



## FINLAND (FIN)

Population: 5.2 million (1998)

Area: 338 145 km<sup>2</sup>



*The designations and the presentation of material on this map of the Member States of the WHO European Region (as at 31 July 1997) do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted lines represent approximate border lines for which there may not yet be full agreement.*

### 1. General information

Systematic collection of information about foodborne epidemics in Finland began in 1975. Collection of information takes place on the basis of the Communicable Disease Act (583/86) and the Communicable Diseases Decree (786/86). The National Board of Health Circular No. 1907 concerning the organization of communicable disease prevention and Directive No. 14/86 concerning the follow-up and reporting of food poisoning and foodborne infections are based on the above legislation.

A new act, the Health Protection Act 763/1994, including collection of information about foodborne outbreaks entered into force in Finland in 1995. The old system was used until end of 1996. In 1997 the notification and reporting system was modified on the basis of the Health Protection Act (Figure FI 1).

Surveillance of foodborne infections and intoxications consists of two elements: the reporting of single cases of communicable diseases including foodborne diseases and the surveillance, investigation and reporting of epidemics (outbreaks).

Physicians have to notify all cases of communicable diseases to the National Public Health Institute (KTL). The data is recorded in the register of Infectious Diseases in Finland. Through this system, information is received on infectious gastroenteritis. Via the National Public Health Institute, data of confirmed single cases of *Salmonellae*, *Shigellae*, etc. are received.

The municipal local outbreak investigation groups are responsible for investigation of every suspected foodborne outbreak and report to the National Food Administration. Final reports

**WHO Surveillance Programme for Control of Foodborne Infections and Intoxications in Europe**  
**7th Report**

Country Reports: *FINLAND 1993 – 1998*

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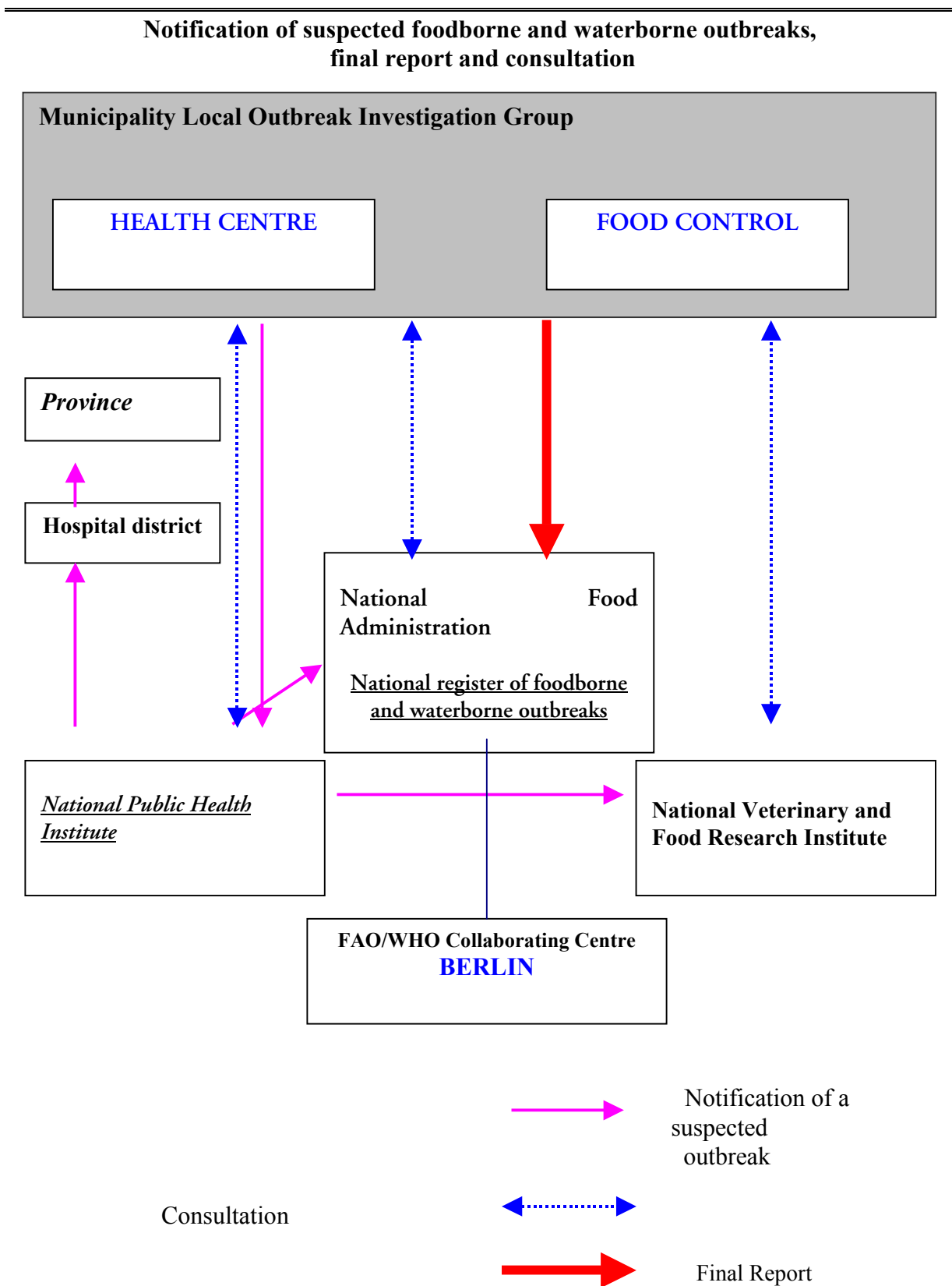
are sent immediately by the National Food Administration to the National Veterinary and Food Research Institute and to the National Public Health Institute.

On May 1, 1994 the communicable diseases notification procedure changed (Ministry of Social Affairs and health Regulation No. 112/02/93). The communicable diseases notification form to be used by physicians was revised and the contents of information to be obtained partly changed. Clinical microbiological laboratories have notified salmonella findings starting May 1, 1994 and other microbiological findings since September 1, 1994.

The criteria for reportable cases in the salmonellosis alia group changed. Previously, physicians notified all cases they detected. Now, infections are to be notified only in the following cases: children below seven years of age, persons working in professions with a risk of transmission, cases of apparently domestic infection, and cases in which a physician's request for the laboratory does not contain sufficient information for the notification by the laboratory. To ensure comparability of this statistics with those of previous years, cases in the salmonellosis alia group have been combined from notifications by both physicians and laboratories.

A simplified flow chart is given in Figure FI 1. Notification of suspected foodborne and waterborne outbreaks, final report and consultation

Figure FI 1



**2. Statutory notification**

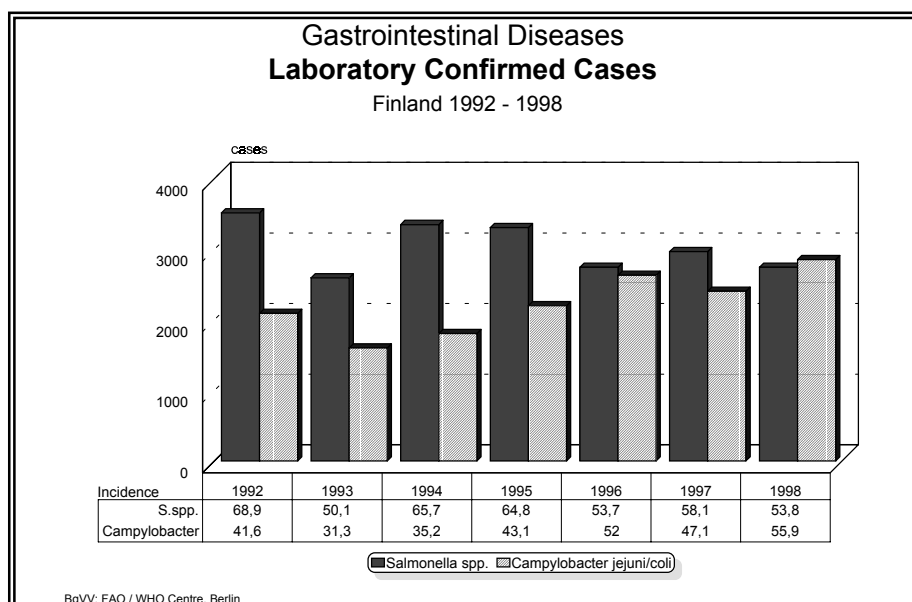
**2.1 Number of cases and incidence rate**

Table FI 1

**Number of laboratory-confirmed single cases and incidence rates  
of some gastrointestinal diseases  
FINLAND 1993 - 1998**

Agent	Year					
	1993	1994	1995	1996	1997	1998
<b><i>Salmonella</i> spp.</b>						
Number of cases	2595	3349	3306	2743	2964	2742
Incidence rate	50.1	65.7	64.8	53.7	58.1	53.8
<b><i>Shigella</i></b>						
Number of cases	90	83	70	100	103	88
Incidence rate	1.8	1.6	1.4	2.0	2.0	1.7
<b><i>Campylobacter jejuni/coli</i></b>						
Number of cases	1600	1804	2197	2629	2404	2851
Incidence rate	31.3	35.2	43.1	52.0	47.1	55.9
<b>EHEC</b>						
Number of cases				2	62	44
Incidence rate				0.03	1.22	0.9

Figure FI 2



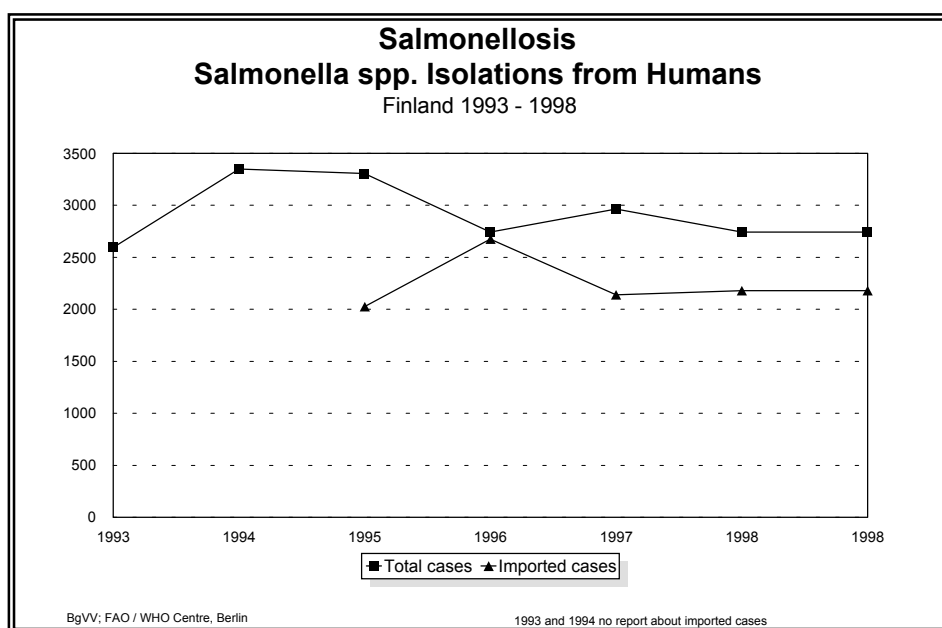
## 2.2 Imported cases of salmonellosis

Table FI 2

***Salmonella* spp. isolations from humans**  
**FINLAND 1993 - 1998**

Year	Total cases	Imported cases	%
1993	2595	-	~70-80
1994	3349	-	~70-80
1995	3306	2026	61
1996	2743	2675	97
1997	2964	2139	72
1998	2742	2179	80

Figure FI 3



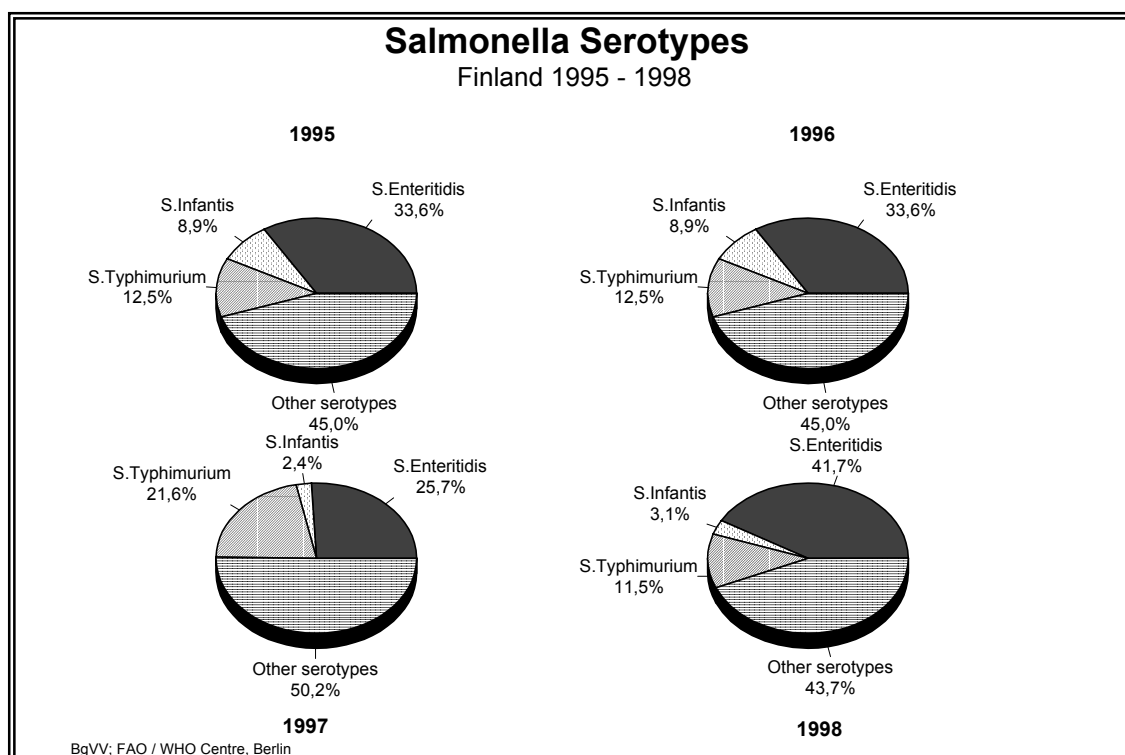
## 2.3 Frequency of various Salmonella serotypes

Table FI 3

**Salmonella Serotypes**  
**FINLAND 1993 - 1998**

	1993	1994	1995	1996	1997	1998
<i>S. Enteritidis</i>	1389	1168	1112	814	763	1144
<i>S. Infantis</i>	101	109	293	86	72	86
<i>S. Typhimurium</i>	372	466	413	349	640	315
Other serotypes	732	1606	1488	1494	1489	1197

Figure FI 4



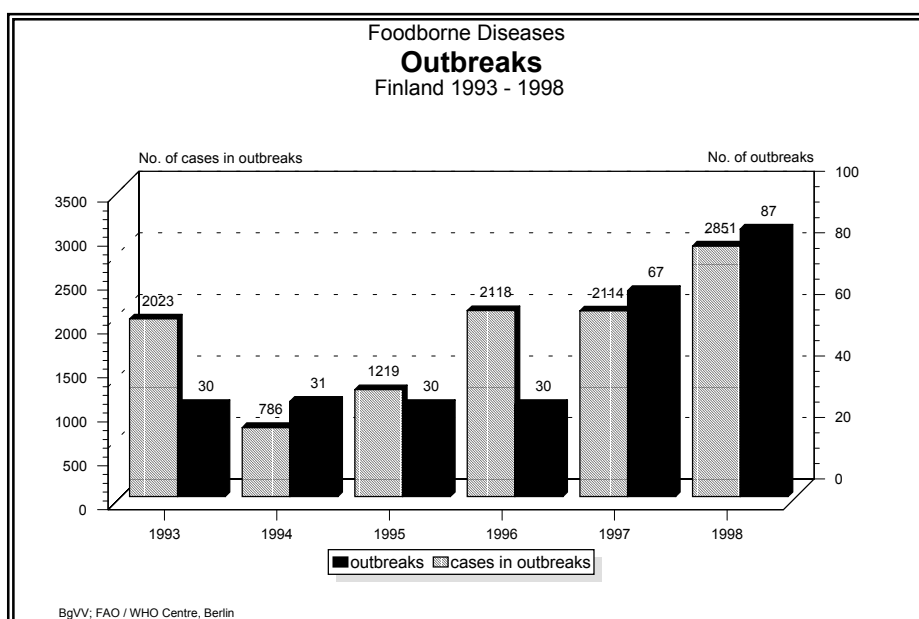
### 3. Epidemiologically investigated incidents

Table. FI 4

**Foodborne Disease Outbreaks**  
FINLAND 1993 - 1998

<u>Year</u>	<u>Outbreaks</u>	<u>Cases in outbreaks</u>
1993	30	2023
1994	31	786
1995	30	1219
1996	30	2118
1997	67	2114
1998	87	2851

Figure FI 5



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**7th Report**

Country Reports: *FINLAND 1993 – 1998*

**3.1 Causative agents**

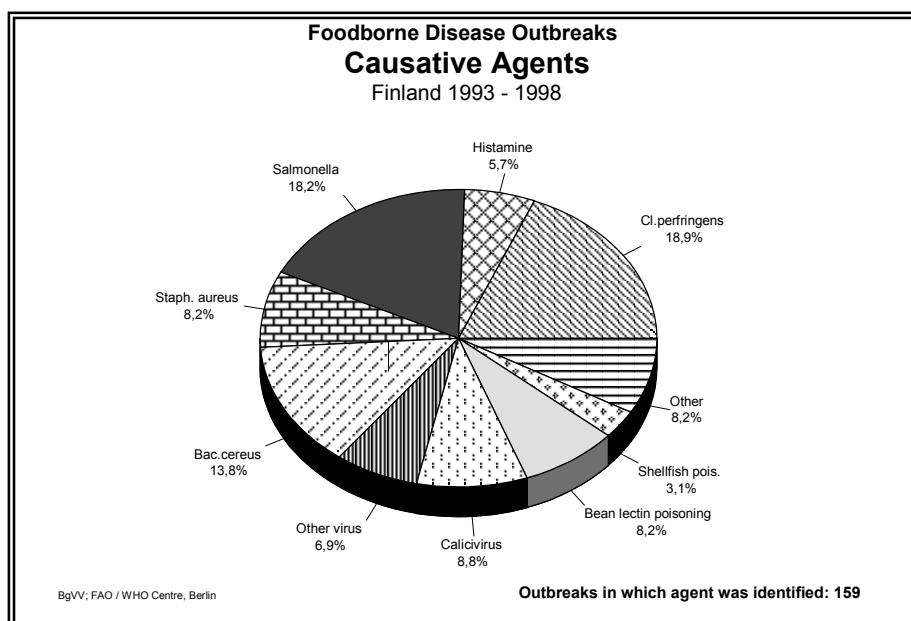
Table FI 5

**Foodborne disease outbreaks by causative agents**  
**FINLAND 1993 - 1998**

Causative agent	Year						Total 1993-1998	
	1993	1994	1995	1996	1997	1998	No.	%
<i>Bacillus cereus</i>	-	3	6	3	7	3	22	13.8
<i>Bacillus sp.</i>	-	-	-	-	1	-	1	0.6
<i>Clostridium perfringens</i>	4	5	4	2	8	7	30	18.9
<i>Campylobacter jejuni</i>	-	-	-	1	1	1	3	1.9
EHEC	-	-	-	-	-	1	1	0.6
<i>Listeria monocytogenes</i>	-	-	-	-	1	-	1	0.6
<i>Salmonella</i>	3	5	8	8	4	1	29	18.2
<i>Staphylococcus aureus</i>	-	5	1	1	4	2	13	8.2
<i>Yersinia pseudotuberc.</i>	-	0	-	1	2	2	5	3.1
<i>Vibrio cholerae</i>	-	-	-	-	-	1	1	0.6
Histamine	2	1	1	2	2	1	9	5.7
Bean lectin poisoning	-	-	-	-	2	11	13	8.2
Shellfish poisoning	-	-	-	-	1	4	5	3.1
Hepatitis A	-	-	-	-	1	1	2	1.3
Calicivirus	-	-	-	-	4	10	14	8.8
Virus	-	-	-	-	9	-	9	5.7
Other	-	-	-	-	1	-	1	0.6
<b>Total known</b>	<b>9</b>	<b>19</b>	<b>20</b>	<b>18</b>	<b>48</b>	<b>45</b>	<b>159</b>	<b>100.0</b>
Unknown	21	12	10	11	22	42	118	
<b>Total</b>	<b>30</b>	<b>31</b>	<b>30</b>	<b>29</b>	<b>70</b>	<b>87</b>	<b>277</b>	
Waterborne outbreaks	3	3	1	2	1	8	18	
<b>OVERALL TOTAL</b>	<b>33</b>	<b>34</b>	<b>31</b>	<b>31</b>	<b>71</b>	<b>95</b>	<b>295</b>	



Figure FI 6



### 3.1.1 Additional information for 1998

Table FI 6

#### Foodborne and waterborne outbreaks by causative agent FINLAND 1998

Causative agent	Number of outbreaks	%	Cases in outbreaks	%
<b>Foodborne</b>				
<i>Bacillus cereus</i>	3	3.1	29	0.3
<i>Campylobacter jejuni</i>	1	1.1	14	0.1
<i>Clostridium perfringens</i>	7	7.4	531	5.5
EHEC	1	1.1	5	0.1
<i>Salmonella</i> Typhimurium <sup>a</sup>	1	1.1	32	0.3
<i>Staphylococcus aureus</i>	2	0.0	60	0.6
<i>Vibrio cholerae</i>	1	2.0	25	0.3
<i>Yersinia pseudotuberculosis</i>	2	1.1	1	0.0
Hepatitis A virus	1	2.0	150	1.6
Calici virus	10	1.1	3	0.0
Histamine	1	10.5	772	8.0
Bean lectine	11	1.1	11	0.1
Shellfish poisoning	4	11.6	224	2.3
Unknown	42	4.2	95	1.0
<b>Subtotal</b>	<b>87</b>	<b>91.6</b>	<b>2 851</b>	<b>29.5</b>
<b>Waterborne</b>				
<i>Campylobacter jejuni</i>	1	1.1	2 200	22.8
<i>Campylobacter</i> sp.	1	1.1	12	0.1
Calici virus	4	4.2	4 553	47.1
Fecal contamination	2	2.0	44	0.5
<b>Subtotal</b>	<b>8</b>	<b>8.4</b>	<b>6 809</b>	<b>70.5</b>
<b>All outbreaks</b>	<b>95</b>	<b>100.0</b>	<b>9 660</b>	<b>100.0</b>

<sup>a</sup> Outbreak is reported mainly in 1997 outbreaks

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**7th Report**

Country Reports: *FINLAND 1993 – 1998*

**3.2 Incriminated foods**

Table FI 7

**Foodborne disease outbreaks by implicated foods and causative agents**  
**FINLAND 1993 - 1998**

	<i>B. cereus</i>	<i>Cl. perfr.</i>	<i>Biogenic amines</i>	<i>Salmonella</i>	<i>Staph. aureus</i>	<i>Virus</i>	<i>Str. pyogenes</i>	<i>Yersinia</i>	<i>Na-glutamate</i>	<i>Campylobact.</i>	<i>Other</i>	unknown	Total 93-98
<b>Meat and meat products</b>													
Meat pot	2	8	-	-	1	-	-	-	-	-	-	7	18
Boiled tongue	-	1	-	-	-	-	-	-	-	-	-	-	1
Roasted ham	-	1	-	-	-	-	-	-	-	-	-	-	1
Liver pot	-	-	-	-	-	-	-	-	-	-	-	1	1
Roasted broiler chicken	-	-	-	-	-	-	-	-	-	-	-	1	1
Ham	-	-	-	1	1	1	-	-	-	-	-	4	7
Steak	1	1	-	-	-	-	-	-	-	-	-	-	2
Meat balls	4	1	-	-	-	-	-	-	-	-	-	1	6
Marinated poultry meat	-	-	-	-	1	-	-	-	-	-	-	1	2
Poultry meat sauce	-	1	-	-	1	-	-	-	-	-	-	-	2
Minced meat sauce	-	1	-	-	-	-	-	-	-	-	-	1	2
Poultry meat pot	-	1	-	-	-	-	-	-	-	-	-	1	2
Minced meat beef	1	-	-	-	1	-	-	-	-	-	-	2	4
Hamburger	-	-	-	-	-	-	-	-	-	-	-	2	2
Turkey	1	-	-	-	-	-	-	-	-	-	-	-	1
Poultry	1	2	-	1	-	1	-	1	1	2	-	2	11
Beef tongue	-	-	-	-	-	-	-	-	-	-	-	1	1
Salami	-	-	1	1	-	-	-	-	-	-	-	-	2
Meat soup	-	1	-	-	-	-	-	-	-	-	-	-	1
Chicken soup	-	3	-	-	-	-	-	-	-	-	-	-	3
<b>TOTAL</b>	<b>10</b>	<b>21</b>	<b>1</b>	<b>3</b>	<b>5</b>	<b>2</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>24</b>	<b>70</b>
<b>Milk and milk products</b>													
Cheese	-	-	2	-	-	-	-	-	-	-	-	-	2
Cheese soup	1	-	-	-	-	-	-	-	-	-	-	1	2
Fresh cheese	-	-	-	-	1	-	-	-	-	-	-	-	1
Unpasteurized milk	-	-	-	2	-	-	-	-	-	-	-	-	2
Soft ice cream	-	-	-	-	-	-	-	-	-	-	-	1	1
Vanilin sauce	1	-	-	-	-	-	-	-	-	-	-	1	2
<b>TOTAL</b>	<b>2</b>	<b>0</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>10</b>

**WHO Surveillance Programme for Control of Foodborne Infections and Intoxications in Europe**  
**7th Report**

Country Reports: *FINLAND 1993 – 1998*

	<i>B.cereus</i>	<i>Cl. perfr.</i>	<i>Biogenic amines</i>	<i>Salmonella</i>	<i>Staph. aureus</i>	<i>Virus</i>	<i>Str. pyogenes</i>	<i>Yersinia</i>	<i>Na glutamate</i>	<i>Campylobact.</i>	<i>Other</i>	<i>Unknown</i>	<i>Total 93-98</i>
<b>Eggs and egg products</b>													
Eggs	-	-	-	2	-	-	-	-	-	-	-	-	2
Egg butter	-	-	-	-	-	-	1	-	-	-	-	-	1
	<b>0</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>3</b>
<b>Fish and fish products</b>													
Canned tuna fish	-	-	4	-	-	-	-	-	-	-	-	4	8
Fried salmon	-	-	-	-	-	-	-	-	-	-	-	2	2
Tuna fish salad	-	-	1	-	-	-	-	-	-	-	-	-	1
Baked fish pastry	-	1	-	-	1	-	-	-	-	-	-	-	2
Fish pie	-	-	-	-	-	-	-	-	-	-	-	1	1
Fish soup	-	2	-	-	-	-	-	-	-	-	-	2	4
Smoked salmon	-	1	-	-	-	1	-	-	-	-	0	-	2
Smoked trout	-	-	-	-	0	-	-	-	-	-	1	-	1
Smoked fish	1	-	-	-	3	-	-	-	-	-	-	-	4
Oysters	-	-	-	-	-	1	-	-	-	-	-	-	1
Roe	1	-	-	-	-	-	-	-	-	-	-	-	1
Flounder	-	1	-	-	-	-	-	-	-	-	-	-	1
Shellfish	-	-	-	-	-	2	-	-	-	-	6	0	8
<b>TOTAL</b>	<b>2</b>	<b>5</b>	<b>5</b>	<b>0</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>7</b>	<b>9</b>	<b>36</b>
<b>Cereals and cereal products</b>													
Porridge	-	-	-	-	-	-	-	-	-	-	-	1	1
Meat pastry	-	-	-	-	1	-	-	-	-	-	-	1	2
Chocolate pudding	1	1	-	-	-	-	-	-	-	-	-	-	2
Cake with cream fill	-	-	-	1	-	-	-	-	-	-	-	3	4
Pastry with egg butter	-	-	-	-	1	-	-	-	-	-	-	-	1
Sandwich	1	-	-	-	-	-	-	-	-	-	-	2	3
Smorgesbroad	-	-	-	-	-	-	-	-	-	-	-	1	1
Berry pudding	-	-	-	-	-	3	-	-	-	-	0	1	4
Croissant	-	-	-	-	-	-	-	-	-	-	-	1	1
<b>TOTAL</b>	<b>2</b>	<b>1</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>10</b>	<b>19</b>

(continued)

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**7th Report**

Country Reports: *FINLAND 1993 – 1998*

	<i>B. cereus</i>	<i>Cl. perfr.</i>	<i>Biogenic amines</i>	<i>Salmonella</i>	<i>Staph. aureus</i>	<i>Virus</i>	<i>Str. pyogenes</i>	<i>Yersinia</i>	<i>Na glutamate</i>	<i>Campylobact.</i>	<i>Other</i>	<i>unknown</i>	<i>Total 93-98</i>
<b>Vegetable and vegetable products</b>													
Mushrooms	-	-	-	-	-	-	-	-	-	-	-	1	1
Mixed salads	1	-	-	-	-	-	-	-	-	-	-	2	3
Salad sauce	-	-	-	-	-	-	-	-	-	-	-	2	2
Sprouts	-	-	-	3	-	-	-	-	-	-	-	-	3
Beans	2	-	-	-	-	-	-	-	-	-	13	3	18
Carrot	-	-	-	-	-	-	-	1	-	-	-	-	1
Tomatpesto	1	-	-	-	-	-	-	-	-	-	-	-	1
Chinese spring rolls	-	-	-	-	-	-	-	-	-	-	-	1	1
Vegetable salad	2	-	-	-	-	1	-	1	-	-	-	11	15
Mashed potatoes	-	-	-	-	-	-	-	-	-	-	-	1	1
Red beet	-	-	-	-	-	-	-	-	-	-	-	1	1
Berries	-	-	-	-	-	5	-	-	-	-	-	1	6
Onion	-	1	-	-	-	-	-	-	-	-	-	-	-
<b>TOTAL</b>	<b>6</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>0</b>	<b>6</b>	<b>0</b>	<b>2</b>	<b>0</b>	<b>0</b>	<b>13</b>	<b>23</b>	<b>54</b>
Composed food	-	1	1	1	-	4	-	1	-	-	-	11	19
Soft drinks	-	-	-	1	-	1	-	-	-	-	1	1	4
<b>TOTAL</b>	<b>0</b>	<b>1</b>	<b>1</b>	<b>2</b>	<b>0</b>	<b>5</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>12</b>	<b>23</b>
Unknown	-	2	-	16	1	3	-	-	-	1	1	30	53
<b>Food Total</b>	<b>22</b>	<b>30</b>	<b>9</b>	<b>29</b>	<b>13</b>	<b>25</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>3</b>	<b>23</b>	<b>116</b>	<b>277</b>
Water	-	-	-	-	-	7	-	-	-	2	-	9	18
<b>OVERALL TOTAL</b>	<b>22</b>	<b>30</b>	<b>9</b>	<b>29</b>	<b>13</b>	<b>32</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>5</b>	<b>23</b>	<b>125</b>	<b>295</b>

**WHO Surveillance Programme for Control of Foodborne Infections and Intoxications in Europe**  
**7th Report**

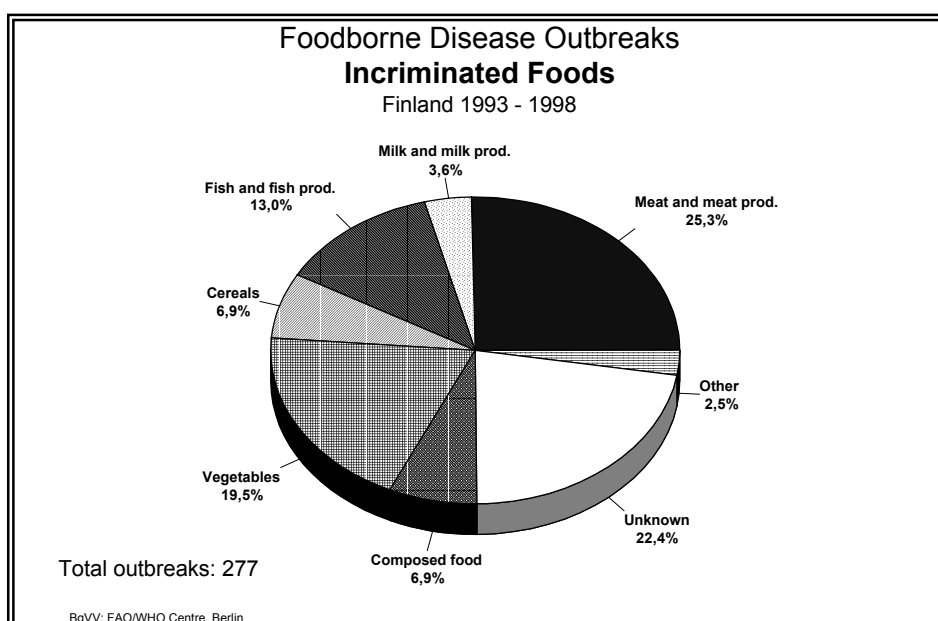
Country Reports: *FINLAND 1993 – 1998*

Table FI 8

**Foodborne disease outbreaks by food groups and causative agents**  
**FINLAND 1993 -1998**

	<i>B. cereus</i>	<i>Campylobacter</i>	<i>Cl. perfr.</i>	EHEC	Biogenic amines	<i>Salmonella</i>	<i>Staph. aureus</i>	Virus	Str. pyogenes	<i>Yersinia</i>	Na glutamate	<i>Vibrio cholerae</i>	Shellfish poisoning	Other	Unknown	<b>Total 1993-98</b>	
																No.	%
Meat and m.products	10	2	21	-	1	3	5	2	-	1	1	-	-	-	24	<b>70</b>	<b>25.3</b>
Milk and m.products	2	-	-	-	2	2	1	-	-	-	-	-	-	-	3	<b>10</b>	<b>3.6</b>
Eggs and eggprod.	-	-	-	-	-	2	-	-	1	-	-	-	-	-	-	<b>3</b>	<b>1.1</b>
Fish and f.products	2	-	5	-	5	-	4	4	-	-	-	1	5	1	9	<b>36</b>	<b>13.0</b>
Cereals and c.products	2	-	1	-	-	1	2	3	-	-	-	-	-	-	10	<b>19</b>	<b>6.9</b>
Vegetables and v.prod.	6	-	1	-	-	3	-	6	-	2	-	-	-	13	23	<b>54</b>	<b>19.5</b>
Composed food	-	-	1	-	1	1	-	4	-	1	-	-	-	-	11	<b>19</b>	<b>6.9</b>
Softdrinks	-	-	-	-	-	1	-	1	-	-	-	-	-	1	1	<b>4</b>	<b>1.4</b>
<b>Total known</b>	<b>22</b>	<b>2</b>	<b>29</b>	<b>0</b>	<b>9</b>	<b>13</b>	<b>12</b>	<b>20</b>	<b>1</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>15</b>	<b>81</b>	<b>215</b>	<b>77.6</b>
Unknown	-	1	1	1	-	16	1	5	-	1	-	-	-	3	33	<b>62</b>	<b>22.4</b>
<b>Total</b>	<b>22</b>	<b>3</b>	<b>30</b>	<b>1</b>	<b>9</b>	<b>29</b>	<b>13</b>	<b>25</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>18</b>	<b>114</b>	<b>277</b>	<b>100</b>
Water	-	2	-	-	-	-	-	7	-	-	-	-	-	-	9	<b>18</b>	
<b>Overall Total</b>	<b>22</b>	<b>5</b>	<b>30</b>	<b>1</b>	<b>9</b>	<b>29</b>	<b>14</b>	<b>33</b>	<b>1</b>	<b>5</b>	<b>1</b>	<b>1</b>	<b>5</b>	<b>16</b>	<b>123</b>	<b>295</b>	

Figure FI 7



### 3.3 Place where food was eaten

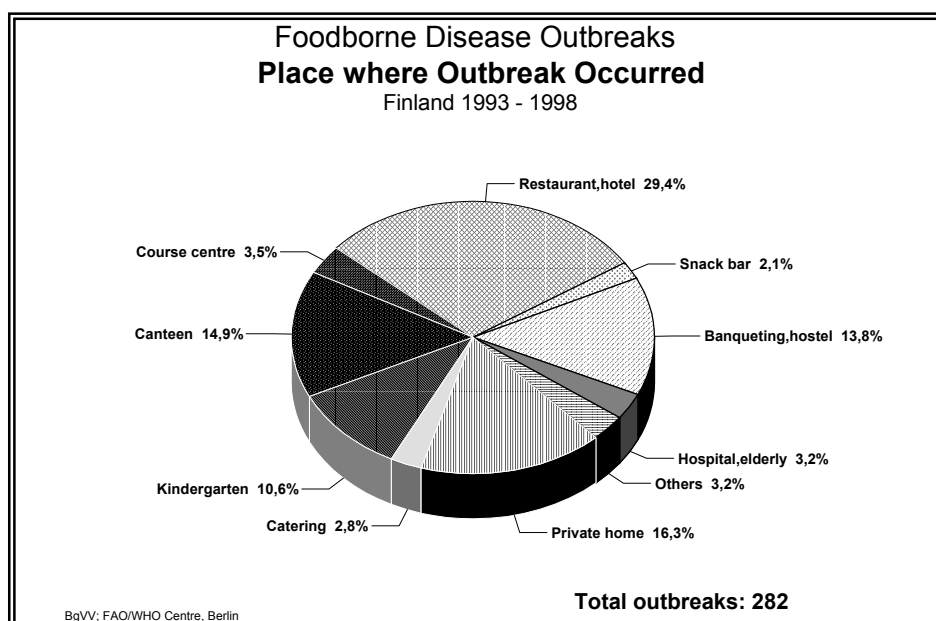
Table FI 9

**Foodborne disease outbreaks by place where food was eaten  
FINLAND 1993 - 1998**

Place	1993	1994	1995	1996	1997	1998	1993-1998	
							No.	%
Restaurant, hotel, café	11	7	9	8	17	31	83	29.4
Course centre, tourist hotel	-	1	-	-	8	1	10	3.5
Holiday/army camp	-	-	1	-	-	1	2	0.7
Snack bar, open air catering	-	2	1	3	-	-	6	2.1
Kindergarten, school	1	2	4	2	8	13	30	10.6
Canteen in industrial establishment	4	6	5	4	6	17	42	14.9
Hospital, home for elderly	1	3	1	-	-	4	9	3.2
Catering	-	-	-	3	5	-	8	2.8
Banqueting, hostel	4	1	5	5	13	11	39	13.8
Private home	8	10	4	4	7	13	46	16.3
Various places, unknown	1	-	-	-	3	1	5	1.8
Airborne spread	-	2	-	-	-	-	2	0.7
<b>TOTAL</b>	<b>30</b>	<b>34</b>	<b>30</b>	<b>29</b>	<b>67</b>	<b>92</b>	<b>282</b>	<b>100.0</b>

\*In some outbreaks there were several types of places where food was eaten

Figure FI 8



### 3.3.1 Additional information for 1998

Table FI 10

Foodborne outbreaks by place of consumption and causative agent\*\*  
FINLAND 1998

Causative agent	Place of consumption										Total
	Canteen	Restaurant, hotel	Camping centre	School	Kindergarten	Hospital, old-age home	Garrison	Means of traffic	Mass events	Home	
<i>Bacillus cereus</i>	-	1	-	-	-	-	-	-	1	1	3
<i>Clostridium perfringens</i> *	1	1	-	-	-	-	-	-	3	3	8
<i>Salmonella</i> Typhimurium	1	-	-	-	-	-	-	-	-	1	2
<i>EHEC</i>	-	-	-	1	-	-	-	-	-	-	1
<i>Staphylococcus aureus</i>	-	-	-	-	-	-	-	-	-	1	1
<i>Vibrio cholerae</i>	-	-	-	-	-	-	-	-	-	1	1
<i>Yersinia pseudotuberculosis</i> *	2	-	-	2	-	-	-	-	-	-	4
Hepatitis A virus	-	-	-	-	-	1	-	-	-	-	1
<i>Calici virus</i> *	2	5	-	-	1	-	-	3	-	-	11
Histamine	-	-	-	1	-	-	-	-	-	-	1
Bean lectine	7	2	-	1	-	1	-	-	-	-	11
Shellfish poisoning*	-	4	-	-	-	-	-	-	-	1	5
Unknown	4	18	1	5	1	2	1	1	4	5	42
<b>Total</b>	<b>17</b>	<b>31</b>	<b>1</b>	<b>10</b>	<b>2</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>11</b>	<b>13</b>	<b>91</b>
<b>%</b>	<b>18.7</b>	<b>34.1</b>	<b>1.1</b>	<b>11.0</b>	<b>2.2</b>	<b>4.4</b>	<b>1.1</b>	<b>1.1</b>	<b>12.1</b>	<b>14.3</b>	<b>100</b>

\* There are several places of consumption per outbreak

\*\* excl. waterborne

**WHO Surveillance Programme for Control of Foodborne Infections and Intoxications in Europe**  
**7th Report**

Country Reports: *FINLAND 1993 – 1998*

**3.4 Contributing factors**

Table FI 11

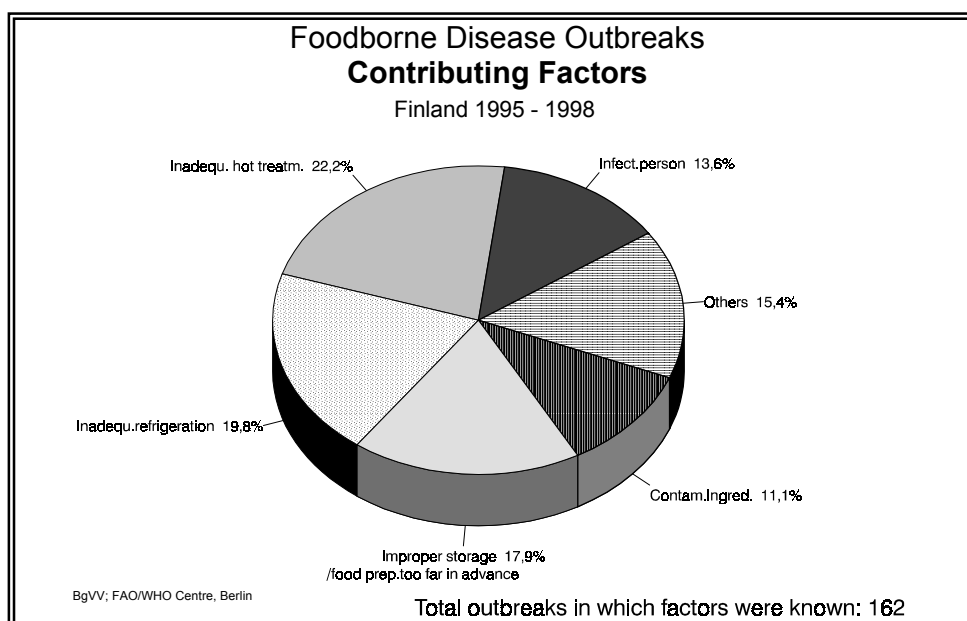
**Foodborne disease outbreaks Contributing factors**  
**FINLAND 1995 - 1998\***

Code	Factor	Year								1995-98	
		1995		1996		1997		1998		No.	%
		No.	%	No.	%	No.	%	No.	%	No.	%
03	Food prepared too far in advance	-	-	-	-	-	-	3	2.6	3	1.1
02	Inadequate hot holding	-	-	1	2.5	-	-	-	-	1	0.4
21	Improper storage	2	5.7	2	5.0	10	13.3	12	10.3	26	9.8
01	Inadequate refrigeration	6	17.1	3	7.5	12	16.0	11	9.5	32	12.0
05	Inadequate cooking/reheating	3	8.6	3	7.5	8	10.7	21	18.1	35	13.2
07	Using of contaminated ingredients	-	-	-	-	4	5.3	14	12.1	18	6.8
08	Infected person	7	20.0	8	20.0	-	-	7	6.0	22	8.3
09	Contaminated equipment	-	-	-	-	-	-	2	1.7	2	0.8
90	Other factors	-	-	4	10.0	8	10.7	11	9.5	23	8.6
	<b>Total outbreaks where factors were known</b>	<b>18</b>	<b>51.4</b>	<b>21</b>	<b>52.5</b>	<b>42</b>	<b>56.0</b>	<b>81</b>	<b>69.8</b>	<b>162</b>	<b>60.9</b>
99	<b>Total outbreaks where factors were not known</b>	<b>17</b>	<b>48.6</b>	<b>19</b>	<b>47.5</b>	<b>33</b>	<b>44.0</b>	<b>35</b>	<b>30.2</b>	<b>104</b>	<b>39.1</b>
	<b>TOTAL OUTBREAKS</b>	<b>35</b>	<b>100.0</b>	<b>40</b>	<b>100.0</b>	<b>75</b>	<b>100.0</b>	<b>116</b>	<b>100.0</b>	<b>266</b>	<b>100.0</b>

\* In some outbreaks there was more than one contributing factor



Figure FI 9



### 3.4.1 Additional information for 1998

Table FI 12

#### Foodborne outbreaks by contributing factor FINLAND 1998

Causative agent	Contributing Factor											Total	
	Contaminated raw material	Crosscontamination	Inadequate cooling	Inadequate heating	Inadequate sanitation	Inadequate facilities	Improper storage temperature	Improper temperature of transfer-	Too long storage time	Infected handler	Other		Unknown
<i>Bacillus cereus</i>	-	-	2	1	-	-	3	1	1	-	-	-	8
<i>Campylobacter jejuni</i>	1	1	-	-	-	-	-	-	-	-	-	-	2
<i>Clostridium perfringens</i>	-	-	5	4	-	2	4	1	-	-	1	-	17
EHEC	-	-	-	-	-	-	-	-	-	-	-	1	1
<i>Salmonella</i> Typhimurium	-	-	-	-	-	-	-	-	-	1	-	-	1
<i>Staphylococcus aureus</i>	-	-	-	-	-	-	1	-	-	1	-	1	3
<i>Vibrio cholerae</i>	1	-	-	1	-	-	-	-	-	-	-	-	2
<i>Yersinia pseudotuberculosis</i>	1	-	-	-	-	-	-	-	-	-	-	1	2
Hepatitis A virus	-	-	-	-	-	-	-	-	-	-	-	1	1
Calici virus	6	-	-	1	-	-	-	-	-	1	-	3	11
Histamine	1	-	-	-	-	-	-	-	-	-	-	-	1
Bean lectine	-	-	-	11	-	-	-	-	-	-	1	-	12
Shellfish poisoning	4	-	-	1	-	-	-	-	-	-	-	-	5
<b>Total known</b>	<b>14</b>	<b>1</b>	<b>7</b>	<b>19</b>	<b>0</b>	<b>2</b>	<b>8</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>2</b>	<b>7</b>	<b>66</b>
Unknown	-	1	4	2	2	3	4	-	2	4	-	29	51
<b>Total</b>	<b>14</b>	<b>2</b>	<b>11</b>	<b>21</b>	<b>2</b>	<b>5</b>	<b>12</b>	<b>2</b>	<b>3</b>	<b>7</b>	<b>2</b>	<b>36</b>	<b>117</b>
%	12.0	1.7	9.4	17.9	1.7	4.3	10.3	1.7	2.6	6.0	1.7	30.8	100

#### 4. Comments

In 1998, the municipal food control authorities notified 95 food poisoning outbreaks, of which 87 were associated with food and eight with drinking water. The data were recorded in the national food poisoning register kept by the National Food Administration. In 1997, twice the number of epidemics was reported, and in 1998 three times the number, compared to previous years throughout the 1990s. In 1998, a marked increase in the number of reported cases of people suffering from food poisoning also occurred. A total of 9660 cases were reported, two thirds of these (6809) being due to drinking water. Around one third of the cases (2851) were due to foodstuffs and one person died. The food poisoning notification and reporting system was revised in Finland in 1997. This has improved food poisoning reporting, which has in effect caused an increase in the number of outbreaks recorded.

Traditional causes of food poisoning, like *Staphylococcus aureus*, *Bacillus cereus* and *Clostridium perfringens* did not increase outbreaks. On the other hand, new consumption habits, like increased use of mussels, beans and foreign frozen berries, led to new epidemics. The latter comprised four calicivirus outbreaks spread by frozen berries, eleven outbreaks from beans, and four cases of shellfish poisoning associated with mussels. Calicivirus also caused two widespread water epidemics through drinking water supplied by water treatment plants. Campylobacter epidemics and an appreciable increase in human infections caused by Campylobacter indicated a significant risk. Campylobacter transmitted through drinking water caused a large epidemic at Haukipudas, as well as one small foodborne and the other small waterborne outbreak. In 1998, one Salmonella epidemic was reported to the food poisoning register. On the basis of different sources the occurrence of salmonella was very modest in Finland in 1998.

The most generally substantiated contributing factors in the handling of food were connected with temperature; these included inadequate heating, an improper storage temperature, inadequate cooling, and the improper temperature during transportation. Raw materials were suspected of being the cause of infection in 15 epidemics. However, in outbreaks traced to berries one cannot consider an infected raw material as a contributing factor in food preparation, the problem being most likely associated with the production and packaging conditions of the berries. The major water epidemics of 1998 indicate the presence of serious problems in drinking water treatment, to the investigation of which special attention needs to be paid.

An association between illness and food or water exposure was demonstrated in 62 (65%) of the epidemics. By contrast, there was no clearly demonstrable correlation in 33 (35%) epidemics which were reported to the food poisoning register. To improve the level of epidemic investigation and thereby to draw more reliable conclusions on the causes of food poisoning there is a need for further training.

*Source: Hatakka, M. and Wihlman, H. Foodborne and waterborne outbreaks in Finland in 1998. Helsinki 1999. National Food Administration / Research Notes 5/1999. 25 pp. + app.*

#### 5. Additional information

The Finnish National Public Health Institute publishes a bulletin which includes epidemiological data on foodborne diseases and can be found at <http://www.ktl.fi/ktlehti/>. For

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**7th Report**

Country Reports: *FINLAND 1993 – 1998*

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further reference on national and international data on foodborne diseases please visit the web page <http://www.who.it/docs/fdsaf/fddata.htm>.