric diseases, particularly at points of entry into the EU and in reception facilities;
- raising awareness among clinicians in transit and destination countries of the possibility of shigellosis in refugees and workers or volunteers at hosting facilities for incoming refugees;
- antimicrobial resistance of *Shigella* species is a growing problem in the treatment of shigellosis and therefore antibiotic susceptibility testing is indispensable for the management of patients with suspected *Shigella* infection;
- timely notification of cases and outbreaks among refugees within the EU/EEA may contribute to increased awareness and preparedness for the disease.

References

1. European Centre for Disease Prevention and Control. Communicable disease risks associated with the movement of refugees in Europe during the winter season - 10 November 2015 [Internet]. Stockholm: ECDC; 2015. Available from: http://ecdc.europa.eu/en/publications/Publications/refugee-migrant-health-in-european-winter-rapid-risk-assessment.pdf.
2. European Centre for Disease Prevention and Control. Infectious diseases of specific relevance to newly-arrived migrants in the EU/EEA - 19 November 2015 [Internet]. Stockholm: ECDC; 2015. Available from: http://ecdc.europa.eu/en/publications/Publications/Infectious-diseases-of-specific-relevance-to-newly-arrived-migrants-in-EU-EEA.pdf.
3. European Centre for Disease Prevention and Control. Expert opinion on the public health needs of irregular migrants, refugees or asylum seekers across the EU's southern and south-eastern borders - September 2015 [Internet]. Stockholm: ECDC; 2015. Available from: http://ecdc.europa.eu/en/publications/Publications/Expert-opinion-irregular-migrants-public-health-needs-Sept-2015.pdf.
4. Centers for Disease Control and Prevention. *Shigella* - Shigellosis. General information [Internet]. Atlanta: CDC; 2015 [updated 5 August 2015; cited 24 November 2015]. Available from: http://www.cdc.gov/shigella/index.html.
5. Heymann DL. Shigellosis. Control of Communicable Diseases Manual, 19th edition. Washington DC: American Public Health Association; 2008. p. 556-60.
6. World Health Organization. Guidelines for the control of shigellosis, including epidemics due to *Shigella dysenteriae* type 1 [Internet]. Geneva: WHO; 2005 [cited 24 November 2015]. Available from: http://apps.who.int/iris/bitstream/10665/43252/1/924159330X.pdf?ua=1&ua=1.
7. Centers for Disease Control and Prevention. *Shigella* - Shigellosis. Resources for public health and medical professionals [Internet]. Atlanta: CDC; 2015 [updated 5 June 2015; cited 24 November 2015]. Available from: http://www.cdc.gov/shigella/resources.html.
8. DuPont HL, Levine MM, Hornick RB, Formal SB. Inoculum size in shigellosis and implications for expected mode of transmission. J. Infect. Dis. 1989 Jun;159(6):1126-8.
9. Guzman-Herrador B, Vold L, Comelli H, MacDonald E, Heier BT, Wester AL, et al. Outbreak of *Shigella sonnei* infection in Norway linked to consumption of fresh basil, October 2011. Euro Surveill [Internet]. 2011; 16(44). Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20007.
10. Löfdahl M, Ivarsson S, Andersson S, Langmark J, Plym-Forshell L. An outbreak of *Shigella dysenteriae* in Sweden, May-June 2009, with sugar snaps as the suspected source. Euro Surveill [Internet]. 2009 Jul 16; 14(28). Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19268.
11. Guzman-Herrador BR, Nilsen E, Cudjoe KS, Jensvoll L, Kvamme JM, Lindegard Aanstad A, et al. A *Shigella sonnei* outbreak traced to imported basil--the importance of good typing tools and produce traceability systems, Norway, 2011. Euro Surveill [Internet]. 2013; 18(49). Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20650.
12. Lewis HC, Kirk M, Ethelberg S, Stafford R, Olsen KEP, Nielsen EM, et al. Outbreaks of shigellosis in Denmark and Australia associated with imported baby corn, August 2007 – final summary. Euro Surveill [Internet]. 2007; 12. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=3279.
13. Simms I, Field N, Jenkins C, Childs T, Gilbart VL, Dallman TJ, et al. Intensified shigellosis epidemic associated with sexual transmission in men who have sex with men--*Shigella flexneri* and *S. sonnei* in England, 2004 to end of February 2015. Euro Surveill [Internet]. 2015; 20(15). Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=21097.
14. Borg ML, Modi A, Tostmann A, Gobin M, Cartwright J, Quigley C, et al. Ongoing outbreak of *Shigella flexneri* serotype 3a in men who have sex with men in England and Wales, data from 2009–2011. Euro Surveill [Internet]. 2012; 17(13). Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=20137.
15. De Schrijver K, Bertrand S, Gutierrez Garitano I, Van den Branden D, Van Schaeren J. Outbreak of *Shigella sonnei* infections in the Orthodox Jewish community of Antwerp, Belgium, April to August 2008. Euro Surveill [Internet]. 2011; 16(14). Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=19838.
16. Jonsson J, Alvarez-Castillo Mdel C, Sanz JC, Ramiro R, Ballester E, Fernanez M, et al. Late detection of a shigellosis outbreak in a school in Madrid. Euro Surveill [Internet]. 2005 Oct; 10(10):[268-70 pp.]. Available from: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=571.

17. Ram PK, Crump JA, Gupta SK, Miller MA, Mintz ED. Part II. Analysis of data gaps pertaining to *Shigella* infections in low and medium human development index countries, 1984-2005. Epidemiology and Infection. 2008 May;136(5):577-603.

18. U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases. Intestinal parasite guidelines for domestic medical examination for newly arrived refugees [Internet]. Atlanta: CDC; 2013 [cited 26 November 2015]. Available from: http://www.cdc.gov/immigrantrefugeehealth/pdf/intestinal-parasites-domestic.pdf.

19. Sana L, editor. Handbook of immigrant health. New York: Plenum Press; 1998.