Eurosurveillance
Free of charge for authors, free of charge for readers.

Back to Table of Contents
en es fr it pt
Previous
Next

Eurosurveillance, Volume 9, Issue 9, 01 September 2004

Surveillance report

TRAVELLERS RETURNING TO SWEDEN AS SENTINELS FOR COMPARATIVE DISEASE INCIDENCE IN OTHER EUROPEAN COUNTRIES, CAMPYLOBACTER AND GIARDIA INFECTION AS EXAMPLES

Citation style for this article: Ekdahl K, Giesecke J. Travellers returning to Sweden as sentinels for comparative disease incidence in other European countries, campylobacter and giardia infection as examples. Euro Surveill. 2004;9(9):pii=476. Available online: http://www.eurosurveillance.org/ViewArticle.aspx?ArticleId=476

Karl Ekdahl and Johan Giesecke
Department of Epidemiology, Swedish Institute for Infectious Diseaese Control and the Department of Medical Epidemiology and Biostatistics, Karolinska Institute, Stockholm, Sweden

Comparable figures on disease incidence between countries are difficu to attain. We therefore compared risk of infection for Swedes going other European countries. We took as the numerator the number imported cases from European countries of campylobacter and giard infection in the national Swedish surveillance database, and as th denominator, the number of visitors to each country from a commerci database on foreign travel. Risk of infection in tourists was als compared to national incidence figures for a selection of countries.
During the 7 year period 1997-2003, 14 829 campylobacter and 111 giardia infections were diagnosed in Swedes returning from a Europea country. The travel database contained information on 14 51 overnight trips to such a country during the same period. Risk campylobacter infection was over 100 per 100 000 travellers Portugal and Turkey, but only 1/100 000 in Finland. Risk of giardias was highest in Russia (50/100 000). There appears to be substanti underreporting of campylobacter infection in many European countries
In conclusion, the risk of infection with campylobacter and giard varies 100-fold across Europe. Returning tourists as a sentin population are a useful tool to estimate these differences. There a large - and unexplained - differences between the risk for travelle and reported national incidence.

Introduction

Comparing incidence figures for infectious diseases between one country a another is notoriously difficult. Healthcare-seeking behaviour, clinical practi and laboratory methods vary considerably, even between otherwise simil countries. Several attempts at collecting national data on an international leve such as the World Health Organization centralized information system f infectious diseases (WHO CISID) [1] or the European Union Zoonosis Report [lose much of their usefulness due to this incomparability.
Sweden has a relatively favourable infectious disease situation . Since many our cases of various infections are imported, we have a long tradition routinely registering the country of infection along with other epidemiologic data. We decided to use these data to estimate risk of infection for a list diseases in various countries. In this paper, we describe the method and a have taken campylobacter and giardia infection in Europe as example result We intend to continue with other diseases and geographical regions in the ne future. Obviously, the method can only be used for fairly common diseases a destinations, otherwise the uncertainty of the estimates becomes too large.

Methods

For this study we used two data sources. The first was our department's t national database of all notified infections in Sweden since 1997, SmiNet [3 The doctor diagnosing a notifiable disease reports a number of items for ea case, including diagnosis, age, sex, and most likely place/country of infecti

case, including diagnosis, age, sex, and most likely place/country of infecti
(based on travel history and knowledge of the disease incubation period). Th
completeness of this reporting can be evaluated against the laboratory reports
which use the same personal identifier, and is 98% or more for most diseas
[4]. During the 7 year period 1997-2003 there were 14 829 campylobact
cases and 1112 giardia cases where infection was reported to have bee
acquired during travel in a European country outside Sweden. These figur
only refer to Swedish residents who travelled abroad (identified in the databa
through the unique personal identification number issued to all Swedis
residents). Newly arrived immigrants, who do not have a personal identificati
number, were excluded prior to the analysis.
The second data source was a commercial database on Swedish travel, th
Swedish Travel and Tourist Database (TDB) [5,6]. This database is mainly use
by the travel industry, and is built on monthly telephone interviews with 200
randomly selected Swedes, in which they are asked about any travel during th
last 6 months. The questions asked are quite detailed and cover destinatio
length of stay, type of travel (business/leisure), type of accommodation, c
rental, etc. We used the part of the database containing age, sex, destinatio
time of travel and length of stay for all respondents during 1997-2003. The
were 14 519 interviewees who had been on overnight trips to a Europea
country other than Sweden during this period. From the age, sex an
geographical distribution of these people, we were able standardise against th
total population of Sweden (9 million) to get an estimate of the actual numb
of travellers to each country during the seven years.
For each country, the risk of infection per 100 000 travellers was calculated
the number of cases reported in travellers returning from that country, divide
by estimated total number of travellers and multiplied with 100 000. Th
confidence intervals were calculated using the formula:

$$e^{\ln \text{risk} \pm 1.96 * \text{sqr}(1/\text{cases}+1/\text{travellers})},$$

where 'cases' was the number of cases reported from a country, and 'travelle
was the actual number of travellers to that country in the TDB data base, n
the estimated Swedish total. The formula thus takes into account both th
uncertainty in the number of reported cases and the uncertainty in the actu
number of responding travellers forming the basis for the estimated tot
number of travellers. The proportion of notifications with unknown country
infection was quite stable over the period; 8-11% for campylobact
notifications and 15-21% for giardia notifications.
This estimate of risk for travellers per country was the main aim of our stud
However, we also wanted to compare these risks to reported national incidenc
We therefore looked for official national surveillance statistics, but it is difficu
to get reliable data of this kind for most infectious diseases in Europe, and the
is no single publication or website to consult. (Our department is leading a
EUfunded project to improve this situation, the Basic Surveillance Network [7]
We could not find any useful data on giardia, but there are some figures f
human campylobacter disease in the annual EU Zoonosis Report [2]. This li
only includes about half of the European countries, and is based on clinic
notification in some, but on laboratory notification in others. Also, only 11 of th
18 Länder in Germany report. For Germany we therefore assumed a populatio
of 50 million instead of the actual 82 million when calculating nation
incidence.
To compare the risk of campylobacter infection in travellers to the nation
reported incidence for some European countries listed in the EU Zoonos
Report, we constructed an 'under-detection index', using Finland (with th
highest detection rate) as reference. The index is based on the ratio of trave
related infections in Swedes and the national incidence, and denotes estimate
number of campylobacter cases not notified for every notified case.

Results

The risk of infection for travellers from Sweden is shown in Table 1 and
Figures 1 and 2. It is evident that there are huge differences between vario
countries, ranging for Campylobacter from 1 per 100 000 travellers in Finland
over 100/100 000 in Turkey and Portugal, and for giardia, from 0/100 000
Austria and Ireland to over 50/100 000 in Russia. It is also evident that th
distribution of these two pathogens is quite different across Europe. The mea
annual incidence of domestically acquired campylobacteriosis and giardiasis
Sweden in the same period was 27.2/100 000 and 2.7/100 000, respectively.
Table 2 gives the official incidence of campylobacteriosis in some countries, an
a rough estimate on how many campylobacter cases are missed for eac
reported case nationally. There is an obvious north-south gradient here, b
even France, Ireland and the Netherlands seem to have a greater problem wi
campylobacter than indicated by national statistics

campylobacter than indicated by national statistics.

TABLE 1

Number of Swedish travellers and notified cases of Campylobacter infection and Giardiasis per European country 1997-2003, with risk estimates for disease notification

			CAMPYLOBACTER INFECTION			GIARDIASIS		
	Estimated no. of travellers	Travellers in TDB*	Cases	Risk per 100 000	95% CI	Cases	Risk per 100 000	95% CI
Austria	1 010 000	245	85	8.4	6.6-10.8	0	-	-
Baltic Republics	810 000	212	78	9.6	7.4-12.5	25	3.09	2.0-4.7
Belgium	520 000	113	112	21.5	16.6-28.0	2	0.38	0.1-1.6
Bulgaria	400 000	89	398	99.5	79.1-125.2	48	12.00	8.4-17.0
Cyprus	850 000	200	284	33.4	27.9-40.0	17	2.00	1.2-3.3
Czech Republic and Slovakia	620 000	162	300	48.4	40.0-58.6	13	2.10	1.2-3.7
Denmark	9 360 000	2088	375	4.0	3.6-4.5	16	0.17	0.1-0.3
Ex-Yugoslavia and Albania	670 000	143	265	39.6	32.3-48.5	146	21.79	17.3-27.4
Finland	7 560 000	1901	71	0.9	0.7-1.2	13	0.17	0.1-0.3
France	3 000 000	740	1009	33.6	30.6-37.0	19	0.63	0.4-1.0
Germany	4 900 000	1181	243	5.0	4.3-5.7	15	0.31	0.2-0.5
Greece	4 810 000	1144	853	17.7	16.2-19.4	43	0.89	0.7-1.2
Hungary	560 000	130	150	26.8	21.2-33.9	7	1.25	0.6-2.7
Iceland	180 000	41	7	3.9	1.7-8.7	1	0.56	0.1-4.0
Ireland	370 000	94	95	25.7	19.3-34.1	0	-	-
Italy	2 680 000	611	229	8.5	7.3-9.9	22	0.82	0.5-1.3
Luxembourg	60 000	13	6	10.0	3.8-26.3	2	3.33	0.8-14.8
Malta	130 000	34	47	36.2	23.3-56.2	2	1.54	0.4-6.4
The Netherlands	760 000	185	69	9.1	6.9-12.0	4	0.53	0.2-1.4
Norway	5 630 000	1320	153	2.7	2.3-3.2	9	0.16	0.1-0.3
Poland	860 000	209	429	49.9	42.3-58.9	33	3.84	2.7-5.5
Portugal	750 000	196	871	116.1	99.5-135.6	14	1.87	1.1-3.2
Romania	70 000	17	61	87.1	50.9-149.2	21	30.00	15.8-56.9
Russia and NIS (excl Baltic Republics)	260 000	59	96	36.9	26.7-51.1	138	53.08	39.1-72.0
Spain	8 510 000	2090	5596	65.8	62.5-69.1	136	1.60	1.3-1.9
Switzerland	470 000	123	57	12.1	8.9-16.6	4	0.85	0.3-2.3
Turkey	1 260 000	289	1795	142.5	125.8-161.3	347	27.54	23.6-32.2
United Kingdom	3 710 000	890	555	15.0	13.5-16.6	15	0.40	0.2-0.7
Total	**60 770 000**	**14 519**	**14 289**	**23.5**	**23.0-24.1**	**1,8**	**1.7**	**1.7-1.9**

*TDB: Swedish Travel and Tourist Database. TDB denotes a database sample of Swedish foreign travel, see text for details

FIGURE 1

Risk of being diagnosed in Sweden with campylobacter infection on return home per 100 000 travellers to countries in Europe. Aggregated data for 7 year period 1997-2003

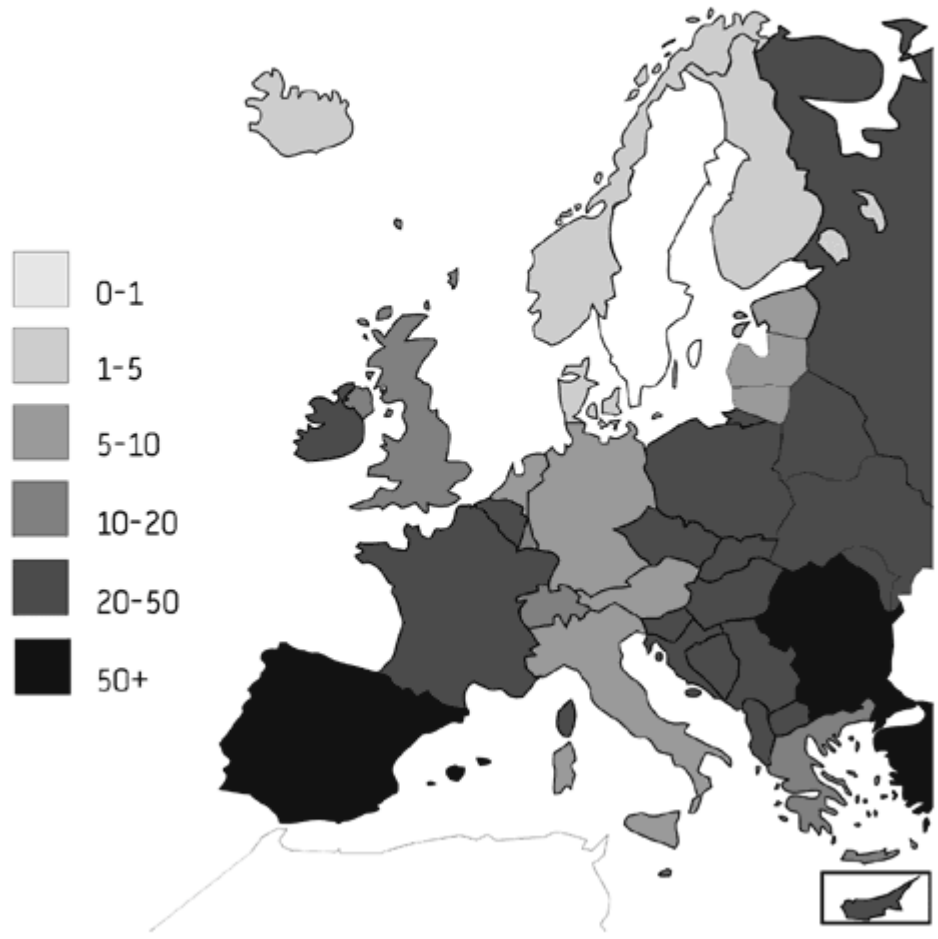
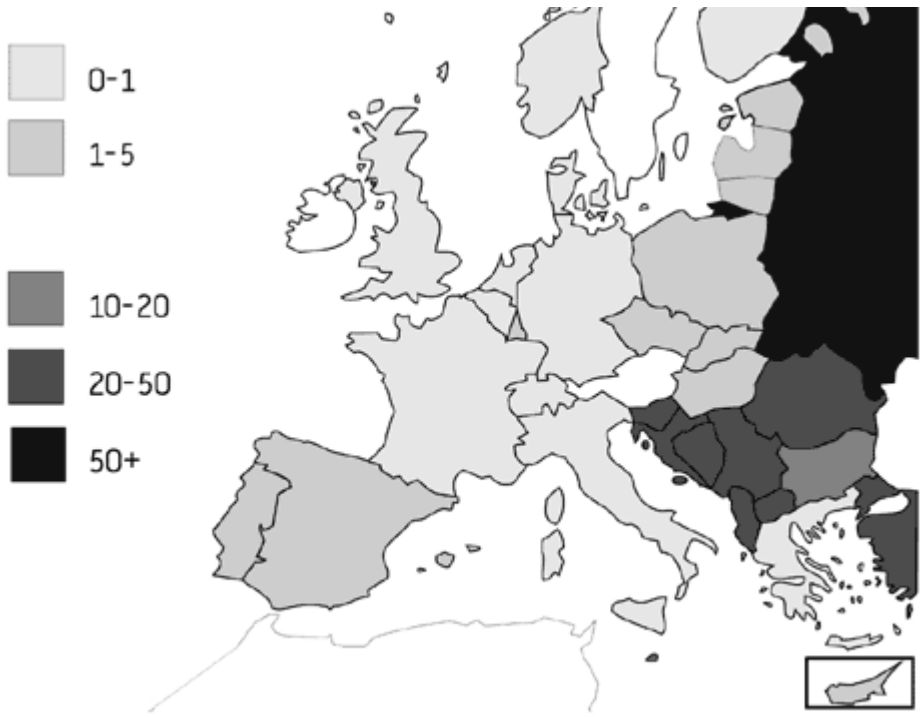


FIGURE 2

Risk of being diagnosed in Sweden with giardia infection on return home per 100 000 travellers to countries in Europe. Aggregated data for 7 year period 1997-2003



Discussion

For a case of any notifiable disease to appear in national surveillance statistic the patient must usually experience symptoms from the infection serio enough to bring the patient to a doctor. The doctor must then suspect t disease, and in most instances order the appropriate laboratory test. At t laboratory, the test must be positive, and the result reported back to t clinician. The case must then be reported upward in the surveillance chain, a finally be entered correctly in the national database. At each of these step there will be differences between countries, which will render comparison national incidence statistics difficult.

In this study we have used tourists from Sweden as a sentinel population measure relative risk of acquiring two diseases in the countries of the Europea Union. The differences observed are substantial.

What are the possible biases? The first is obviously that the estimates f number of travellers to each country are based on a random sample of Swede interviewed over the telephone. Estimates for unusual destinations in particul will have wide confidence intervals. The questions asked about travel were fai detailed, making it unlikely that the respondents would not tell the truth abo their destination. Conversely, names were not registered by the interviewer and there should thus be little incentive not to report trips taken abroad. T representativeness of the TDB database has been studied in an internal repo from Gothenburg University [6], and found to be good. In order to validate t figures even further, we also compared them with figures for collected landi cards reported from several few countries. For these destinations, agreeme was good (less than 5 % difference for travel to Thailand), but obviously v could not check against such figures for any EU country.

Second, length of stay will differ between destinations. Most Swedes travelli to other Nordic countries will only stay a few days, whereas holidays of a we or longer will be the norm for Mediterranean destinations (indeed, data on t mean length of stay from the TDB ranged from 3.6 days in travellers Denmark to 10.1 days in travellers to Spain, while most of the countries we visited for an average of 5 to 9 days). However, our system mostly picks u infections acquired towards the end of a stay, since a tourist with an illne acquired shortly after arrival at the foreign destination will often have recover before the journey home, or have been cared for at the travel destination. Th bias would therefore lead to an underestimation of the risk in countries whe tourists stay longer.

Third, the propensity to seek healthcare for a given symptom may also differ f infections acquired closer to home than in more distant places. It is unlikel however, that this behaviour would differ between tourists returning from, f examply, Greece or Spain. Risk comparisons may well be best made along t same latitude, but even so, there are notable differences. On the other hand, returning travellers are more likely to see a doctor than patients who have n travelled, some of the underdetection of domestic cases in the countries und study could be explained by health-seeking behaviours.

Fourth, doctors may be more inclined to test for specific pathogens if t patient is returning from a known high-risk country. For the two pathoge used as example in this paper, this selection bias could possibly have led more zealous diagnostic work on giardiasis in travellers returning from Russia.

Fifth, travellers to different countries may not be alike. Some areas may attra mainly holidaymakers, who display a different exposure pattern from busine travellers who travel to other destinations. Finally, for several diseases, ri varies throughout the year, often in parallel with incidence of travel. We appli

a logistic regression model to the data, adjusting for age, sex and month travel, but it changed the results only minimally.

The use of incidence in tourists to compare with reported national incidence obviously entails even more biases: tourists probably differ from natives in exposure, particularly to enteric pathogens, since they will be eating out much more often. There may also be some immunity in the local population that visitors lack - something that many travellers to new places have experienced.

The figures do, however, raise some questions: 378 campylobacter cases per year in France, compared to some 140 annually in returning Swedish tourists, or an annual incidence of 43 per 100 000 in Ireland compared to about 25 per 100 000 Swedish visitors - seem unlikely.

Another problem with the figures in Table 2 is that reported incidence is a mixture of imported and domestic cases not only in Sweden. For example, almost 80% of British cases are imported to that country [8], and should thus not represent any risk to visiting Swedes. The ratio of imported to domestic cases is, however, unknown for most countries, and difficult to control for. The situation is likely similar in Finland and the UK, and if domestic Finnish incidence only was used for comparison, the ratio of undetected to reported cases would increase even more for countries where a larger portion of cases are domestic.

We believe that the use of returning tourists as a sentinel population is a valuable tool for estimating risk of infection in various countries. It would be very interesting to see similar studies from other countries.

TABLE 2

Comparison of risk of Campylobacter infection in travellers to national reported incidence for a few European countries. National data from 2000

	Risk per 100 000 travellers	Reported number of cases	Population (x 1000)	Annual incidence per 100 000	Under-detection index * (Finland = 1)
Austria	8.4	3458	8002	43	15
Belgium	21.5	6682	10 239	65	25
Denmark	4.0	4386	5330	82	4
Finland	0.9	3527	5171	68	Reference
France	33.6	378	58 749	01	3958
Germany	5.0	30 876	50 000 [1]	62	6
Greece	17.7	3	10 554	0	47 191
Ireland	25.7	1613	3777	43	46
Luxembourg [2]	10.0	171	430	40	19
The Netherlands	9.1	3474	15 854	22	31
Norway	2.7	2326	4479	52	4
United Kingdom	15.0	63 378	60 270	105	11

* "Under-detection index" denotes estimated number of Campylobacter cases not notified for every notified case, using Finland as reference

[1] Only 11 of 18 Länder in Germany reporting. Their population has been assumed to be 50 million.

[2] Data for Luxembourg from 1999

References

1. World Health Organization Regional Office for Europe. Computerized inform system for infectious diseases (CISID). (**http://data.euro.who.int/cisid**)
2. European Commission. Trends and sources of zoonotic agents in animals, feedstuffs, food and man in the European Union and Norway in 2000. DG SAN publication 927/2002.
3. Swedish Institute for Infectious Disease Control. Updated statistics covering notifiable diseases of Sweden.
(**http://gis.smittskyddsinstitutet.se/mapapp/build/intro_eng.html**)
4. Jansson A. Sensitivity and timeliness of case reporting in the Swedish statu surveillance of communicable diseases 1998-2002. Master Thesis in Public Hea Karolinska Institute, 2004.
(**http://www.smittskyddsinstitutet.se/upload/Publikationer/MSc-surveillance.pdf**)
5. Swedish Travel and Tourist Data Base, TDB. Resurs AB, Sweden.
(**http://www.resursab.se**)
6. Holmberg I, Westberg M. The Swedish Travel and Tourist Data Base, TDB – technical report [in Swedish]. Gothenburg University, 2001.
7. Basic Surveillance Network

(http://www.smittskyddsinstitutet.se/SMItemplates/Article____411
8. Adak GK, Long SM, O'Brien SJ. Trends in indigenous foodborne disease and deaths, England and Wales: 1992 to 2000. Gut. 2002;51:832-41.

Back to Table of Contents

en es fr it pt

Previous

Next

To top | Recommend this page