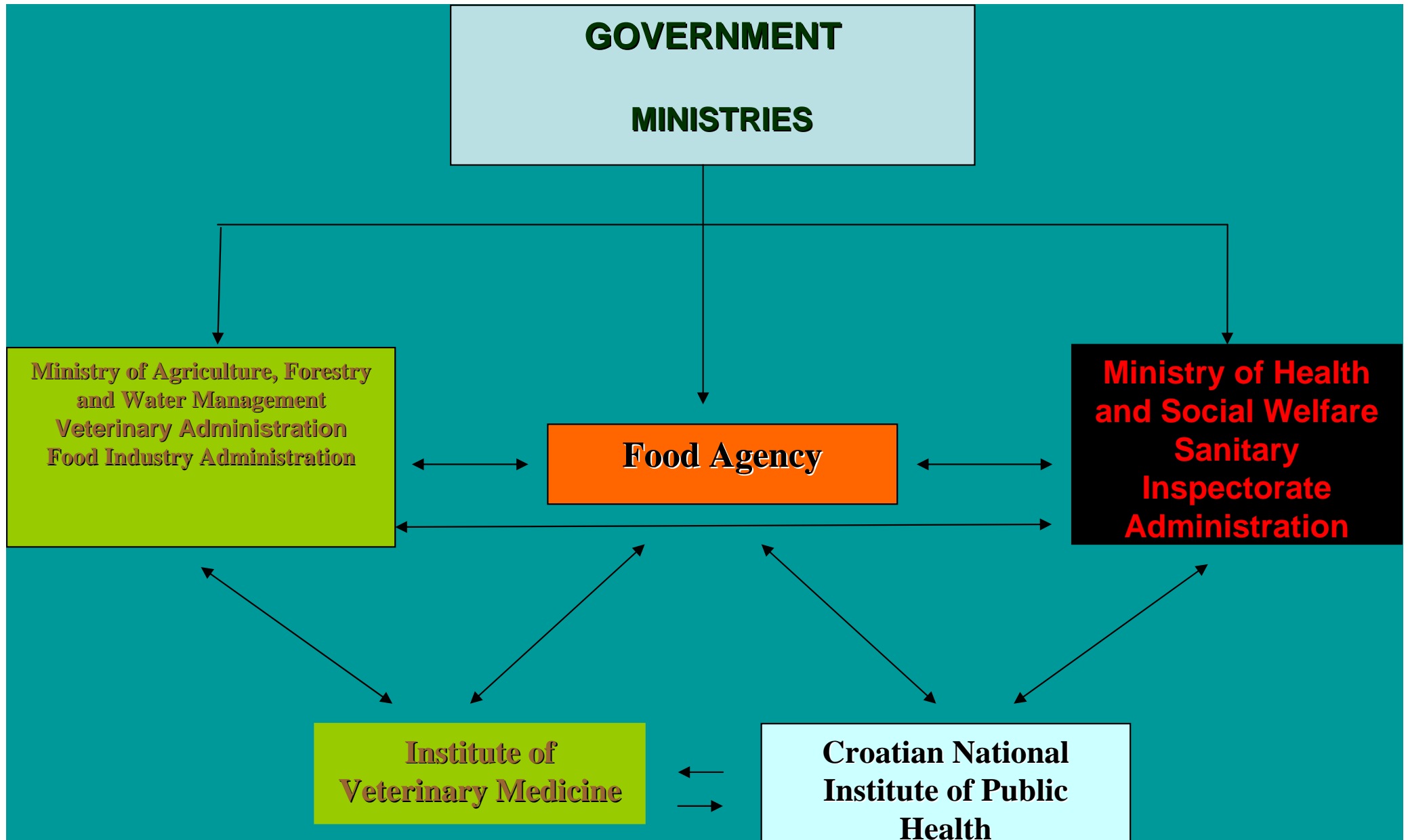


Foodborne diseases/outbreaks in Croatia



Krunoslav Capak, M.D.

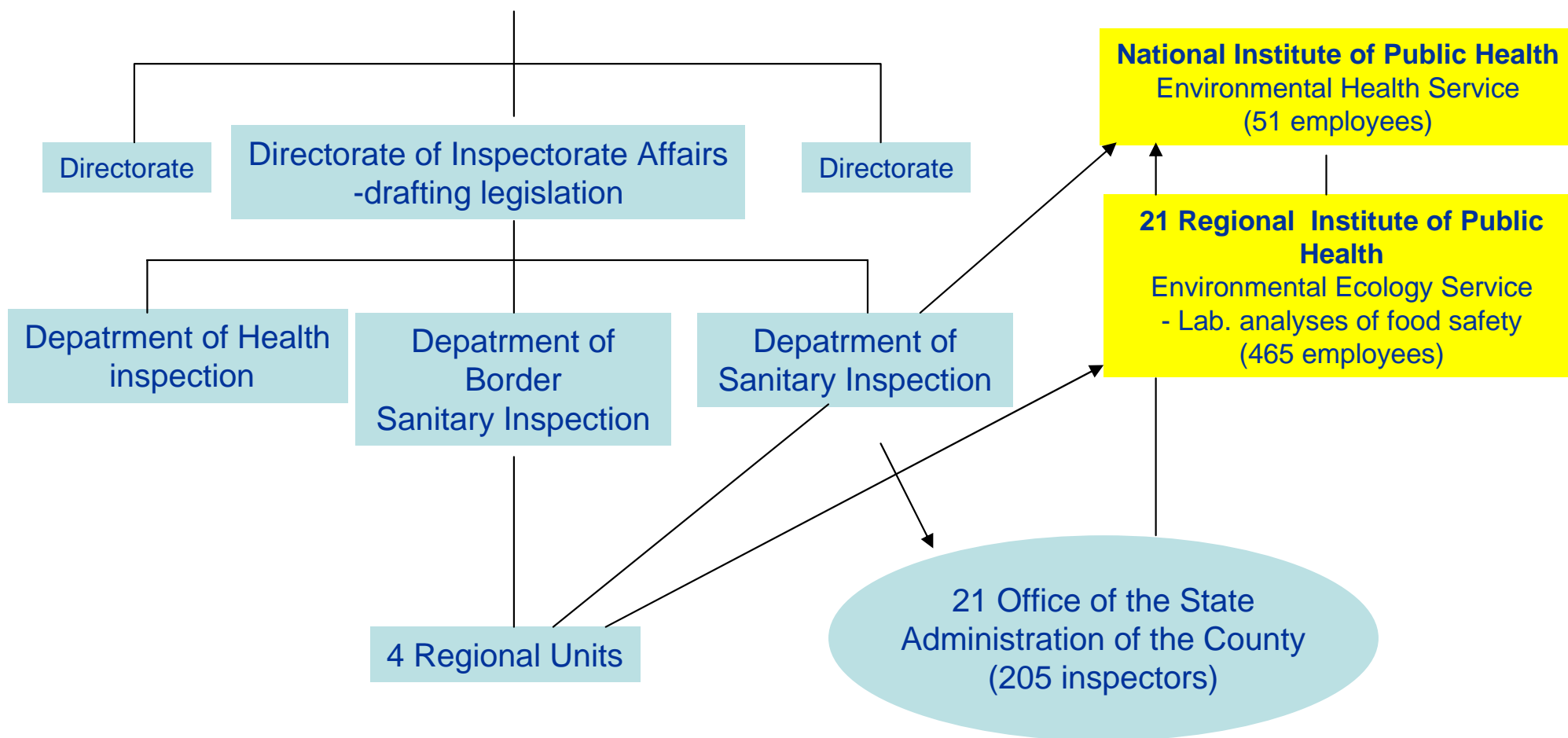
Organisation of the state administration for safety of foods



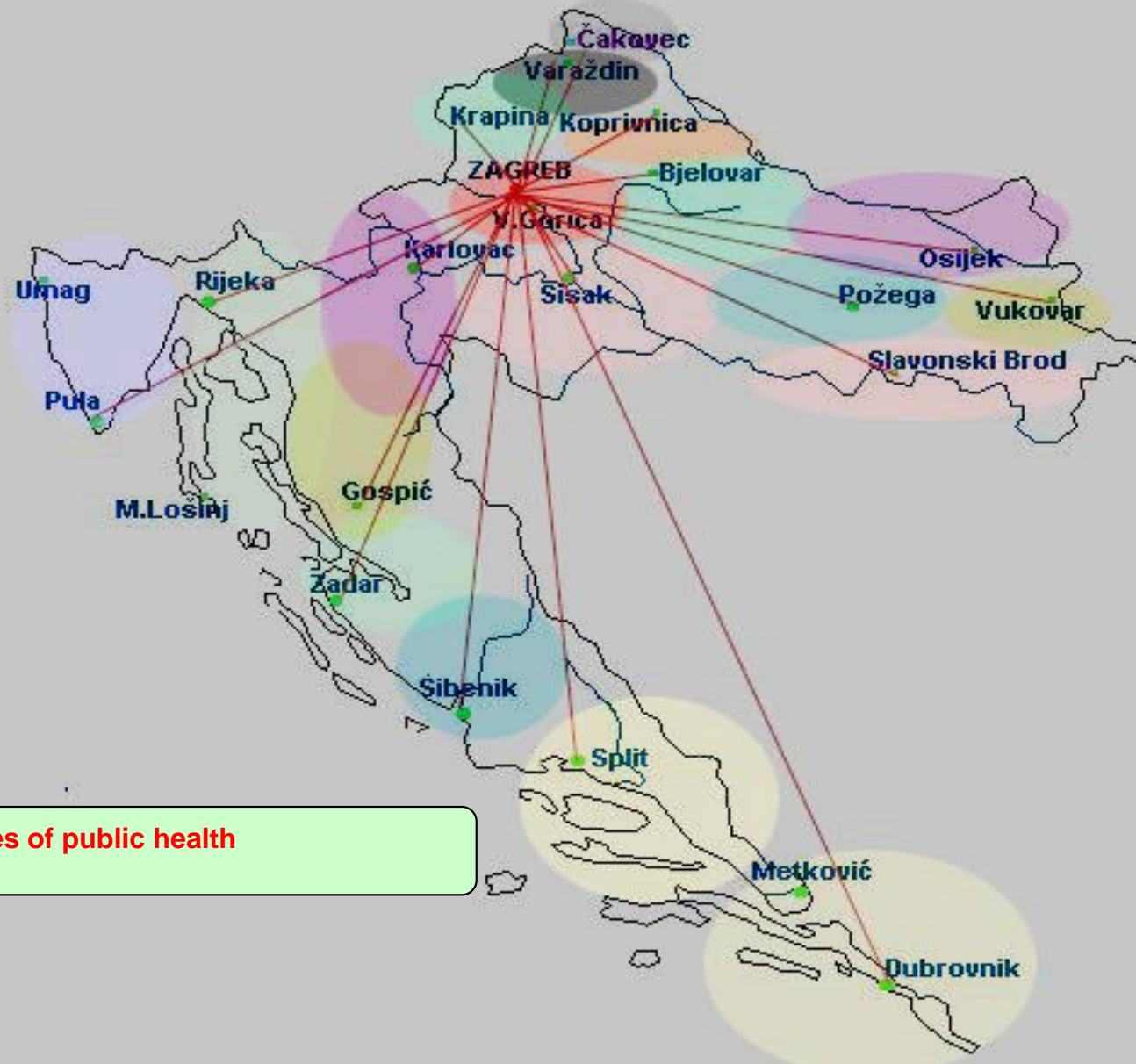
Structure of the MINISTRY OF HEALTH AND SOCIAL WELFARE

Relation with the County Sanitary Inspection and the Croatian National Public Health Institute and County Institutes

MINISTRY OF HEALTH AND SOCIAL WELFARE



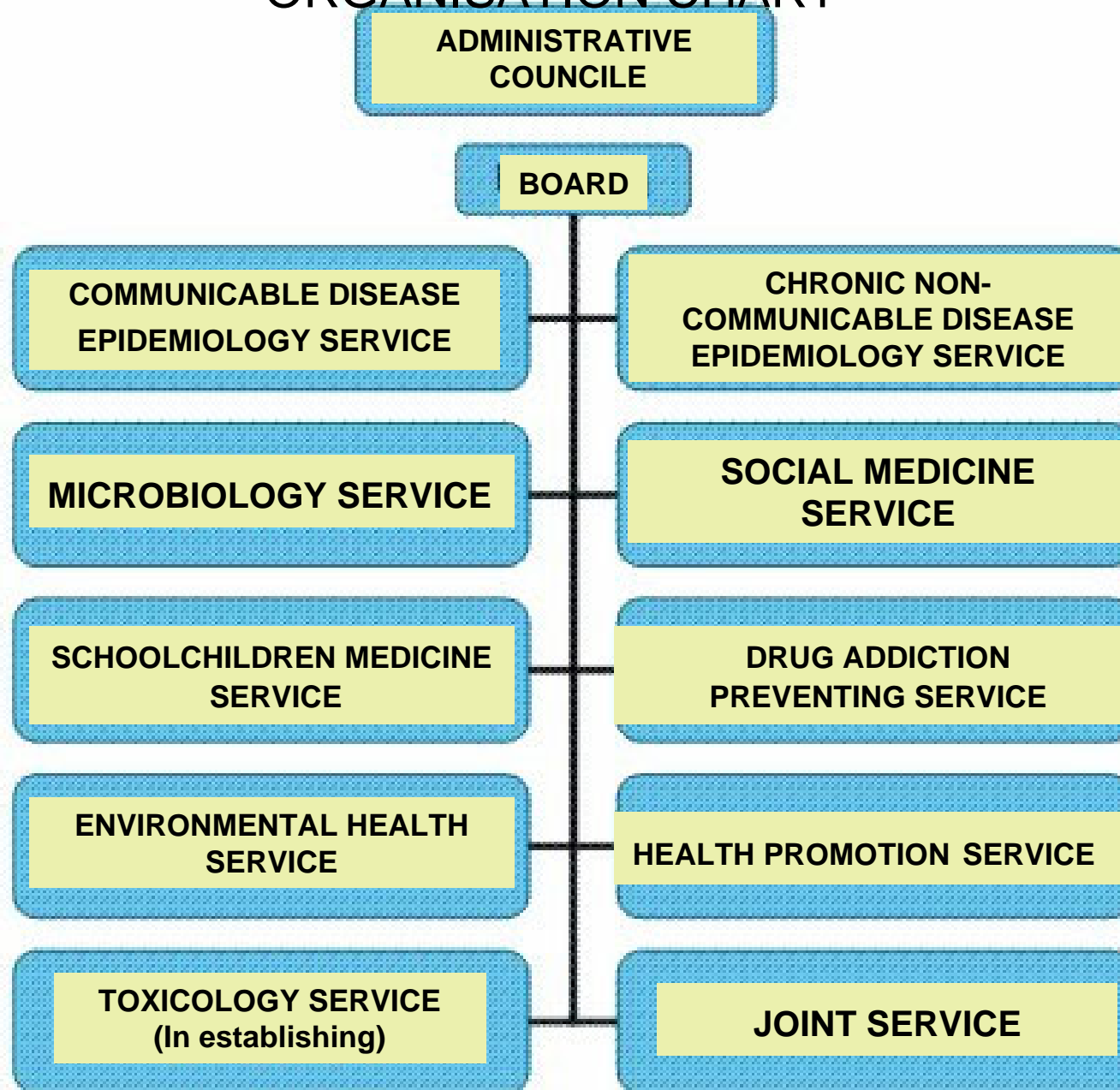
NETWORK OF PUBLIC HEALTH INSTITUTES

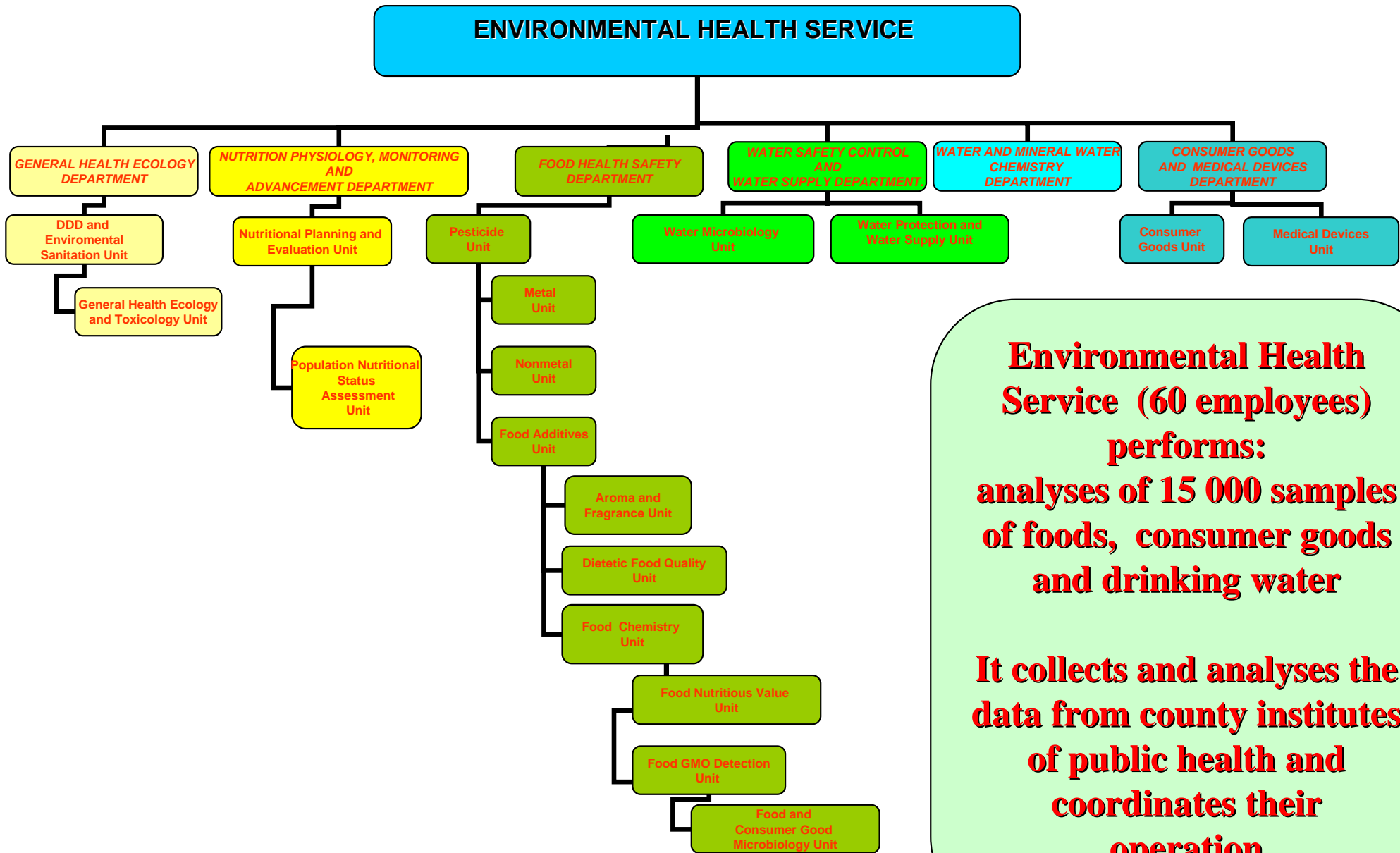


20 county institutes of public health

CROATIAN NATIONAL INSTITUTE OF PUBLIC HEALTH

ORGANISATION CHART





Environmental Health Service (60 employees) performs: analyses of 15 000 samples of foods, consumer goods and drinking water

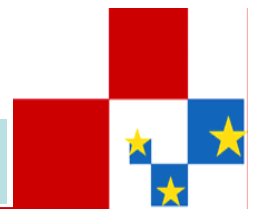
It collects and analyses the data from county institutes of public health and coordinates their operation

quarantine 1377

**CROATIA HAS A LONG TRADITION
OF COMMUNICABLE DISEASE
SURVEILLANCE AND
CONTROL**

DUBROVNIK

An aerial photograph of Dubrovnik, Croatia, showing the city's white stone walls and red-tiled roofs built on a cliffside overlooking the sea. The city is densely packed with buildings, and the sea is visible in the foreground. The text 'quarantine 1377' is in the top left, 'CROATIA HAS A LONG TRADITION OF COMMUNICABLE DISEASE SURVEILLANCE AND CONTROL' is in the middle left, and 'DUBROVNIK' is in the bottom right.



Long tradition of communicable disease surveillance

*systematically collected data (at first mortality, later morbidity) from the year **1874** (for instance: 10000 deaths from variola)

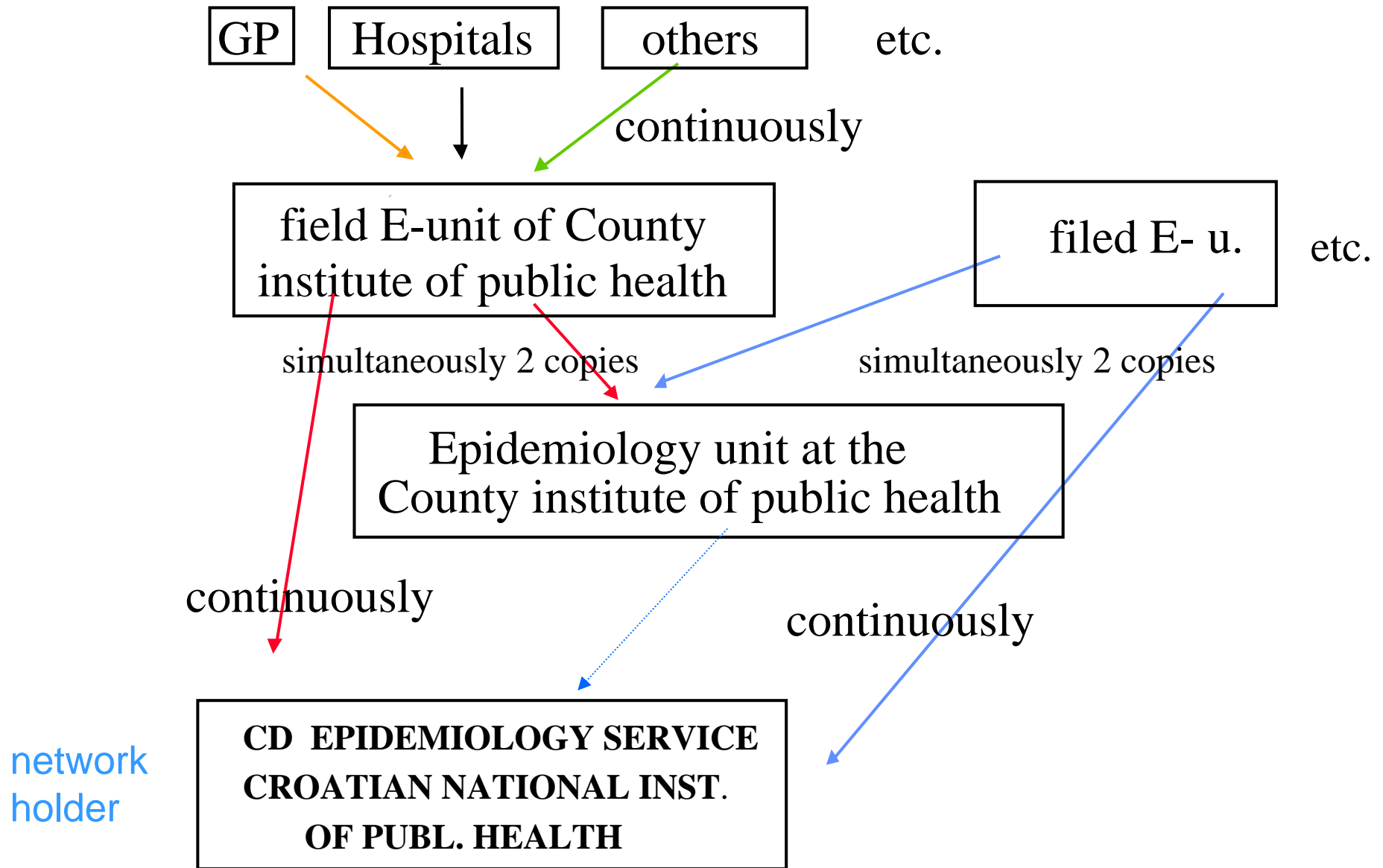
*since the twenties of the last century, basically the same system is functioning, i. e. over **80 years**:

within that:

cases of communicable disease should be as soon as possible, **notified** to health service and to health authorities, to be **monitored** periodically (daily, weekly, monthly, annually) on a defined territorial level (district, county, state) with **the main purpose**: to intervene, and stop further spread of the diseases

other purposes: evaluation of effects of measures and observing morbidity and mortality trends

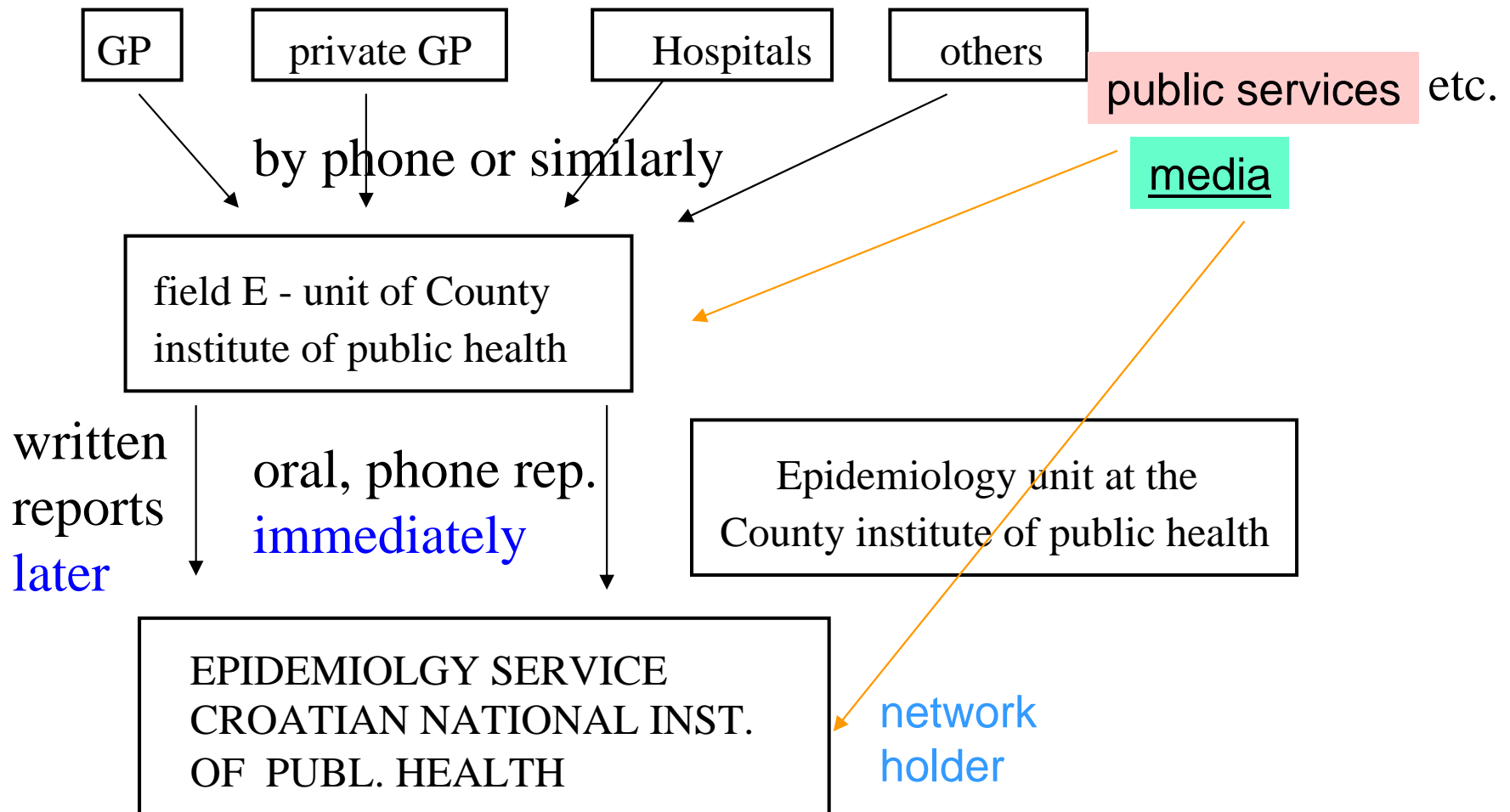
FLOW OF INDIVIDUAL CASE NOTIFICATIONS IN CROATIA



FEED BACK to county and field level: MONTHLY

FLOW OF OUTBREAK REPORTS IN CROATIA

Communicable diseases



FEED BACK to county and field level: **MONTHLY**

Also participating: governmental services: Ministry of health;
sanitary inspection



STATE STATISTICAL PROGRAM I – Food samples not in compliance on microbiological assay 1997 - 2005

Year	DOMESTIC PRODUCTION			IMPORT			GRAND TOTAL		
	Total	Unsafe	%	Total	Unsafe	%	Total	Unsafe	%
1997	33.624	3.113	9.26	12.402	314	2.53	46.026	3.427	7.44
1998	34.389	3.669	10.67	11.136	296	2.66	45.525	3.965	8.71
1999	35.405	2.830	7.99	11.417	186	1.63	46.822	3.260	6.96
2000	35.241	2.543	7.22	8.614	706	8.20	43.855	3.249	7.41
2001	39.453	3.501	8.87	10.936	884	8.08	50.389	4.385	8.70
2002	33.624	3.113	9.26	12.790	339	2.65	47.454	3.156	6.65
2003	37.656	3.558	9.45	10.265	290	2.83	47.921	3.848	8.03
2004	37.919	2.773	7.31	7.023	162	2.31	44.942	2.935	6.53
2005	34.353	2.610	7.60	7.515	59	0.79	41.868	2.669	6.37

source: State statistical programme data on food safety (Croatian National Institute of Public Health)

SSP II - Food samples not in compliance on chemical assay 1997 - 2005

Year	DOMESTIC PRODUCTION			IMPORT			GRAND TOTAL		
	Total	Unsafe	%	Total	Unsafe	%	Total	Unsafe	%
1997	12.382	755	6.10	16.206	645	4.00	28.588	1.400	4.90
1998	13.763	651	4.73	14.667	525	3.58	28.430	1.176	4.14
1999	11.636	512	4.40	14.351	501	3.49	25.987	1.013	3.90
2000	16.367	817	4.99	12.242	268	2.19	28.609	1.085	3.79
2001	14.668	1092	7.44	16.952	843	4.97	31.620	1.935	6.12
2002	13.802	779	5.64	17.745	998	5.62	31.547	1.777	5.63
2003	15.284	693	4.53	15.855	666	4.20	31.139	1.359	4.36
2004	16.147	761	4.71	9.846	220	2.23	25.993	891	3.77
2005	18.067	820	4.54	11.152	392	3.52	29.219	1.212	4.15

source: State statistical programme data on food safety (Croatian National Institute of Public Health)

SSP III – Sanitary Control of Drinking Water From Public Water Supply Water safety control findings Croatia 1997 – 2005.

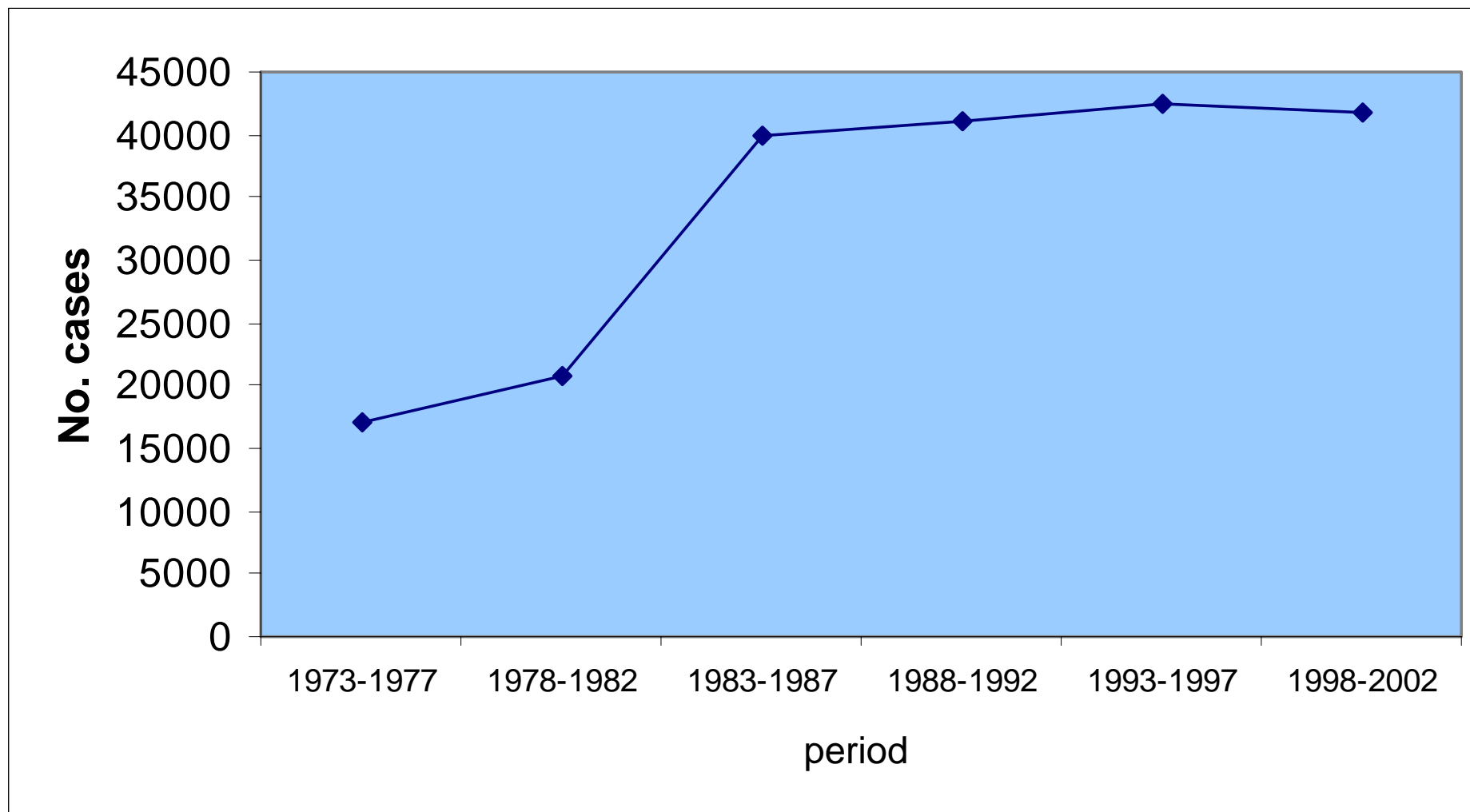
Years	CHEMICAL ANALYSIS			MICROBIOLOGICAL ASSAY		
	No. samples	Unsafe	%	No. samples	Unsafe	%
1997	22.511	1.987	8.8	24.007	2.166	9.0
1998	25.054	1.555	6.2	27.004	2.572	9.5
1999	24.048	1.515	6.2	24.951	2.447	9.8
2000	23.538	2.174	9.2	25.374	2.128	8.4
2001	23.287	1.669	7.2	25.371	2.113	8.3
2002	22.791	1.848	8.1	23.583	1.936	8.2
2003	25.010	1.536	6.1	25.239	1.935	7.7
2004	24.680	1.602	6.5	24.908	1.908	7.7
2005	25.361	1.502	5.9	26.345	1.463	5.6

source: State statistical programme data on food safety (Croatian National Institute of Public Health)

Food intoxication outbreaks and cases, 1997-2005

Year	N°outbreaks	N°cases in outbreaks	Food intoxication total	Cases of salmonellos
1993	56	2028	10982	7087
1994	67	1811	9048	4931
1995	47	1433	7727	3642
1996	47	928	6481	2899
1997	56	581	8241	4204
1998	65	1492	8320	4288
1999	66	1223	8244	4120
2000	79	1434	10112	5134
2001	101	1108	9947	5620
2002	96	1735	7150	6570
2003	71	1946	9812	5755
2004	79	1451	9075	4940
2005	100	1413	10432	5619

Food intoxication and intoxication trends in Croatia, by 5-year periods for 1973-2002

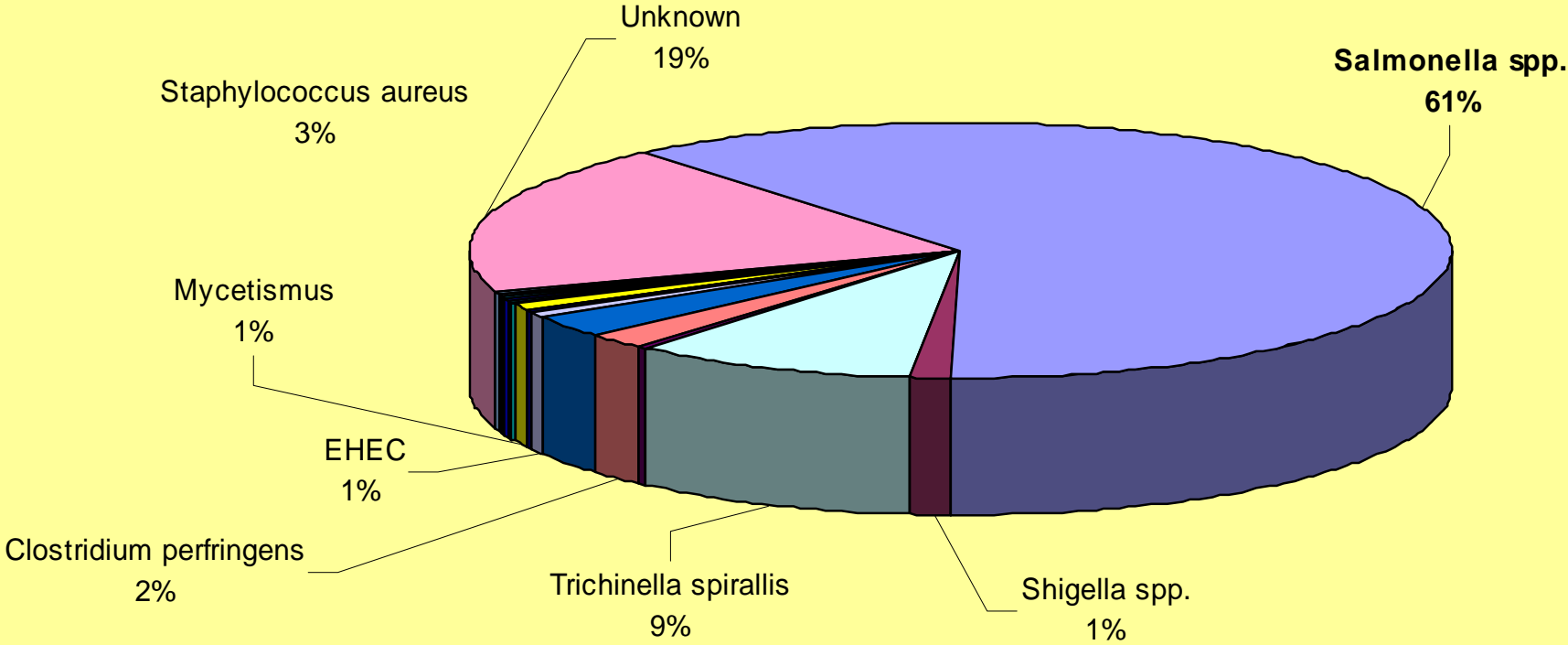


Food intoxication outbreaks by causative agent, 1998-2005

Year Agent	1998	1999	2000	2001	2002	2003	2004	2005
Salmonella	38	34	65	68	69	47	46	65
Trichinella	16	21	9	11	6	8	8	1
Staph. aureus		2	1	4	3	3	3	1
Shigella	1	1		2	1			
Cl. Perfringens	1	1			2	1	2	1
Cl. botulinum	2	1	1	2	2	1		
Bacillus cereus							2	
Mycetismus				6				
Camp. jejuni	1				1			1
E. coli								1
HAV		1	6			2	2	4
Histamine				2	1			
<u>Yersinia entercol.</u>					1			1
Adenovirus					1			1
Rota virus				1		2	3	3
Norwalk virus								2
Total known	59	61	82	96	87	64	66	81
Unknown	6	5	2	5	9	7	13	19
Total	65	66	84	101	96	71	79	100

source: State statistical programme data on food safety (Croatian National Institute of Public Health)

Cases of food intoxication in outbreaks by causative agent from 1995-2005



Cases associated with foodborne disease outbreaks by causative agents , 1999 - 2004

Causative agents	1999.	2000.	2001.	2002.	2003.	2004.
	No.	No.	No.	No.	No.	No.
Salmonella enteritidis	417	1176	714	925	759	673
Salmonella cholerae suis	0	3	0	0	0	0
Salmonella spp.	0	0	0	0	0	65
Salmonella typhimurium	3	33	51	0	56	0
Salmonella gr. B	0	0	3	7	8	0
Salmonella gr. C	40	3	2	0	0	0
Salmonella gr. D	0	6	0	0	0	0
Salmonella kottbye	0	0	6	0	0	0
Salmonella einsütel	33	0	0	0	0	0
Salmonella hanten IV	110	0	0	0	0	0
Salmonella stanleyville	11	0	0	0	0	0
TOTAL SALMONELLA	614	1221	776	932	823	738
Shigella sonnei	4	0	8	0	0	18
Shigella flexneri	0	0	0	12	0	0
Yersinia enterocolitika	0	0	0	28	0	0
Bacillus cereus	0	0	0	0	0	32
Trichinella spiralis	291	136	57	30	284	78
Clostridium botulinum	12	4	8	5	4	0
Clostridium perfringens	57	0	0	42	11	84
Staphylococcus aureus	30	12	22	159	51	34
EHEC	0	0	0	0	0	160
Campylobacter spp.	0	0	0	24	0	8
Mycetismus	0	0	87	0	0	0
Toxin ikre	0	0	4	0	0	0
Cigua toxin	0	0	6	20	0	0
Adeno virus	0	0	0	42	0	0
Rota virus	0	0	32	0	0	12
Norwalk virus	0	0	0	0	0	24
HAV	7	0	0	0	0	0
Calci virus	0	0	0	0	38	0
Total known	1015	1373	1005	1294	0	1188
Unknown	208	61	103	441	735	263
Total	1223	1434	1108	1735	1946	1451

source: State statistical programme data on food safety (Croatian National Institute of Public Health)

Foodborne disease outbreaks - spot 2000 - 2004

Place/Year	2000	2001	2002	2003	2004
Canteen	7	3	7	1	8
Restaurant, hotel	14	11	19	23	20
Retail store	0	0	0	0	2
Pastry shop	12	3	4	3	2
Private home	21	36	51	20	22
Ship	0	0	0	0	1
Church	0	0	0	0	1
Vacation center	0	0	1	2	0
Medical care	2	6	5	7	8
Refugee center	0	1	0	0	0
School/kinder garden	4	4	3	0	6
Public gathering	18	37	4	15	8
Food processing	0	0	0	0	1
Unknown	1	0	2	0	0
Total	79	101	96	71	79

source: State statistical programme data on food safety (Croatian National Institute of Public Health)

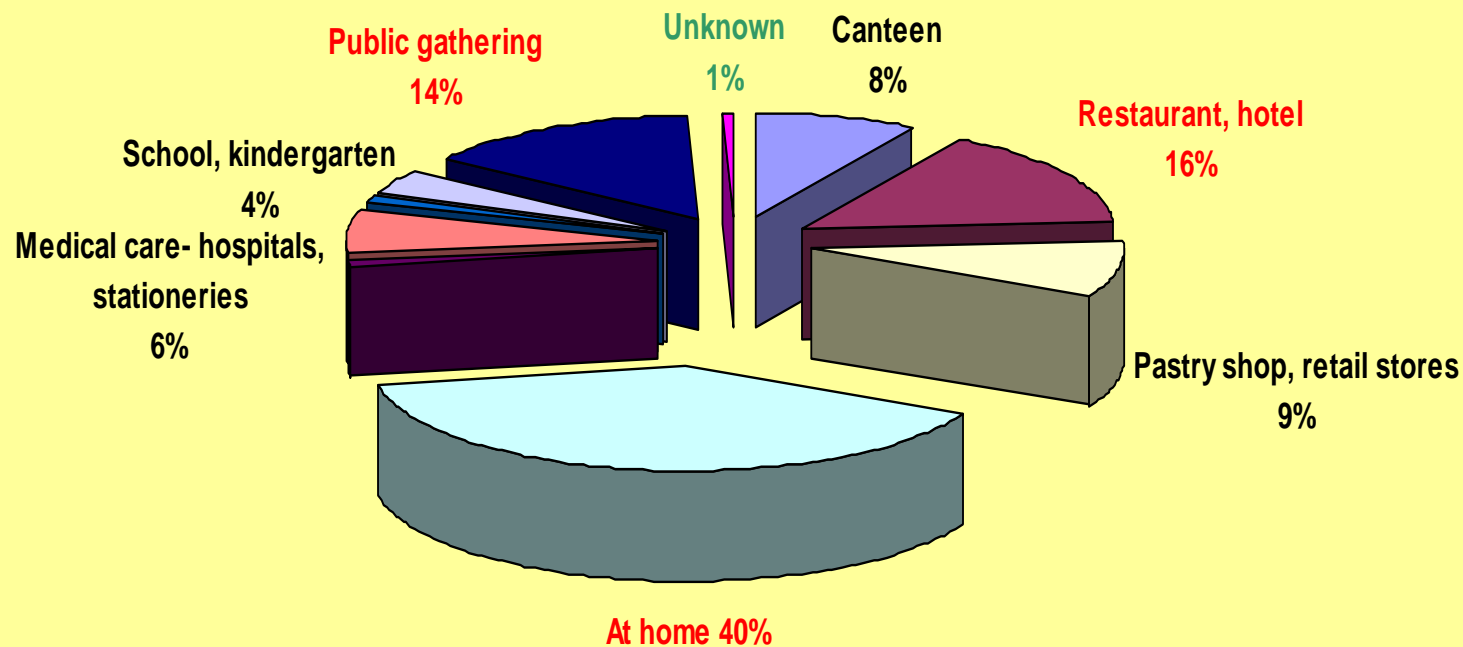
Foodborne disease outbreaks - incriminated food, 1999 - 2004

Year	1999.	2000.	2001.	2002.	2003.	2004.
Incriminated food						
meat beef	0	1	3	1	1	1
pork	3	6	4	5	3	9
chicken	0	2	7	6	3	4
unspecified	2	1	2	2	1	2
meat products minced meat	1	2	0	1	1	2
sausages	16	6	6	5	7	1
other	1	0	7	3	7	3
fish,shellf.	1	1	4	2	0	3
egg products	4	4	10	11	2	5
bean salad	1	0	1	2	2	0
potato salad coleslaw	1	1	0	3	9	1
confectioneries ice cream	2	4	1	0	1	0
egg cream cakes	16	38	38	34	19	23
milk and products	4	2	1	2	0	1
ready-to-eat meal	6	7	8	10	8	2
mushrooms	0	0	6	0	0	1
Total food known	58	75	98	87	64	58
Food unknown	8	4	3	9	7	21
Total	66	79	101	96	71	79

source: State statistical programme data on food safety (Croatian National Institute of Public Health)

Food intoxication outbreaks – according to the spot where food was bought, consumed or contaminated

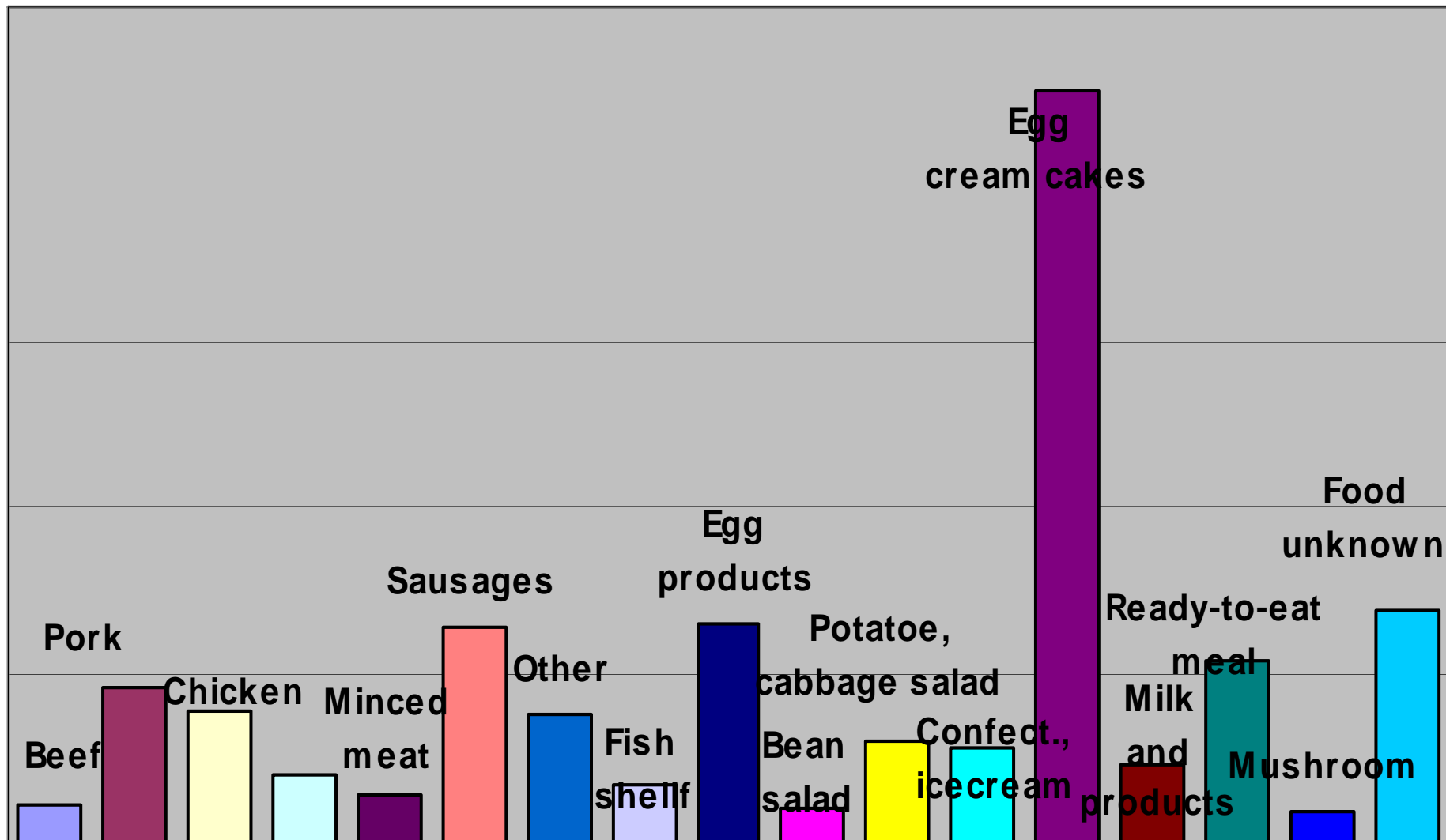
Proportion of food intoxication outbreaks according to the consumption spot for the period 1995 - 2005



Food intoxication outbreaks according to foodstuff that was contaminated 1995 - 2005

Year	95	96	97	98	99	00	01	02	03	04	05	95-05	%
Incriminated food	Number of outbreaks												
Meat beef	2	0	0	0	0	1	3	1	1	1	0	9	1,3
pork	4	3	5	5	3	6	4	5	3	9	2	49	6,1
chicken	1	0	6	4	0	2	7	6	3	4	1	34	4,7
unspecified	3	2	0	1	2	1	2	2	1	2	3	19	2,6
Meat products: minced meat	0	0	0	3	1	2	0	1	1	2	1	11	1,8
sausages	2	7	5	8	16	6	6	5	7	1	3	66	7,3
other	1	2	4	4	4	0	7	3	7	3	1	36	4,5
Fish, shellf	1	2	0	1	1	1	4	2	0	3	2	17	2,3
Egg products	6	5	10	6	4	4	10	11	2	19	10	87	10,1
Bean salad	0	1	0	0	1	0	1	2	2	0	0	7	1,1
Potatoe, french, cabbage salad	1	2	2	0	1	1	0	3	9	2	2	23	3,6
Confectioneries, ice cream	3	0	2	1	2	4	1	0	1	15	16	45	6,3
Egg cream cakes	14	8	12	18	16	38	38	34	19	8	29	234	28,2
Milk and products	3	2	3	3	4	2	1	2	0	0	0	20	2,4
Ready-to-eat meal	3	4	1	4	6	7	8	10	8	1	2	54	6,1
Mushroom	0	0	1	0	0	0	6	0	0	1	1	9	1,2
Food unknown	9	9	5	7	5	4	3	9	7	8	13	79	9,7
Total	53	47	56	65	66	79	101	96	71	79	86	799	100

Food intoxication outbreaks according to foodstuff that was contaminated for years 1993 –2005 .



Foodborne disease outbreaks - Contributing factors, 1993 - 2004

Factor/Year	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004
Food prepared too far in advance	7	2	3	1	2	5	5	3	1	1	7	4
Inadequate hot holding	1	0	1	1	1	2	1	6	4	6	2	1
Improper storage	8	6	2	2	5	3	5	7	12	8	7	4
Inadequate thawing	1	0	0	3	0	2	1	0	0	0	0	0
Inadequate refrigeration	4	6	2	3	7	9	3	1	0	2	5	4
Inadequate cooking/reheating	6	6	9	5	14	10	8	11	28	22	2	1
Using of contaminated ingredients	1	9	3	8	2	10	9	17	13	20	4	9
Infected person	8	10	10	6	6	4	5	17	14	11	13	21
Contaminated equipment	5	4	3	8	3	1	5	5	8	13	6	10
Obtaining food unsafe	0	0	0	0	0	0	0	0	0	0	13	5
More than one contributing factor	5	5	2	1	5	6	6	3	8	5	0	0
Inadequate cooking	0	0	0	0	0	0	0	0	0	0	7	7
Inadequate cooling and heating	0	0	0	0	0	0	0	0	0	0	5	1
Other factors	2	5	3	5	6	9	10	1	5	8	0	6
Total known	48	53	38	43	51	61	58	71	93	96	71	73
Total unknown factors	8	14	9	4	5	4	8	8	8	0	0	6
Total	56	67	47	47	56	65	66	79	101	96	71	79

source: State statistical programme data on food safety (Croatian National Institute of Public Health)

Characteristics of food intoxication outbreaks in some European countries

The most common in neighbouring countries	Slovenia	Austria	Italy	Hungary	Slovakia	Ireland	Croatia
Causative agent	Salmonella spp. 42,2%	Salmonella spp. 62,1%	Salmonella spp. 62,5%	Unknown 61,2% (Salm.spp. 21,1%)	Salmonella spp. 65,3%	Campylobacter 39,0%	Salmonella spp. 66,8%
Foodstuff	Unknown 38,2% (other 30,1%)	Unknown 48,0% (eggs 39,0%)	Unknown 48,0% (eggs 10%)	Ready-to-eat meal 23,4%	Mayonnaise and salad sauce 24,5%	Unknown 63,9%	Egg cream cakes 28,2%
Spot	School(kindergarten) 32,9%	Restaurant/hotel 44,7%	At home 66,7%	At home 86,7%	At home 32,0%	Restaurant/hotel 44,4%	At home 39,6%
Contributing factor	Carrier	Inadequate cooking 30%	Unknown	Unknown 26,1% (inadequate cooking or heating 24,5%)	Unknown 45,3% (Usage of contaminated ingredients 42,2%)	Unknown 65,6%	Carrier 15,6%

Thank You !