

# Gastroenteritis outbreak linked to seafood consumption in a Northern Aegean island, Greece, February 2010

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## Introduction

On 18 February 2010, the Hellenic Centre for Diseases Control and Prevention was informed about a gastroenteritis outbreak in three islands of the Northern Aegean Sea, pertaining to the prefecture of Lesvos. As it is very common to abstain from meat and consume seafood on Ash Monday in Greece (this year on 15 February), sea food items were suspected to be the vehicle of the outbreak.

## Methods

A retrospective cohort study was conducted in the smallest island, and the whole population was used as a cohort; participants were interviewed face-to-face via a structured questionnaire. Rate ratios and the corresponding 95% confidence intervals were calculated. A primary case of gastroenteritis was defined as any person who had at least two episodes of diarrhoea or vomiting in the 72 hours following the noon of Monday 15 February. Any person who developed symptoms later on, was defined as a secondary case. Data were entered into EpiData Entry v3.1 and statistical analyses were run in Stata v11.

## Results

### Descriptive epidemiology

One hundred and eighty one of the 197 residents of the island were included in the study. Eighty seven (48.1%) of them were female and the median age was 42 years (3 months - 97 years). Sixty-four (35.4%) reported gastroenteritis symptoms since 15 February. The most commonly reported symptoms were diarrhoea (81.2%), abdominal pain (79.7%), vomiting (68.8%), fatigue (52.4%), myalgia (44.4%), nausea (35.9%), fever (29.7%), shivering (26.6%) and headache (6.7%). Thirty-four (53.1%) of them were primary cases and 30 were secondary cases. The distribution of cases by date of symptoms onset is presented in Figure 1.

### Analytical epidemiology

Results of the univariate analysis are presented in table 1. The consumption of raw seafood that had been imported to the island from Eastern Macedonia and Thrace was found to be statistically significantly associated with gastroenteritis among primary cases, while the consumption of local sea food items, was not found to be a risk factor. After all imported seafood that were consumed raw had been categorised together, people who consumed at least one of these food items were 21.5 (95% C.I.: 8.9-51.8) times more likely to develop symptoms of gastroenteritis within three days compared to those who did not. Twenty-nine (85.3%) of 34 primary cases and two (7.7%) of 26 secondary cases had consumed raw seafood on the 15th of February 2010.

### Laboratory and environmental investigation

Four stool samples were tested for common enteropathogens and one was further tested for *Norovirus*. Results were negative. Seafood leftovers were not tested due to the limited public health capacity in the region, which did not allow the timely collection of samples.

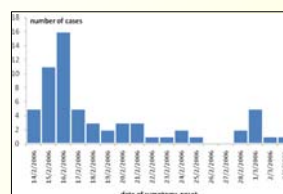
## Conclusions

Laboratory and environmental sampling and back-tracing were not optimal in this study because of geographical restrictions. This fact pinpoints the need for supporting mechanisms for the investigation of outbreaks that occur on small and remote islands of the country. However, there was strong epidemiological evidence that seafood items that had been imported to the island and were consumed around Ash Monday were the vehicle of this outbreak.

**Table 1:** Risk factors for the acquisition of gastroenteritis symptoms following Ash Monday 15 February 2010 in a Northern Aegean island, Greece, February 2010.

Risk factors	Exposed			Not exposed			RR	95% C.I.
	Cases	Total	AR%	Cases	Total	AR%		
<b>Sex (ref: male)</b>	17	86	19.8	17	94	18.1	1.09	0.6-2.0
<b>Age (ref: 65+ years)</b>								
0-4y				2	45	4.44	0	n/a
5-14y	3	18	16.7	2	45	4.44	3.75	0.68-20.6
15-64y	29	108	26.9	2	45	4.44	6.04	1.50-24.5
<b>Water consumption at home</b>								
Tap	27	145	18.6	7	36	19.4	0.96	0.45-2.02
Bottled	10	51	19.6	24	130	18.5	1.06	0.55-2.06
<b>Food consumption</b>								
Locally produced pasta*	17	52	32.7	16	124	12.9	2.53	1.39-4.62
Imported pasta	5	59	8.47	28	117	23.9	0.35	0.14-0.87
Cured meat products (i.e. ham)*	2	28	7.14	31	148	21.0	0.34	0.09-1.34
Bottled pasteurized milk*	10	72	13.9	22	103	21.4	0.65	0.33-1.29
Pork*	12	48	25.0	21	124	16.9	1.48	0.79-2.76
Locally produced cheese	11	50	22.0	22	128	17.2	1.28	0.67-2.44
Imported cheese*	16	93	17.2	17	85	20.0	0.86	0.46-1.59
Veal*	5	27	18.5	28	145	19.3	0.96	0.41-2.26
Egg	14	73	19.2	19	103	18.5	1.04	0.56-1.94
Chicken	10	53	18.9	23	120	19.2	0.98	0.50-1.92
Rice*	1	8	12.5	32	168	19.1	0.66	0.10-4.21
Lamb	8	43	18.6	25	132	18.9	0.98	0.48-2.01
Cucumber*	1	10	10.0	32	166	19.3	0.52	0.08-3.42
Tomato*	6	29	20.7	27	147	18.4	1.13	0.51-2.48
Cabbage*	12	66	18.2	21	110	19.1	0.95	0.50-1.81
Fruits*	14	66	21.2	19	110	17.3	1.23	0.66-2.28
Sweets*	2	30	6.67	31	146	21.2	0.31	0.08-1.24
Fish	5	46	10.9	28	130	21.5	0.50	0.21-1.23
Tahini halva*	18	74	24.3	15	104	14.4	1.69	0.91-3.13
Fish roe*	24	106	22.6	9	72	12.5	1.81	0.89-3.67
Filled vineyard leaves	1	6	16.7	32	172	18.6	0.90	0.15-5.51
Legumes* (lentiles, chickpeas, dry beans)	2	27	7.41	31	151	20.5	0.36	0.09-1.42
<b>Seafood</b>								
Raw smooth Venus clams*	23	31	74.2	11	148	7.43	9.98	5.45-18.3
Cooked smooth Venus clams	0	0	n/a	33	178	18.5	n/a	n/a
Raw oysters*	17	23	73.9	15	154	9.74	7.59	4.43-13.0
Cooked oysters*	0	1	0	32	176	18.2	0	n/a
Raw scallops*	17	21	81.0	16	157	10.2	7.94	4.48-13.2
Cooked scallops*	0	0	n/a	33	178	18.5	n/a	n/a
Raw clams*	14	19	73.7	19	159	12.0	6.17	3.74-10.2
Cooked clams*	0	1	0	32	176	18.2	0	n/a
Cooked mussels*	6	7	85.7	27	171	15.8	5.43	3.43-8.60
Sea squirts*	1	1	100	32	177	18.1	5.53	4.04-7.57
Sea urchins	24	108	22.2	9	70	12.9	1.73	0.85-3.50
Limpets	9	34	26.5	24	144	16.7	1.59	0.81-3.10
Squid	4	58	6.90	29	120	24.2	0.29	0.11-0.77
Octopus	3	36	8.33	30	142	21.1	0.39	0.13-1.22
Cuttlefish*	0	8	0	33	170	19.4	0	n/a
Loabster*	0	1	0	33	177	18.6	0	n/a
Shrimps*	2	13	15.4	31	156	18.8	0.82	0.22-3.05
Crawfish*	0	0	n/a	33	178	18.5	n/a	n/a
Crab	0	0	n/a	33	178	18.5	n/a	n/a
Sea anemone (fried)	1	12	8.3	32	166	19.3	0.43	0.06-2.90
<b>Any raw imported seafood*</b>	<b>29</b>	<b>38</b>	<b>76.3</b>	<b>5</b>	<b>141</b>	<b>3.55</b>	<b>21.5</b>	<b>8.94-51.8</b>

\*food items not produced on the island



**Figure 1:** Distribution of symptoms onset date among cases with gastroenteritis in a Northern Aegean island, Greece, February-March 2010 (n=62).

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