



# Υγιεινή Εγκαταστάσεων Βιομηχανιών Τροφίμων

## Ενότητα 2<sup>η</sup>

### ΕΠΙΔΗΜΙΟΛΟΓΙΚΑ ΣΤΟΙΧΕΙΑ

Όνομα καθηγητή: ΠΑΝ. Ν. ΣΚΑΝΔΑΜΗΣ

Τμήμα: Επιστήμης τροφίμων και διατροφής του ανθρώπου



Ευρωπαϊκή Ένωση  
Ευρωπαϊκό Κοινωνικό Ταμείο



ΥΠΟΥΡΓΕΙΟ ΠΑΙΔΕΙΑΣ & ΘΡΗΣΚΕΥΜΑΤΩΝ, ΠΟΛΙΤΙΣΜΟΥ & ΑΘΛΗΤΙΣΜΟΥ  
ΕΙΔΙΚΗ ΥΠΗΡΕΣΙΑ ΔΙΑΧΕΙΡΙΣΗΣ

Με τη συγχρηματοδότηση της Ελλάδας και της Ευρωπαϊκής Ένωσης



ΕΥΡΩΠΑΪΚΟ ΚΟΙΝΩΝΙΚΟ ΤΑΜΕΙΟ





# ΣΤΟΧΟΙ ΤΟΥ ΜΑΘΗΜΑΤΟΣ

- Κατανόηση της συχνότητας και της σοβαρότητας των τροφιμογενών δηλητηριάσεων
- Εξοικείωση με τους Εθνικούς και Διεθνείς Φορείς αποτύπωσης των τροφιμογενών προβλημάτων και των επιδημιολογικών μηχανισμών παρακολούθησης των τροφιμογενών ασθενειών
- Αποτύπωση της σχετικής βαρύτητας των τροφιμογενών ασθενειών από χημικούς και βιολογικούς κινδύνους



# ΠΙΝΑΚΑΣ 1(α)

Number of reported foodborne-disease outbreaks, cases, and deaths, by etiology — United States. 1996-2002

Etiology	Outbreaks	Outbreaks	Cases	Cases	Deaths	Deaths
	No.	(%)	No.	(%)	No.	(%)
<b>Bacterial</b>						
Bactus cereus	37	(0,6)	571	(0,4)	0	(0,0)
Brucella	1	0,0	4	(0,0)	0	(0,0)
Campylobacter	61	0,9	1,440	(1,1)	0	(0,0)
Clostridium botuilmum	12	(0,2)	52	(0,0)	1	(1,1)
Clostridium perfringens	130	(2,0)	6,724	(5,2)	4	(4,5)
Escherichia cdl*	140	(2,1)	4,854	(3,8)	4	(4,5)
Listeria monocytogenes	11	(0,2)	256	(0,2)	38	(43,2)
Salmonela	585	(8,8)	16,821	(13,1)	20	(22,7)

\* Enterotiemorrhagic (<132 outbreaks). Enterotoxigenic (7), Enterooggregative (1)

f Serotype 01 (1 outbreak), Serotype non-01, norw013Q (1), serotype unspecified (1)



# ΠΙΝΑΚΑΣ 1(β)

Number of reported foodborne-disease outbreaks, cases, and deaths, by etiology — United States. 1996-2002

Etiology	Outbreaks	Outbreaks	Cases	Cases	Deaths	Deaths
	No.	(%)	No.	(%)	No.	(%)
<b>Bacterial</b>						
Shigella	67	(1,0)	3,677	(2,9)	1	(1,1)
Staphylococcus aureus	101	(1,5)	2,766	(2,2)	2	(2,3)
Streptococcus	1	(0,0)	4	(0,0)	0	(0,0)
Vibrio cholerae*	3	(0,0)	12	(0,0)	0	(0,0)
Vibrio parahaemolyticus	25	(0,4)	613	(0,5)	0	(0,0)
Vibrio, other	1	(0,0)	2	(0,0)	0	(0,0)
Yersinia enterocolitica	8	(0,1)	87	(0,1)	0	(0,0)
Other bacterial	1	(0,0)	4	(0,0)	0	(0,0)
<b>Total bacterial</b>	<b>1,184</b>	<b>(17,8)</b>	<b>37,887</b>	<b>(29,5)</b>	<b>70</b>	<b>(79,5)</b>

\* Enterohemorrhagic (<132 outbreaks). Enterotoxigenic (7), Enterococcal (1)

f Serotype 01 (1 outbreak), Serotype non-01, norw013Q (1), serotype unspecified (1)



# ΠΙΝΑΚΑΣ 1(γ)

Number of reported foodborne-disease outbreaks, cases, and deaths, by etiology — United States. 1996-2002

Etiology	Outbreaks		Cases		Deaths	
	No.	(%)	No.	(%)	No.	(%)
<b>Chemical</b>						
Ciguatoxin	84	(1,3)	315	(0,2)	1	(1,1)
Heavy metals	2	(0,0)	23	(0,0)	0	(0,0)
Mushroom toxin	2	(0,0)	6	(0,0)	0	(0,0)
Scombrotxin	118	(1,8)	463	(0,4)	0	(0,0)
Shellfishtoxin	5	(0,1)	36	(0,0)	0	(0,0)
Other chemical	10	(0,2)	207	(0,2)	0	(0,0)
<b>Total chemical</b>	<b>23</b>	<b>(3,3)</b>	<b>1,140</b>	<b>(0,9)</b>	<b>1</b>	<b>(1,1)</b>

\* Enterotiemorrhagic <132 outbreaks). Enterotoxigenic (7), Enteroooggregative (1)  
 f Serotype 01 (1 outbreak), Serotype non-01, norw013Q (1), serotype unspecified (1)



# ΠΙΝΑΚΑΣ 1(δ)

Number of reported foodborne-disease outbreaks, cases, and deaths, by etiology — United States. 1996-2002

Etiology	Outbreaks	Outbreaks	Cases	Cases	Deaths	Deaths
	No.	(%)	No.	(%)	No.	(%)
<b>Parasitic</b>						
Anisakis	1	(0,0)	14	(0,0)	0	(0,0)
Cryptosporidium parvum	4	(0,1)	139	(0,1)	0	(0,0)
Cyclospora cayetanensis	9	(0,1)	325	(0,3)	0	(0,0)
Giarda intestinalis	3	(0,0)	119	(0,1)	0	(0,0)
Trichinella spiralis	6	(0,1)	33	(0,0)	0	(0,0)
<b>Total parasitic</b>	<b>23</b>	<b>(0,3)</b>	<b>630</b>	<b>(0,5)</b>	<b>0</b>	<b>(0,0)</b>

\* Enterotiemorrhagic (<132 outbreaks). Enterotoxigenic (7), Enteroooggregative (1)  
f Serotype 01 (1 outbreak), Serotype non-01, norw013Q (1), serotype unspecified (1)



# ΠΙΝΑΚΑΣ 1(ε)

Number of reported foodborne-disease outbreaks, cases, and deaths, by etiology — United States. 1996-2002

Etiology	Outbreaks	Outbreaks	Cases	Cases	Deaths	Deaths
	No.	(%)	No.	(%)	No.	(%)
<b>Viral</b>						
Astrovirus	1	(0,0)	14	(0,0)	0	(0,0)
Hepatitis A	50	(0,8)	981	(0,8)	4	(4,5)
Norovirus	657	(9,9)	27,171	(21,2)	1	(1,1)
Rotavirus	1	(0,0)	108	(0,1)	0	(0,0)
<b>Total viral</b>	<b>709</b>	<b>(10,7)</b>	<b>28,274</b>	<b>(22,0)</b>	<b>5</b>	<b>(5,7)</b>
<b>Multiple etiologies</b>	30	(0,5)	1,050	(0,8)	0	(0,0)
<b>Confirmed etiology</b>	2.167	(32,6)	68,981	(53,7)	76	(86,4)
<b>Unknown etiology</b>	4,490	(67,4)	59,389	(46,2)	12	(13,6)
<b>Total 1998-2002</b>	<b>6.647</b>	<b>(100,0)</b>	<b>128,370</b>	<b>(100,0)</b>	<b>88</b>	<b>(100,0)</b>

\* Enterotiemorrhagic <132 outbreaks). Enterotoxigenic (7), Enteroooggregative (1)  
f Serotype 01 (1 outbreak), Serotype non-01, norw013Q (1), serotype unspecified (1)



# ΚΡΟΥΣΜΑΤΑ ΚΑΙ ΕΞΑΡΣΕΙΣ ΤΡΟΦΙΜΟΓΕΝΩΝ ΑΣΘΕΝΕΙΩΝ

## ΟΦΕΙΛΟΜΕΝΩΝ ΣΕ ΒΙΟΛΟΓΙΚΟΥΣ ΚΙΝΔΥΝΟΥΣ ΣΤΗΝ ΕΥΡΩΠΗ

Figure SU1. Reported notification rates of zoonoses in confirmed human cases in EU, 2009

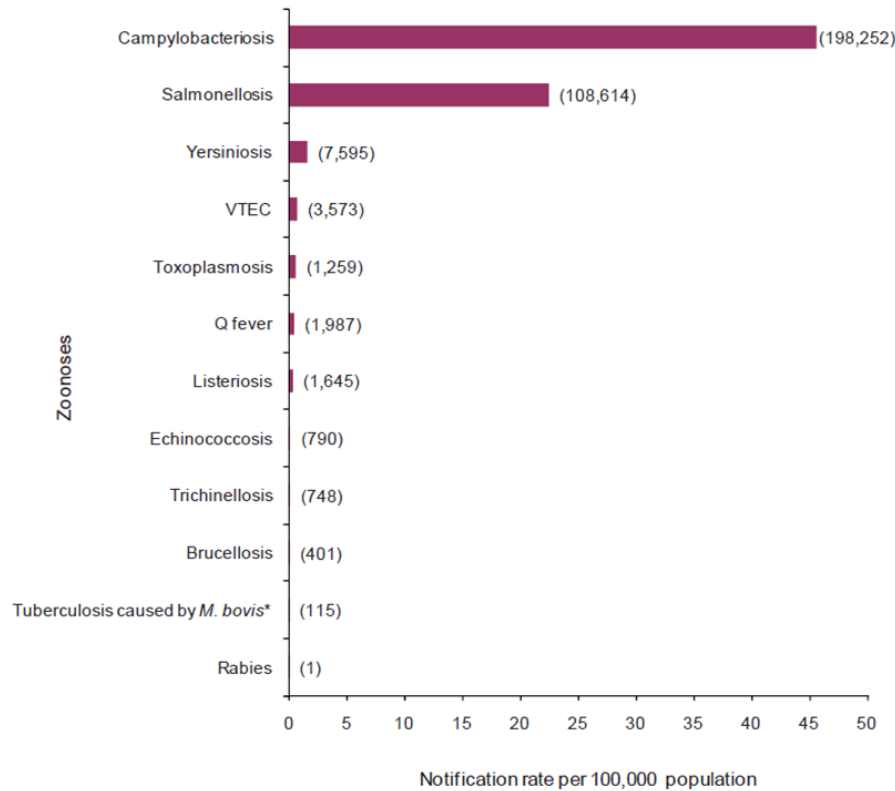
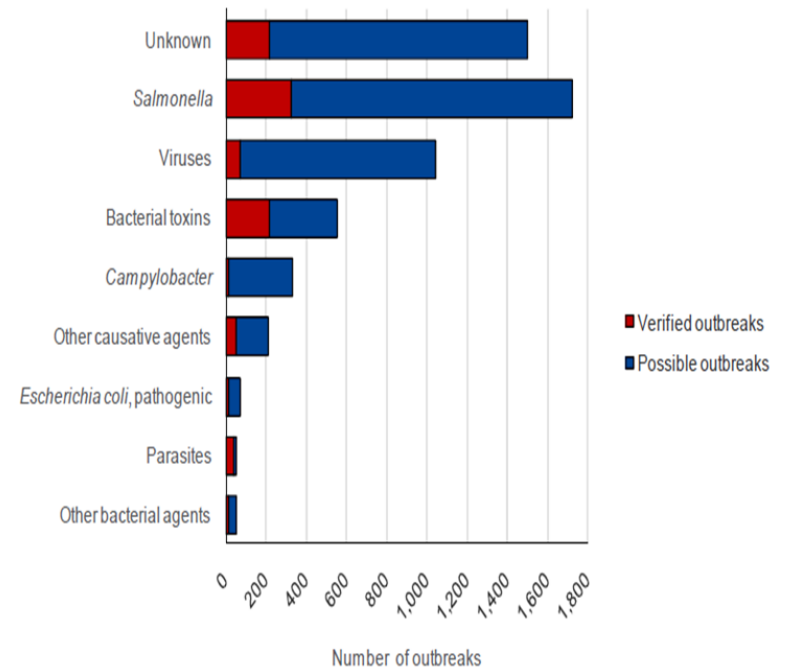


Figure SU2. Distribution of food-borne outbreaks (possible and verified) per causative agent in EU, 2009







# ΤΡΟΦΟ-ΔΗΛΗΤΗΡΙΑΣΕΙΣ ΣΤΗΝ Ε.Ε ΚΑΙ ΕΥΡΥΤΕΡΗ ΠΕΡΙΟΧΗ

	1993-1998 (Schmidt and Tirado (2001))	EU 2006 (EFSA, 2007)	EU 2007 (EFSA, 2010)	EU 2008 (EFSA, 2010)	EU 2009 (EFSA 3/2011)
Countries	42	22 EU+3	25+2	25 EU+ 2	25 EU +2
<b>Annual outbreaks</b>	<b>5,556</b>	<b>5,807</b>	<b>5,826</b>	<b>5,405</b>	<b>5550</b>
<b>Annual illnesses</b>	<b>65,231</b>	<b>55,029</b>		<b>48,888</b>	<b>48964</b>
Annual hospitalized persons		5,780 (10.5%)		6,329 (12.9%)	4356( 8.9%)
Deaths		55( 0.01%)		32 (0.06%)	46 (0.09%)
Known etiologic agent in the countries	<b>76.9%</b> (41.6-100%) <b>UNKNOWN 23.1%</b>		<b>74.4</b> (17.7-100) <b>UNKNOWN 25.6%</b>		<b>72.9%</b> (21.50100) <b>UNKNOWN 27.1%</b>



# EFSA, 23-MARCH, 2011

Table OUT2. Total number of reported food-borne outbreaks (excluding vorifiod waterborne outbreaks) in EU, 2007-2009

	2009				2008			
Country								
	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Austria	351	4.2	340		368	4.4	354	14
Belgium	105	1.0	91	14	104	1.0	89	15
Czech Republic	25	0.2	23	2	23	0.2	22	1
Denmarx	51	0.9	35	16	82	1.5	66	16

	2007			
Country				
	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Austria	438	5.3	427	11
Belgium	75	0.7	54	21
Czech Republic	37	0.4	33	4
Denmarx	57	1.1	0	57



# EFSA, 23-MARCH, 2011(2)

Table OUT2. Total number of reported food-borne outbreaks (excluding verified waterborne outbreaks) in EU, 2007-2009

	2009				2008			
Country								
	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Estonia	23	1.7	22	1	51	3.8	46	5
Finland	54	1.0	24	30	41	0.8	33	8
France	1,256	2.0	898	358	1,081	1.7	808	273
Germany	602	0.7	567	35	1,068	1.3	1,038	30

	2007			
Country				
	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Estonia	28	2.1	26	2
Finland	32	0.6	0	32
France	984	1.6	0	984
Germany	1,405	1.7	1,343	62



# EFSA, 23-MARCH, 2011(3)

Table OUT2. Total number of reported food-borne outbreaks (excluding verified waterborne outbreaks) in EU, 2007-2009

	2009				2008			
Country								
	N		Possible outbreaks (n)	Verified outbreaks (n)	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Greece	53	0,5	53	0	55	05	54	1
Hungary	59	0,6	38	21	114	1,1	79	35
Ireland	28	0,6	27	1	25	0,6	23	2
Italy	248	0,4	248	0	245	0,4	245	0

	2007			
Country				
	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Greece	55	0,5	55	0
Hungary	269	2,7	217	52
Ireland	20	0,5	15	5
Italy	-	-	-	-



# EFSA, 23-MARCH, 2011(4)

Table OUT2. Total number of reported food-borne outbreaks (excluding vorifiod waterborne outbreaks) in EU, 2007-2009

	2009				2008			
Country								
	N		Possible outbreaks (n)	Verified outbreaks (n)	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Greece	53	0.5	53	0	55	0.5	54	1
Hungary	59	0.6	38	21	114	1.1	79	35
Ireland	28	0.6	27	1	25	0.6	23	2
Italy	248	0.4	248	0	245	0.4	245	0
Latvia <sup>2</sup>	805	35.6	694	111	45	2.0	35	10

	2007			
Country				
	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Greece	55	0,5	55	0
Hungary	269	2,7	217	52
Ireland	20	0,5	15	5
Italy	-	-	-	-
Latvia <sup>2</sup>	10,2	218	15	233



# EFSA, 23-MARCH, 2011(5)

Table OUT2. Total number of reported food-borne outbreaks (excluding verified waterborne outbreaks) in EU, 2007-2009

	2009				2008			
Country	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Lithuania	175	5,2	167	8	228	6,8	216	12
Luxembourg	-	-	-	-	2	0,4	2	0
Malta	46	11,1	46	0	64	156	64	0
Netherlands	247	1,5	214	33	324	2,0	289	35
Poland	313	0,8	203	110	484	1,3	329	155

	2007			
Country	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Lithuania	196	5,8	186	10
Luxembourg	-	-	-	-
Malta	57	14,0	57	0
Netherlands	345	2,1	308	37
Poland	562	1,5	407	155



# EFSA, 23-MARCH, 2011(6)

Table OUT2. Total number of reported food-borne outbreaks (excluding verified waterborne outbreaks) in EU, 2007-2009

	2009				2008			
Country								
	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Portugal	11	0.1	0	11	35	0.3	24	11
Romania	54	0.3	0	54	46	0.2	9	37
Slovakia	303	5.6	297	6	75	1.4	66	9
Slovenia	5	0.2	2	3	17	0.8	16	1
Spam	416	0.9	275	141	551	1.2	337	214

	2007			
Country				
	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Portugal	-	-	-	-
Romania	42	0.2	5	37
Slovakia	114	2.1	97	17
Slovenia	17	0.9	0	17
Spam	619	1.4	365	254



# EFSA, 23-MARCH, 2011(7)

Table OUT2. Total number of reported food-borne outbreaks (excluding verified waterborne outbreaks) in EU, 2007-2009

	2009				2008			
Country								
	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Sweden	224	24	213	11	154	1.7	148	6
United Kingdom	96	0.2	96	0	50	0.1	50	0
EU Total	5,550	1.1	4,573	977	5,332	1.1	4,442	890
Norway	47	1.0	42	5	63	1.3	59	4
Switzerland	13	0.2	7	6	10	0.1	5	5

	2007			
Country				
	N	Reporting rate per 100	Possible outbreaks (n)	Verified outbreaks (n)
Sweden	-	-	-	-
United Kingdom	42	0.2	5	37
EU Total	114	2.1	97	17
Norway	17	0.9	0	17
Switzerland	619	1.4	365	254





# ΤΡΟΦΙΚΕΣ ΔΗΛΗΤΗΡΙΑΣΕΙΣ ΟΦΕΙΛΟΜΕΝΩΝ ΣΕ ΓΝΩΣΤΟΥΣ ΠΑΘΟΓΟΝΟΥΣ

Reported number of foodborne disease illnesses in the United States for the years 2002-2006 and 2007 and estimated annual number (mean and 90% credible interval) of domestically acquired foodborne illnesses caused by 31 pathogens.

Foodborne disease agents	Mean annual illnesses for 2002-6	Illnesses For 2007	Estimated annual mean illnesses (thousands) (90% credible interval) (EID 17 (1): 7-22, 2011)
Salmonella spp non typhoidal	3,475	3,515	1,027 (645-1,680)
C.perfringens	2,062	1,606	966 (192.3-2,483)
Staphylococcal enterotoxin	554	286	241.1 (72.3-529.40)
E.coli O157:H7 (STEC)	375	603	63.2 (17.7-149.6)
Non-O157:H57(STEC)			112.8 (11.5-287.9)
E.coli (ETEC), Other E.coli	106	142	17.9 (2-46.2), 12 (16-31)
Campylobacter spp	624	372	845 (377-1,611)
Shigella spp.	495	355	131.3 (24.5-375)
B.cereus	130	164	63.4 ( 15.7-147.4)
V.parahaemolyticus , other vibrios	114	5	34.7 (18.8-26.5), 17.6 (10.8-26.5)



# ΤΡΟΦΙΚΕΣ ΔΗΛΗΤΗΡΙΑΣΕΙΣ ΟΦΕΙΛΟΜΕΝΩΝ ΣΕ ΓΝΩΣΤΟΥΣ ΠΑΘΟΓΟΝΟΥΣ (2)

Reported number of foodborne disease illnesses in the United States for the years 2002-2006 and 2007 and estimated annual number (mean and 90% credible interval) of domestically acquired foodborne illnesses caused by 31 pathogens.

Foodborne disease agents	Mean annual illnesses for 2002-6	Illnesses For 2007	Estimated annual mean illnesses (thousands) (90% credible interval) (EID 17 (1): 7-22, 2011)
Listeria	22	5	1.6 (0.6-3.2)
C.botulinum	11	16	0.055 (0.034-0.091)
Yersinia enterocolitica	5	0.0	97.7 (18.3-172.7)
Other bacteria	122	43	
<b>TOTAL BACTERIA</b>	<b>8,098 Χιλιάδες (32.3%)</b>	<b>7,115 (33.5%)</b>	<b>3,658 (2,321-5,581) Εκατομμύρια! (7.7%)</b>
<b>TOTAL VIRUSES</b>	<b>6,120 Χιλιάδες, (24.4%)</b>	<b>8,087, (38.1%)</b>	<b>5,570 (3,274-8,356) Εκατομμύρια! (11.7%)</b>
Noroviruses	6009 Χιλιάδες!	8,020	5,462 (3,227-8,309) Εκατομμύρια! (11.4%)
<b>TOTAL PARASITES*</b>	<b>400</b>	<b>210</b>	<b>232.7 (162-370)</b>
<b>TOTAL CHEMICAL</b>	<b>396</b>	<b>210</b>	
<b>Total major known pathogens</b>	<b>20,018</b>	<b>15,477</b>	<b>9,388 (6,641- 12,746) (20%)</b>
<b>Unspecified agents</b>	<b>5,061 (20.1%)</b>	<b>5,757 (27.1%)</b>	<b>38,393 (19,830-61,196) (80%)</b>
<b>Grand Total</b>	<b>25,079</b>	<b>21,234</b>	<b>47,781 (28,659-71,134)</b>



# PATHOGENS

Table 2. Top five pathogens causing domestically acquired foodborne illnesses

Pathogen	Estimated annual number of illnesses	90% Credible Interval	%
Norovirus	5,461,731	3,227,078-8,309,480	58
Salmonella, nontyphoidal	1,027,561	644,786-1,679,667	11
Clostridium perfringens	965,958	192,316-2,483,309	10
Campylobacter spp.	845,024	337,031-1,611,083	9
Staphylococcus aureus	241,148	72,341-529,417	3
Subtotal			91



# ΚΑΤΑΝΟΜΗ ΤΡΟΦΙΜΟΓΕΝΩΝ ΠΡΟΒΛΗΜΑΤΩΝ

## ΠΟΥ ΟΦΕΙΛΟΝΤΑΙ ΣΕ ΓΝΩΣΤΟΥΣ ΚΑΙ ΑΓΝΩΣΤΟΥΣ ΒΙΟΛΟΓΙΚΟΥΣ ΚΙΝΔΥΝΟΥΣ

Table 1. Estimated annual number of domestically acquired foodborne illnesses, hospitalizations, and deaths due to 31 pathogens and unspecified agents transmitted through food, United States

Foodborne agents	Estimated annual number of illnesses (90% credible interval)	%	Estimated annual number of hospitalizations (90% credible interval)	%	Estimated annual number of deaths (90% credible interval)
31 known pathogens	9.4 million (6.6-12.7 million)	20	55,961 (39,534-75,741)	44	1,351 (712-2,268)
Unspecified agents	38.4 million (19.8-61.2 million)	80	71,878 (9,924-157,340)	56	1,686 (369-3,338)
Total	47.8 million (28.7-71.1 million)	100	127,839 (62,529-215,562)	100	3,037 (1,492-4,983)



# ΚΑΤΑΤΑΞΗ ΒΙΟΛΟΓΙΚΩΝ ΚΙΝΔΥΝΩΝ

## ΜΕ ΒΑΣΗ ΤΩΝ ΑΡΙΘΜΟ ΕΙΣΑΓΩΓΩΝ ΣΤΑ ΝΟΣΟΚΟΜΕΙΑ

Table 3. Top five pathogens causing domestically acquired foodborne illnesses resulting in hospitalization

Pathogen	Estimated annual number of hospitalizations	90% Credible Interval	%
Salmonella, nontyphoidal	19,336	8,545-37,490	35
Norovirus	14,663	8,097-23,323	26
Campylobacter spp.	8,463	4,300-15,227	15
Toxoplasma gondii	4,428	3,060-7,146	8
E. coli (STEC) 0157	2,138	549-4,614	4
Subtotal			88



# ΚΑΤΑΤΑΞΗ ΒΙΟΛΟΓΙΚΩΝ ΚΙΝΔΥΝΩΝ(2)

## ΜΕ ΒΑΣΗ ΤΩΝ ΑΡΙΘΜΟ ΘΑΝΑΤΗΦΟΡΩΝ ΚΡΟΥΣΜΑΤΩΝ

Table 4. Top five pathogens causing domestically acquired foodborne illnesses resulting in death

Pathogen	Estimated annual number of deaths	90% Credible Interval	%
Salmonella, nontyphoidal	378	0-1,011	28
Toxoplasma gondii	327	200-482	24
Listeria monocytogenes	255	0-733	19
Norovirus	149	84-237	11
Campylobacter spp.	76	0-332	6
Subtotal			88



# ANNUAL DISEASE

Table ES-1: Annual Disease Burden Caused by 14 Foodborne Pathogens

PATHOGEN	COMBINED RANK <sup>#</sup>	QALY LOSS	COST OF ILLNESS (\$ MIL.)	ILLNESSES <sup>#</sup>	HOSPITALIZATIONS <sup>#</sup>	DEATHS <sup>#</sup>
<i>Salmonella</i> spp.	1	16,782	3,309	1,027,561	19,336	378
<i>Toxoplasma gondii</i>	2	10,964	2,973	86,686	4,428	327
<i>Campylobacter</i> spp.	3	13,256	1,747	845,024	8,463	76
<i>Listeria monocytogenes</i>	3	9,651	2,655	1,591	1,455	255
Norovirus	5	5,023	2,002	5,461,731	14,663	149
<i>E.coli</i> 0157:H7	6	1,565	272	63,153	2,138	20
<i>Clostridium peifringens</i>	6	875	309	965,958	438	26
<i>Yersinia enterocolitica</i>	8	1,415	252	97,656	533	29
<i>Vibrio vulnificus</i>	8	557	291	96	93	36
<i>Shigella</i> spp.	10	545	121	131,254	1,456	10
<i>Vibrio</i> other	11	341	47	57,616	210	4
<i>Cryptosporidium parvum</i>	12	149	107	52,228	183	12
<i>E. coli</i> non-0157 STEC	13	327	26	112,752	271	0
<i>Cyclospora cayetanensis</i>	14	10	2	11,407	11	0
Total		61,461	14,114	8,914,713	53,678	1,322



# BATZ ET AL. 2011. UNIVERSITY OF FLORIDA

Table ES-2: The top 10 pathogen-food combinations in terms of annual disease burden, by combined rank

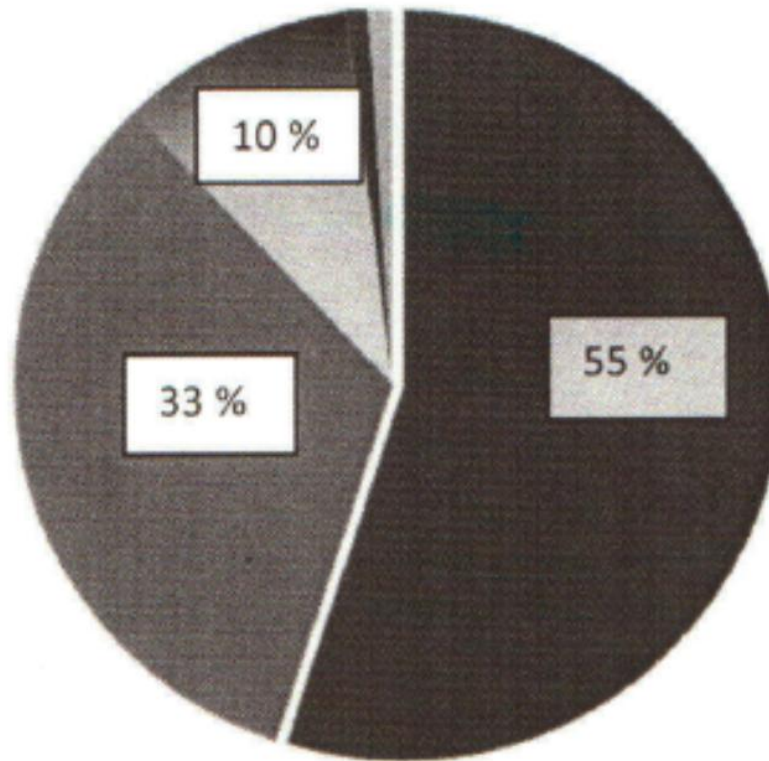
PATHOGEN-FOOD COMBINATIONS	COMBINED RANK	QALY LOSS	COST OF ILLNESSES (\$ MIL.)	ILLNESSES	HOSPITALIZATIONS	DEATHS
Campylobacter- Poultry	1	9,541	1,257	608,231	6,091	55
Toxoplasma - Pork	2	4,495	1,219	35,537	1,815	134
Listeria - Deli Meats	3	3,948	1,086	651	595	104
Salmonella - Poultry	4	3,610	712	221,045	4,159	81
Listeria - Dairy products	5	2,632	724	434	397	70
Salmonella - Complex foods	6	3,195	630	195,655	3,682	72
Norovirus - Complex foods	6	2,294	914	2,494,222	6,696	68
Salmonella - Produce	8	2,781	548	170,264	3,204	63
Toxoplasma - Beef	8	2,541	689	20,086	1,026	76
Salmonella - Eggs	10	1,878	370	115,003	2,164	42
TOTAL		36,915	8,151	3,861,128	29,830	765





# AJAYI ET AL. (2011)

**FIGURE 1.** Laboratory confirmed etiology of foodborne disease, 1998–2002 in the United States, as reported by Lynch and others (35)



Bacterial ■ Viral ■ Chemical ■ Parasitic ■ Multiple causes



# ΛΕΞΕΙΣ - ΚΛΕΙΔΙΑ

- Βιολογικοί κίνδυνοι
- Παθογόνοι
- Παρακολούθηση
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- EFSA
- Επιπολασμός
- Κρούσματα
- Εξάρσεις
- Τροφιμογενείς ασθένειες



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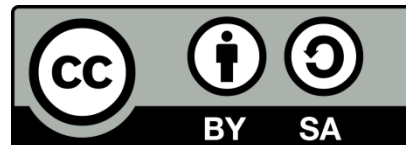
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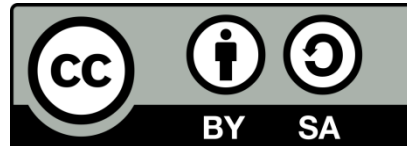
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