





ORTA DOĐU TEKNİK ÜNİVERSİTESİ
MIDDLE EAST TECHNICAL UNIVERSITY

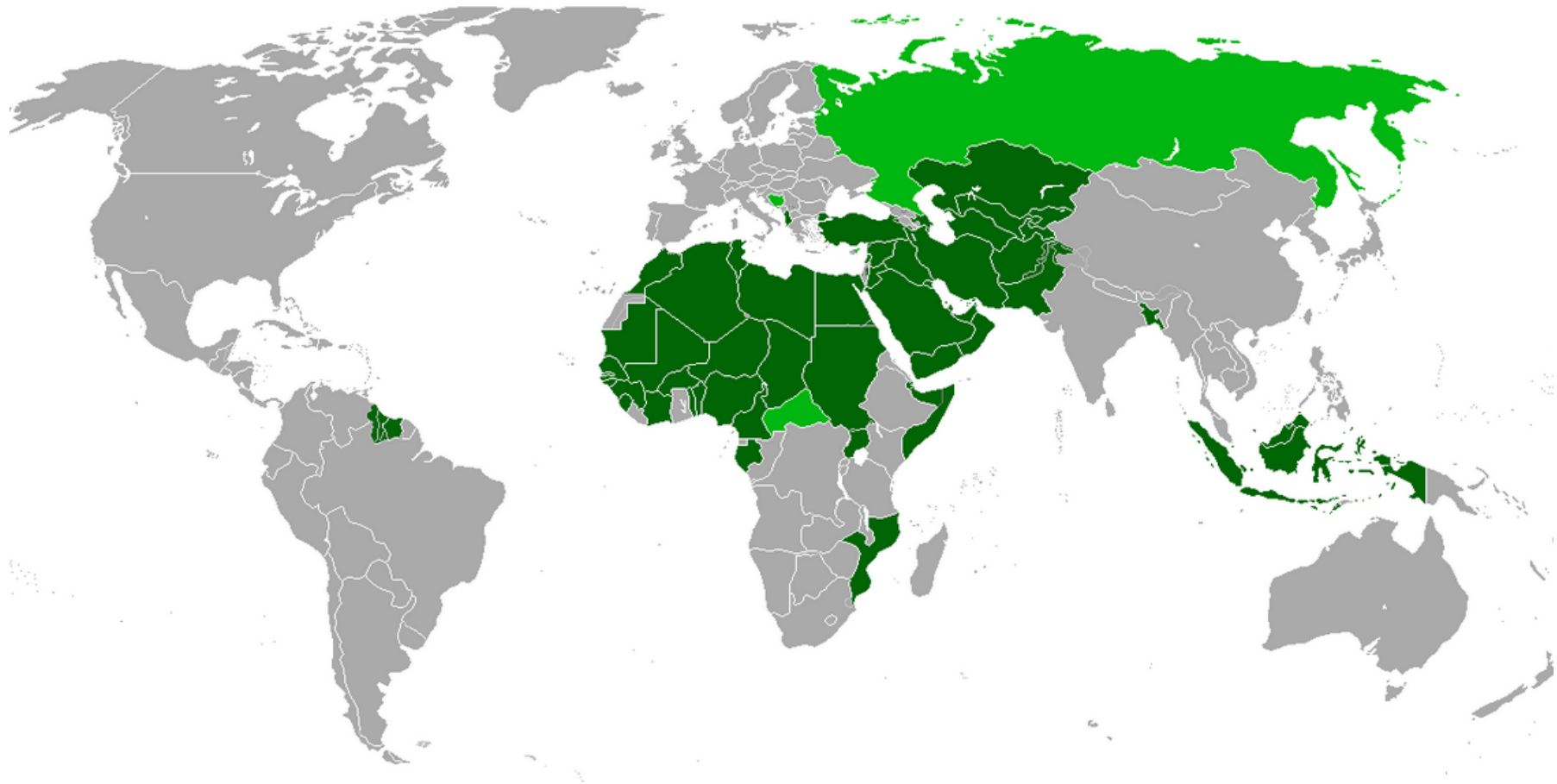
Importance of Food Safety in OIC Countries

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01.12.2014

OIC Member States and Observers



Food Security

“when all people at all times have access to sufficient, **safe**, nutritious food to maintain a healthy and active life” (1)

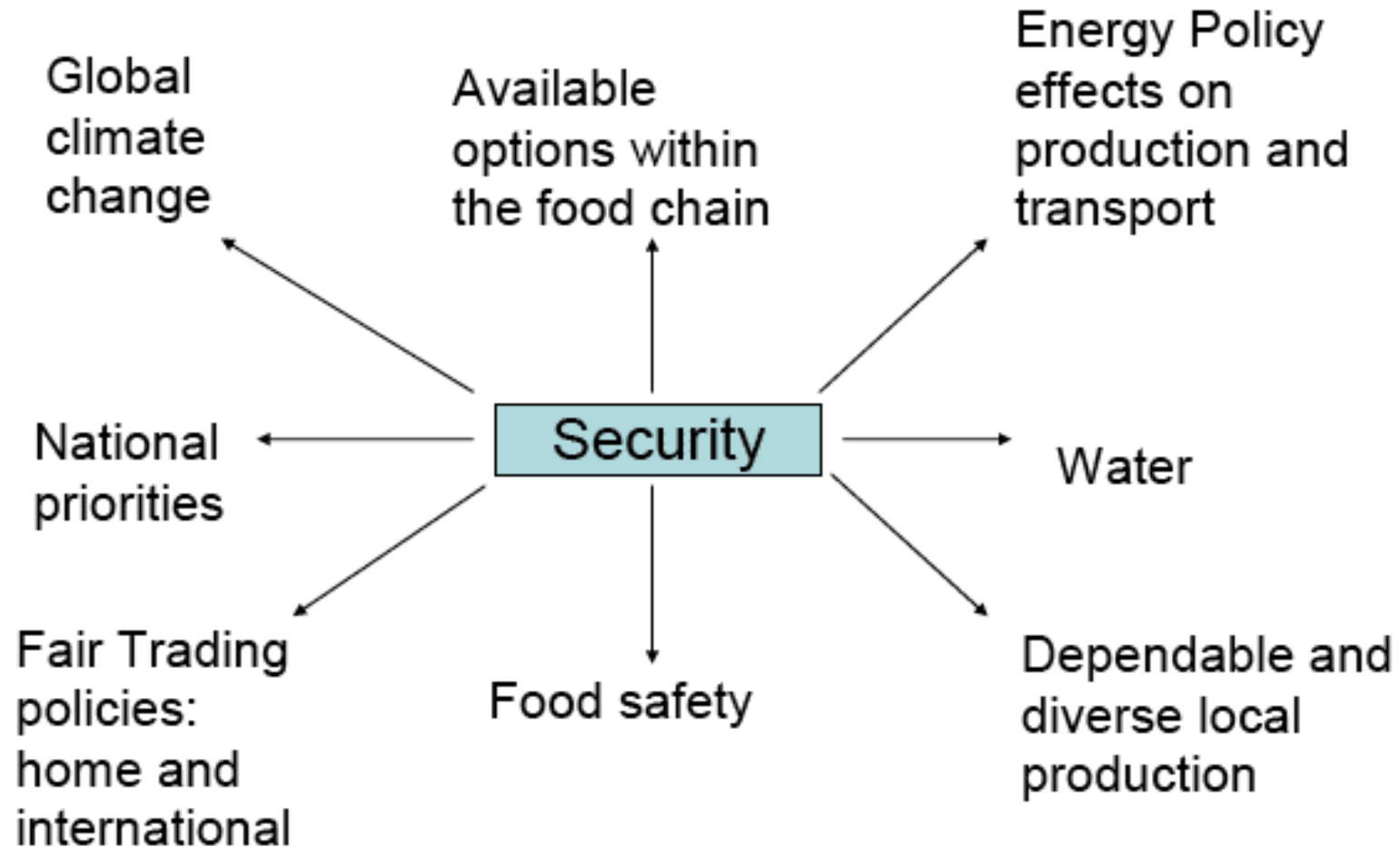


Food Security

Food security is built on **three pillars**: (1)



Food Security

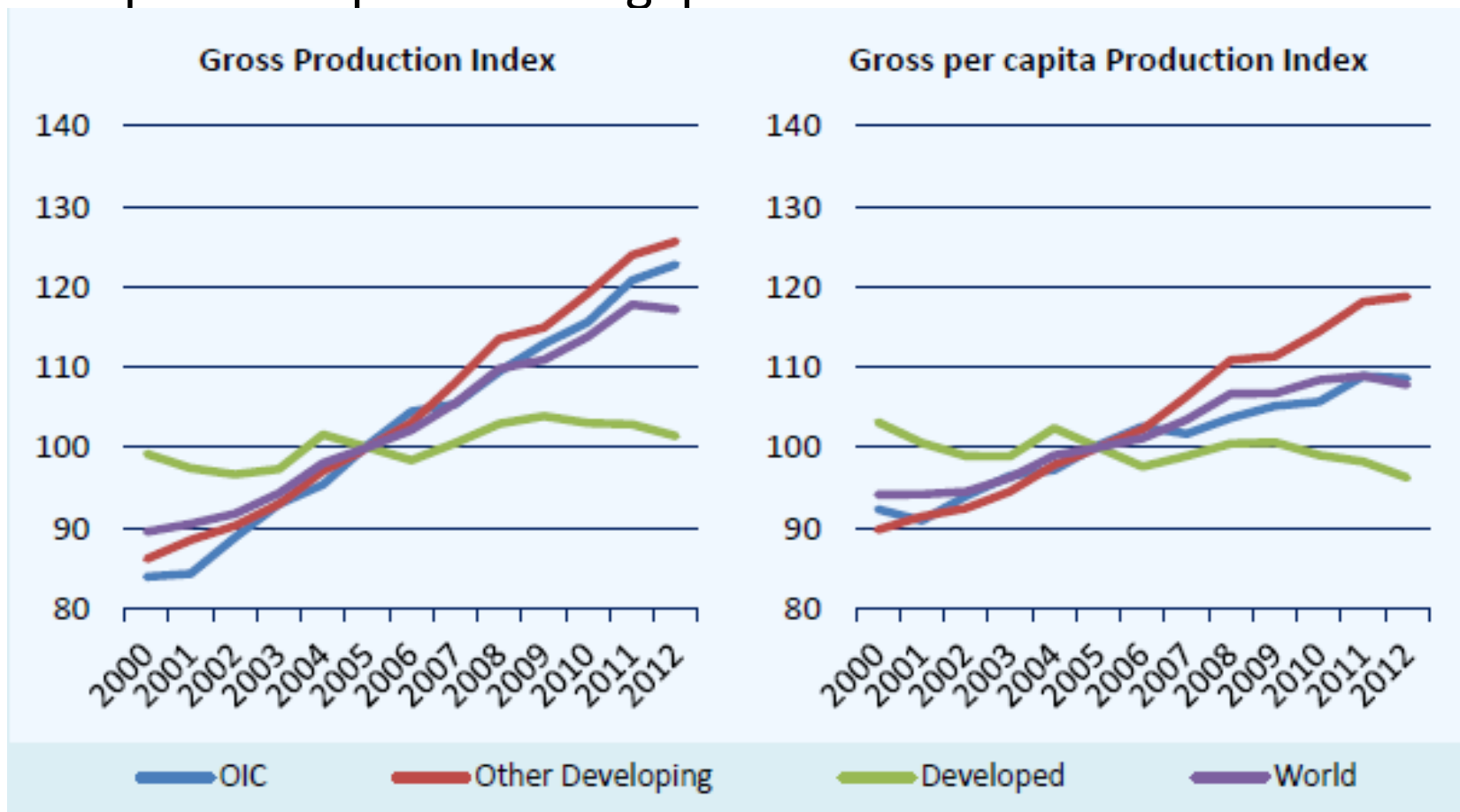


(2)



Food Production Index 2000-2012 (4)

Per capita food production gap with other countries is increasing

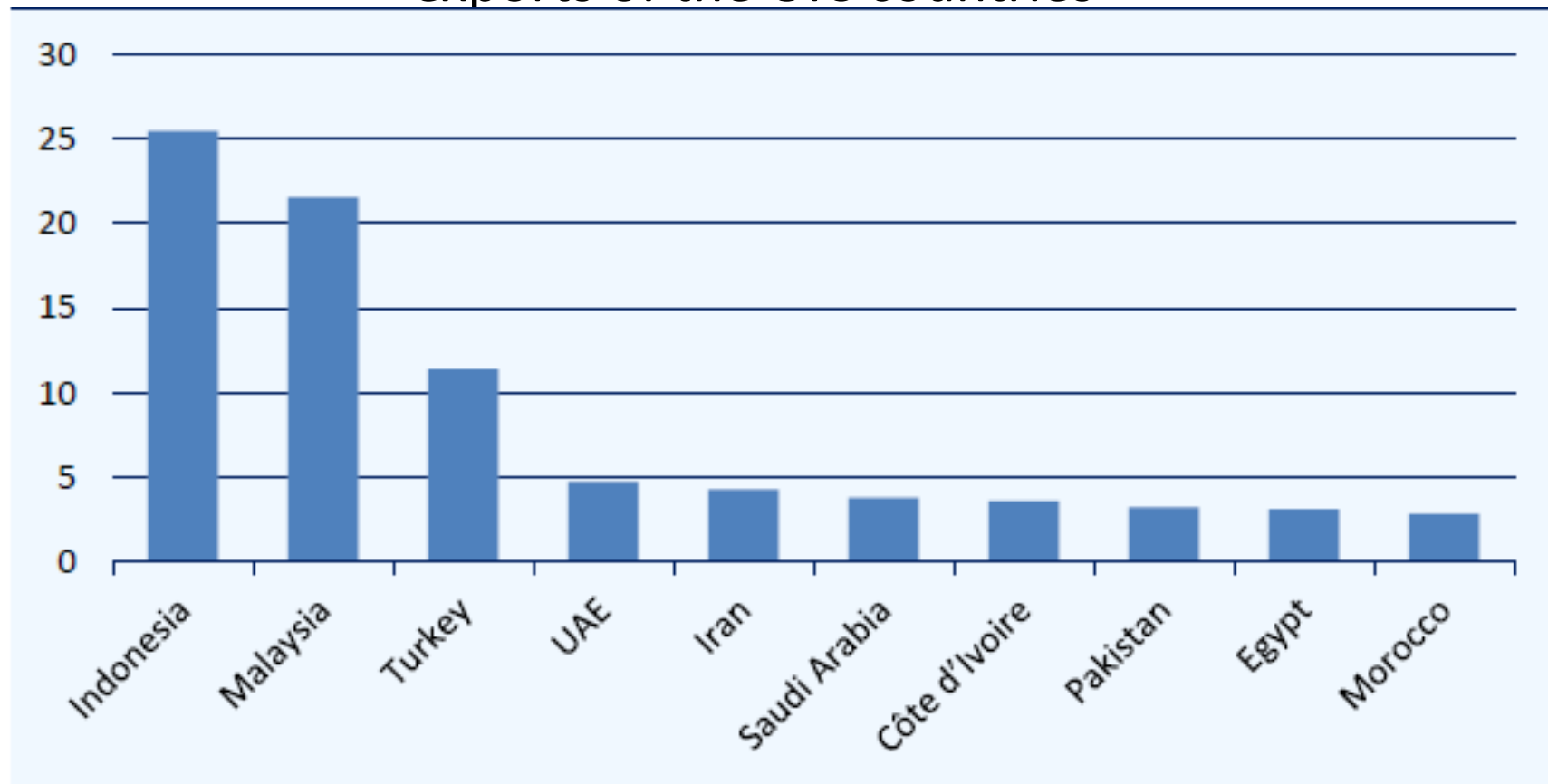


Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Tables 12 and 13)



OIC Top-10 Food Exporters, 2012 (4)

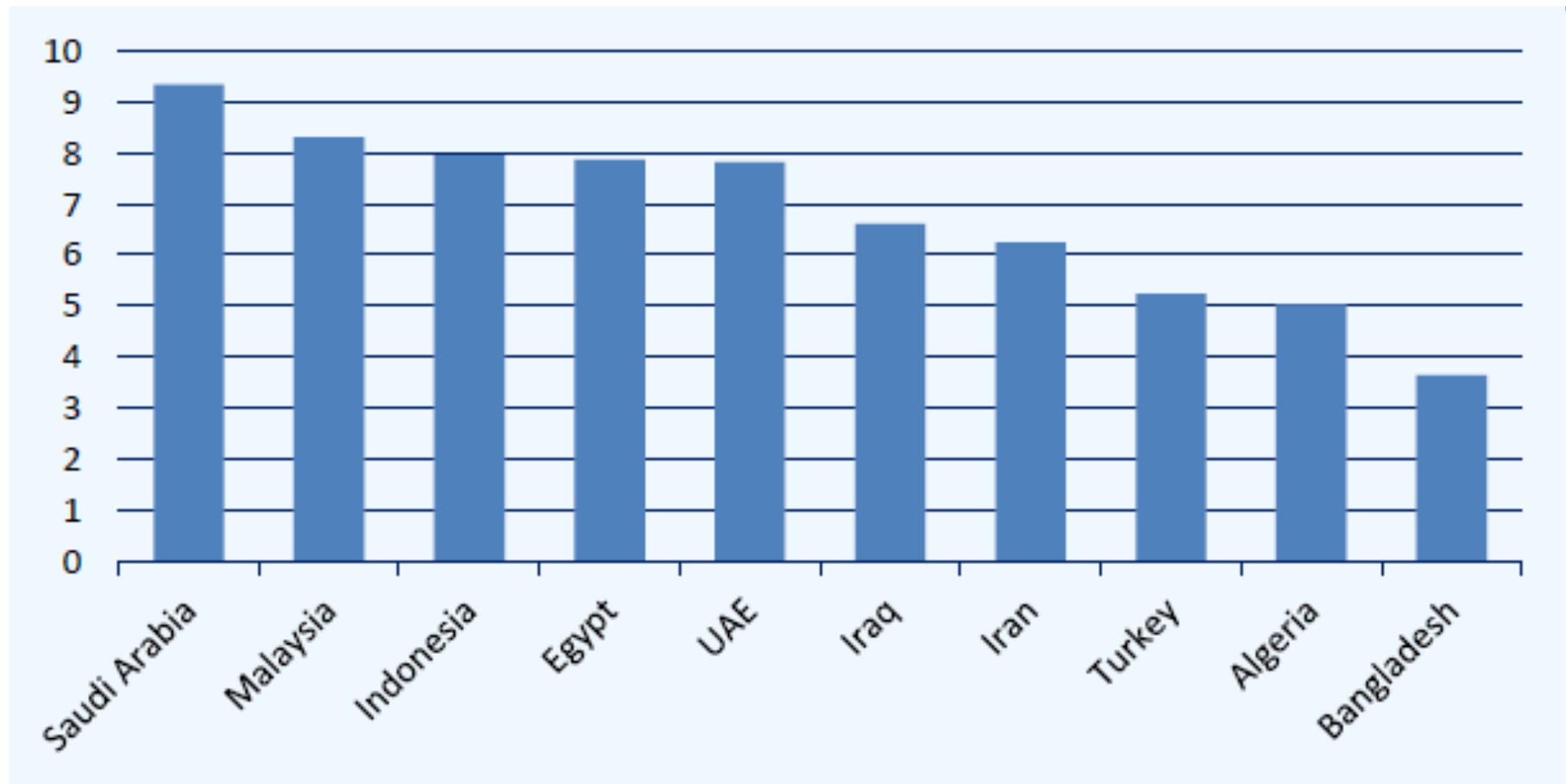
In 2012, only 10 countries, accounted for 84% of the total food exports of the OIC countries



Source: World Trade Organization Online Database (Annex Table 14)



OIC Top-10 Food Importers, 2012 (4)

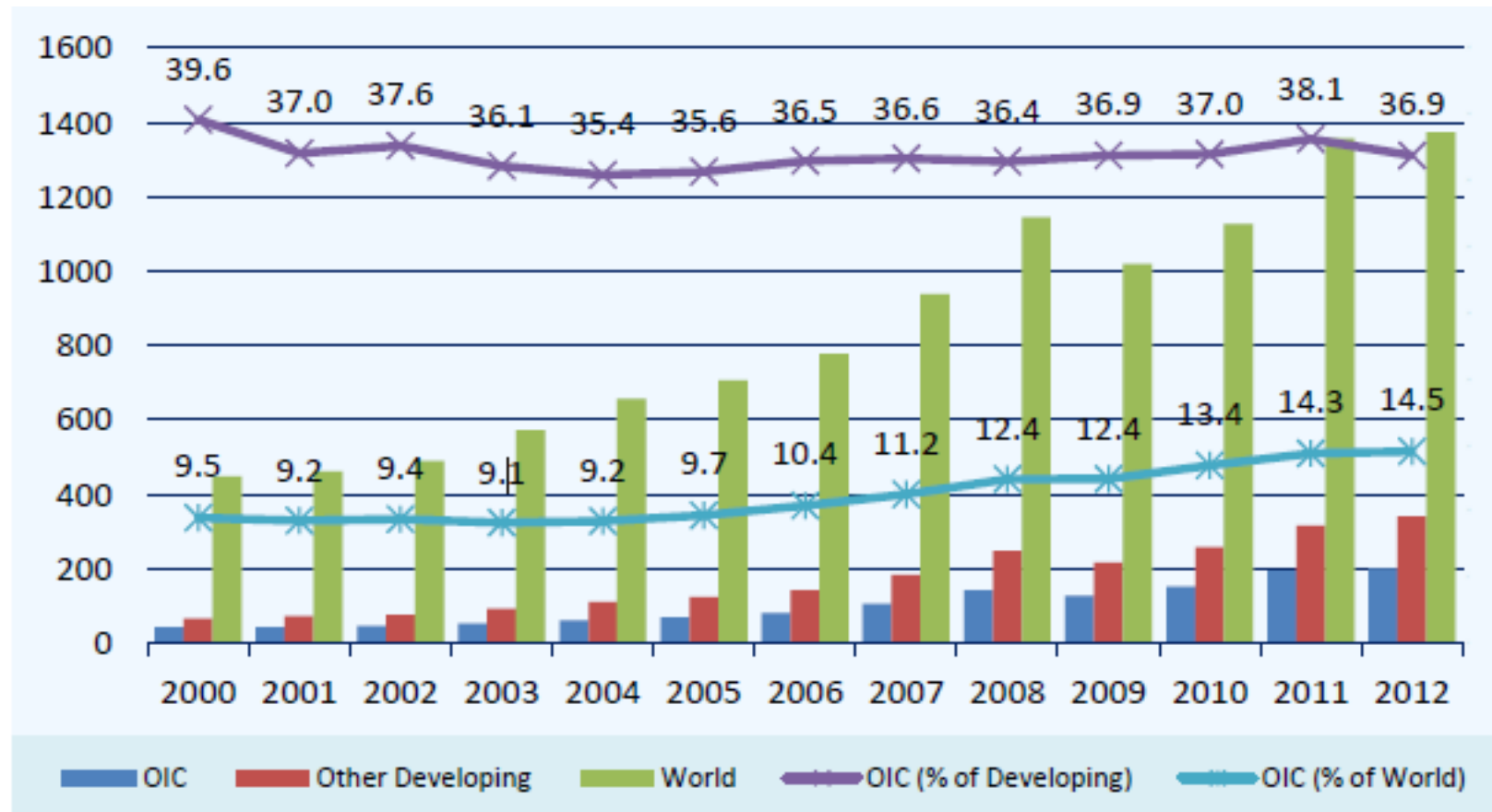


Source: World Trade Organization Online Database (Annex Table 15)



Food Imports (US\$ billion) (4)

OIC countries are net importers of food



Source: World Trade Organization Online Database (Annex Table 15)



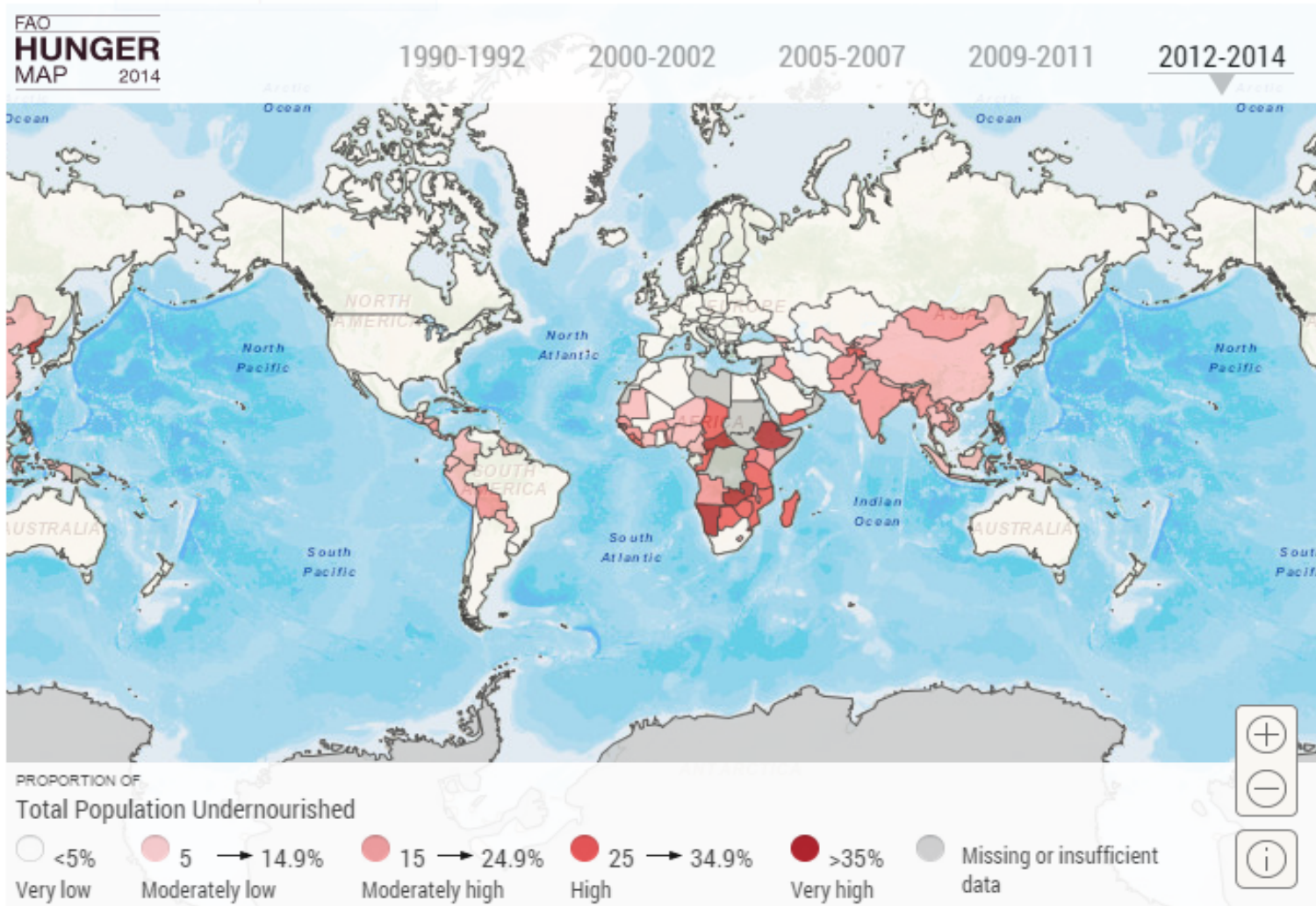
Low-Income Food Deficit Countries in OIC Member Countries (5)

Afghanistan	Gambia	Senegal
Bangladesh	Guinea	Sierra Leone
Benin	Guinea-Bissau	Somalia
Burkina Faso	Kyrgyz Republic	Sudan
Cote d'Ivoire	Mali	Tajikistan
Cameroon	Mauritania	Togo
Chad	Mozambique	Uganda
Comoros	Niger	Uzbekistan
Djibouti	Nigeria	Yemen

Source: www.fao.org



Food Security Situation Worldwide (6)



Food Security Situation Worldwide

Regions/subregions/countries	Number of people undernourished						Proportion of undernourished in total population					
	1990-92	2000-02	2005-07	2009-11	2012-14 ³	Change so far ⁴	1990-92	2000-02	2005-07	2009-11	2012-14 ³	Change so far ⁴
	(millions)					(%)	(%)					
WORLD	1 014.5	929.9	946.2	840.5	805.3	-20.6	18.7	14.9	14.3	12.1	11.3	-39.6
Developed regions	20.4	21.1	15.4	15.7	14.6	-28.4	<5.0	<5.0	<5.0	<5.0	<5.0	na
Developing regions	994.1	908.7	930.8	824.9	790.7	-20.5	23.4	18.2	17.3	14.5	13.5	-42.4
Least-developed countries ⁶	209.3	243.4	237.6	237.8	246.7	17.8	40.0	36.4	31.4	28.6	27.5	-31.3
Landlocked developing countries ⁷	94.6	112.4	105.9	102.4	106.9	13.0	35.7	33.6	28.3	25.0	23.7	-33.6
Small island developing states ⁸	10.2	10.7	10.9	10.0	10.0	-2.3	24.5	22.5	21.4	18.8	18.1	-26.0
Low-income economies ⁹	199.4	237.4	231.4	232.8	244.0	22.4	39.2	36.4	31.7	29.3	28.4	-27.7
Lower-middle-income economies ¹⁰	408.3	374.9	421.3	357.7	348.6	-14.6	22.9	17.5	18.2	14.4	13.7	-40.3
Low-income food-deficit countries ¹¹	461.1	468.5	514.5	471.7	481.8	4.5	27.6	22.8	22.8	19.4	18.9	-31.7
FAO regions												
<i>Africa</i> ¹²	176.0	202.5	205.3	211.2	214.1	21.6	33.3	29.8	26.5	24.4	23.8	-28.5
<i>Asia and the Pacific</i> ¹³	727.1	618.3	648.5	543.8	504.6	-30.6	24.4	18.0	17.8	14.3	12.9	-47.0
<i>Europe and Central Asia</i> ¹⁴	9.9	11.5	8.9	7.7	6.3	-36.8	8.0	8.5	6.2	5.1	<5.0	na
<i>Latin America and the Caribbean</i> ¹⁵	68.4	61.0	49.2	41.5	37.0	-45.9	15.3	11.5	8.7	7.0	6.1	-60.3
<i>Near East and North Africa</i> ¹⁶	16.5	23.0	26.7	26.9	32.8	98.6	6.6	7.5	7.9	7.3	7.7	17.8

(3)



Food Security Situation in OIC Countries (3)

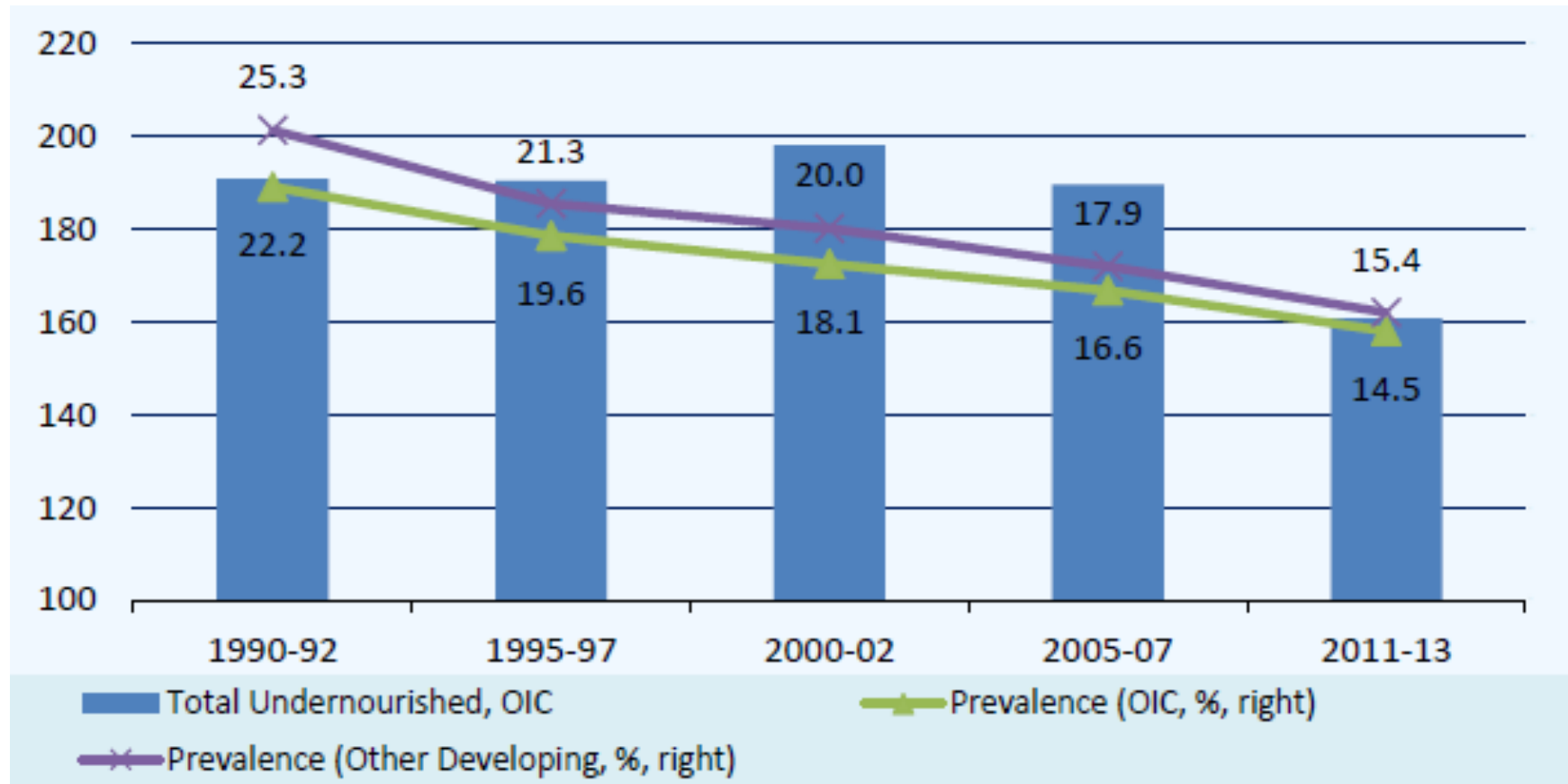
Regions/subregions/countries	Number of people undernourished						Proportion of undernourished in total population					
	1990-92	2000-02	2005-07	2009-11	2012-14*	Change so far*	1990-92	2000-02	2005-07	2009-11	2012-14*	Change so far*
	(millions)					(%)	(%)					
AFRICA	182.1	209.0	211.8	216.8	226.7	24.5	27.7	25.2	22.6	20.9	20.5	-26.1
Northern Africa¹⁷	6.0	6.5	6.4	5.6	12.6	<i>na</i>	<5.0	<5.0	<5.0	<5.0	6.0	<i>na</i>
Algeria	2.1	2.7	2.4	1.9	ns	>-50.0	7.7	8.4	6.8	5.1	<5.0	na
Egypt	ns	ns	ns	ns	ns	>-50.0	<5.0	<5.0	<5.0	<5.0	<5.0	na
Morocco	1.5	1.9	1.7	1.7	ns	>0.0	5.9	6.6	5.5	5.3	<5.0	na
Tunisia	ns	ns	ns	ns	ns	>0.0	<5.0	<5.0	<5.0	<5.0	<5.0	na
Sub-Saharan Africa¹⁴	176.0	202.5	205.3	211.2	214.1	21.6	33.3	29.8	26.5	24.4	23.8	-26.5
Benin	1.5	1.6	1.3	1.2	1.0	-31.5	28.1	22.4	15.1	12.4	9.7	-65.6
Cameroon	4.7	5.0	3.9	2.8	2.3	-50.4	37.8	30.8	21.0	13.5	10.5	-72.3
Central African Republic	1.4	1.6	1.6	1.5	1.7	23.3	47.3	42.9	40.7	34.4	37.6	-20.4
Chad	3.6	3.5	4.1	4.9	4.5	23.1	59.1	40.1	39.9	41.5	34.8	-41.1
Côte d'Ivoire	1.3	2.7	2.5	2.8	3.0	123.3	10.6	16.2	14.1	14.6	14.7	37.7
Djibouti	0.5	0.4	0.3	0.2	0.2	-64.0	74.8	48.9	33.0	23.1	18.9	-74.8
Gabon	0.1	ns	ns	ns	ns	>-50.0	11.7	<5.0	<5.0	<5.0	<5.0	na
Gambia	0.1	0.2	0.2	0.1	0.1	-11.3	13.3	13.0	14.9	8.8	6.0	-
Guinea	1.5	2.3	2.1	2.0	2.1	43.8	23.2	26.1	21.4	18.4	18.1	-
Guinea-Bissau	0.2	0.3	0.4	0.4	0.3	25.3	23.1	26.6	25.7	23.1	17.7	-
Mali	1.4	1.3	1.1	ns	ns	<-50.0	16.7	12.6	9.1	<5.0	<5.0	na
Mauritania	0.3	0.3	0.4	0.3	0.3	-17.3	14.6	11.2	10.8	7.4	6.5	-
Mozambique	7.7	7.8	7.8	7.5	7.2	-6.7	55.4	41.2	36.2	31.2	27.9	-
Niger	2.2	2.3	2.0	1.8	2.0	-9.4	27.7	20.5	14.4	11.0	11.3	-
Nigeria	20.9	11.	9.2	8.9	11.2	-46.4	21.3	8.9	6.4	5.5	6.4	-
Rwanda	3.8	4.7	4.5	4.0	4.0	3.7	55.6	54.3	46.3	37.2	33.8	-
Senegal	1.9	2.9	2.4	1.8	2.4	24.1	24.5	28.2	21.1	13.9	16.7	-
Sierra Leone	1.7	1.7	2.0	1.8	1.6	-10.2	42.8	40.2	37.4	31.0	25.5	-
Sudan (former) ¹⁹	10.6	9.6	10.	11.	na	na	40.0	27.2	25.0	24.3	na	na
Togo	1.5	1.4	1.4	1.3	1.0	-29.0	37.9	28.7	24.2	20.5	15.3	-
Uganda	4.2	7.1	6.6	8.5	9.7	129.9	23.2	28.1	22.2	24.9	25.7	11.1

Food Security Situation in OIC Countries (3)

	1990-92	2000-02	2005-07	2009-11	2012-14 ^a	Change so far ^a	1990-92	2000-02	2005-07	2009-11	2012-14 ^a	Change so far ^a
	(millions)					(%)	(%)					
ASIA	742.6	637.5	668.6	565.3	525.6	-29.2	23.7	17.6	17.4	14.1	12.7	-46.5
Caucasus and Central Asia	9.6	10.9	8.5	7.4	6.0	-37.3	14.1	15.3	11.3	9.5	7.4	-47.4
<i>baijan</i>	1.8	1.4	ns	ns	ns	<-50.0	23.6	17.1	<5.0	<5.0	<5.0	na
<i>Kazakhstan</i>	ns	ns	0.8	ns	ns	>-50.0	<5.0	<5.0	5.0	<5.0	<5.0	na
<i>Kyrgyzstan</i>	0.7	0.8	0.5	0.4	0.3	-54.3	16.0	16.7	9.4	7.9	6.0	-62.6
<i>Tajikistan</i>	1.6	2.5	2.8	2.9	2.7	65.9	28.1	39.5	40.5	37.4	32.3	15.2
<i>Turkmenistan</i>	0.4	0.4	0.2	ns	ns	<-50.0	8.6	8.4	5.1	<5.0	<5.0	na
<i>Uzbekistan</i>	ns	3.6	3.3	2.5	1.7	134.7	<5.0	14.4	12.6	9.1	5.8	74.6
Southern Asia (excluding India)	81.0	86.7	85.8	84.1	85.8	5.9	24.5	21.0	19.1	17.7	17.3	-29.4
<i>Afghanistan</i>	3.8	10.0	8.3	7.1	7.5	100.8	29.5	46.7	32.4	24.8	24.7	-16.4
<i>Bangladesh</i>	36.0	27.7	24.3	26.0	26.2	-27.3	32.8	20.6	16.8	17.2	16.7	-50.0
<i>India</i>	210.8	186.2	235.7	190.4	190.7	-9.5	23.8	17.6	20.6	15.8	15.2	-36.0
<i>Iran (Islamic Republic of)</i>	2.9	3.8	4.7	4.7	ns	>0.0	5.1	5.6	6.6	6.4	<5.0	na
<i>Maldives</i>	<0.1	<0.1	<0.1	<0.1	<0.1	-22.3	12.3	11.9	15.3	9.8	6.2	-50.1
<i>Pakistan</i>	28.7	34.3	38.2	37.6	39.6	37.9	25.1	23.4	23.7	21.7	21.7	-13.5
South-Eastern Asia	138.0	117.7	103.3	79.3	63.5	-54.0	30.7	22.3	18.3	13.4	10.3	-66.3
<i>Brunei Darussalam</i>	ns	ns	ns	ns	ns	>0.0	<5.0	<5.0	<5.0	<5.0	<5.0	na
<i>Indonesia</i>	35.9	38.3	42.7	32.3	21.6	-39.8	19.7	18.1	18.7	13.4	8.7	-56.2
<i>Malaysia</i>	1.0	ns	ns	ns	ns	>0.0	5.1	<5.0	<5.0	<5.0	<5.0	na
Western Asia^{2b}	8.0	13.8	17.0	18.3	18.5	132.0	6.3	8.6	9.3	9.1	8.7	38.6
<i>Iraq</i>	1.4	5.8	7.3	7.8	7.9	460.6	7.9	23.5	26.0	25.2	23.5	199.2
<i>Jordan</i>	0.2	0.3	ns	ns	ns	>-50.0	5.5	6.0	<5.0	<5.0	<5.0	na
<i>Kuwait</i>	0.8	ns	ns	ns	ns	<-50.0	39.5	<5.0	<5.0	<5.0	<5.0	na
<i>Lebanon</i>	ns	ns	ns	ns	ns	>0.0	<5.0	<5.0	<5.0	<5.0	<5.0	na
<i>Saudi Arabia</i>	ns	ns	ns	ns	ns	>-50.0	<5.0	<5.0	<5.0	<5.0	<5.0	na
<i>Turkey</i>	ns	ns	ns	ns	ns	>-50.0	<5.0	<5.0	<5.0	<5.0	<5.0	na
<i>United Arab Emirates</i>	ns	ns	ns	ns	ns	>0.0	<5.0	<5.0	<5.0	<5.0	<5.0	na
<i>Yemen</i>	3.6	5.3	6.1	6.1	6.3	75.0	28.9	29.5	29.6	26.6	25.7	-11.1
Latin America	60.3	52.7	40.8	33.9	29.5	-51.1	14.4	10.7	7.7	6.1	5.1	-64.3
<i>Guyana</i>	0.2	<0.1	<0.1	<0.1	<0.1	-51.4	22.8	9.7	10.4	11.9	10.0	-56.0
<i>Suriname</i>	<0.1	<0.1	<0.1	<0.1	<0.1	-29.0	15.5	13.9	11.5	8.7	8.4	-45.7

Under-nourishment in OIC Member Countries

One in eight people across the globe are undernourished

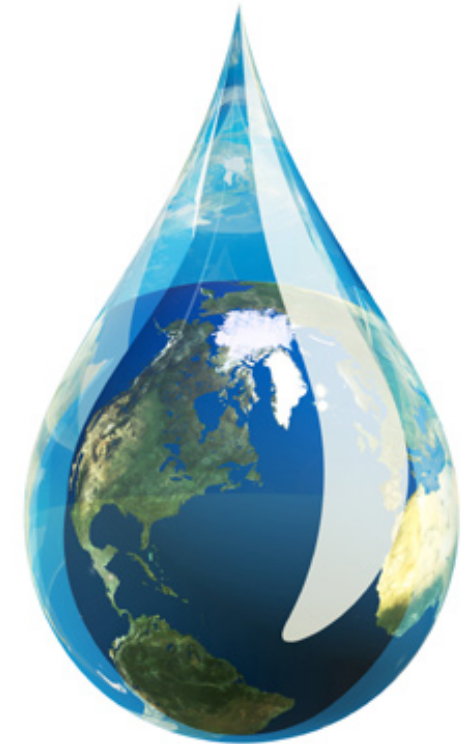


Source: Food and Agriculture Organization (FAO) FAOSTAT Online Database (Annex Tables 17 and 18)

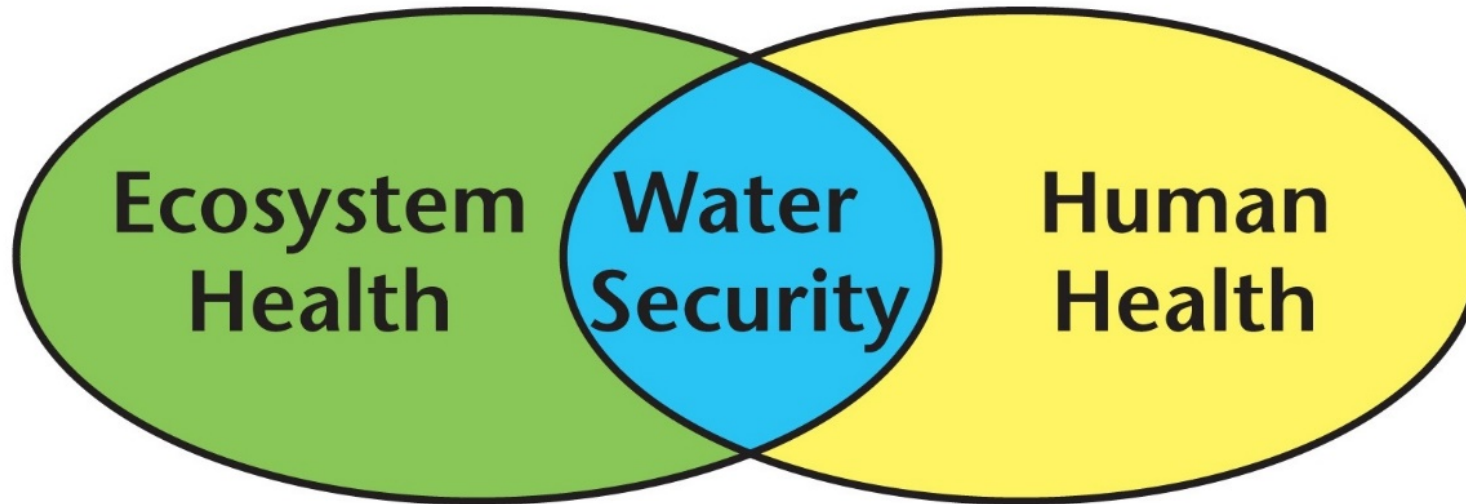


Water Security

The capacity of a population to safeguard sustainable access to adequate quantities of acceptable quality water for sustaining livelihoods, human well-being, and socio-economic development, for ensuring protection against water-borne pollution and water-related disasters, and for preserving ecosystems in a climate of peace and political stability. (7)



Water Security (8)



Water Security :

« sustainable access on a watershed basis to adequate quantities of water, of acceptable quality, to ensure human and ecosystem health. »

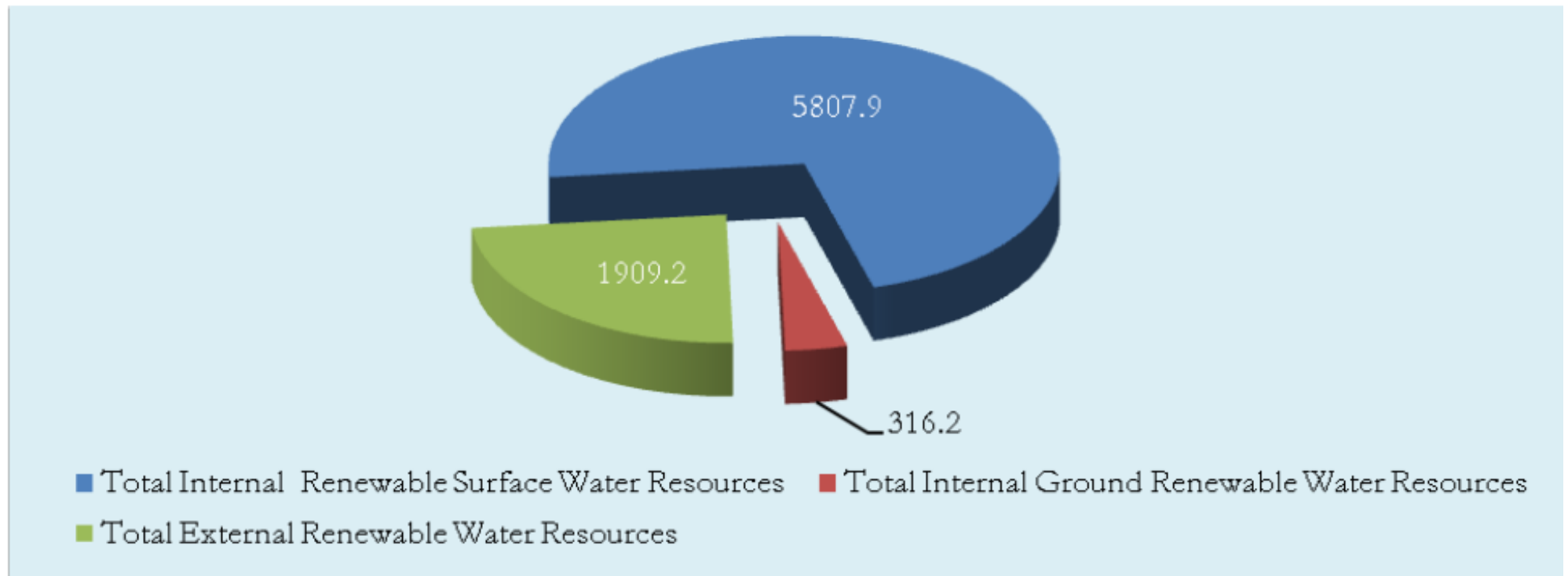
Water Resources OIC Member Countries

- The total renewable water resources in OIC Member Countries is 8033.32 km³ in 2007, which represents 9.86% of the world total renewable resources.
- The total internal resources is approximately 76.2% of the total renewable resources of OIC Member Countries.
- The total amount of surface water resources, which means rivers and natural ponds, represents around 95% of total internal water. (9)



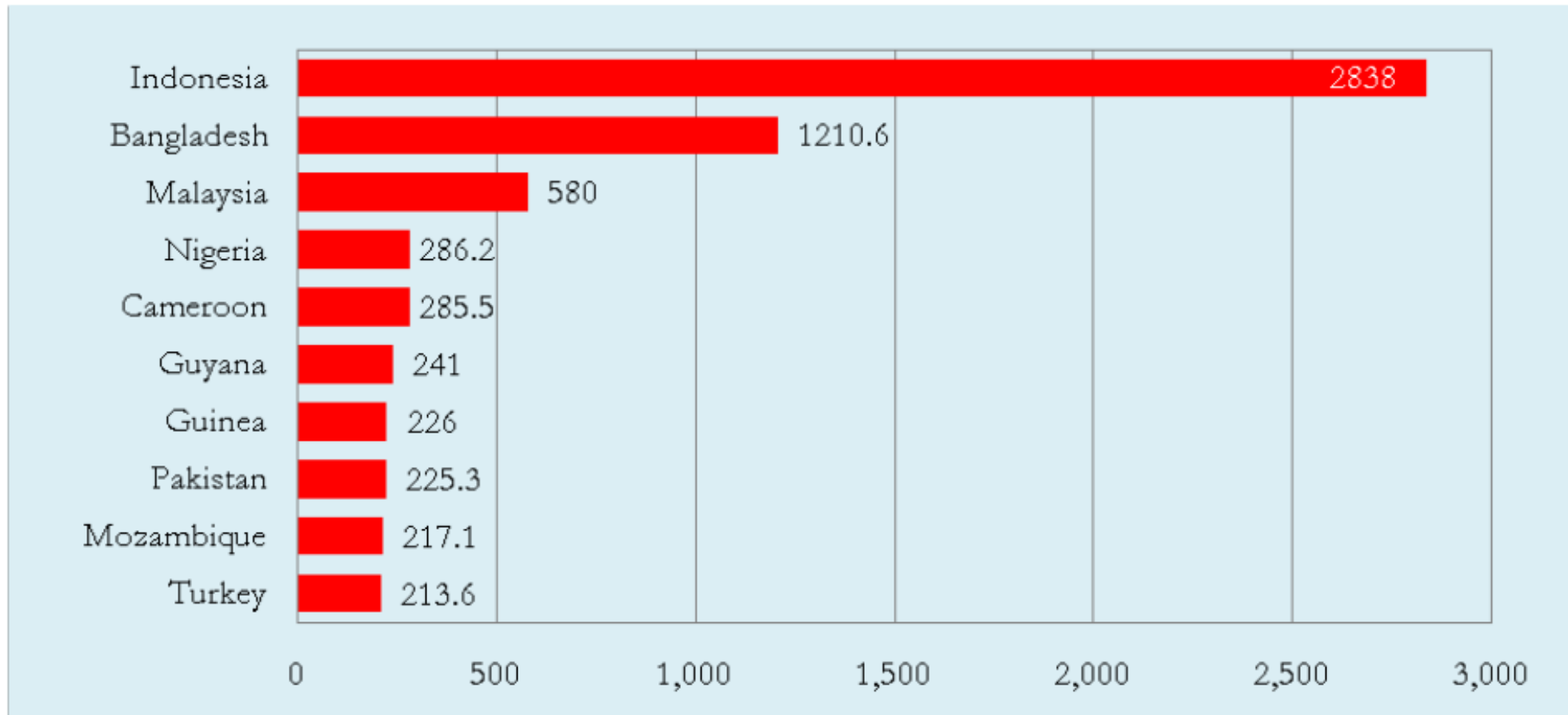
Water Resources OIC Member Countries

Total Renewable Internal and External Water Resources in OIC Member Countries (9)



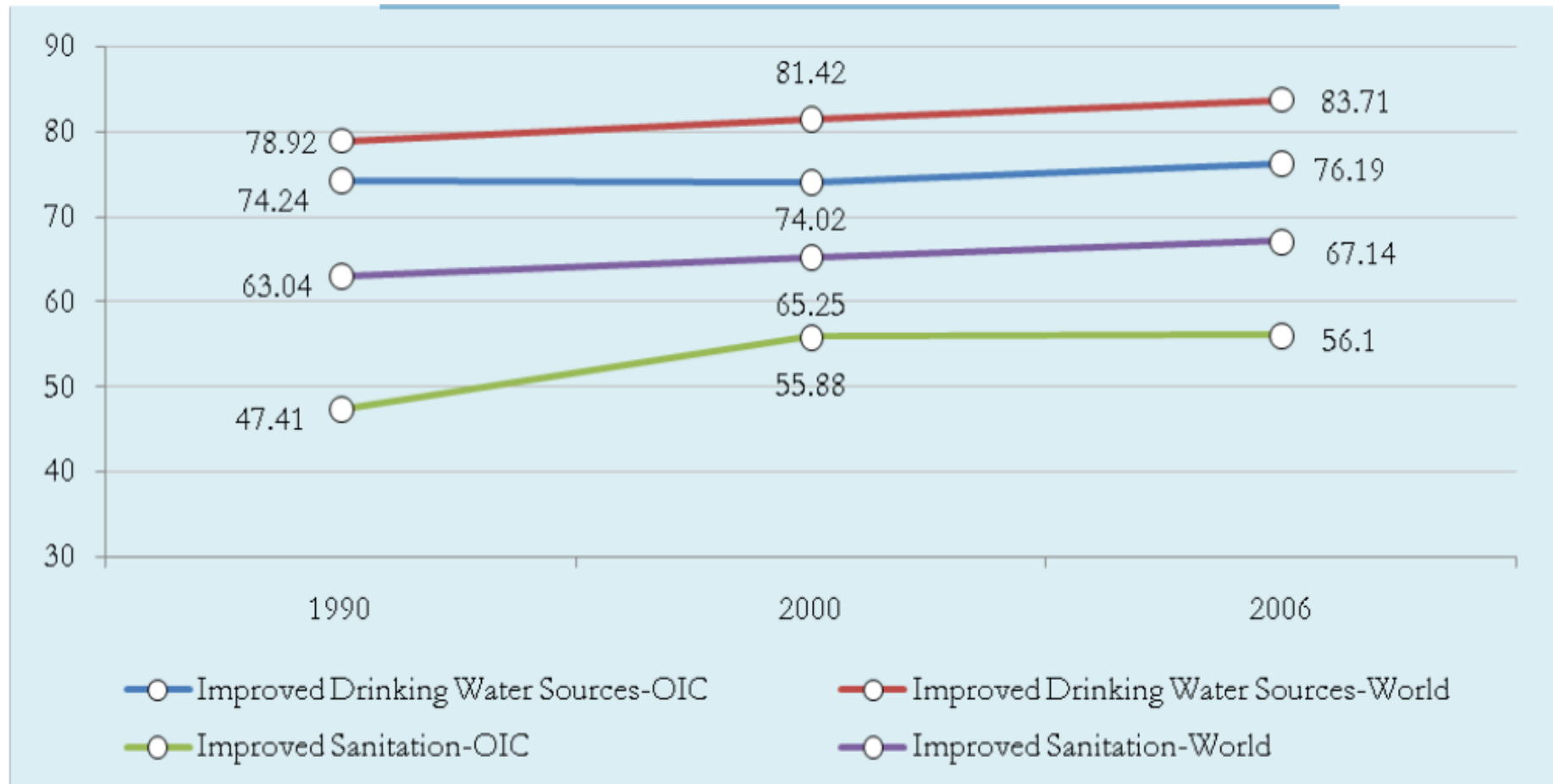
Water Resources OIC Member Countries

Top 10 Highest Total Renewable Water Resources in OIC (9)



Water Resources OIC Member Countries

Population with Access to Improved Water and Sanitation (%) Regions, 2007 (km³) (9)



Food Safety

Food safety refers to the conditions and practices that preserve the quality of food to prevent contamination and foodborne illnesses.
(10)



Foodborne Disease

- Foodborne disease is any disease from a short, mild illness to life-threatening disease resulting from consumption of contaminated food.
- Causes: Viruses, Bacteria, Parasites, Toxins, Metals, Prions



Food Safety on Farm to Fork Chain

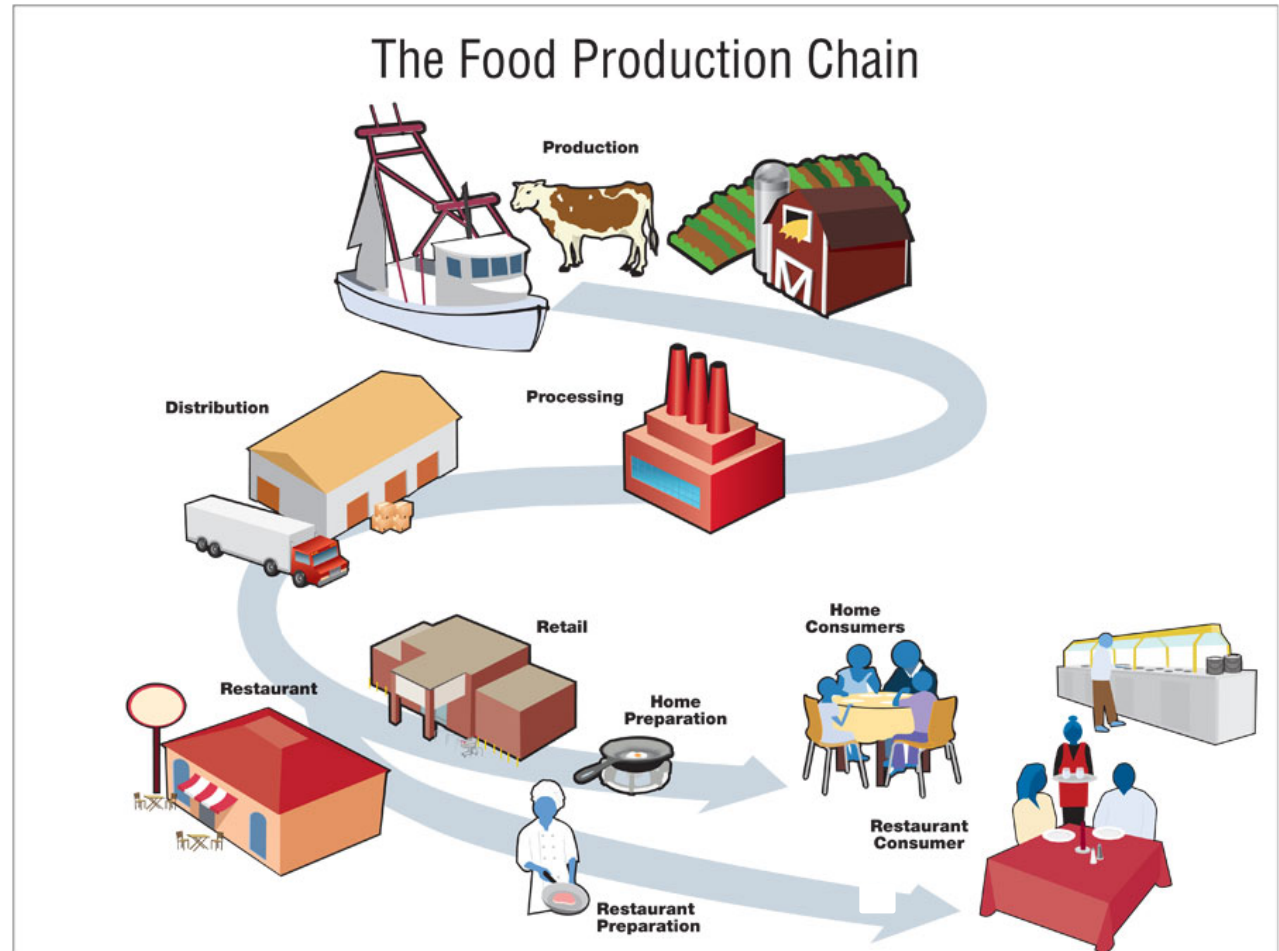
Foodborne Diseases

EFSA (2014)

- salmonellosis is **the second most common** illness in EU

- 27 EU countries have reported 91,034 human salmonellosis

- **Transmission from animals**, mostly farm animals, pork, reptiles and produce



Foodborne Diseases

- Diseases in humans result from the consumption of either food and water contaminated with
 - viable pathogenic bacterial cells (or spores)
 - food containing toxins produced by toxigenic bacteria and molds



Foodborne Diseases

- Divided into 3 groups:
 - Intoxication or poisoning
 - Infection



Intoxication or poisoning

- Illness occurs due to the consumption of toxins of bacteria and molds in foods.
 - Exp.: Staph food poisoning



Infection

- Illness occurs as a result of the consumption of food and water contaminated with enteropathogenic bacteria.
 - Enteropathogenic bacteria alive in the food or water during consumption
 - Viable cells, even in small numbers, can establish and multiply in the digestive tract
- Exp.: Salmonellosis



Foodborne intoxication or poisoning

Illness occurs due to the consumption of toxins of bacteria and molds in foods



Foodborne intoxication or poisoning

General characteristics:

- Toxin produced by a pathogen while growing in a food
- Heat labile or heat stable toxin
- Ingestion of a food, containing active toxin, not viable cells
- Symptoms occurring quickly, as early as 30 min after ingestion
- Symptoms differing with type of toxins
- Febrile (feverish) not present



Foodborne intoxication or poisoning

1. Staphylococcal Intoxication
2. Botulism
3. Mycotoxicosis



Infection

- Illness occurs as a result of the consumption of food and water contaminated with enteropathogenic bacteria and viruses.
 - Enteropathogenic bacteria alive/viruses in the food or water during consumption
 - Viable cells, even in small numbers, can establish and multiply in the digestive tract
- Exp.: Salmonellosis



Infection

Characteristics:

1. Live cells of the enteric pathogens, including viruses consumed through food
2. Pathogens penetrating through the membrane and establish in the epithelial cells of the intestine, multiply, and produce toxins (infection)
3. Dose levels to cause disease varies- 1 to 10^5 cells
4. Symptoms occurring after about 24 hours
5. Symptoms including abdominal pain, diarrhea, nausea, vomiting, and fever
6. Nonenteric symptoms resulting when pathogens or their toxins passed through the intestine and invade or affect other internal organs or tissues. Ex.: enterohemorrhagic *E. coli*



Infection

Main infectious diseases due to foodborne pathogens:

1. Salmonellosis
2. Campylobacteriosis
3. Listeriosis
4. Diseases due to pathogenic *Escherichia coli*
5. Shigellosis
6. Yersiniosis
7. Gastroenteritis by *Vibrio* spp.
8. Enteric viruses



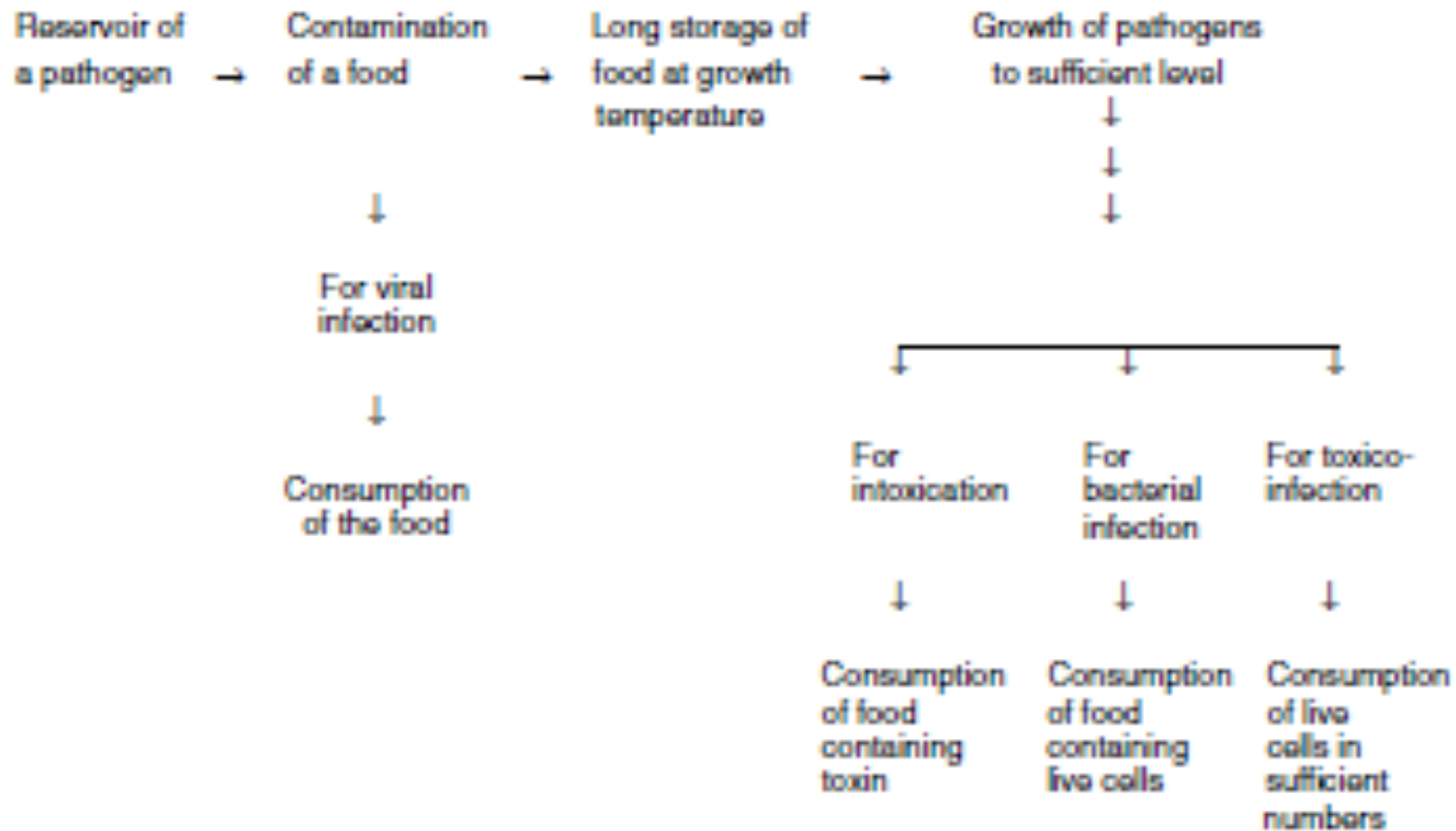
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8. Enteric viruses



Sequence of events leading to a foodborne disease



Global Burden of Foodborne Illness

- Globally, there are nearly 1.7 billion cases of diarrheal disease every year, largely attributable to contaminated food and drinking water.
- Each year diarrhea kills around 760 000 children under five.
- A significant proportion of diarrheal disease can be prevented through safe drinking-water and adequate food safety practices. (11)



Global Burden of Foodborne Illness

The global incidence of salmonellosis (12)

WHO Region	Cases (millions)	Deaths (thousands)	Incidence rate /100 pyr
SEARO	29.8	49.2	4.0
EMRO	0.56	0.9	0.1
AMRO	2.2	3.7	0.3
EURO	5.0	8.4	0.8
WPRO	53.6	88.5	3.2
AFRO	2.5	4.1	0.3
Total	94.8	155.0	1.1

Majowicz S et al., Clin Inf Dis 2010;50:882-889



Number of outbreaks and human cases in EU. 2009

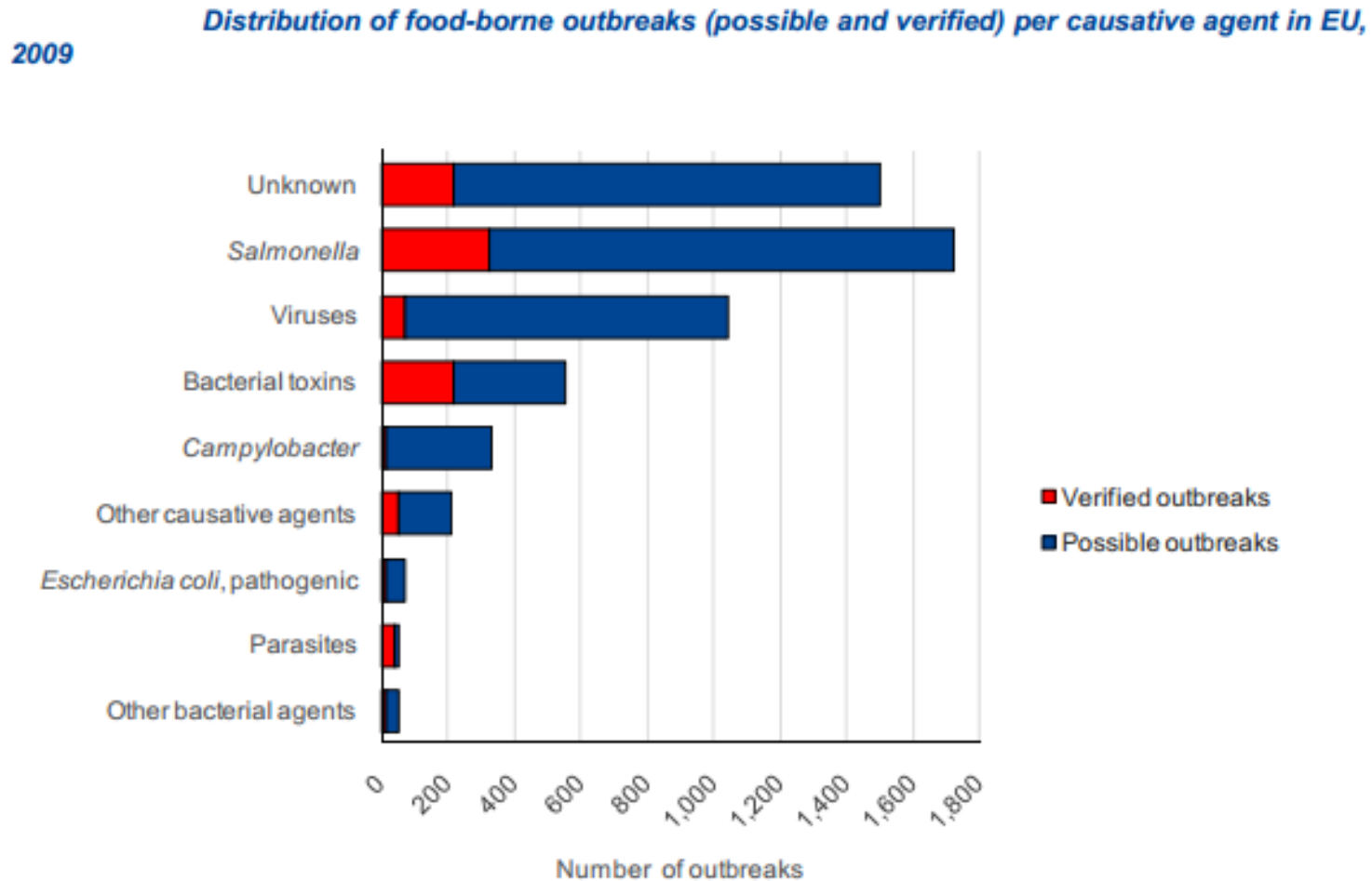
Number of outbreaks and human cases per causative agent in verified food-borne outbreaks in EU, 2009

Causative agent	2009				
	N	%	Human cases		
			Cases	Hospitalised	Deaths
<i>Salmonella</i>	324	33.2	4,500	988	6
Bacterial toxins	218	22.3	3,611	295	4
Viruses	70	7.2	3,189	15	0
Other causative agents	55	5.6	394	93	0
Parasites	40	4.1	572	259	0
<i>Escherichia coli</i> , pathogenic	18	1.8	228	62	0
<i>Campylobacter</i>	16	1.6	102	9	1
Other bacterial agents	18	1.8	248	50	12
Unknown	218	22.3	1,728	71	0
EU Total	977	100	14,572	1,842	23

Note: Data from 977 outbreaks are included: Austria (11), Belgium (14), Czech Republic (2), Denmark (16), Estonia (1), Finland (30), France (358), Germany (35), Hungary (21), Ireland (1), Latvia (111), Lithuania (8), Netherlands (33), Poland (110), Portugal (11), Romania (54), Slovakia (6), Slovenia (3), Spain (141) and Sweden (11).

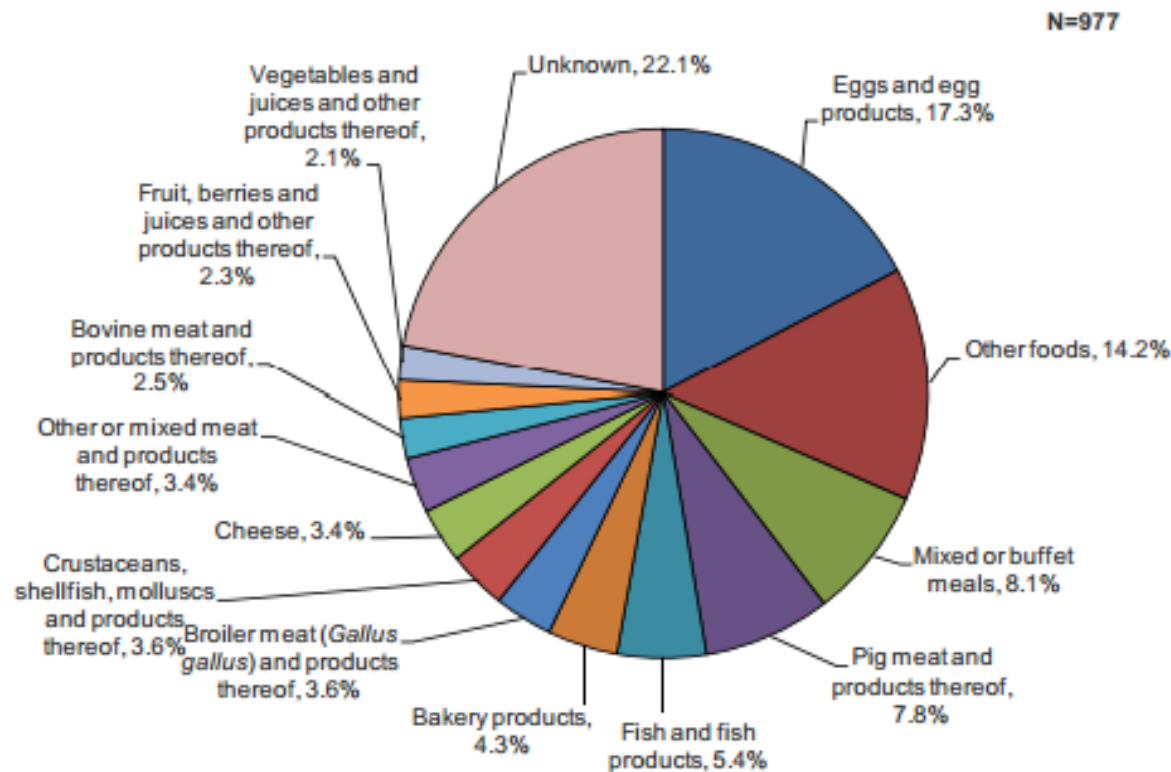


Distribution of foodborne outbreaks in EU. 2009



Distribution of verified outbreaks in EU, 2009

Distribution of verified outbreaks by food vehicle in EU, 2009



Note: Data from 977 outbreaks are included: Austria (11), Belgium (14), Czech Republic (2), Denmark (16), Estonia (1), Finland (30), France (358), Germany (35), Hungary (21), Ireland (1), Latvia (111), Lithuania (8), Netherlands (33), Poland (110), Portugal (11), Romania (54), Slovakia (6), Slovenia (3), Spain (141) and Sweden (11).

Foodborne Disease Burden in OIC Countries

Number of notifiable foodborne diseases in Malaysia from 1990 to 2009. (14)

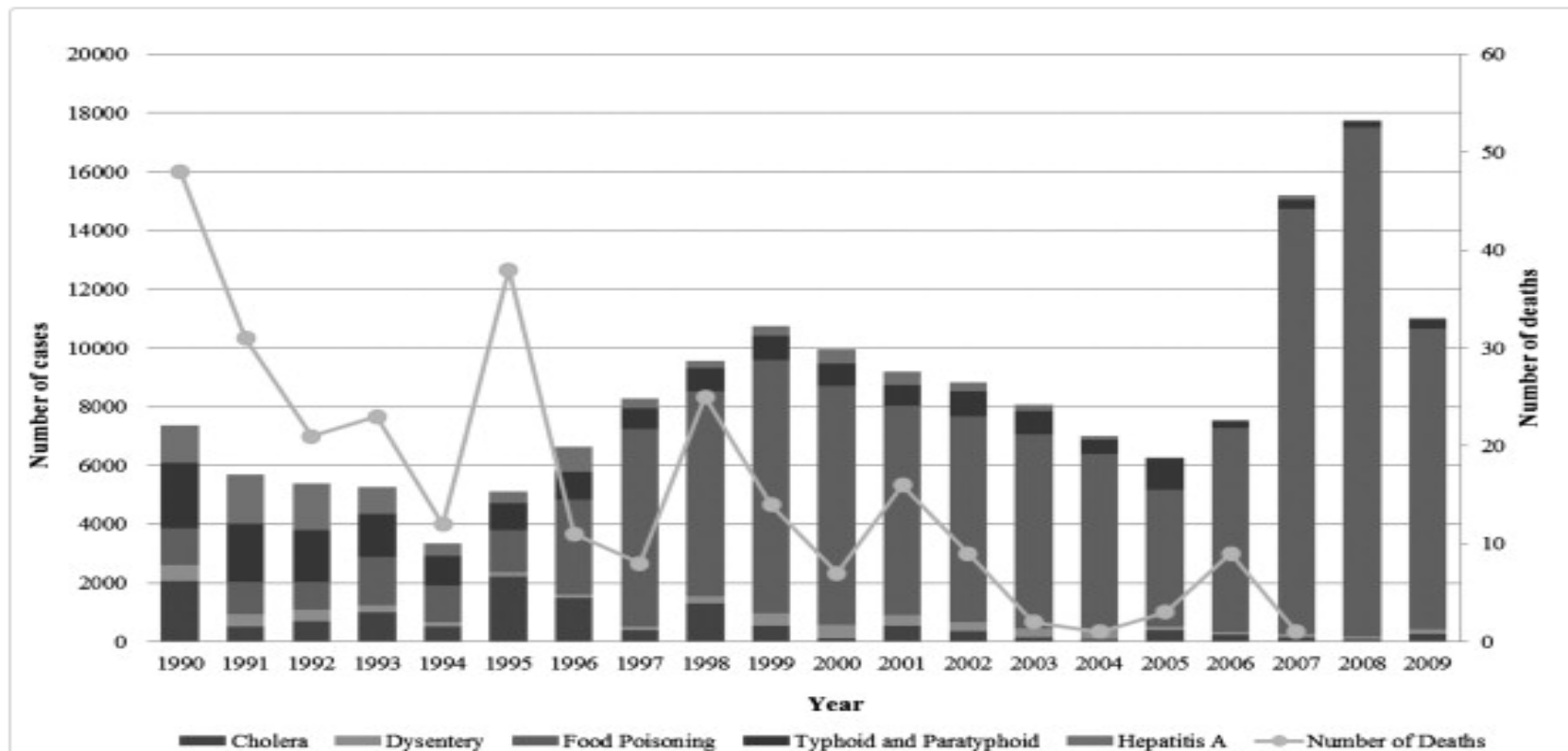


Fig. 3.

Number of notifiable foodborne diseases in Malaysia from 1990 to 2009.

Source: MOH. 2007b. MOH. 2009 and MOH. 2010a and Zulkifle (2007).



Foodborne Disease Burden in Pakistan

- Prevalence of many pathogens in several foods is commonplace in Pakistan.
- Precise estimates for foodborne illnesses in Pakistan are hard to make because of the absence of any monitoring, surveillance, and infection control.
- Cholera, campylobacteriosis, *E. coli* gastroenteritis, salmonellosis, shigellosis, typhoid, and brucellosis have been demonstrated to be the major foodborne illnesses
- Protozoa such and enteric viruses have also been found to be implicated in majority of the cases to cause these illnesses (15)



Foodborne Disease Burden in Pakistan

Top 10 Causes of Deaths in Pakistan (16)

Lower respiratory infections 12%
Ischaemic heart disease 11%
Diarrheal disease 9 %
Perinatal conditions 8%
Cerebrovascular disease 6%
Tuberculosis 5%
Chronic obstructive pulmonary disease 4%
Measles 3%
Whooping cough 2%
Congenital anomalies 2%

Top 10 Causes of Deaths in US (17)

Heart disease: 596,577
Cancer: 576,691
Chronic lower respiratory diseases: 142,943
Stroke: 128,932
Accidents: 126,438
Alzheimer's disease: 84,974
Diabetes: 73,831
Influenza and Pneumonia: 53,826
Kidney Diseases: 45,591
suicide 39,518

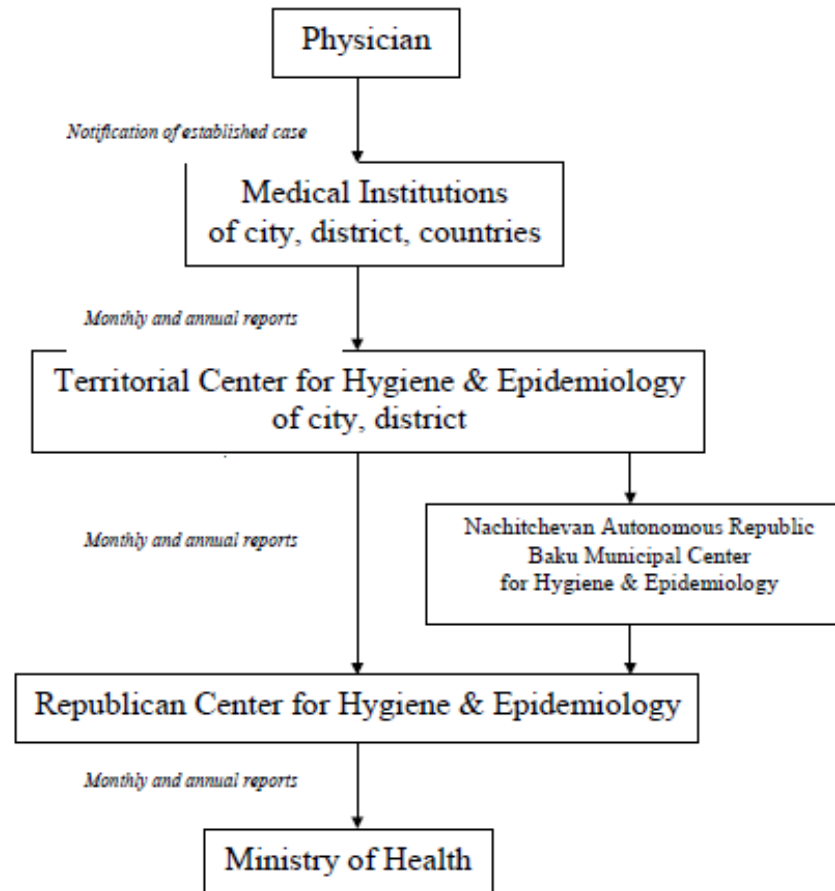


Food Safety Situation in OIC Countries

- Very high incidence of water and foodborne pathogenic infections
 - Leading to very high morbidity and mortality rates.
- No comprehensive system or organization exists for surveillance of outbreaks,
- No mechanism of outbreak investigation, control, and prevention of water and foodborne infection at OIC level.



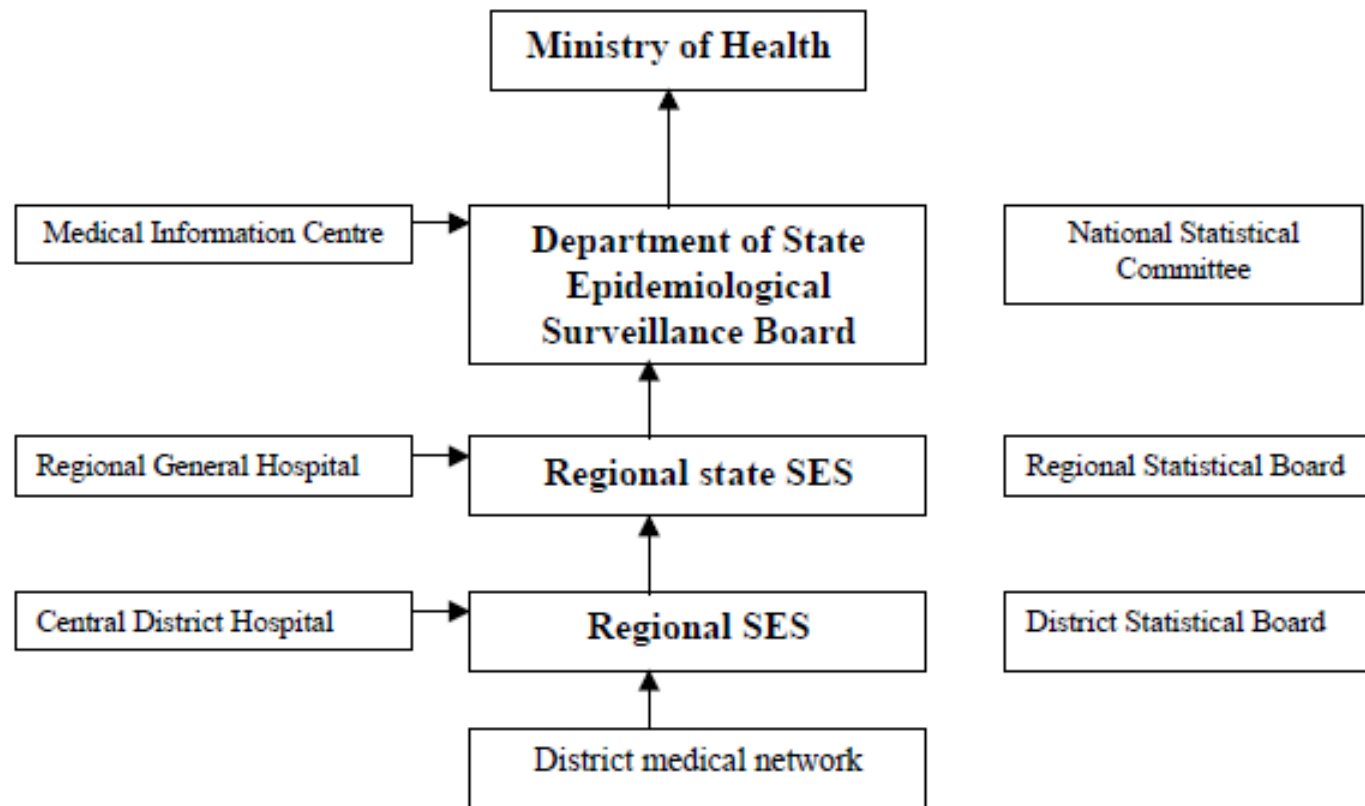
Foodborne Disease Surveillance System in AZERBAIJAN



WHO Surveillance Programme: Country Reports: KYRGYZSTAN



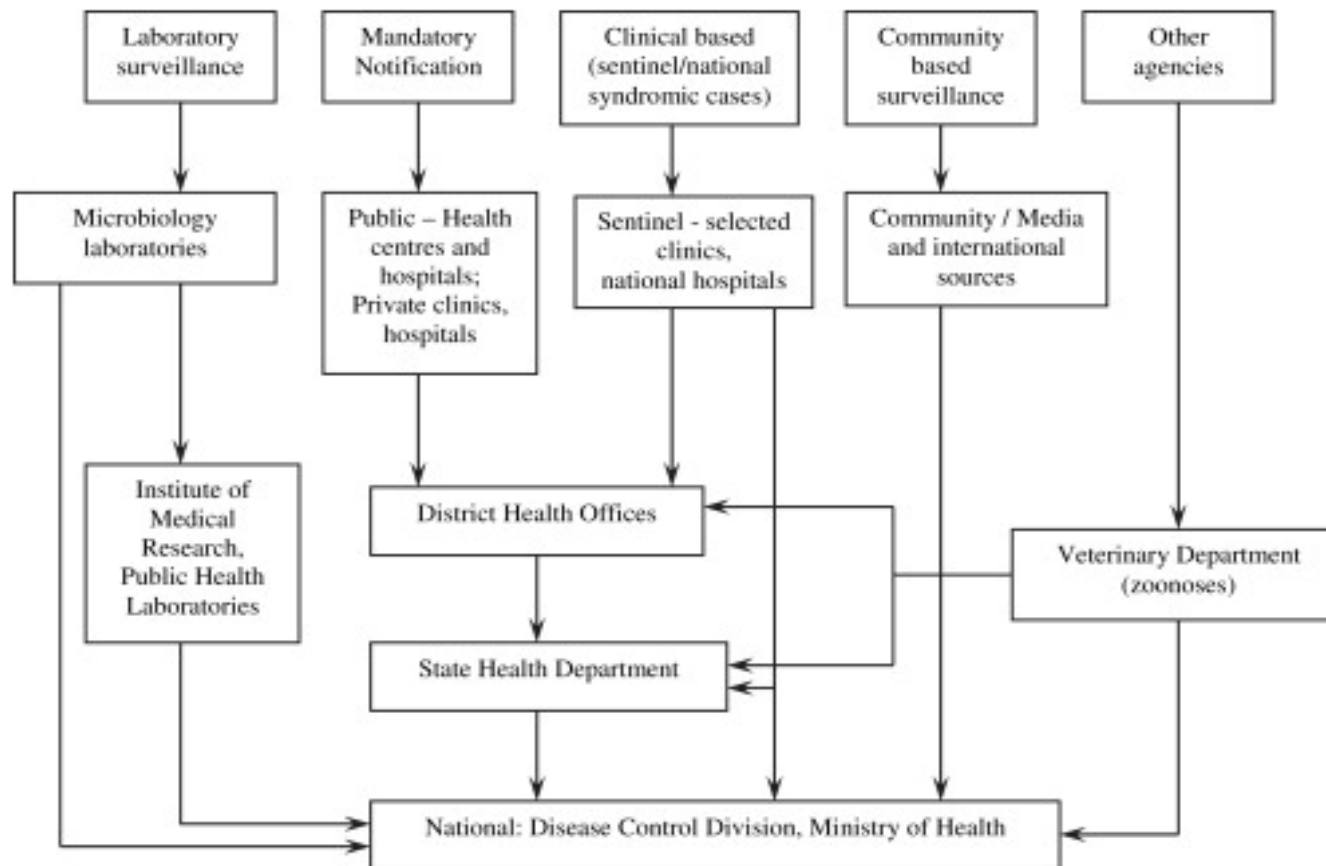
Foodborne Disease Surveillance System in KYRGYZSTAN



WHO Surveillance Programme: Country Reports: KYRGYZSTAN



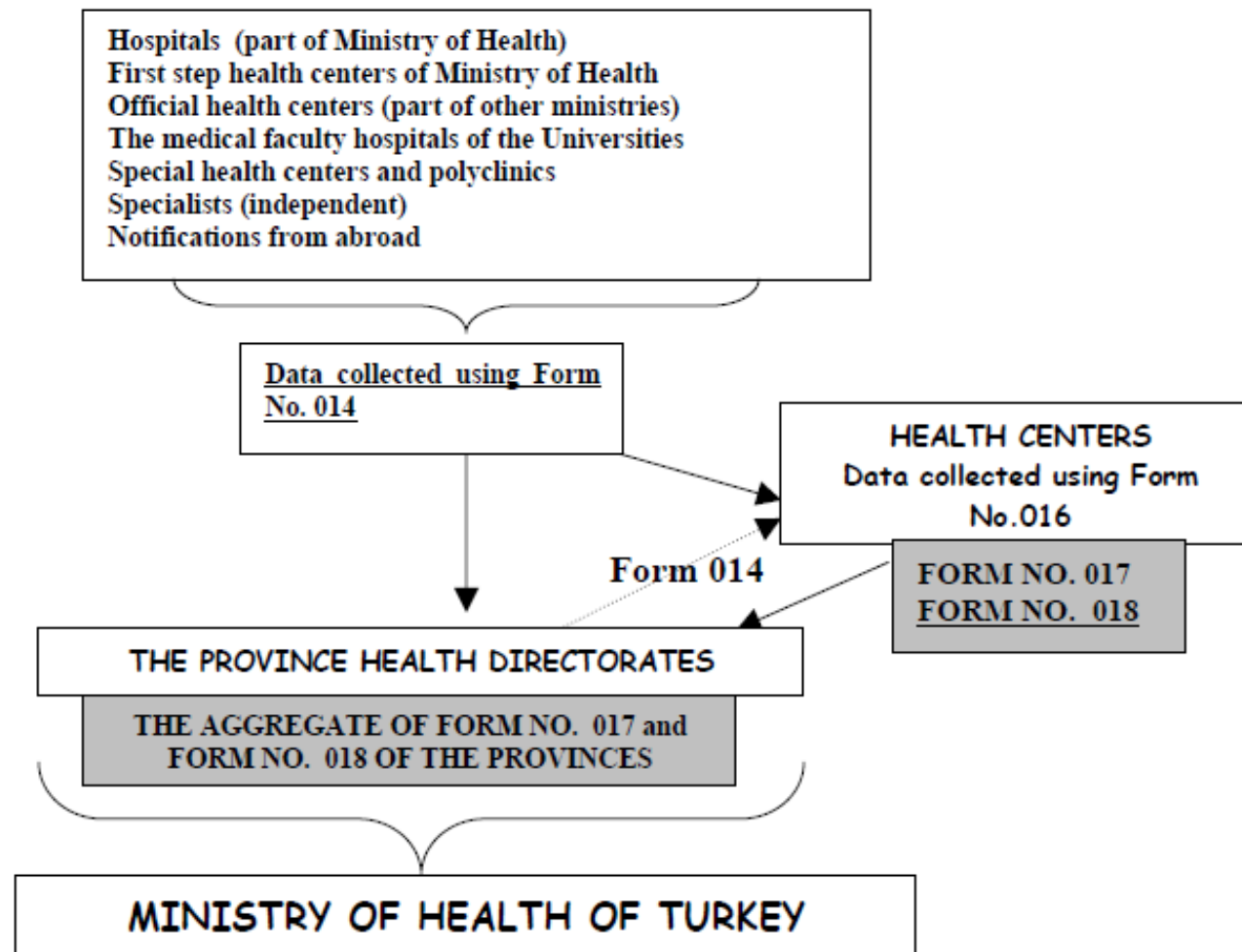
Foodborne Disease Surveillance System in Malaysia (14)



WHO Surveillance Programme: Country Reports: Malaysia



Foodborne Disease Surveillance System in Turkey



WHO Surveillance Programme: Country Reports: Turkey



Foodborne Disease Surveillance System in *Uzbekistan*

Foodborne disease surveillance system

UZBEKISTAN 1999-2000



WHO Surveillance Programme: Country Reports: Uzbekistan



Foodborne Disease Surveillance System at OIC Level

Provide safe water and food

Process raw agricultural produce to increase shelf life as well as economical value

Training of government officers as well as faculty members

No Surveillance System exists opposite to EU or USA

Such system and a database is necessary for outbreak investigation, surveillance, disease control and prevention



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Thank you...

