

# Assisted reproductive technology in Europe, 2011: results generated from European registers by ESHRE<sup>†</sup>

The European IVF-Monitoring Consortium (EIM)<sup>‡</sup> for the European Society of Human Reproduction and Embryology (ESHRE)

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**STUDY QUESTION:** The 15th European IVF-monitoring (EIM) report presents the results of treatments involving assisted reproductive technology (ART) initiated in Europe during 2011: are there any changes in the trends compared with previous years?

**SUMMARY ANSWER:** Despite some fluctuations in the number of countries reporting data, while the overall number of ART cycles has continued to increase year by year, the pregnancy rates in 2011 decreased slightly to those reported in 2010, and the number of transfers with multiple embryos (3+) and the multiple delivery rates declined.

**WHAT IS KNOWN ALREADY:** Since 1997, ART data in Europe have been collected and reported in 14 manuscripts, published in *Human Reproduction*.

**STUDY DESIGN, SIZE, DURATION:** Retrospective data collection of European ART data by the EIM Consortium for the European Society of Human Reproduction and Embryology (ESHRE); cycles started between 1 January and 31 December 2011 are collected on a yearly basis. The data are collected by National Registers, when existing, or on a voluntary basis by personal information.

**PARTICIPANTS/MATERIALS SETTING, METHODS:** From 33 countries (+2 compared with 2010), 1064 clinics reported 609 973 treatment cycles including: IVF 138 592, ICSI 298 918, frozen embryo replacement (FER) 129 693, egg donation (ED) 30 198, *in vitro* maturation 511, preimplantation genetic diagnosis/screening 6824 and frozen oocyte replacements 5237. European data on intrauterine insemination (IUI) using husband/partner's semen (IUI-H) and donor semen (IUI-D) were reported from 861 IUI laboratories in 24 countries. A total of 174 390 IUI-H and 41 151 IUI-D cycles were included.

**MAIN RESULTS AND THE ROLE OF CHANCE:** In 17 countries where all clinics reported to the ART register, a total of 361 972 ART cycles were performed in a population of 285 million inhabitants, corresponding to 1269 cycles per million inhabitants. For all IVF cycles, the clinical pregnancy rates per aspiration and per transfer were stable with 29.1 and 33.2%, respectively, and for ICSI, the corresponding rates also were stable with 27.9 and 31.8%, respectively. In FER cycles, the pregnancy rate per thawing increased to 21.3% if compared with previous years. In ED cycles, the pregnancy rate per fresh transfer decreased to 45.8% (47.4% in 2010) and increased to 33.6% (33.3% in 2010) per thawed transfer. The delivery rate after IUI-H decreased to 8.3 (8.9 in 2010), and to 12.2% (13.8% in 2010) after IUI-D. In IVF and ICSI cycles, 1, 2, 3 and 4+ embryos were transferred in 27.5, 56.7, 14.5 and 1.3% of cycles, respectively. The proportions of singleton, twin and triplet deliveries after IVF and ICSI (added together) were 80.8, 18.6 and 0.6%, respectively, resulting in a total multiple delivery rate of 19.2% compared with 20.6% in 2010, 20.2% in 2009, 21.7% in 2008, 22.3% in 2007 and 20.8% in 2006. In FER cycles, the multiple delivery rate was 13.2% (12.8% twins and 0.4% triplets). Twin and triplet delivery rates associated with IUI cycles were 9.7/0.6% and 7.3/0.3%, following IUI-H and IUI-D treatment, respectively.

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<sup>‡</sup>EIM Committee 2013–2015: chairman: M.S.K.; chairman elect: T.D.H.; past chairman: A.P.F. members: J.M., K.E., J.A.C., C.C.-J. and C.D.G. V.G. is a science manager at ESHRE Central Office, Brussels. See also Appendix for contributing centres and contact persons representing the data collection programmes in the participating European countries.

**LIMITATIONS, REASONS FOR CAUTION:** The method of reporting varies among countries, and registers from a number of countries have been unable to provide some of the relevant data such as initiated cycles and deliveries. As long as data are incomplete and generated through different methods of collection, results should be interpreted with caution.

**WIDER IMPLICATIONS OF THE FINDINGS:** The 15th ESHRE report on ART shows a continuing expansion of the number of treatment cycles in Europe, with more than 600 000 cycles reported in 2011. Since 2006, the proportion of IVF to ICSI cycles has reached a plateau after a small decrease in 2009. Pregnancy and delivery rates after IVF remained relatively stable compared with 2010 and 2009. The pregnancy rate per aspiration in ICSI cycles declined for the first time by 0.9%. The multiple delivery rate is lower than ever before.

**STUDY FUNDING/COMPETING INTERESTS:** The study had no external funding; all costs are covered by ESHRE. There are no competing interests.

**Key words:** IVF / ICSI / intrauterine insemination using husband/partner's semen / insemination / Europe / register / data / collection / registry

## Introduction

This report is the 15th annual publication of the European IVF-monitoring Consortium ([www.eshre.eu/eim](http://www.eshre.eu/eim)) under the umbrella of the European Society of Human Reproduction and Embryology (ESHRE) on European data on assisted reproductive technology (ART).

The 14 previous reports, also published in *Human Reproduction* (Assisted reproductive technology in Europe, 1997–1999; Nyboe Andersen et al., 2004, 2005, 2006, 2007, 2008a,b, 2009; de Mouzon et al., 2010, 2012; Ferraretti et al., 2012, 2013; Kupka et al., 2014), covered treatment cycles from 1997 to 2010. As in the last three reports, the printed version contains the four most significant tables. In addition, a total 19 supplementary tables are available online, making this 2011 report consistent with published reports from previous years. In the future, starting with the 16th report covering data from 2012, calculations will be done using a new computerized system.

## Materials and Methods

Data on ART were collected from 33 European countries, covering IVF, ICSI, frozen embryo replacement (FER), egg donation (ED), *in vitro* maturation (IVM), pooled data on preimplantation genetic diagnosis (PGD) and preimplantation genetic screening (PGS) as well as frozen oocyte replacements (FOR).

In addition to ART, data on intrauterine inseminations (IUI) using husband/partner's semen (IUI-H) and donor semen (IUI-D) were also included.

The report includes treatments started between 1 January 2011 and 31 December 2011. Data on pregnancy outcomes are derived from follow-up of the cohort treated during this time period. All countries are asked twice to deliver results.

The method of reporting data in 2011 was similar to that used in the previous years, in order to allow comparison of results. One table with an overview of all countries was added in 2010 (Supplementary Table S1). Some titles of the tables were changed.

The data collection forms were revised and since 2009, a few additional pieces of information were collected regarding the register characteristics (validation process, public access to individual clinical data and financial support) and the number of fresh IVF cycles performed with semen donation or surgically obtained partner's semen.

In addition, ED cycles were divided into fresh and frozen replacements and data on embryo donation were also collected.

To clarify what kind of information was needed, extra footnotes were added.

The main focus of the EIM reports is to cover the huge variety of treatments in Europe with all the different regulations and laws behind them.

Therefore, a questionnaire with six modules (online available) was sent out to the coordinator of each participating country in April 2013. Data were directly entered in an online ESHRE computer system by each country coordinator. Data analysis was performed in ESHRE's central office by V.G.

After the first tables had been created, each participating country had the opportunity to correct the data in March 2014.

As is evident from the tables, the only complete data reported from all countries were on the number of aspirations and the number of centres performing ART, not IUI.

Total values (in terms of numbers and percentages) presented in the tables, refer to those countries where all data have been reported, as underlined in the footnotes.

Definitions refer to the International Committee Monitoring Assisted Reproductive Technology (ICMART) and World Health Organization glossary of ART terminology (Zegers-Hochschild et al., 2009).

## Results

### Participation

The present report includes data from 33 of 51 European countries (Supplementary Table S1, Fig. 1, Supplementary data).

In contrast to the 2010 report, Macedonia was not able to send data (contributing in 2009 with 3029 cycles all together). Cyprus restarted to send in data. Albania and Turkey (one of the main contributors in 2008 with 107 clinics and 43 928 cycles) reported until 2007, but for 3 years, data for these countries have been missing in the report. Croatia and Latvia reported until 2008, but for 2 years, these countries have not reported data.

Six countries did not provide any data for a minimum of two consecutive years (2010 and 2011) (Albania, Bosnia, Croatia, Latvia, Slovakia and Turkey).

Belarus and Malta are 'new' countries. Belarus delivered data in 2011 for the first time.

The proportion of clinics reporting the data was 81.0% (82.5% in 2010) (Table I). In 17 countries (16 in 2010 and 21 in 2009), the coverage reached 100% (Table I, Supplementary Table SIV).

Switzerland, Montenegro and Belarus were able to report data from all but a single centre each.

In Germany, more than 95% of the centres are included. This is the result of an ongoing fundamental change in the structure of the data collection and data analysis initiated by a governmental initiative.

	European countries geographically	Members of the European Union	2006	2007	2008	2009	2010	2011
Albania	X							
Andorra	X							
Armenia	X							
Aserbajdschan	X							
Austria	X	X						
Belarus	X							
Belgium	X	X						
Bosnia	X							
Bulgaria	X	X						
Croatia	X	X						
Cyprus	X	X						
Czech Republic	X	X						
Denmark	X	X						
Estonia	X	X						
Finland	X	X						
France	X	X						
Georgia	X							
Germany	X	X						
Greece	X	X						
Hungary	X	X						
Iceland	X							
Ireland	X	X						
Italy	X	X						
Kazachstan	(x)							
Kosovo	X							
Latvia	X	X						
Liechtenstein	X							
Lithuania	X	X						
Luxemburg	X	X						
Macedonia	X							
Malta	X	X						
Moldova	X							
Monaco	X							
Montenegro	X							
Norway	X							
Poland	X	X						
Portugal	X	X						
Romania	X	X						
Russia	X							
San Marino	X							
Serbia	X							
Slovakia	X	X						
Slovenia	X	X						
Spain	X	X						
Sweden	X	X						
Switzerland	X							
The Netherlands	X	X						
Turkey	X							
UK	X	X						
Ukraine	X							
Vatican City	X							
	51	28	29 reporting	33 reporting	36 reporting	34 reporting	31 reporting	33 reporting
	not a member of the EIM		no data received		data received			

**Figure 1** Countries participating in the European IVF-Monitoring consortium in Europe 2006–2011.

Participation was very low in Greece (16%), and limited in Bulgaria (23%) and Lithuania (17%). Among the countries with the largest populations, the coverage was 100% in Italy, France and UK, 97% in Germany, 82% in Russia and only 55% in Spain.

Comparing the 30 countries that provided data in 2010 and 2011 consecutively, the amount of IVF+ICSI cycles increased from 407 675 to 433 395 (6.3%).

Registers from a number of countries have been unable to provide data on initiated cycles and deliveries; in addition, several countries show a high percentage of pregnancies that are lost to follow-up.

Therefore, complete outcome data were only available on the pregnancy rate per aspiration, while some of the more reliable indicators of treatment success (clinical pregnancies and deliveries per initiated cycle) cannot be reported completely and comparing countries should be performed with caution.

### Reporting methods and size of the clinics

Among the 17 countries where reporting was complete (Supplementary Table SIV), the register was compulsory for 15 (11 held by a National Health Authority and 4 by a Medical Organization) and voluntary for 2—both held by a Medical Organizations (Supplementary Table SIII).

Six registers were based on individual forms, i.e. cycle-by-cycle data.

Some used the core-data-description described earlier (Germond *et al.*, 2008). In the 16 countries with partial EIM reporting, 14 registers were voluntary, 2 compulsory. Three were held by a National Health Authority, 11 by a Medical Organization and 2 by private initiative; only 4 used individual forms.

Thirteen countries (Austria, Belarus, Belgium, Finland, France, Germany, Italy, Poland, Slovenia, Spain, Sweden, Switzerland and UK) reported some kind of data validation process.

Public access to individual clinic data was available in 11 countries: Ireland, Kazakhstan, Moldova, Montenegro, Romania, Serbia, Slovenia, Spain, Sweden, Switzerland and UK. Public ( $\pm$  industry or professional society) financial support for the national registration effort was present in 20 countries, while in only 6 countries (Belarus, Denmark, Germany, Greece, Portugal and Slovenia), all the expenses were covered by the centres alone.

The distribution of clinics according to the number of cycles varied considerably among the countries (Supplementary Table SII). For instance, small clinics, providing < 100 cycles annually, accounted for 8 out of 21 reporting centres in Romania (62%), 1 of 4 in Montenegro (33%) and 49 of 201 in Italy (27%).

**Table I Treatment frequencies after ART in European countries in 2011.**

Country	IVF units in the country		Clinics reporting	IUI labs reporting	Treatment cycles		FER	PGD	ED	IVM	FOR	All	Cycles/million	
	Clinics	IUI labs			IVF	ICSI							Women 15–45	Population
Austria	28		28		963	4902	811					6676	4160	812
Belarus	4	4	3	3	1272	816	107		16	5		2216		
Belgium	18	34	18	28	4032	13 953	9445	605	1066		29	29 130	14 930	2793
Bulgaria	26	26	6	6	383	1394	256	0	68	0	0	2101		
Cyprus	7		7		365	1099	314	0	268			2046	8046	1826
Czech Republic	36		36		2268	10 058	4117	608	3268			20 319	9293	1922
Denmark	21	67	21	43	6243	5184	2870	139	124	0	0	14 560	13 824	2633
Estonia	5	5	5	5	556	1184	582	0	152	0	0	2474	9359	1928
Finland	18	23	18	23	2552	2347	3403	12	705	0		9019	9470	1715
France	103	92	103	92	21 726	39 168	22 777	516	979	87		85 253	6971	1306
Germany	128		124		10 795	38 286	18 273	0	0			67 354		
Greece	67		11	11	623	3757	582	71	152	0	0	5185		
Hungary	12		12		995	3186	453	9	38			4681	2289	469
Iceland	1	1	1	1	275	160	198	0	108	0	0	741	11 366	2382
Ireland	7	8	5	6	1200	1080	762	0	0			3042		
Italy	201	354	201	354	9523	46 563	5184	0	0		2507	63 777	5401	1045
Kazakhstan	10		4		1536	871	414	85	302		1	3209		
Lithuania	6	10	1	1	52	47	16	0	0			115		
Moldova	3	3	1	1	356	276	0	0	0	0	0	632		
Montenegro	4	4	3	3	18	407	20	0	0			445		
Norway	11	11	11	11	3189	3161	2575	0	0	2	0	8927	9111	1801
Poland	38		30	29	501	9510	4530	190	661	33	79	15 504		
Portugal	27	28	27	28	1830	3873	1057	69	269	4	5	7107	3326	660
Romania	21	21	13	13	362	859	246	0	49	37	0	1553		
Russia	120		98		21 669	22 732	8273	724	3293	280	123	57 094		
Serbia	14		6		570	990	0	0	0			1560		
Slovenia	3	3	3	3	1207	2118	696	39	6		3	4069	10 276	2034
Spain	214	314	118	137	3922	32 844	11 132	2887	15 600	4	2367	68 756		
Sweden	16		16		6146	5945	6056	63	352			18 562	10 250	2046
Switzerland	26		25		830	4546	4080	0	0			9456		
The Netherlands	13		13		8333	8336	7513	0	0			24 182	7592	1452
Ukraine	32		22	20	2598	4556	2012	75	607		3	9851		
The UK	74	99	74	99	21 702	24 710	10 939	732	2115	59	120	60 377	4918	963
All	1314	1107	1064	917	138 592	298 918	129 693	6824	30 198	511	5237	609 973	6556	1269

Treatment cycles in IVF and ICSI refer to initiated cycles.

IVF and ICSI: for Austria, Belgium, France, Germany, Greece, Lithuania and Serbia treatment cycles refer to aspirations.

For Austria in 1177 cycles, it is not known whether IVF or ICSI was performed.

Treatment cycles in FER refer to thawings.

FER: for Belarus, Finland, Kazakhstan, Lithuania and the Netherlands treatment cycles refer to transfers.

Treatment cycles in PGD contain both fresh and frozen cycles and refer to initiated cycles in the fresh cycles and thawings in the frozen cycles.

Treatment cycles in ED refer to transfers and contain fresh and frozen cycles.

Treatment cycles in IVM refer to aspirations.

Treatment cycles in FOR refer to thawings.

<http://www.census.gov/population/international/data/idb/region.php>.

IVF, *in vitro* fertilization; IUI, intrauterine insemination; ICSI, intracytoplasmic sperm injection; FER, frozen embryo replacement; ED, egg donation; IVM, *in vitro* maturation; PGD, preimplantation genetic diagnosis; FOR, frozen oocyte replacements.

Large clinics performing > 1000 cycles a year constituted 13 of 18 (72%) in Belgium, 2 of 3 in Slovenia and 6 of 13 (46%) centres in the Netherlands.

## Number of treatment cycles per technique and availability

In total, 609 973 cycles were reported in 2011 (Table I)—61 945 more than in 2010 (+11.3%). Compared with 2010, two more countries reported in 2011 (Fig. 2).

Among the 437 510 fresh cycles reported in 2011, 138 592 were IVF (32%) and 298 918 were ICSI (68%). For ~10 years (between 1997 and 2007), an increase in the proportion of ICSI to IVF cycles was described. Since 2008, a plateau seems to be established (Fig. 3).

Among the fresh aspirations, 20 countries reported 14 117 of 262 784 cycles performed with donor semen (5.4%) and 25 countries reported 11 819 of 329 551 cycles performed with surgically obtained partner's semen (3.6%).

Information about FER-thawing was available in all countries except Belarus, Finland, Greece, Lithuania, Moldova, Serbia and the Netherlands (Table II).

Information about FER transfer was available in all countries except Moldova and Serbia (Supplementary Table SVII). A total of 118 072 FER-thawing cycles had been reported in 2011. A total of 118 869 FER-transfer cycles had been reported—14 808 more than in 2010.

Overall, the proportion of FER cycles compared with 'fresh' cycles was 32.3% (28% in 2010), but in some countries, the proportion was much higher: 85.8% in Switzerland; 82.2% in Finland, 55.1% in the Netherlands,

54.4% in Sweden, 54.1% in Iceland, 50.9% in Poland, 47.7% in Belgium, 41.4% in Norway and 41.1% in the Czech Republic.

The number of ED cycles, reported by 22 countries, was 30 298 (in 2010: 22 countries with 23 625 cycles).

Table I also shows the number of cycles per million women of reproductive age (15–45 years) and per million inhabitants, in the 17 countries where data coverage was 100%. Details are reported in Supplementary Table SIV. In Denmark, 5.8% of all infants born had been registered by an ART programme. In Italy, this number was 1.7%.

## Pregnancies and deliveries after treatment

Table II shows pregnancy and delivery rates per aspiration for IVF and ICSI, and pregnancy and delivery rates per thawing for FER.

Three countries (Cyprus, Hungary and Lithuania) did not provide data on deliveries. Austria provided only total cumulative deliveries after IVF and ICSI combined.

Thus, the mean pregnancy and delivery rates were computed for countries providing the relevant information.

There were significant national variations in clinical outcomes. On average, pregnancy rates per aspiration were 29.1% for IVF (29.2% in 2010) (Table II) and 27.9% for ICSI (28.8% in 2010). In FER cycles, the pregnancy rate per thawing was 21.3% (21.5% in 2010).

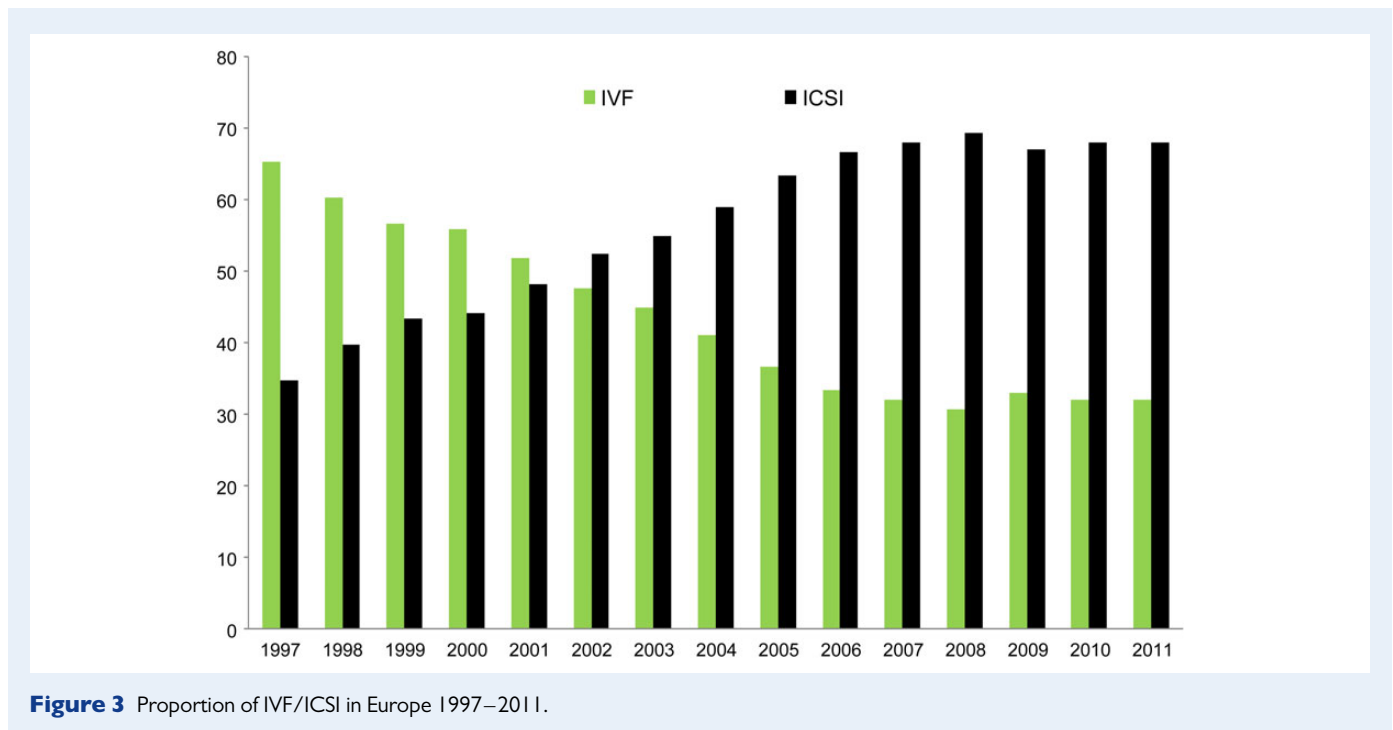
For IVF, the pregnancy rate was 19.1% in Czech Republic and 50.0% in Montenegro.

As shown in Supplementary Tables SXIII and SXIV, several countries experienced difficulties in gathering full pregnancy outcome data.

Year	Countries	Clinics	Cycles	Cycle-increase (%)	ART infants
1997	18	482	203 225		35 314 *
1998	18	521	232 225	+14.3	21 433 *
1999	21	537	249 624	+7.5	26 212 *
2000	22	569	275 187	+10.2	17 887 *
2001	23	579	289 690	+5.3	24 963 *
2002	25	631	324 238	+11.9	24 283*
2003	28	725	365 103	+12.6	68 931
2004	29	785	367 056	+0.5	67 973
2005	30	923	419 037	+14.2	72 184
2006	32	998	458 759	+9.5	87 705
2007	33	1029	493 420	+7.6	96 690
2008	36	1051	532 260	+7.9	107 383
2009	34	1005	537 463	+1.0	109 239
2010	31	991	550 296	+2.4	120 676
2011	33	1314	609 973	+11.3	134 106
<b>total</b>			<b>5 907 556</b>		<b>881 474</b>

\* only countries with data of all centers had been analyzed

**Figure 2** Number of clinics, cycles and ART-infants in Europe 1997–2011.



**Figure 3** Proportion of IVF/ICSI in Europe 1997–2011.

Overall, the pregnancies lost to follow-up were 11.1% (7.3% in 2010) for IVF and ICSI and 11.4% (6.5% in 2010) for FER.

The mean delivery rates per aspiration for IVF, ICSI and FER (per thawing) were 21.7, 19.9 and 14.4%, respectively (Table II).

These figures represent the actual recorded deliveries, even though a number of deliveries may have occurred in the lost to follow-up group.

A detailed account of numbers of cycles, aspirations, transfers, pregnancies, deliveries and the corresponding rates per technique in each country are reported in [Supplementary Table SV](#) for IVF, [Supplementary Table SVI](#) for ICSI and [Supplementary Table SVII](#) for FER.

The number of documented miscarriages was reported by 30 countries for IVF and ICSI and by 27 countries for FER ([Supplementary Tables SXIII and SXIV](#)).

In these countries, the rates varied from 1.3 to 85.3% for fresh cycles (mean of 17.0%) and from 11.2 to 50.0% for FER (mean of 21.6%).

The figures may be underestimated because of pregnancies lost to follow-up.

In the nine countries with complete follow-up, the average figures were 21.0% for fresh cycles and 24.0% for FER.

ED (fresh transfer) was reported by 21 countries ([Supplementary Table SVIII](#)). In most of the countries where data were not reported, this technique was not allowed. Since 2009, the donor cycles (aspirations) and the recipient cycles (transfers) were divided into fresh or frozen/thawed cycles.

Frozen/thawed cycles include oocyte or embryo cryopreservation. In total, 8975 clinical pregnancies resulted from 28 045 embryo transfers.

A significant number of ED are carried out using frozen oocytes.

The mean pregnancy rate was 45.8% (50.4% in 2010) in fresh transfers and 33.6% (33.3% in 2010) in thawed transfers.

The mean delivery rate per donation was 39.1%.

Fifteen countries reported data on embryo donation: 3153 transfers were performed, with 992 pregnancies (31.5%).

In total, 134 106 infants were born after IVF, ICSI, FER, ED and PGD in the 30 countries where the reporting included newborns (Table II).

Of the 134 106 ART infants, 102 160 were born after IVF/ICSI fresh cycles ([Supplementary Table SXIII](#)) and 21 156 were born after FER I ([Supplementary Table SXIV](#)).

### Age distribution

The age distribution of women treated with IVF and ICSI varied across countries ([Supplementary Tables SIX and SX](#)). The highest percentages of women aged 40 years or more in IVF-cycles were found in Greece, Switzerland and Italy, whereas the highest percentages of women aged 34 years or less were found in Ukraine, Belarus and Montenegro.

As expected, pregnancy rates associated with IVF and ICSI decreased with advancing age. The same trend was seen for delivery rates.

For women  $\geq 40$  years undergoing ICSI, the delivery rates vary from 5.0% in Czech Republic to 14.9% in Kazakhstan ([Supplementary Table SX](#)).

FER cycles ([Supplementary Table SXI](#)) included a relatively higher percentage of young women ( $\leq 34$  years: 50%) and, as in fresh cycles, pregnancy and delivery rates decreased with age.

In ED cycles ([Supplementary Table SXII](#)), the age of the recipient was 40 years or more in 58.7% of cases on average, and few countries reported  $< 40\%$ : Hungary (17.6%), Romania (34.8%), Slovenia (16.7%) and Sweden (11.4%).

Pregnancy and delivery rates in oocyte recipients were comparable across different age groups.

### Number of embryos transferred and multiple births

Table III summarizes the number of embryos transferred after IVF and ICSI combined. The total proportion of single-embryo transfers (SETs) was 27.5% (25.8% in 2010 and 24.2% in 2009 and 22.4% in 2008).

**Table II Results after ART in 2011.**

Country	Cycles IVF + ICSI	IVF			ICSI			FER			ART infants	ART infants per national births
		Aspirations	Pregnancies per aspiration (%)	Deliveries per aspiration (%)	Aspirations	Pregnancies per aspiration (%)	Deliveries per aspiration (%)	Thawings	Pregnancies per thawing (%)	Deliveries per thawing (%)		
Austria	7042	963	33.9		4902	31.1		811	32.6		2075	2.7
Belarus	2088	1224	47.5	33.3	778	40.6	28.0				846	0.8
Belgium	17 985	4032	27.4	19.8	13 953	25.4	18.7	9445	19.2	13.7	5588	4.4
Bulgaria	1777	374	35.8	27.5	1372	32.4	19.5	256	39.1	19.5	525	0.7
Cyprus	1464	348	34.2		1066	40.3		314	31.2			
Czech Republic	12 326	1742	19.1	13.5	10 049	29.7	17.8	4117	25.1	14.0	4016	3.7
Denmark	11 427	5912	24.5	22.1	5072	25.7	23.4	2870	16.8	14.2	3437	5.8
Estonia	1740	541	32.2	24.6	1169	32.0	25.0	582	14.6	10.3	631	4.2
Finland	4899	2446	28.7	22.3	2243	26.4	20.2				1751	2.9
France	60 894	21 726	22.9	18.6	39 168	24.4	20.1	22 777	15.6	12.0	17 328	2.1
Germany	49 081	10 795	27.3	18.4	38 286	27.0	18.5	18 273	18.9	12.5	13 757	2.1
Greece	4380	623	28.1	14.4	3757	32.3	15.5				1430	
Hungary	4181	991	34.0		3180	30.2		453	34.2			
Iceland	435	275	21.1	17.1	160	23.8	21.3	198	22.2	15.7	146	3.3
Ireland	2280	1035	30.0	24.7	1003	26.4	21.5	762	20.9	16.3	680	0.9
Italy	56 086	8227	23.5	15.0	42 059	21.5	14.2	5184	17.6	11.3	9436	1.7
Kazakhstan	2407	1535	38.4	26.4	862	43.0	29.5	414	37.0	23.7	1025	
Lithuania	99	52	26.9		47	42.6						
Moldova	632	345	34.8	30.1	267	36.0	30.7				251	0.6
Montenegro	425	18	50.0	38.9	400	26.0	23.3	20	10.0	10.0	125	1.7
Norway	6350	3008	28.2	23.2	3028	25.1	20.8	2575	19.5	14.8	1892	3.1
Poland	10 011	481	36.6	22.7	9411	34.5	24.0	4530	25.1	15.8	3890	1.0
Portugal	5703	1632	33.3	27.0	3563	25.6	19.6	1057	18.8	14.0	1757	1.8
Romania	1221	343	40.5	29.4	821	36.9	24.4	246	24.4	13.4	472	0.2
Russia	44 401	20 726	34.2	22.9	22 321	32.0	20.6	8273	27.5	14.7	14 552	0.8
Serbia	1560	570	30.5	20.0	990	35.8	29.7				564	
Slovenia	3325	1181	29.7	22.9	2051	26.0	21.2	696	24.9	19.7	974	4.4
Spain	36 766	3436	32.7	17.3	29 620	31.7	18.8	11 132	28.1	14.3	14 973	
Sweden	12 091	5701	30.0	24.2	5603	28.2	23.3	6056	23.0	18.2	4071	
Switzerland	5376	718	22.4	18.2	4071	26.7	20.0	4080	19.4	13.4	1779	2.2
The Netherlands	16 669	7480	29.3	20.6	7814	31.5	23.4				4892	2.7
Ukraine	7154	2499	41.0	30.4	4322	38.6	30.9	2012	33.1	25.4	3585	0.7
The UK	46 412	19 345	30.8	27.0	24 667	30.7	26.9	10 939	22.9	20.0	17 658	2.2
All	438 687	130 324	29.1	21.7	288 075	27.9	19.9	118 072	21.3	14.4	134 106	

For IVF and ICSI, there were for Austria, Belarus, the Czech Republic, France, Ireland, Kazakhstan, Norway, Poland and Russia, respectively, 3, 20, 8, 34, 10, 10, 8, 67 and 292 deliveries with unknown outcome. These were accepted as singletons to calculate the ART infants.

For FER, there were for the Czech Republic, France, Norway, Poland, Romania, Russia and Spain, respectively, 3, 4, 1, 23, 3, 18 and 3 deliveries with unknown outcome. These were accepted as singletons to calculate the ART infants.

For Belarus, Finland, Kazakhstan, Lithuania, Moldova, Serbia and the Netherlands, no data on the number of thawings were available.

For ED, there were for Belarus, the Czech Republic, France, Iceland, Poland, Russia and Spain, respectively, 1, 4, 1, 2, 12, 34 and 425 deliveries with unknown outcome. These were accepted as singletons to calculate the ART infants.

For PGD, there was for the Czech Republic one delivery with unknown outcome. This one was accepted as singleton to calculate the ART infants.

**Table III** Number of embryos transferred after ART and deliveries in 2011.

Country	IVF + ICSI								FER										
	Transfers	1 embryo	%	2 embryos	%	3 embryos	%	4+ embryos	%	Deliveries	Twin deliveries	%	Triplet deliveries	%	Deliveries	Twin deliveries	%	Triplet deliveries	%
Austria	6215	2349	37.8	3680	59.3	180	2.9	1	0.0	1674	361	21.6	20	1.2					
Belarus	1982	138	7.0	1126	56.8	701	35.4	17	0.9	625	199	32.9	2	0.3	6	1	16.7	0	0.0
Belgium	16 201	8293	51.2	6412	39.6	1257	7.8	233	1.4	3407	363	10.7	7	0.2	1298	134	10.3	1	0.1
Bulgaria	1590	211	13.3	607	38.2	647	40.7	125	7.9	370	61	16.5	3	0.8	50	5	10.0	0	0.0
Cyprus																			
Czech Republic	9950	2889	29.0	6604	66.4	440	4.4	17	0.2	2022	422	21.0	3	0.1	576	110	19.2	0	0.0
Denmark	9319	3948	42.4	4769	51.2	602	6.5	0	0.0	2491	401	16.1	10	0.4	408	54	13.2	1	0.2
Estonia	1569	379	24.2	1064	67.8	126	8.0	0	0.0	425	84	19.8	4	0.9	60	3	5.0	0	0.0
Finland	4141	3004	72.5	1134	27.4	3	0.1	0	0.0	994	64	6.4	0	0.0	656	33	5.0	2	0.3
France	50 794	15 879	31.4	29 947	59.2	4442	8.8	343	0.7	11 924	2074	17.4	26	0.2	2726	256	9.4	3	0.1
Germany	45 481	7151	15.7	30 820	67.8	7462	16.4	0	0.0	9090	1857	20.4	73	0.8	2286	330	14.4	24	1.0
Greece	3708	536	14.5	955	25.8	1830	49.4	387	9.9	684	142	41.5	12	3.5	82	14	56.0	1	4.0
Hungary	3922	611	15.6	2160	55.1	1028	26.2	123	3.1										
Iceland	357	155	43.4	202	56.6	0	0.0	0	0.0	81	9	11.1	0	0.0	31	2	6.5	0	0.0
Ireland	1783	581	32.6	1047	58.7	154	8.6	1	0.1	472	75	16.2	0	0.0	124	9	7.3	0	0.0
Italy	42 331	8432	19.9	17 323	40.9	14 654	34.6	1922	4.5	7192	1374	19.1	102	1.4	584	78	13.4	2	0.3
Kazakhstan	2289	517	25.8	1072	53.5	393	19.6	23	1.1	659	113	17.5	14	2.2	98	7	7.1	1	1.0
Lithuania	91	7	7.7	17	18.7	67	73.6	0	0.0										
Moldova	574	37	6.4	184	32.1	311	54.2	42	7.3	186	41	22.0	12	6.5					
Montenegro	384	65	16.9	86	22.4	227	59.1	6	1.6	100	23	23.0		0.0	2		0.0		0.0
Norway	5190	3018	58.2	2135	41.1	37	0.7	0	0.0	1327	148	11.2	0	0.0	380	35	9.2	1	0.3
Poland	8608	1627	20.0	5961	73.3	527	6.5	14	0.2	2366	453	19.7	11	0.5	717	92	13.3	1	0.1
Portugal	4405	956	21.7	3183	72.3	264	6.0	2	0.0	1140	263	23.1	1	0.1	148	24	16.2	1	0.7
Romania	1085	101	9.3	476	44.0	392	36.3	112	10.4	301	85	28.2	5	1.7	33	8	26.7	1	3.3
Russia	38 851	5853	17.0	21 190	61.7	6325	18.4	968	2.8	9329	2117	23.4	127	1.4	1214	263	22.0	17	1.4
Serbia	1428	234	16.4	366	25.6	828	58.0	0	0.0	408	108	26.5	24	5.9					
Slovenia	2773	955	34.4	1769	63.8	49	1.8	0	0.0	705	102	14.5		0.0	137	23	16.8		0.0
Spain	27 744	4943	17.9	19 567	70.9	3075	11.1	0	0.0	6163	1362	22.1	21	0.3	1588	245	15.5	4	0.3
Sweden	10 019	7490	74.8	2529	25.2	0	0.0	0	0.0	2681	132	4.9	1	0.0	1104	51	4.6	2	0.2
Switzerland	4221	844	20.0	2695	63.8	682	16.2	0	0.0	944	192	20.3	6	0.6	547	72	13.2	6	1.1
The Netherlands	13 629									3373	316	9.4	3	0.1	1124	65	5.8	4	0.4
Ukraine	6387	784	12.3	3805	59.6	1729	27.1	69	1.1	2094	529	25.3	19	0.9	512	116	22.7	3	0.6
The UK	40 150	13 729	34.2	24 368	60.7	2050	5.1	0	0.0	11 846	2210	18.7	34	0.3	2192	344	15.7	4	0.2
All	367 171	95 716	27.5	197 253	56.7	50 482	14.5	4405	1.3	85 073	15 680	18.6	540	0.6	18 683	2374	12.8	79	0.4

For Austria, IVF + ICSI also included the FER cycles.



Double-embryo transfers (DETs) occurred in 56.7% (56.7% in 2010 and 57.7% in 2009 and 53.2% in 2008).

Triple-embryo transfers were reported in 14.5% (16.1% in 2010, 16.9% in 2009 and 22.3% in 2008).

Four or more embryos were transferred in 1.3% (1.5% in 2010, 1.2% in 2009 and 2.1% in 2008).

Information on numbers of elective single transfers is not yet available.

As shown in Table III, major differences were seen between countries concerning the number of embryos transferred. In 2011, three countries reported an SET rate of over 50% (Belgium 50.4%, Finland 67.55% and Sweden 73.3%).

The proportion of triple-embryo transfers ranged from 0 in Sweden and Iceland and 0.1% in Finland to  $\geq 40\%$  in Bulgaria, Greece, Lithuania, Moldova, Montenegro and Serbia.

The transfer of four or more embryos ranged from 0% in 15 countries and over 2% in 9 countries to 10.4% in Romania.

In FER cycles, the proportions of single, double, triple and  $\geq 4$  embryos transfers were 37.9, 53.1, 8.7 and 0.4%, while in ED, the figures were 19.7, 70.2, 9.5 and 0.6%, respectively.

In fresh IVF/ICSI cycles, the percentages of multiple deliveries were 19.2% in total (19.6% in 2010), 18.6% twins (19.6% in 2010, 19.4% in 2009, 20.7% in 2008 and 21.3% in 2007) and 0.6% triplets (1.0% in 2010, 0.8 in 2009, 1.0% in 2008 and 2007) (Table III).

After FER, the percentages were 12.8% for twins (12.5% in 2010, 12.7% in 2009, 13.4% in 2008 and 13.1% in 2007) and 0.4% for triplet deliveries (0.3% from 2010 to 2007).

Additional data on pregnancy outcome, singleton and multiple deliveries are provided in [Supplementary Tables SXIII and SXIV](#).

In ED, of 7137 deliveries with known data on multiplicity, 1761 were twins (24.7%) and 44 were triplets (0.6%) (data not presented in tables).

## Perinatal risks and complications

[Supplementary Table SXV](#) summarizes the risk of preterm deliveries according to the number of newborns. Data were available from 17 countries. These show that the risk of extreme preterm birth (gestational weeks 20–27) increased from 0.9% (1.1% in 2010) for a singleton delivery to 3.7% (3.2% in 2010) for twins and 13.5% (12.8% in 2010) for triplets.

The same trend was noted for very preterm birth (28–32 weeks), from 2.3 to 10.4% and 32.4%, respectively. Term delivery (37+ weeks) rate was 88.0% for singleton, 46.1% for twins and only 8.6% for triplets.

Ovarian hyperstimulation syndrome (OHSS) was reported in 24 of the 33 countries ([Supplementary Table SXVI](#)). In total, 1705 cases of OHSS were recorded, corresponding to a prevalence of 0.6% (0.4% in 2010 and 0.8% in 2009) of all stimulated cycles in the countries reporting the data. The table also includes data on the incidence of other adverse outcomes, such as bleeding (711 cases), infection (59 cases) and fetal reductions (343 cases). Maternal death was reported in one case (two cases in 2010 and one in 2009).

The figures may be underestimated because of limited information.

## Preimplantation genetic diagnosis/ preimplantation genetic screening

PGD/PGS activity, recorded from 16 countries (17 in 2010) (Table I), involved 6370 fresh cycles and 454 thawings, resulting in 3921 fresh and 344 frozen embryo transfers, 1506 pregnancies (35.3% per transfer)

and 996 deliveries (23.3% per transfer), the main contributor being Spain with 2887 cycles. More complete data and detailed analysis of PGD/PGS in Europe will be published separately by ESHRE's PGD Consortium ([Moutou \*et al.\*, 2014](#)).

## In vitro maturation

IVM was recorded in nine countries (Table I). A total of 511 aspirations (493 in 2010, 1334 in 2009 and 562 in 2008) and 437 transfers were recorded, resulting in 127 pregnancies and 87 deliveries. Russia accounted for 55% of cycles and 75% of deliveries.

## Frozen oocyte replacement

FOR was recorded by 10 countries (Table I), with a total of 5237 thawings (4859 in 2010), 4368 transfers, 1415 pregnancies and 853 deliveries. The majority (93%) was performed in Italy and Spain.

## Intrauterine insemination

The number of IUI laboratories present in the countries was recorded in 2009 for the first time. In 2011, 22 countries reported IUI cycles, with a total of 1107 units, 917 of which (83.0%) were reporting to the EIM (Table I).

Table IV provides data on IUI-H and IUI-D cycles. With regard to IUI-H, 174 390 cycles (175 732 in 2010) were reported by 23 countries—the main contributors being France, Italy and Spain.

Among the countries reporting deliveries, the mean delivery rate per cycle was 8.3% (8.8% in 2010), with 9.7% (9.6% in 2010) of deliveries being twin and 0.6% (0.5% in 2010) triplet deliveries.

For IUI-D, 41 151 cycles (33 596 in 2010) were reported by 21 countries, the main contributors being Denmark, Spain and Belgium. The delivery rate per cycle was 12.2% (14.1% in 2010), with multiple delivery rates of 7.3% (8.5% in 2010) for twins and 0.3% (0.2% in 2010) for triplets.

Data available on outcomes in women below 40 years and 40 years or more are presented in [Supplementary Tables SXVII and SXVIII](#). The delivery rate associated with IUI-H declined with age (8.2% below 40 years versus 3.4% above) and the multiple delivery rate decreased from 9.1 to 5.5% for twins, and from 0.7 to 0.3% for triplets.

Similar findings were seen in IUI-D, where delivery rates decreased from 12.9 to 5.8%, twin deliveries from 7.1 to 2.1% and triplets from 0.2 to 0.0% (women below 40 versus women older than 40 years).

## Sum of fresh and FER ('cumulative') delivery rates

[Supplementary Table SXIX](#) gives an estimate of a cumulative delivery rate per aspiration in countries performing FER and reporting deliveries.

The calculation, presented as the sum of fresh and FER deliveries as nominator with as denominator the number of aspirations obtained during the same year, is not a true cumulative delivery rate per aspiration, but it shows that the delivery rate (fresh versus cumulative) can increase in the countries reporting the relevant data.

Overall, the increase after inclusion of FER deliveries was from 19.7 to 24.0%, but in some countries, the rise of the delivery rates was even more significant (Finland +13.4%, Switzerland +10.2%).

In countries where the proportion of FER cycles was at least 30% of the total number of oocyte aspiration cycles, our definition of cumulative delivery rate added more than 3% to the delivery rate per fresh cycle.

**Table IV IUI with husband (partner) semen (IUI-H) or donor semen (IUI-D) in 2011.**

Country	IUI-H									IUI-D								
	Cycles	Deliveries	%	Singleton	%	Twin	%	Triplet	%	Cycles	Deliveries	%	Singleton	%	Twin	%	Triplet	%
Austria																		
Belarus	507	47	9.3	36	97.3	1	2.7	0	0.0	16	2	12.5	2	100.0	0	0.0	0	0.0
Belgium	11 395	634	5.6	598	96.0	25	4.0	0	0.0	6824	384	5.6	370	97.4	9	2.4	1	0.3
Bulgaria	1134	64	5.6	60	93.8	4	6.3	0	0.0	304	22	7.2	20	90.9	2	9.1	0	0.0
Cyprus																		
Czech Republic																		
Denmark	6643	836	12.6	734	87.8	91	10.9	11	1.3	9583	1233	12.9	1185	96.1	45	3.6	3	0.2
Estonia	165	17	10.3	15	88.2	1	5.9	1	5.9	86	6	7.0	5	83.3	0	0.0	1	16.7
Finland	3903	340	8.7	324	95.3	15	4.4	1	0.3	1029	133	12.9	130	97.7	3	2.3	0	0.0
France	54 789	5230	9.5	4598	88.6	566	10.9	28	0.5	4004	652	16.3	576	88.3	73	11.2	3	0.5
Germany																		
Greece	1087	68	6.3	55	87.3	8	12.7	0	0.0	53	16	30.2	14	87.5	2	12.5	0	0.0
Hungary																		
Iceland																		
Ireland	762	72	9.4	64	88.9	7	9.7	1	1.4	280	48	17.1	46	95.8	2	4.2	0	0.0
Italy	32 644	2062	6.3	1866	90.5	179	8.7	17	0.8									
Kazakhstan	773	10	1.3	7	70.0	3	30.0	0	0.0	170	8	4.7	7	87.5	1	12.5	0	0.0
Lithuania																		
Moldova	128	16	12.5	16	100.0	0	0.0	0	0.0	60	15	25.0	14	93.3	1	6.7	0	0.0
Montenegro	220	23	10.5	21	91.3	2	8.7		0.0									
Norway	479	62	12.9	52	83.9	10	16.1	0	0.0	472	85	18.0	83	97.6	2	2.4	0	0.0
Poland	13 341	1018	7.6	900	92.3	73	7.5	2	0.2	2286	380	16.6	328	89.9	36	9.9	1	0.3
Portugal	2049	184	9.0	161	87.5	20	10.9	3	1.6	190	41	21.6	34	82.9	7	17.1	0	0.0
Romania	1334	87	6.5	75	89.3	8	9.5	1	1.2	128	13	10.2	13	100.0	0	0.0	0	0.0
Russia	7562	888	11.7	815	92.7	61	6.9	3	0.3	3822	626	16.4	580	92.9	43	6.9	1	0.2
Serbia	1152																	
Slovenia	786	65	8.3	59	90.8	6	9.2		0.0	4		0.0						
Spain	24 013	1755	7.3	1526	87.0	214	12.2	15	0.9	6787	683	10.1	599	87.7	84	12.3	0	0.0
Sweden										443	82	18.5	79	96.3	2	2.4	1	1.2
Switzerland																		
The Netherlands																		
Ukraine	1606	226	14.1	206	91.2	20	8.8		0.0	581	92	15.8	84	91.3	8	8.7		0.0
The UK	7918									4029	502	12.5	453	90.2	47	9.4	2	0.4
All	174 390	13 704	8.3	12 188	89.7	1314	9.7	83	0.6	41 151	5023	12.2	4622	92.4	367	7.3	13	0.3

Italy: underestimation of deliveries because of high number of pregnancies lost to follow-up, IUI-D is forbidden.

Romania: data from only 13 out of 21 clinics.

The UK: for IUI-H, only the number of cycles and pregnancies are available.

## Cross-border reproductive care

Only seven countries reported data on cross-border reproductive care (CBRC): Belarus, Iceland, Montenegro, Poland, Slovenia, Spain and Switzerland. A total of 3507 cycles were reported, 60.0% of which involved IVF/ICSI with the couple's own gametes, 17.6% were EDs and 21.8% were IUI or IVF with semen donation. Information regarding the countries of origin was very incomplete and not reliable enough to draw any conclusions. The main reason (45%) reported by patients was to seek a higher quality treatment than available in their home countries.

## Discussion

The present report is the 15th consecutive, annual European report on ART data. Taken together, these reports cover nearly 6 million treatment cycles from 1997 to 2011. Since 2003 also the infants born after ART had been included—nearly 800 000.

As shown in the tables, the method of reporting varies among countries and registers. A number of countries have been unable to provide some of the relevant data, such as initiated cycles and deliveries.

It can be argued that as long as data are incomplete and generated through different methods of collection, results should be interpreted with caution.

Nevertheless, the findings reported in this paper reveal important trends in practice and outcomes in Europe and give a clear picture of the differences existing among countries.

In comparison with 2010, the number of countries reporting to the ESHRE's EIM Consortium increased from 31 in 2010 to 33 in 2011. Albania, Bosnia, Croatia, Latvia, Macedonia, Malta, Slovakia and Turkey were not able to contribute data.

Most of the independent European states that have never contributed data are very small countries (Andorra, Armenia, Liechtenstein, Luxembourg, Monaco, San Marino and Vatican City). Data are also not available from Azerbaijan, Georgia and Kosovo, but overall, the EIM has been collecting data from nearly 80% of the European countries for several years.

This trend has been ongoing since 2009. The EIM consortium is working on support for those countries with no existing national registry or with difficulties in providing data.

In 2011, the coverage of all clinics in countries which provided data was 81.0%.

The number of countries with 100% coverage was 17—similar to 2010 (21 in 2009, 19 in 2008).

The lowest reporting rates were from Greece (16%), Lithuania (17%) and Bulgaria (23%).

Overall, the number of reported cycles increased by 11.3% but also the number of countries increased (31 to 33). Comparing the 30 countries which reported also in 2010, an increase in IVF/ICSI cycles from 407 675 to 433 395 could be demonstrated (6.3%).

In Russia, 63% more cycles were registered in 2011 compared with 2010, while Greece increased by ~59%. On the other hand, the treatment cycles decreased in Bulgaria (62%) and Ireland (28%).

Clear reasons for this trend are not distinct, but the economic situation could be addressed here.

In 2011, the USA (CDC, 2012) reported 101 213 started IVF/ICSI cycles (100 824 in 2010).

For Australia and New Zealand, 40 696 initiated cycles were reported (47 260 in 2010) (Macaldowie, 2015).

The structure of data collection, legal conditions and insurance systems can influence not only the amount of treatment cycles per inhabitant but also success rates. This has to be taken into account by comparing different annual reports.

As shown in Table I and Supplementary Table SIV, the average number of treatment cycles per million inhabitants in the countries with 100% coverage was 1269 (1214 in 2010), while the average number of treatment cycles per million females of reproductive age (15–49 years) was 6556 (6221 in 2010).

Huge differences in access (cycles/million females of reproductive age) exist among countries, with the highest figures from Belgium (14 930), Denmark (13 824) and Iceland (11 366), and the lowest from Hungary (2289).

Countries able to provide over 10 000 cycles per million women of reproductive age and over 2000 cycles per million inhabitants were Belgium, Denmark, Iceland, Slovenia and Sweden.

Overall, the highest availability was reported by Belgium, Slovenia and the Nordic countries. Finally, the percentage of newborns conceived through ART varied from 0.2% in Romania to 5.8% in Denmark.

The pregnancy rate per aspiration remained relatively stable for IVF at 29.1% (2010: 29.2%, 2009: 28.9%, 2008: 28.7%). For the ICSI treatment, for the first time, a pregnancy rate of <28% was reported: 27.9% (2010: 29.8%, 2009: 28.5%, 2008: 28.7%).

Delivery rates per aspiration and per transfer, respectively, for IVF (21.7%, 24.8%) showed a marginal decrease, compared with figures from 2010 (22.4 and 25.5%) (2009: 20.6 and 23.0%, 2008: 21.2 and 24.3%).

Delivery rates per aspiration and per transfer, respectively, for ICSI (19.9%, 22.7%) also showed a marginal decrease, compared with figures from 2010 (21.2 and 23.7%) (2009: 19.3 and 21.5%, 2008: 20.4 and 22.7%).

The delivery rate per thawing for FER (14.4%) was stable (2010: 14.3%, 2009: 13.3%, 2008: 13.7%), but this indicator of outcome may be always strongly influenced by the missing data on deliveries.

After a small decrease in 2009, the proportion of ICSI versus conventional IVF procedures showed similar percentages (ICSI 68.0%) compared with data from the previous year (Fig. 3).

The figure is likely to have been driven by the absence of data from Turkey, a country with a very high proportion of ICSI cycles (98%) in 2008.

Table I demonstrates a marked variation in the relative proportions of IVF and ICSI within Europe, and the difference seems to have a geographical distribution.

In several countries from northern and eastern Europe (Belarus, Montenegro, Kazakhstan, Norway, Iceland), IVF remains the dominant technology. In contrast, in most countries from western and central Europe (Austria, Greece, Italy, Montenegro, Poland, Spain, Switzerland), ICSI was used in a minimum of 80% of cases.

In Australia and New Zealand, 67.8% of all cycles used ICSI in 2011 and in the USA, the corresponding figure was 67%, reflecting an uniform trend throughout the world in performing ICSI in the majority of the cycles.

The marked increase in the use of ICSI cannot be explained by a similar increase in male infertility but rather by a more liberal use of this technique in cases with mixed infertility, unexplained infertility, mild male factor infertility, low oocyte number and fertilization failures (Jain and Gupta, 2007; Nyboe Andersen *et al.*, 2008b).

This is, however, unlikely to fully account for the observed differences, which can only be explained by differences in professional strategy, clinical decision-making, insurance-strategies and/or financial incentives.

Overall, in 2011, the number of transfers with 3+ embryos (15.8%) was lower compared with 2010 (17.5%), 2009 (18.1%) and 2008 (24.4%), while the mean percentage of SETs (intended and not intended) increased to 27.5% (2010: 22.4%, 2009: 24.2%, 2008: 25.8%).

The proportion of DET decreased to 56.7% (56.7% in 2010 and 57.7% in 2009) (Table III).

For the third time since 1997, the proportion of 3+ embryos transfers was <20% and the proportion of SETs was higher than that of triple embryo transfers (Fig. 4).

The highest proportions of SETs were found in Finland (72.5%), Norway (58.2%), Sweden (73.3%), Belgium (51.2%) and Denmark (42.4%).

In contrast,  $\geq 50\%$  of 3+ embryo transfers were reported in Lithuania, Greece, Moldova, Montenegro and Serbia.

The EIM reports are unable to discriminate between elective (intended) SET (eSET) versus SET in general (unintended), but the increase in the number of transfers of one embryo seen in recent years is undoubtedly due to an increase in eSET.

Despite huge differences in embryo transfer policy across countries, the overall trend towards transferring fewer embryos seen over the last 10 years seems to continue (Clua et al., 2012).

In comparison with the situation in Europe, data from other registers show that SET was performed in 73.2% (2010 69.6%) of cycles in Australia and New Zealand (Macaldowie et al., 2011) and 17% in the USA (CDC, 2011).

Similar observations can be made for the multiple delivery rates.

In 2011, the multiple delivery rates (twins + triplets) in IVF and ICSI cycles were marginally lower with the previous years: 2011: 18.6% and 0.6%, 2010: 19.6% and 1.0%, 2009: 19.4% and 0.8% (Table III).

Overall, a remarkable reduction in triplet deliveries over the years is seen (3.6% in 1997 and 0.6% in 2011), but major differences are still evident across countries.

Some countries registered a high triplet delivery rate, most particularly Moldova (6.5%), Serbia (5.9%) and Greece (3.5%). Several other countries were able to maintain the triplet deliveries at  $\leq 0.2\%$  (Belgium,

Czech Republic, Finland, France, Iceland, Ireland, Montenegro, Norway, Portugal, Slovenia, Sweden and The Netherlands).

The twin delivery rate ranged from 4.8% in Sweden to 41.6% in Greece.

We have included data describing preterm birth rates according to the number of fetuses in the pregnancy (Supplementary Table SXV), which was completed by 17 countries. The risk of extreme preterm birth (<28 weeks) was increased 4-fold for twins and 15-fold for triplets (0.9–13.5%).

The risk of very preterm birth (28–32 weeks) is increased almost 4-fold for twins and 14-fold for triplets (2.3–32.4%).

Fetal reductions are almost always performed in triplet or higher order gestations. Thus, when analysing the range of triplet delivery rates in different countries, the number of fetal reductions should also be considered. A total of 343 procedures were reported (98 less than in 2010) (Supplementary Table SXVI). However, the number is likely to be an underestimate, since several countries, including large countries such as Germany and Italy, did not report on this intervention. Without fetal reductions, the proportion of triplet pregnancies and triplet deliveries would have been much higher.

The delivery rates in Europe remain lower than in the USA, where in fresh non-donor cycles performed in 2011, the delivery rate (live birth) per aspiration was 32.6% (33.7% in 2010) and the delivery rate per transfer was 35.8% (36.8% in 2010) (CDC, 2011).

However, outcomes in Europe were very similar to those achieved in Australia and New Zealand, where the delivery rates (live deliveries) in fresh cycles were 18.6% (20.2% in 2010) per aspiration and 22.3% per transfer (23.6% in 2010) (AIHW, 2011).

Data on deliveries and infants must be considered and compared with some caution because of the difficulties met by several European countries in collecting pregnancy outcome data (Supplementary Table SXIV), while the pregnancy loss to follow-up was low in the annual reports both in the USA and in Australia/New Zealand.

Figures for multiple-infant birth rate (twins, triplets or more) point to important differences between the USA (28.8%), Europe (19.2%) and Australia/New Zealand (13.1%).

With the noticeable decline in the number of embryos transferred and the increasing proportion of FER cycles, the cumulative delivery rate per started cycle may be the most relevant end-point for ART.

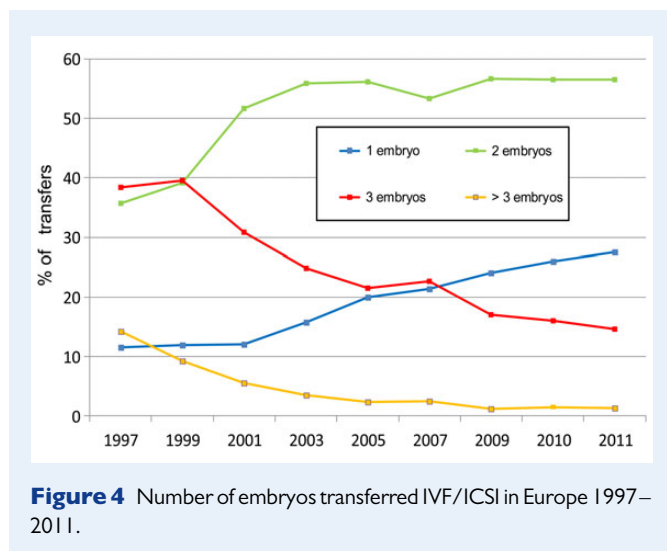
However, this figure can only be obtained a few years after the initial oocyte aspiration.

In Supplementary Table SXIX, the cumulative delivery rate is presented as the sum of fresh and FER pregnancies obtained in the same calendar year. The method of calculation can be methodologically criticized, but the estimate may be close to the actual figure. In several countries, FER deliveries added substantially to the delivery rates per cycle:

Finland (20.4–33.8%), Belgium (18.9–26.2%), Sweden (22.2–31.3%) and Norway (20.9–26.9%), supporting their embryo transfer and freezing policies.

Regarding direct risks of ART, OHSS was recorded only in 0.6% of all stimulated cycles. However, there may be a degree of under-reporting of this complication as the rate varied between 0 and 2.6% in the countries reporting it (Supplementary Table SXVI).

For the 10th consecutive year, the present report includes European data on treatments with IUI-H (174 390 cycles) and IUI-D (41 151), which is similar to 2010.



**Figure 4** Number of embryos transferred IVF/ICSI in Europe 1997–2011.

Since the inception of IUI data collection, no significant differences have been noted in terms of delivery rates and in the incidence of multiple pregnancies, but the data do not allow a distinction in reproductive outcome between IUI after natural cycles or after hormonal stimulation.

In 2009, the EIM Consortium decided to continue to address the phenomenon of CBRC. An optional module was added to the data collection sheets asking for the numbers of CBRC patients, the type of treatment requested, main countries of origin and the reason for travelling abroad. Only a total of 3507 cycles were reported by seven countries. As in 2009 and 2010, the number was much lower compared with the estimation, based on the CBRC study performed in Europe (Shenfield *et al.*, 2010): 11 000–14 000 patients and 25 000–30 000 cycles per year.

In addition, only incomplete information was reported regarding the countries of origin and reasons for travelling.

In summary, the 15th ESHRE report on ART for Europe shows a continuing moderate expansion in the number of treatment cycles, with more than 600 000 cycles reported in 2011. The use of ICSI has reached a plateau.

Pregnancy and delivery rates after IVF remained relatively stable, compared with 2009 and 2010. In ICSI cycles, pregnancy and delivery rates were slightly reduced. The number of multiple embryo transfers (3+ embryos) and the multiple delivery rate have shown again a clear decline.

## Supplementary data

Supplementary data are available at <http://humrep.oxfordjournals.org/>.

## Authors' roles

V.G. performed the calculations. M.S.K. wrote the paper. All other co-authors reviewed the document and made appropriate corrections and suggestions for improving the document. Finally, this document represents a fully collaborative work.

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## Conflict of interest

None declared.

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