



# Fertility differences across the MENA region

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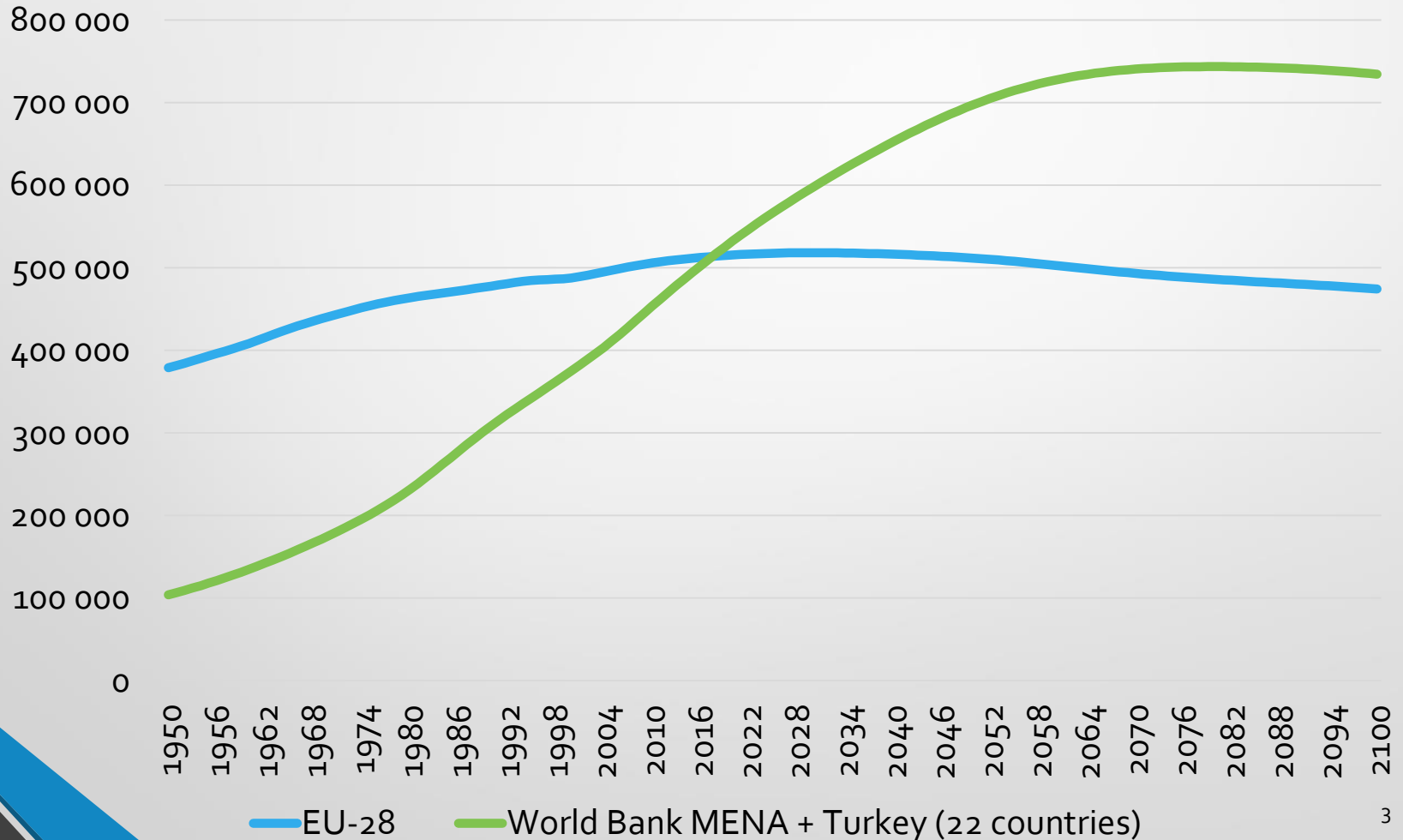
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# Motivation

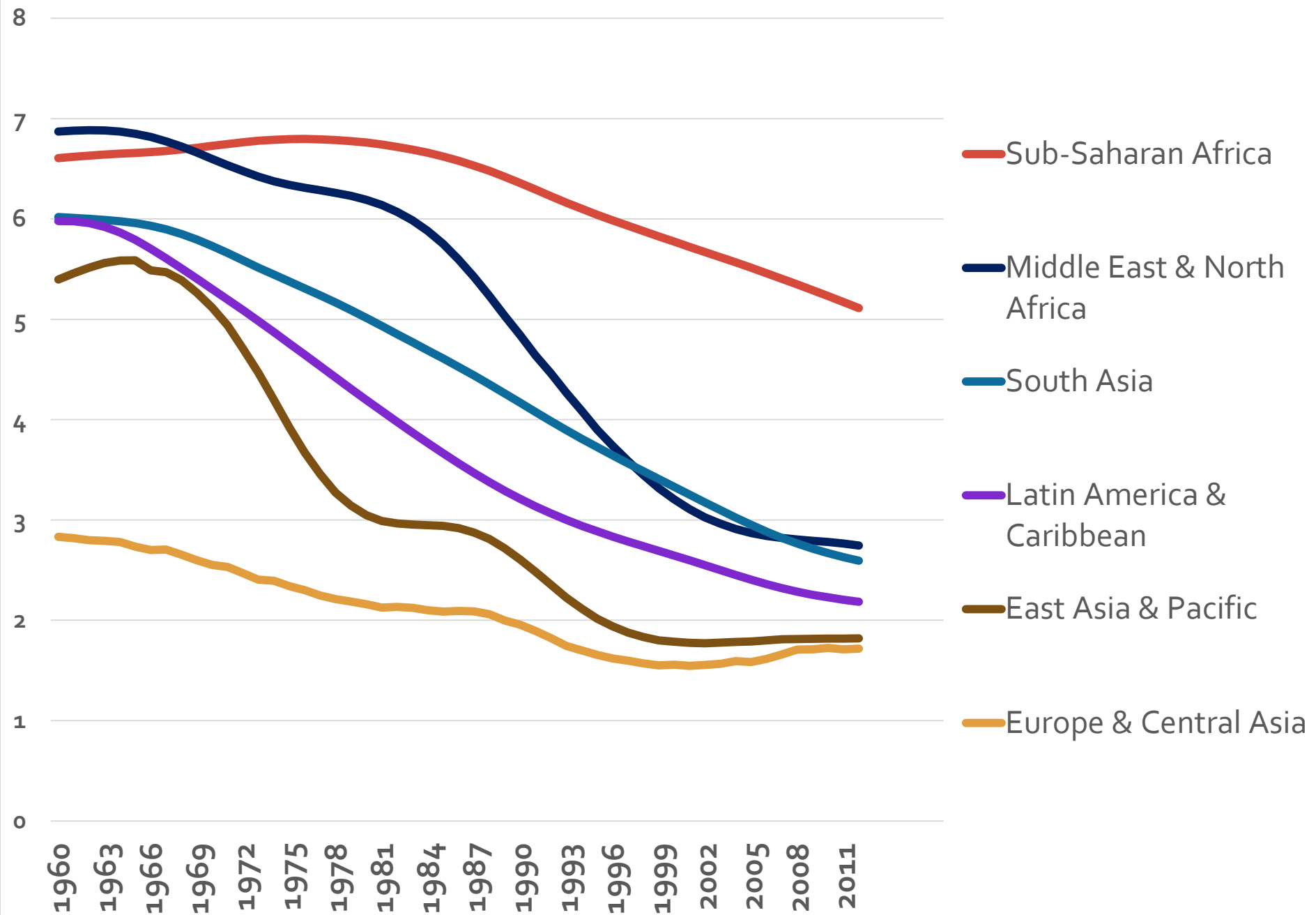
- With exception for Sub-Saharan Africa, MENA countries still have the highest fertility level in the world.
- The greatest fertility decline in the world during last 30 years (Salehi-Isfahani et al, 2010), but then fertility decline stalled.
- Densely populated and actively growing region, with common religion, influence of Arab culture, but in the same time very diverse in fertility level (Eberstadt and Shah, 2012).

# MENA – Emerging region

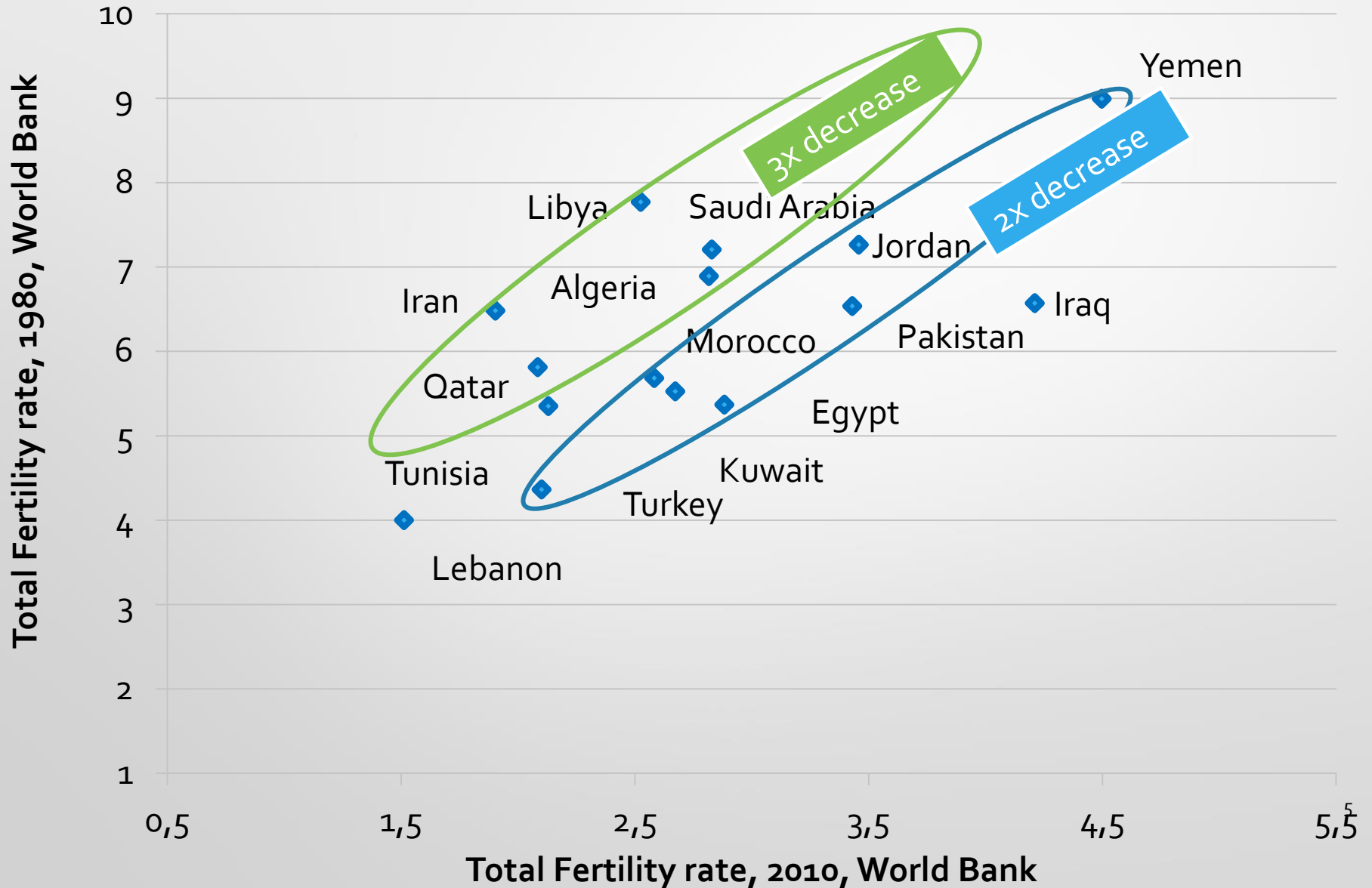
UN population dynamics and projections (medium fertility scenario), thousands of inhabitants



# Total fertility rate in the world, World Bank regions



# MENA Fertility trend 1980-2010



# The goal

The goal is to explain the differences in fertility patterns in MENA countries through the relationship between socio-economic factors and values

Research question: Why this diversity occurs in countries with similar traditional social norms and common dominating religion?

MENA countries had almost the same fertility level just a half century ago - why then it differs now? And what are the main factors of such diversity nowadays?

# Literature review (1)

- Focused mainly on a single countries (Hosseini-Chavoshi and Abbasi-Shavazi, 2012; Frini and Muller, 2012; Salam, 2013; Dinçer et al., 2014; Loeffler and Friedl, 2014), or the whole region (Eberstadt and Shah, 2012), but without revealing fertility differences among the countries of the MENA region.
- Studies where fertility differences are investigated, mostly focused on comparison of developed and developing countries (Abeynayake et al., 2012; Jain and Ross, 2012), but don't examine fertility differences within the MENA region.

# Literature review (2)

- Muslim family law hinders fertility decline and preserve patriarchy, but socio-economic development puts heavy pressure on it (Moghadam, 2003, 2004)
- Access to contraception and level of education are factors that contribute the most to fertility decline (Moghadam, 2004; Obermeyer, 1994; Hoodfar, 1996; Roudi-Fahimi & Kent, 2007; Salam, 2013; Loeffler and Friedl, 2014)
- Strong leadership of the government, its' strong intention to provide widely available contraception, healthcare and education (expecially for women), in order to lower fertility level is a key for understanding the trends in some Middle East countries (Caldwell and Sathar, 1996).
- There is no or little connection between fertility level and labor participation of women in MENA countries (İlkkaracan, 2012; Loeffler and Friedl, 2014).



# Conceptual scheme – number of children

## Individual:

- Gender
- Age groups
- Education
- Marital status
- Income
- **Employment**
- **Gender equality attitudes**
- **Perception of self-control choices**

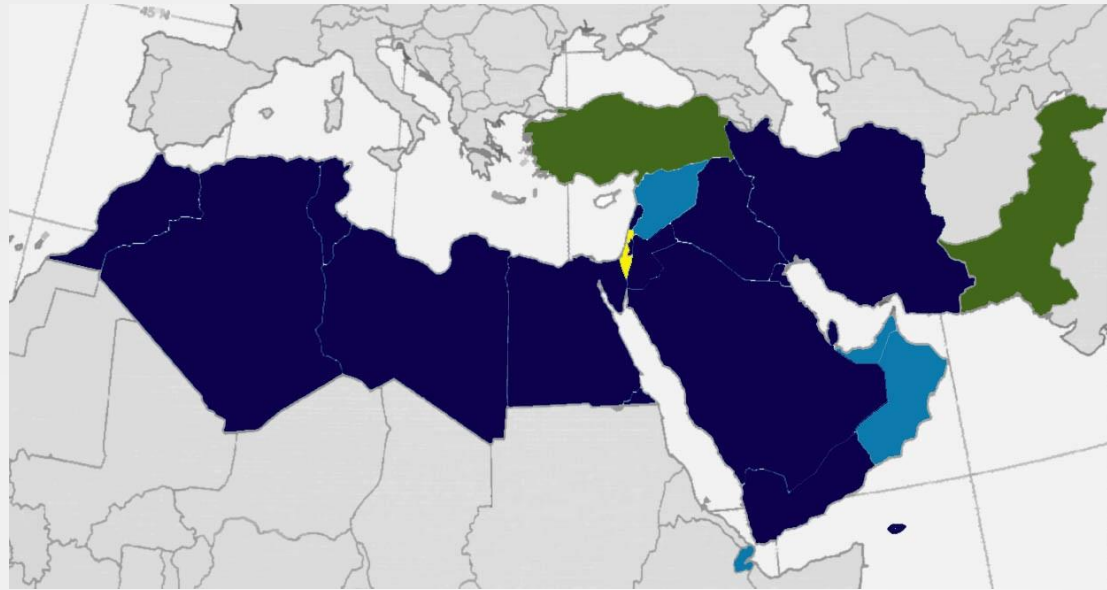
## Country:

- Economic conditions (GDP PPP per capita)
- Government policy of investing into human capital (expenditures on health as % of GDP, secondary education enrollment rate)
- Access to contraception (any method use)
- Society human empowerment level (Welzel's Emancipative values index)

# Hypotheses

- H1: People with gender-egalitarian attitudes have fewer children in all MENA countries regardless of other conditions;
- H2: People with high self-perception of freedom have fewer children in all MENA countries regardless of other conditions;
- H3: Employed women tend to have fewer children in all MENA countries regardless of other conditions;
- H4: Fertility models are different in different MENA country groups:
  - H4.1: For oil-rich MENA countries – stronger effect of marriage (Engelen & Puschmann, 2011: “How unique is Western European marriage pattern? A comparison of nuptiality in historical Europe and the contemporary Arab world”);
  - H4.2: Income effect is positive in most developed countries and negative in least developed countries

# Data



**Dataset:** WVS, 4-6 waves, 16 countries, age limits 35-65,

Our sample for 16 countries amounts of 22,196 respondents.

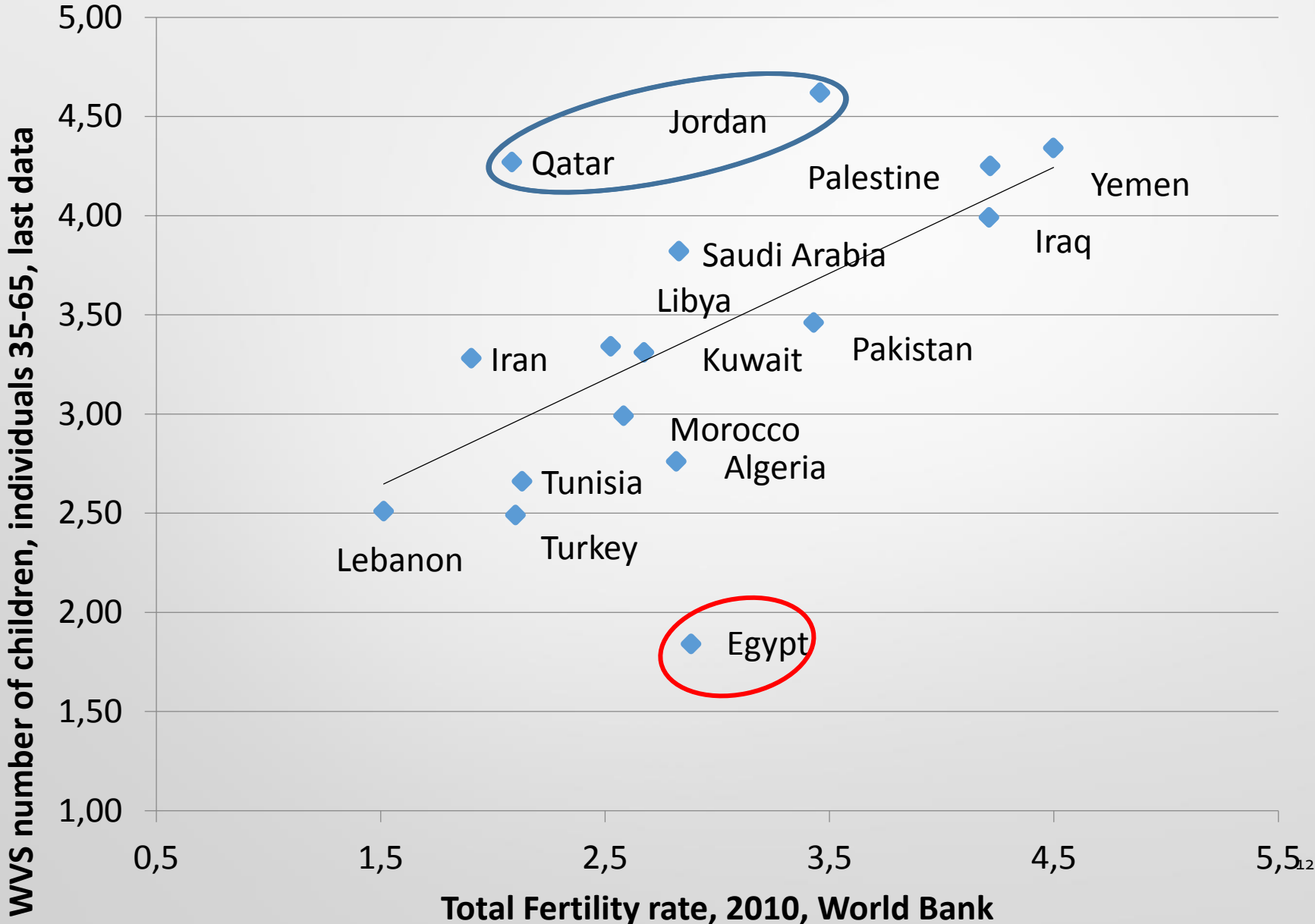
## **Methods:**

*1<sup>st</sup> step* – Poisson regression on individual variables for each country, comparison of determinants.

*2<sup>nd</sup> step* – Analysis of country-level data and selection of most important factors and working out the typology of countries clusters on consistent socio-economic and demographic patterns in MENA region.

*3<sup>rd</sup> step* – Poisson regression modeling - testing cluster and macro level variables.

# Fertility in the survey and in the statistics



# Variables - Model

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## Control variables:

<b>Gender</b>	0 – females, 1 - males
<b>Age groups</b>	1 - '35-44' , 2 - '45-54' , 3 - '55-65'
<b>Marital status</b>	1 - married, 0 – others
<b>Education</b>	1 - higher education, 0 – any other level
<b>Household income</b>	1 - low, 2 - medium income, 3 - high

## Tested variables:

<b>Employment status</b>	1 - employed, 2 - unemployed, 3 – nonactive
<b>Perception of self – freedom (choice and control over life)</b>	1 - Low level of freedom, 2 - middle level of freedom, 3 - full freedom of social
<b>Gender-equality attitudes index</b>	0 - traditional attitudes, 1 - egalitarian attitudes

# Results – Country models

**Age groups:** younger generations – less children;

**Marital status:** strongly positive effect among all countries;

**Higher education:** negative effect in all countries, where significant;

**High income:** «-» in Kuwait, Libya and Turkey, «+» – in Saudi Arabia;

**Low income:** positive effect in Kuwait and Iraq, negative –Egypt;

**Unemployment:** «+» in Qatar, Pakistan, Morocco and Kuwait, «-»- in Iran;

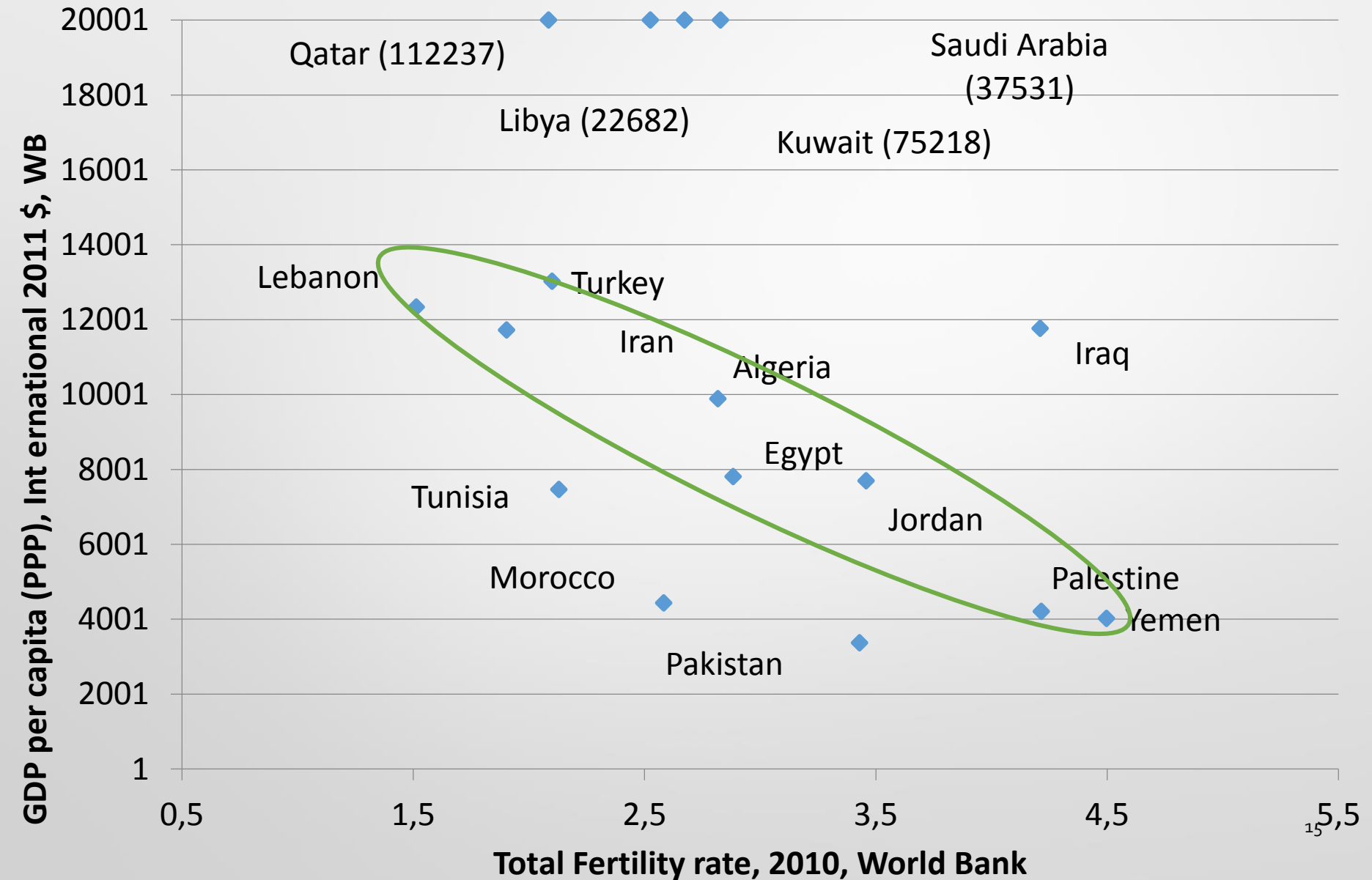
**Nonactive to employed:** greater number of children in Iraq, Jordan, Lebanon, Libya, Qatar, Saudi Arabia, fewer - in Egypt

**Medium to high level of freedom:** fewer children in Libya, Egypt, Yemen, more children - in Saudi Arabia

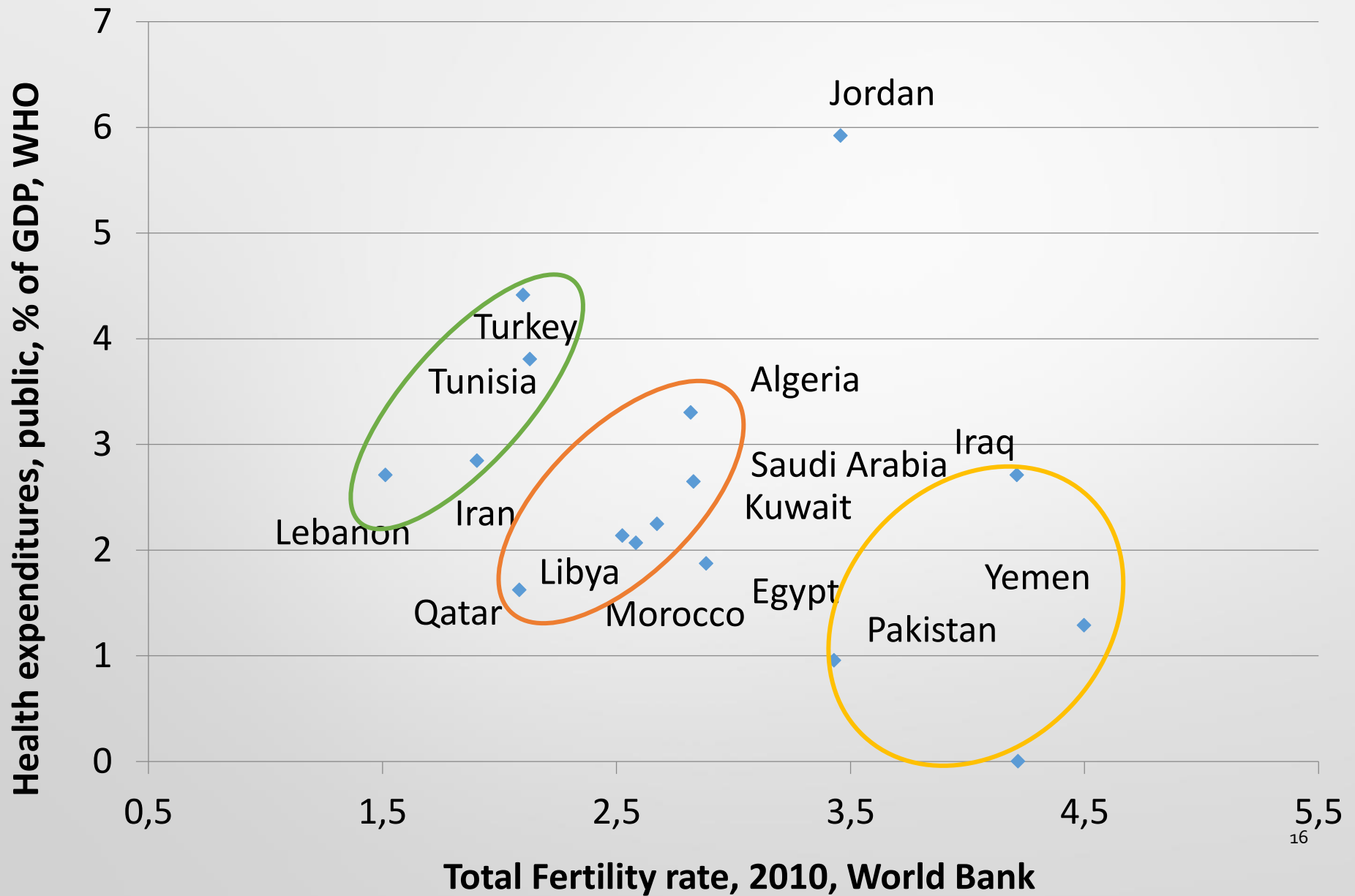
**Low level of freedom:** fewer children in Yemen and Saudi Arabia

**Gender-equality values index:** fewer children for persons with more egalitarian values in most countries, except for Egypt

# GDP per capita and TFR in MENA countries

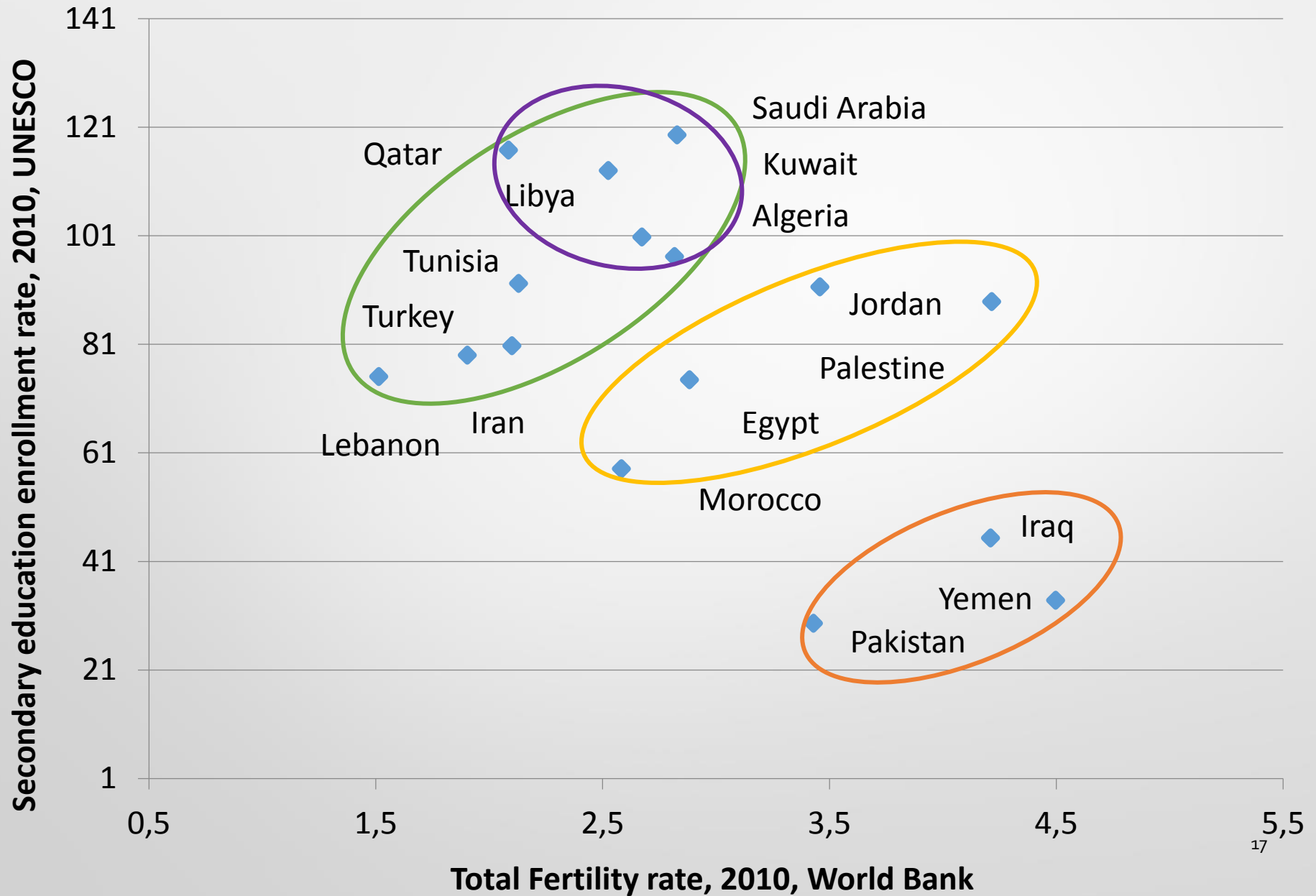


# Health Expenditures in MENA countries

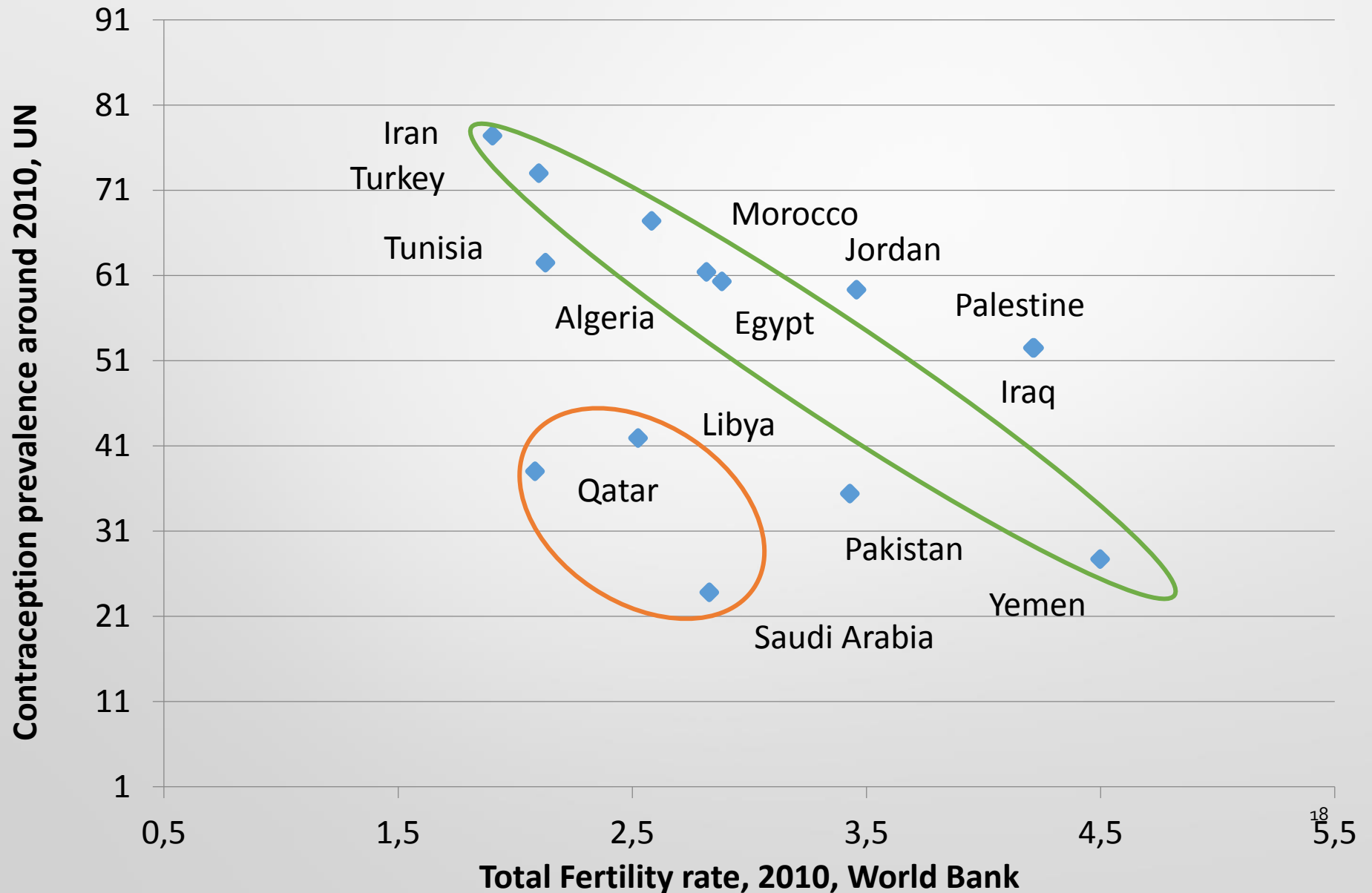




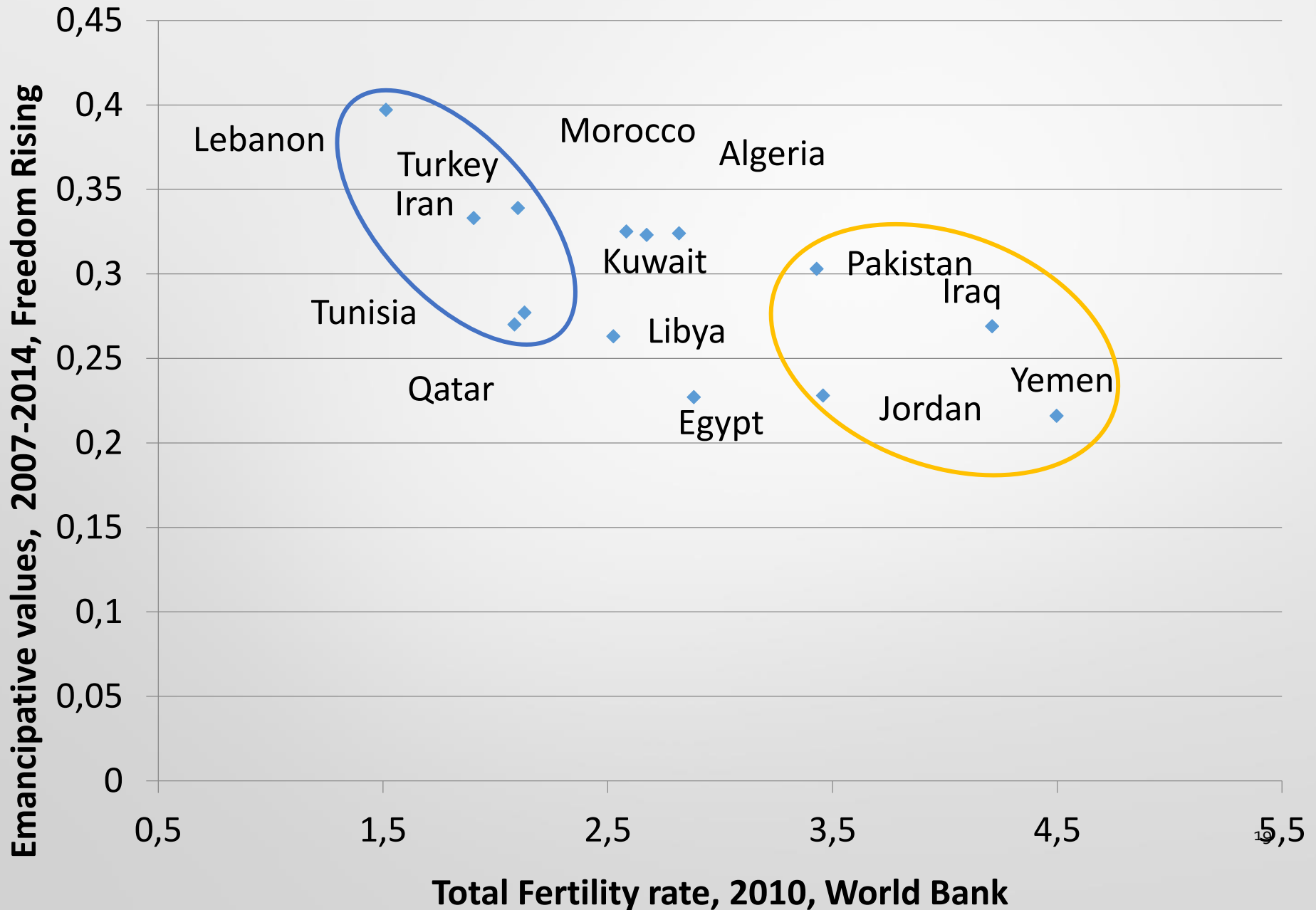
# Education enrollment and fertility level in MENA



# Contraception use and fertility level in MENA



# Emancipative Values in MENA countries



# Macro-analysis: clusters (I)

- 1) Most developed countries with widespread contraception, high level of education and healthcare system and high level of emancipative values:

Turkey, Tunisia, Iran, Lebanon. TFR=1,5-2,1

- 2) Oil-exporting economies, that decreased fertility level primarily by vast education investments and astronomical level of GDP per capita but who attempt to restrict contraception and family planning programs. Moderate level of social expenditures (% GDP) and emancipative values, high level of education, low level of contraception prevalence:

Qatar, Libya, Kuwait, Saudi Arabia, Algeria. TFR=2,1-2,8

# Macro-analysis: clusters (II)

3) Moderately developed countries without large reserves of natural resources. Moderate level of contraception prevalence, moderate level of social expenditures and education system, moderate level of emancipative values:

Egypt, Morocco, Jordan, Palestine. TFR=2,6-4,2

4) Less developed MENA countries with low level of socio-economic development. Low level of contraception prevalence, social expenditures, education system, emancipative values:

Iraq, Pakistan, Yemen. TFR=3,4-4,5

# Country clusters – descriptive statistics

	Cluster 1 (Top developed)	Cluster 2 (Oil- Rich)	Cluster 3 (Less developed)	Cluster 4 (Least developed)
N	6631	7125	4904	3394
Country-level (not population-weighted)				
Total Fertility rate (2010)	1,92	2,60	3,22	4,02
Contraception prevalence, any method, %	70,2	42,6	60,2	39,2
GDP per capita (PPP), Int 2011 \$	15591	53061	8449	7174
Secondary education enrollment rate	81	110	78	36
Health expenditures, public, % GDP (without Palestine)	3,4	2,4	3,2	1,7
Emancipative Values Index (Welzel) (without Palestine)	0,34	0,30	0,26	0,27

<b>Multilevel poisson regression models</b>	Model 1 (Basic)	Model 2 (with clusters)	Model 3 (with macro-variables)
Basic - Female			
Male	-0.0643***	-0.0645***	-0.0637***
Basic - 35-44			
45-54	0.232***	0.232***	0.234***
55-64	0.371***	0.371***	0.380***
Basic - Any other marital status			
Married	0.797***	0.798***	0.804***
Basic - Not higher education			
Higher education	-0.0967***	-0.0965***	-0.102***
Basic - Low family income			
Middle Income	-0.0468***	-0.0468***	-0.0418***
High Income	-0.0637***	-0.0640***	-0.0627***
Basic - employed			
Unemployed	0.0439**	0.0440**	0.0449**
Non-Active	0.131***	0.131***	0.137***
Basic - Low level of freedom of choice and control			
Middle level of Freedom	-0.0319	-0.0316	-0.0415*
Full Freedom	0.00852	0.00882	-0.00239
Gender Equality Values index (0->1)	-0.193***	-0.193***	-0.185***
Cluster: Basic - Top-developed			
Cluster: Oil-rich		<b>0.342***</b>	
Cluster: less developed		0.187	
Cluster: least developed		<b>0.369**</b>	
Country: Contraception prevalence			<b>-0.0111***</b>
Country: Education Enrollment			<b>-0.00590*</b>
Country: Health expenditures			<b>0.0959**</b>
Country: Emancipation values			-0.595
Country GDP PPP per capita (log)			<b>0.201**</b>
Constant	0.429***	0.136	-0.565
Observations	9,226	9,226	8,780
AIC	36983.14	36984.91	35077.25
BIC	37082.96	37120.38	35211.77
Number of groups	16	16	15

# Multilevel models results

- Expected: older, married, less educated and employed persons have less children;
- Freedom is barely significant: more freedom – less children;
- More gender-egalitarian values, less children;
- Oil-rich and least developed countries – more children;
- Country variables: less children for higher level of contraception prevalence and education enrollment rate, more children for higher health expenditures and higher GDP per capita.



# Single-level poisson regression models for clusters

	Cluster 1 (top-developed)	Cluster 2 (oil-rich)	Cluster 3 (less developed)	Cluster 4 (least developed)
Basic - Female				
Male	0.00819	-0.143***	0.101**	-0.0309
Basic - 35-44				
45-54	0.332***	0.252***	0.0733**	0.182***
55-64	0.515***	0.372***	0.129***	0.272***
Basic - Any other marital status				
Married	0.661***	<b>1.025***</b>	0.778***	0.510***
Basic - Not higher education				
Higher education	<b>-0.139***</b>	-0.0289	-0.0354	<b>0.100**</b>
Basic - Low family income				
Middle Income	<b>-0.113***</b>	-0.0337	0.0467	<b>-0.0917***</b>
High Income	<b>-0.237***</b>	0.0140	0.0988*	<b>-0.274***</b>
Basic - employed				
Unemployed	<b>-0.0632*</b>	0.106***	0.265***	0.0261
Non-Active	0.154***	0.191***	0.190***	0.112
Basic - Low level of freedom of choice and control				
Middle level of Freedom	-0.000707	-0.0495	0.00918	0.0148
Full Freedom	0.00154	0.0247	0.0724	0.0783
Gender Equality Values index (0->1)	<b>-0.441***</b>	-0.162***	0.112	-0.331***
Constant	0.384***	0.301***	0.198**	<b>0.869***</b>
Observations	2,560	3,049	2,181	1,436
Pseudo R-squared	0,08	<b>0,11</b>	0,05	0,03

# Cluster models results

- Marriage effect is the strongest for Oil-rich MENA countries – along with low contraception prevalence and lower fertility => “European marriage pattern” in rich MENA? Fertility control using marriage postponement, not contraception – caused by enormous wealth. Second evidence after Engelen & Puschmann, 2011.
- Higher education has negative effect on number of children in top-developed countries, but positive effect in least developed countries (H: better health – longer childbirth period?);
- Higher income – less children, but only significant in top-developed and least developed countries;
- Unemployed in top-developed MENA have less children, but more – in all other MENA;
- Freedom is not significant; negative and strong GEV effect in top- and least-developed MENA

# Additional issues

- Sex variable: as the number of children can't be different for males and females, negative difference in number implies different age models: age of having a first child is probably much higher for males in oil-rich countries .
- => more children for men in less developed MENA – high remarriage rates?



Thank you for your attention

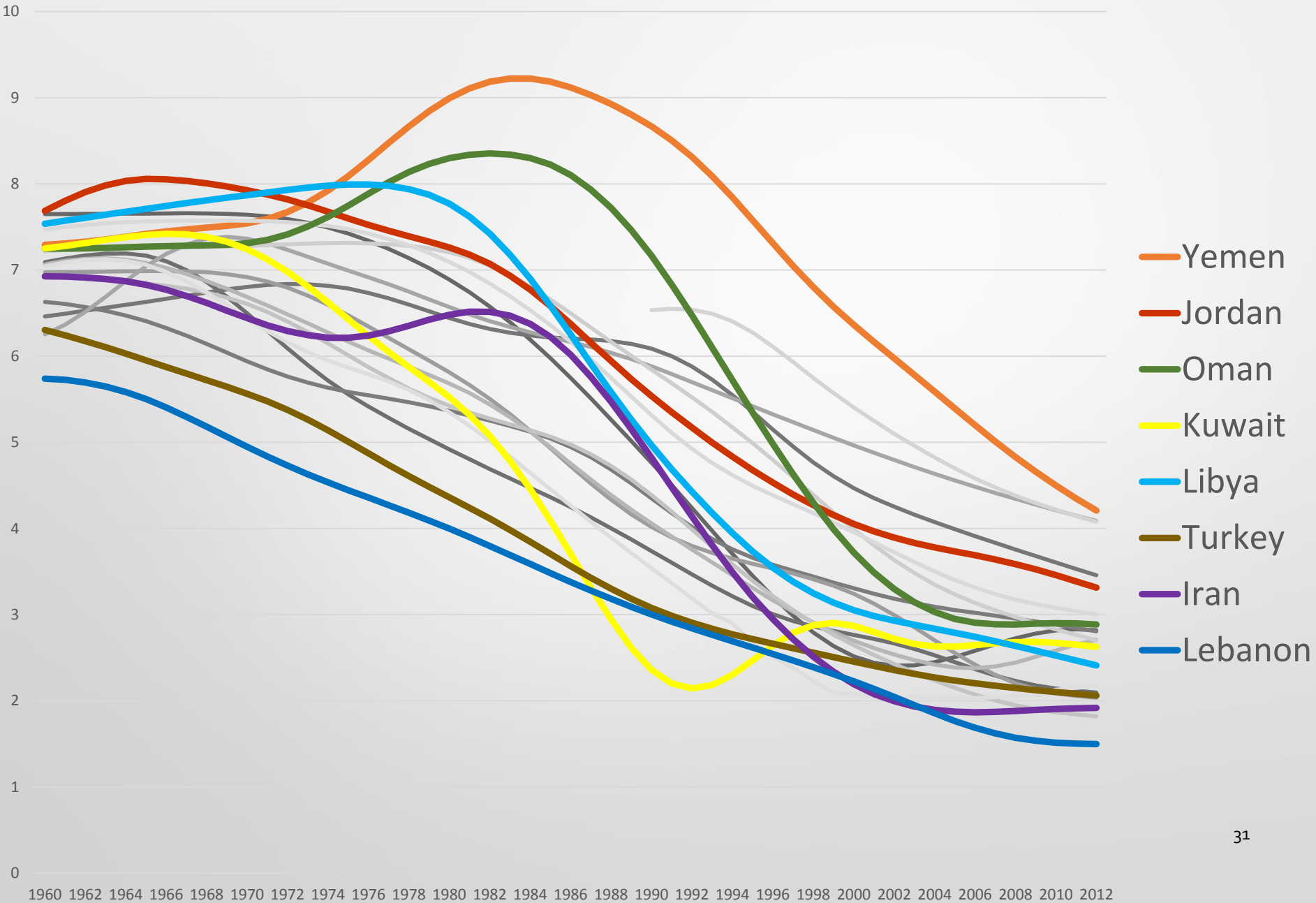
# Descriptive statistics, total sample, 15+, WVS data

Country	Year of survey	N (total sample)	Number of children	% females	% up to 35 years	High educated, %	High educ, f. %	High income, %	Employed, f.%	Unempl oyed, total %	Lack of freedo m	Gender egalit. at. index
Jordan	2014	1200	3.3	50.0	41.6	23.6	20.7	11.0	8.2	19.4	5.8	0.4
Qatar	2010	1060	3.0	54.0	42.0	46.5	46.9	31.0	40.1	10.5	3.5	0.4
Yemen	2014	1000	2.9	50.2	53.2	24.8	5.2	4.3	8.0	15.2	16.1	0.3
Palestine	2013	1000	2.8	51.2	48.5	39.8	35.6	8.7	14.1	14.7	12.3	0.4
Iraq	2012	1200	2.6	47.6	48.9	25.1	18.5	11.8	14.0	14.2	10.2	0.4
Kuwait	2014	1303	2.3	36.3	48.7	43.0	46.0	21.6	70.5	10.2	5.3	0.4
Pakistan	2012	1200	2.3	48.2	52.5	9.5	4.5	18.1	2.6	9.6	5.4	0.3
S, Arabia	2003	1502	2.2	49.8	57.9	25.9	21.1	30.2	17.7	6.4	8.5	0.3
Libya	2014	2131	1.9	48.9	42.8	37.2	31.5	15.2	35.2	12.2	8.7	0.4
Turkey	2011	1605	1.8	51.4	46.6	20.5	15.6	18.5	18.6	16.1	4.1	0.5
Morocco	2011	1200	1.8	50.3	51.3	9.1	4.1	2.5	77.8	7.8	11.3	0.5
Algeria	2013	1200	1.7	49.3	49.8	23.6	21.8	9.4	21.0	20.2	9.5	0.4
Tunisia	2013	1205	1.7	47.4	47.9	17.6	13.0	6.1	27.0	23.2	11.1	0.4
Iran	2007	2667	1.7	49.9	63.4	25.9	21.2	8.7	15.9	22.3	5.8	0.3
Lebanon	2013	1200	1.5	51.0	45.8	40.9	36.7	20.4	41.2	13.5	4.4	0.6
Egypt	2013	1523	1.4	67.8	40.4	23.8	13.0	5.7	11.2	8.7	15.8	0.3

# Descriptive statistics, sample of 35-65 years old, WVS data

Country	Year of survey	N	Numb er of kids	% wome n	For selected sample, 35- 65						
					High educated ,%	High educated , f. %	High income, %	Employ ed, f. %	Unemplo yed, total %	Lack of freedom, %	Gender egalit.at., index
Jordan	2014	603	4.6	47.3	27.3	28.4	14.3	11.0	12.4	5.2	0.4
Yemen	2014	366	4.3	54.0	14.7	6.3	5.5	8.0	15.0	17.7	0.3
Qatar	2010	579	4.3	55.1	38.2	43.7	31.3	44.9	6.1	4.1	0.4
Palestine	2013	453	4.3	55.3	48.5	47.8	8.7	12.3	12.2	11.4	0.4
Iraq	2012	559	4.0	44.3	22.8	21.2	14.1	11.2	10.6	9.7	0.4
Saudi Arabia	2003	538	3.8	49.9	23.1	19.6	30.5	17.7	8.9	7.8	0.3
Pakistan	2012	528	3.5	53.3	10.2	6.0	19.7	3.0	7.3	6.2	0.3
Libya	2014	1039	3.3	42.4	47.8	53.5	15.8	30.6	9.3	6.8	0.4
Kuwait	2014	469	3.3	35.9	41.2	50.7	22.8	77.9	5.6	6.0	0.4
Iran	2007	870	3.3	51.6	28.0	25.5	10.5	16.2	25.8	6.1	0.3
Morocco	2011	369	3.0	51.0	5.4	5.4	3.4	84.1	7.5	9.1	0.5
Algeria	2013	474	2.8	52.6	32.2	36.0	9.1	22.0	22.6	9.4	0.5
Tunisia	2013	451	2.7	43.7	22.7	24.2	7.9	31.4	21.0	9.3	0.4
Lebanon	2013	570	2.5	48.8	47.3	47.4	21.7	42.9	11.8	5.1	0.6
Turkey	2011	718	2.5	48.7	29.0	25.0	22.0	23.4	8.7	3.4	0.5
Egypt	2013	812	1.8	70.6	22.1	18.4	4.7	9.5	7.5	15.6	0.3

# Total fertility rate in MENA countries



# Poisson regression, country models (I)

	Tunisia	Turkey	Lebanon	Iran	Qatar	Saudi Arabia	Libya	Algeria	Kuwait
Female	Basic category								
Male	-0.206**	0.0183	0.0570	0.0893	-0.0801	-0.0762	-0.236***	-0.0706	-0.0367
35-44	Basic category								
45-54	0.431***	0.181***	0.303***	0.396***	0.132***	0.194***	0.346***	0.325***	0.275***
55-64	0.767***	0.353***	0.410***	0.657***	0.248***	0.235**	0.562***	0.571***	0.243***
Any other status	Basic category								
Married	0.768***	0.564***	0.915***	0.336***	0.765***	0.799***	1.157***	1.362***	0.743***
Any other education	Basic category								
Higher education	-0.211	-0.324***	-0.0571	-0.227***	-0.0958**	-0.146***	-0.0970**	-0.269***	0.0839*
Low family income	Basic category								
Middle Income	-0.0452	-0.114*	0.0641	-0.0948**	-0.0880	-0.0384	-0.0727	-0.0369	-0.220***
High Income	-0.0995	-0.317***	0.0364	-0.165*	-0.0853	0.150**	-0.127**	0.0201	-0.365***
Employed	Basic category								
Unemployed	-0.275***	0.0526	0.165**	-0.0893	0.208***	-0.259	-0.0446	0.0423	0.185**
Non-Active	0.0849	0.136	0.137**	0.218***	0.163***	0.256***	0.218***	0.0466	0.182
Lack of freedom	Basic category								
Middle level	-0.137	0.0279	-0.0457	0.0441	0.0651	-0.0668	0.0334	-0.264**	0.0558
Full Freedom	-0.0551	-0.00338	-0.0671	0.0510	0.124	-0.169**	0.0904	-0.153	0.139
Gender Equality	Basic category								
Values index (0->1)	-0.307	-0.0149	-0.334**	-0.506***	0.137	-0.111	-0.144	-0.255*	-0.363***
Constant	0.257	0.273*	-0.0261	0.694***	0.626***	0.611***	0.109	-0.0755	0.598***
Observations	435	706	564	855	567	536	1,014	468	464
Pseudo R-squared	0,14	0,05	0,11	0,08	0,06	0,09	0,14	0,20	0,11

\*\*\* p<0.01 \*\* p<0.05 \* p<0.1



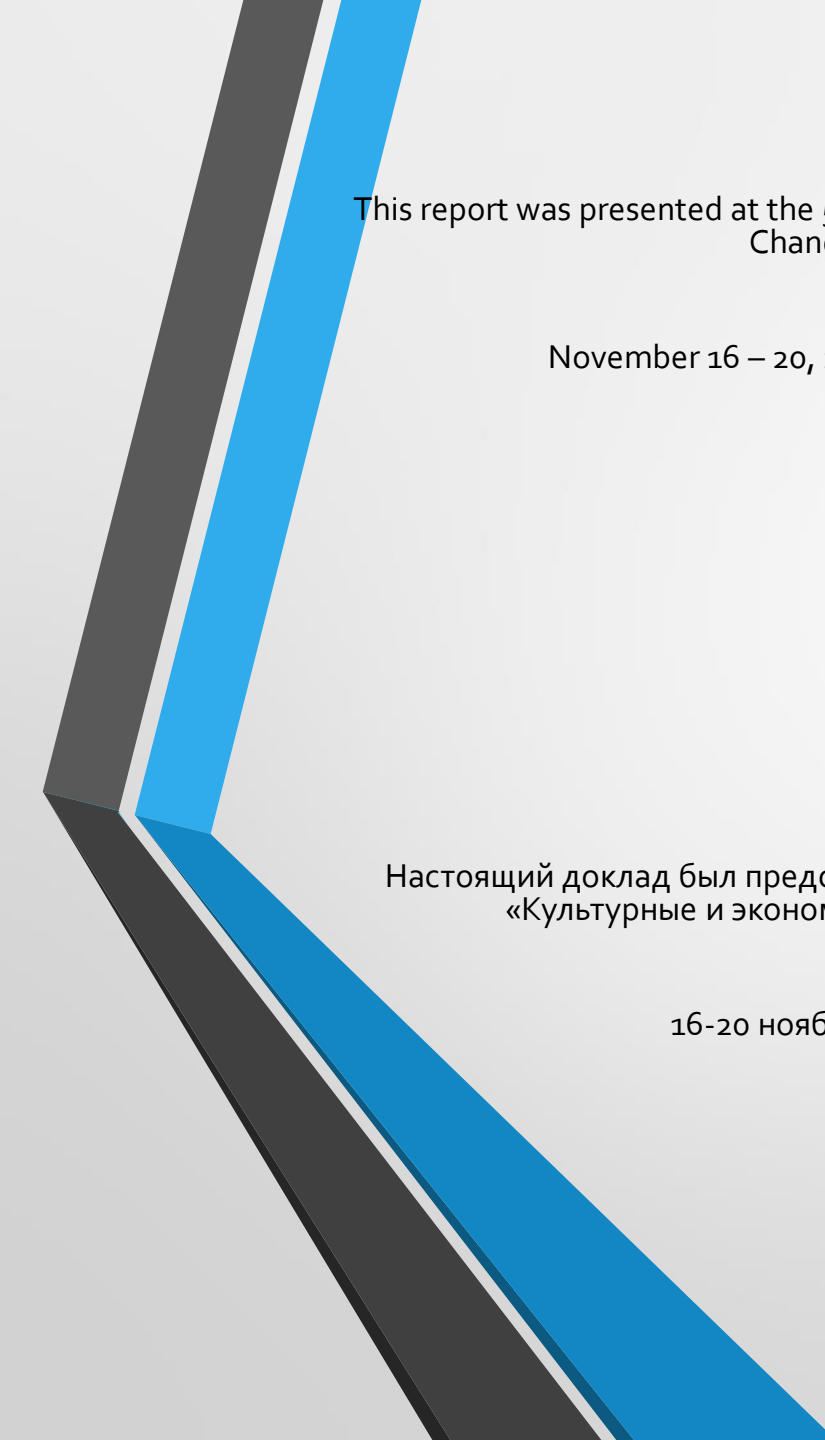
# Poisson regression, country models (II)

	Egypt	Morocco	Jordan	Palestine	Iraq	Pakistan	Yemen
Female	Basic category						
Male	-0.136	-0.159***	0.139	-0.122*	0.0664	-0.0372	-0.0361
35-44	Basic category						
45-54	-0.249***	0.371***	0.190***	0.211***	0.197***	0.215***	0.0712
55-64	-0.605***	0.619***	0.414***	0.227***	0.253***	0.414***	0.0992
Any other status	Basic category						
Married	0.571***	0.695***	0.727***	0.653***	0.548***	0.874***	0.312**
Any other education	Basic category						
Higher education	-0.155*	0.0400	-0.139***	-0.0570	0.0262	0.110	0.0220
Low family income	Basic category						
Middle Income	0.173***	-0.0451	-0.0648	-0.100*	0.000823	-0.0420	-0.0743
High Income	0.184	-0.285*	0.0333	-0.0896	-0.142	-0.136*	-0.341
Employed	Basic category						
Unemployed	0.168	0.0644	0.0639	0.0274	0.0527	0.153**	-0.117
Non-Active	-0.158*	0.0254	0.300***	-0.0151	0.169	0.0634	0.158
Lack of freedom	Basic category						
Middle level	-0.107	-0.0845	-0.0866	0.0598	-0.0630	0.116	0.101
Full Freedom	0.0138	-0.157	-0.0374	0.105	-0.00873	0.124	0.293***
Gender Equality Values index (0->1)	0.326*	-0.352**	-0.174	-0.280*	-0.374**	-0.233	-0.354*
Constant	0.398**	0.496***	0.635***	0.897***	0.814***	0.243	1.079***
Observations	783	362	590	446	554	520	362
Pseudo R-squared	0,06	0,10	0,07	0,04	0,04	0,05	0,03

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

# Country-level data, 2010

	Total Fertility rate, WB	Female labor force participation rate, % (ILO estimate)	Male unemployment, % (ILO estimate)	GDP per capita (PPP), Int 2011 \$	Urban population, % (nat. est.) (Palestine - 2009)	Tertiary education enrollment rate	Contraception prevalence	Abortion grounds (2011)	Fertility policy (2011) (1 - raise, 2 - maintain, 3 - lower, 4 - no intervention)	Family planning support (2011) (1 - direct, 2 - indirect, 3 - no support, 4 - forbidden)	Civil liberties level (higher - less liberties)	Effective Democracy Index (Welzel)	Quality of government index (1 - highest quality)	Health expenditures, % GDP	Education expenditures, %GDP	Gender Inequality Index (2013)	Empicative Values Index (Welzel)	Secular Values Index (Welzel)
Yemen	4,5	24,8	9,7	4534,2	31,7	6,6	27,7	1	3	1	5	11,0	0,31	1,3	4,6	0,73	0,22	0,29
Palestine	4,2	14,7	24,6	4162,7	73,9	57,4	52,5	-	-	-	-	-	-	-	-	-	-	-
Iraq	4,2	14,5	13,5	12329,7	69,0	11,9	52,5	1	4	1	6	2,0	0,29	2,7	-	0,54	0,27	0,35
Jordan	3,5	15,6	10,2	11256,1	82,5	42,9	59,3	1,2,3,5	3	1	5	25,0	0,56	5,9	-	0,49	0,23	0,19
Pakistan	3,4	23,9	4	4219,6	36,6	8,0	35,4	1,2,3	3	1	5	8,0	0,47	1,0	2,3	0,56	0,30	0,31
Egypt	2,9	23,3	4,8	10614,6	43,0	31,8	60,3	1	3	1	5	11,0	0,47	1,9	3,8	0,58	0,23	0,20
Saudi Arabia	2,8	17,7	3,5	45597,8	82,1	40,3	23,8	1,2,3	4	3	6	4,0	0,58	2,6	5,1	0,32	-	-
Algeria	2,8	14,6	8,1	12494,1	67,5	34,1	61,4	1,2,3	3	1	5	10,0	0,44	3,3	4,3	0,43	0,32	0,35
Kuwait	2,7	42,8	1,9	75365,5	98,3	41,2	-	1,2,3,5	1	1	5	33,0	0,61	2,2	3,8	0,29	0,32	0,25
Morocco	2,6	25,9	8,9	6465,7	57,7	13,5	67,4	1,2,3	3	1	4	20,0	0,61	2,1	5,4	0,46	0,33	0,21
Libya	2,5	29,8	15,9	30260,7	77,6	-	41,9	1	4	3	7	0,0	0,39	2,1	-	0,22	0,26	0,23
Tunisia	2,1	24,9	12,2	10410,9	65,9	43,4	62,5	1,2,3,4,5,6,7	3	1	5	14,0	0,60	3,8	6,2	0,27	0,28	0,27
Turkey	2,1	27,6	11,5	16674,0	70,7	50,1	73,0	1,2,3,4,5,6,7	2	1	3	34,0	0,52	4,4	2,9	0,36	0,34	0,24
Qatar	2,1	50,5	0,1	127983,8	98,7	26,6	38,0	1,2,3,5	1	3	5	17,0	0,58	1,6	2,4	0,52	0,27	0,13
Iran	1,9	16	11,9	16979,6	70,6	42,9	77,4	1	1	3	6	6,0	0,48	2,8	4,3	0,51	0,33	0,34
Lebanon	1,5	22	4,4	16263,0	87,2	48,6	-	1	4	1	3	16,0	0,49	2,7	1,6	0,41	0,40	0,43



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