RAPID RISK ASSESSMENT

Multi-country outbreak of *Salmonella* Stanley infections

27 July 2012

Main conclusions and recommendations

The increase of *Salmonella* Stanley infections reported in Belgium, Hungary and Germany in 2012 is not related to international travel. The occurrence of one single PFGE pattern of strains isolated from different countries suggests a common source, which has not yet been identified; potential vehicles might be food, feed, or contact.

Most *Salmonella* Stanley cases are related to travel to south-east Asia, mainly Thailand. The emergence of cases in three EU countries without documented travel history outside the EU in the same period of time and with a specific age distribution, common antibiotic-resistance profile and PFGE pattern confirms an epidemiological and microbiological link. Investigations are in progress in the affected countries to detect new cases and identify the potential vehicle. At the EU level, ECDC is facilitating a coordinated response by gathering the available epidemiological and microbiological information, supporting the investigation in the Member States and liaising with European and international food safety networks.

The search for *Salmonella* Stanley strains with an epidemic PFGE profile in the historical datasets from food and animals is ongoing and may help to identify a potential source.

Member States are encouraged to perform PFGE testing on all recent isolates of *Salmonella* Stanley to increase the possibility of identifying potential vehicles of infection.

ECDC will continue to closely monitor this event and will update the risk assessment as soon as new relevant information becomes available.

Public health issue

Multi-country outbreak of *Salmonella enterica* serovar Stanley (*Salmonella* Stanley) in Belgium, Hungary and Germany.

Source and date of request

European Commission, Directorate-General for Health and Consumers, 20 July 2012.

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Disease background information

Salmonella enterica serovar Stanley (*Salmonella* Stanley) is one of the serovars most frequently associated with human infections in south-east Asia. *Salmonella* Stanley was the second most common serovar in human salmonellosis in Thailand in the years 2002 to 2007, accounting for 11% of all salmonellosis cases there [1]. In the central region of Thailand, *S.* Stanley isolates that were collected between 2001 and 2006 from patients, asymptomatic carriers and non-human sources showed highest rates of antibiotic resistance to sulfamethoxazole (92%), tetracycline (80%), and streptomycin (77%) whereas resistance against nalidixic acid and ciprofloxacin was low, at 5% and 2% respectively [2]. In 2001–2007, *Salmonella* Stanley was among the 20 most frequently reported serovars in Japan, Malaysia, Philippines, Croatia, Denmark, Finland, the Netherlands, and Canada [3].

The following outbreaks of *Salmonella* Stanley as a cause of human gastroenteritis outside south-east Asia have been reported:

- In 1995, an international outbreak of *Salmonella* Stanley in the United States and Finland was traced to alfalfa sprouts grown from contaminated seeds [4].
- In 2001, an international outbreak of *Salmonella* Stanley affecting Canada, England and Wales, Scotland and Australia was associated with consumption of imported peanuts [5].
- From September 2006 to February 2007, a nationwide outbreak of gastrointestinal illness caused by *Salmonella* Stanley occurred in Switzerland. Cases were linked to the consumption of a specific brand of soft cheese that was produced in the western cantons of Switzerland [6]. This was the first *Salmonella* Stanley outbreak reported in Europe related to non-imported food items.
- In Sweden, there was a *Salmonella* Stanley outbreak caused by imported lime leaves in 2006 [7].
- In 2007, an outbreak of *Salmonella* Stanley in Sweden was suspected to be due to imported contaminated alfalfa sprouts [8].

From 2005 to 2012 there have been 17 RASFF (Rapid Alert System for Food and Feed) notifications on *Salmonella* Stanley, mostly food items originating from Thailand, but also from Germany, the Netherlands, Vietnam, Brazil and China. Contaminated food items were: dog chew, pet food, organic rapeseed cake, peanuts, frozen beef tenderloin, pak paew (Thai herbs), wild betel leaf bush (herbs), water grass, dried Mu-Err mushrooms, pak-pang (Chinese morning glory from Thailand), kafir lime leaves (herbs), sweet basil, fresh-water spinach, fresh parsley, fresh pennywort, lemon grass (fresh herbs), white hing choi (Amaranthus tricolor), fresh mint and chilled whole chicken.

In EFSA's (European Food Safety Authority) database from the annual reporting on zoonoses in 2004–2011 and from the EU-wide *Salmonella* baseline surveys, there are 37 reported isolations of *Salmonella* Stanley for animals, food and feed. These isolations are from pigs, fowl, turkeys, reptiles, cats, dogs, pork, dairy products, mushrooms, feed material and feed for fur animals.

Between 2006 and 2012, a total of 2 926 *Salmonella* Stanley cases have been reported to the European Surveillance System (TESSy) by 23 EU/EEA countries and 75% (n = 1 724) of cases with known travel history (n = 2 309) were travel-related. This proportion has remained rather stable between 2007 and 2011 (Table). Between 2007 and 2011, the case numbers of *Salmonella* Stanley reported have decreased from 682 cases in 2007 to 464 in 2011 (Table). For 2012, 170 cases of *Salmonella* Stanley have been reported at the EU/EEA level (13 countries) for the first quarter, compared with 120 cases for the same period in 2011 (by 12 countries).

Table. Number of human *Salmonella* Stanley infections and number of domestic and travel-related infections in the EU/EEA, 2007–2011

	2007		2008		2009		2010		2011	
	Cases	%	Cases	%	Cases	%	Cases	%	Cases	%
Domestic	142	27.2	109	22.0	91	25.6	88	26.5	116	34.2
Travel-related	380	72.8	387	78.0	264	74.4	244	73.5	223	65.8
Total cases with known travel history	522	100.0	496	100.0	355	100.0	332	100.0	339	100.0
All cases	**682**		**624**		**460**		**427**		**464**	

Source: The European Surveillance System (TESSy)

During the period 2006–2012, the top five source countries for travel-related *Salmonella* Stanley infections were Thailand (75% of all cases with known data), Pakistan (5%), India (4%), Vietnam (3%) and Philippines (3%).

Event background information

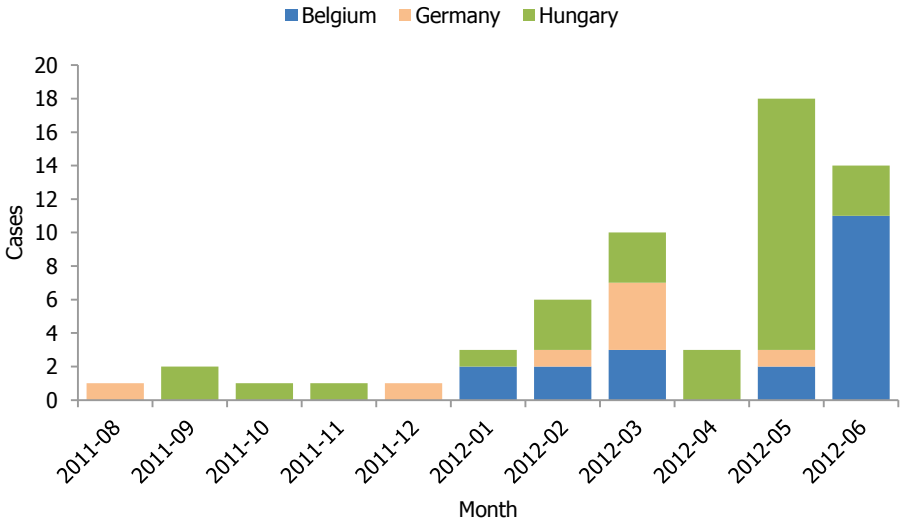
On 29 June 2012, the National Reference Centre for *Salmonella* in Belgium reported through the EPIS-FWD platform a significant increase of *Salmonella* Stanley cases in 2012: as of 26 July 2012, 26 laboratory-confirmed cases were reported with a peak of ten cases between 11 and 25 June, exceeding the average of 3–6 *Salmonella* Stanley cases reported annually. The median age is 21 years (range 2–59 years), and 10 are female. The implicated strain is resistant to nalidixic acid and sensitive to all other antibiotics tested. Twenty of the typed strains showed an indistinguishable PFGE profile (Figure). No source or vehicle of infection has been identified so far and investigations are ongoing. A recent decline in the number of cases has been observed. The last identified case had onset on 25 June 2012.

Through EPIS FWD, two additional countries reported cases in 2012 with a potential link to the Belgian outbreak.

Since September 2011, Hungary has reported 110 cases of non-travel-associated *Salmonella* Stanley (19 in 2011 and 91 in 2012) compared with 2–10 cases detected annually during previous years. Ninety-seven of the cases were symptomatic and 13 asymptomatic. Thirty-seven isolates have been further investigated and 36 showed PFGE profiles indistinguishable from the Belgian cases, including four asymptomatic cases. The increase in reported cases started in September 2011 with 2–3 cases monthly and peaked in May 2012 (27 cases) (Figure). All cases are considered autochthonous; two cases occurred in the same household and two cases linked to a summer camp are currently under investigation. More than half of the Hungarian counties are affected. Half of the cases occurred among children under six years-old and 34% of all cases needed hospitalisation. All of the strains are resistant to nalidixic acid. No common source has yet been identified but investigations are ongoing. The last reported case from Hungary with indistinguishable PFGE profile had onset of symptoms on 6 June; more recent *Salmonella* Stanley cases have been identified but PFGE typing is still ongoing (onset of symptoms of the last case was 13 July).

Since August 2011, Germany has reported 50 infections with *Salmonella* Stanley, which is more than twice the expected number of cases. Eight of them show the indistinguishable outbreak PFGE profile. Most of the German cases had onset of disease in March 2012 (Figure) and none had a travel history to Belgium or Hungary. Forty-one cases are likely to be autochthonous. Both sexes are affected equally and about half are juveniles, the majority of which are young children. Many of the 16 German states are affected with more than half the cases in western Germany, but cases do not cluster near the Belgian–German border. Case reporting in June and July has been similar to previous years in these months (two cases in June and three in July). Of 17 isolates available for PFGE testing (four from 2011 and 13 from 2012), seven showed a PFGE pattern indistinguishable from the Belgian and Hungarian cases and one differed by one band. The latter is considered to be part of the cluster. These eight isolates were all non-travel-associated and correspond to two cases from August and December 2011, five from March 2012, when an increase of *Salmonella* Stanley notifications in Germany was detected, and one in June 2012. This latest case is the isolate with one-band difference.

Figure. Number of symptomatic cases of *Salmonella* Stanley with an indistinguishable PFGE profile, by month of onset or, if missing, by month of diagnosis, notification or hospitalisation reported from Hungary (32), Germany (8) and Belgium (20), August 2011–July 2012



In total, 60 *Salmonella* Stanley cases (32 from Hungary, 20 from Belgium, eight from Germany) with an indistinguishable PFGE pattern were reported from EU/EEA countries to ECDC until 26 July 2012. The median age (including four asymptomatic cases) was seven years-old (range 1 to 89 years). The hospitalisation rate for the 40 symptomatic cases with the indistinguishable PFGE profile from Germany and Hungary was 53%.

As of 26 July 2012, 22 countries including 19 EU/EEA countries, Canada, the US and Switzerland report that they have not observed a similar unusual increase of infections associated with this serovar.

Nevertheless, Sweden have reported 11 autochthonous cases since January, of which nine had onset after April 2012. A smaller cluster from a birthday party in April has been investigated but no source of infection was found. The PFGE profiles from the Swedish cases do not match the Belgian pattern, so the Swedish cases are most likely not to related to this outbreak.

The PFGE pattern of the outbreak strain has been checked against the PulseNet USA database. Strains with matching profiles were found but they have not been reported since 2009 in the US. No susceptibility data for that pattern was available in the PulseNet USA database.

The PFGE profile associated with the outbreak was also compared with strains included in large PFGE database of *Salmonella* Stanley in the Statens Serum Institut (SSI) in Denmark and no matches between the outbreak pattern and any of the 93 PFGE types were observed. PFGE profiles of *Salmonella* Stanley from the SSI database are highly diverse and many of them have been isolated from travel-associated cases.

A RASFF notification was issued by Denmark on 17 July about *Salmonella* Stanley in chilled whole chicken originating from Germany. Further PFGE testing has confirmed a different pattern.

In addition, INFOSAN issued an alert on 20 July to identify cases outside of the EU.

ECDC threat assessment for the EU

The increase in the number of *Salmonella* Stanley infections reported in Belgium, Hungary and Germany in 2012 is not related to international travel. The occurrence of one single PFGE pattern of strains isolated from different countries suggests a common source, which has not yet been identified; potential vehicles might be food, feed, or contact.

Forty-two percent of the cases with the indistinguishable PFGE profile were reported among children under six years of age. The high proportion of cases in young children may be either due to the fact that children in general are more at risk for gastrointestinal infections, to a higher susceptibility for disease in this age group, or to an increased exposure of this age group.

The high hospitalisation rate among the PFGE cases might be due to the fact that strains from hospitalised cases are more likely to be further investigated.

The number of cases has increased gradually over time with the highest number of cases reported in May 2012. Recently, a decline in the number of cases has been observed in Belgium. Germany did not report a significant

increase of *Salmonella* Stanley cases but nevertheless identified eight cases with the outbreak PFGE pattern. Recent cases in Hungary have been detected but the results of the PFGE typing are not yet available.

An EU *Salmonella* Stanley epidemic case definition and a common line listing have been agreed upon with the affected countries.

The lack of knowledge of the potential source and vehicle of infection limits the options for controlling this outbreak. So far, *Salmonella* Stanley has been isolated relatively rarely from food and animals in the EU.

It is likely that further cases can be identified and therefore a coordinated investigation among affected Member States is necessary.

Conclusions

Most *Salmonella* Stanley cases are related to travel to south-east Asia, mainly Thailand. The emergence of cases in three EU countries without documented travel history outside the EU in the same period of time and with a specific age distribution, common antibiotic resistant profile and PFGE pattern confirms an epidemiological and microbiological link. Investigations are in progress in the affected countries to detect new cases and identify potential vehicles of infection. At the EU level, ECDC is facilitating a coordinated response by gathering the available epidemiological and microbiological information, supporting investigations in the Member States and liaising with European and international food safety networks.

Member States are encouraged to perform PFGE testing of all recent isolates of *Salmonella* Stanley to increase the possibility of identifying the vehicle of infection.

ECDC will continue to closely monitor this event and will update the risk assessment as soon as new relevant information becomes available.

According to the available information it is likely that further cases will occur but the impact for public health at the EU level is considered to be limited.

References

1. Hendriksen RS, Le Hello S, Bortolaia V, Pulsrikarn C, Nielsen EM, Pornruangmong S, et al. Characterization of Isolates of Salmonella enterica Serovar Stanley, a Serovar Endemic to Asia and Associated with Travel. J. Clin. Microbiol. 2012; 50(3):709.
2. Sirichote P, Bangtrakulnonth A, Tianmanee K, Unahalekhaka A, Oulai A, Chittaphithakchai P,et al. Serotypes and antimicrobial resistance of Salmonella enterica ssp in central Thailand, 2001-2006. Southeast Asian J Trop Med Public Health. 2010 Nov;41(6):1405-15.
3. Hendriksen RS, Vieira AR, Karlsmose S, Lo Fo Wong DM, Jensen AB, Wegener HC, et al. Global monitoring of Salmonella serovar distribution from the World Health Organization Global Foodborne Infections Network Country Data Bank: results of quality assured laboratories from 2001 to 2007. Foodborne Pathog Dis. 2011 ; **8**(8): p. 887-900.
4. Mahon BE, Pönkä A, Hall WN, Komatsu K, Dietrich SE, Siitonen A,, et al. An international outbreak of Salmonella infections caused by alfalfa sprouts grown from contaminated seeds. J Infect Dis. 1997;175:876–882.
5. Kirk MD, Little CL, Lem M, Fyfe M, Genobile D, Tan A, et al. An outbreak due to peanuts in their shell caused by Salmonella enterica serotypes Stanley and Newport sharing molecular information to solve international outbreaks. Epidemiol Infect. 2004;132:571–577.
6. Pastore R, Schmid H, Altpeter E, Baumgartner A, Hächler H, Imhof R, et al. Outbreak of Salmonella serovar Stanley infections in Switzerland linked to locally produced soft cheese, September 2006 – February 2007. Euro Surveill. 2008;13(37):pii=18979. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=18979.
7. Lindqvist A. Salmonella Stanley från limeblad. EPI-aktuellt [in Swedish]. 2006:5.
8. Werner S, Boman K, Einemo I, Erntell M, de Jong B, Lindqvist A, et al. Outbreak of *Salmonella* Stanley in Sweden associated with alfalfa sprouts, July-August 2007. Euro Surveill. 2007;12(42):pii=3291. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=3291.