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PHARMINE Report

The 2011 PHARMINE report on pharmacy and pharmacy education in the European Union

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ABSTRACT*

The PHARMINE consortium consists of 50 universities from European Union member states or other European countries that are members of the European Association of Faculties of Pharmacy (EAFP). EU partner associations representing community (PGEU), hospital (EAHP) and industrial pharmacy (EIPG), together with the European Pharmacy Students' Association (EPSA) are also part of the consortium.

The consortium surveyed pharmacies and pharmacists in different settings: community, hospital, industry and other sectors. The consortium also looked at how European Union higher education institutions and courses are organised.

The PHARMINE survey of pharmacy and pharmacy education in Europe produced country profiles with extensive information for EU member states and several other European countries. These data are available at:

http://www.pharmine.org/losse_paginas/Country_Profiles/.

This 2011 PHARMINE report presents the project and data, and some preliminary analysis on the basic question of how pharmacy education is adapted to pharmacy practice in the EU.

Keywords: Education, Pharmacy. Pharmaceutical Services. European Union. Europe.

INFORME PHARMINE 2011 SOBRE LA FARMACIA Y LA FORMACIÓN EN FARMACIA EN LA UNIÓN EUROPEA

RESUMEN

El consorcio PHARMINE se compone de 50 universidades de estados miembros de la Unión Europea que son miembros de la Asociación Europea de Facultades de Farmacias (EAFP). También hacen parte del consorcio asociaciones representando a las farmacias comunitarias (PGEU), hospitalarias (EAHP), e industrias (EIPG), así como la Asociación Europea de Estudiantes de Farmacia (EPSA).

El Consorcio encuestó a farmacias y farmacéuticos en diferentes ámbitos: comunidad, hospital, industria y otros sectores. El consorcio también revisó como se organizan las instituciones de educación superior y los cursos en la Unión Europea.

El cuestionario PHARMINE de farmacia y educación farmacéutica en Europa produjo perfiles de países con información exhaustiva de los estados miembros de la UE y otros países europeos. Estos datos están disponibles en http://www.pharmine.org/losse_paginas/Country_Profiles/.

Este Informe PHARMINE 2011 presenta el proyecto y los datos, y algunos análisis preliminares sobre la cuestión básica de cómo se adapta la educación farmacéutica a la práctica de la farmacia en la UE.

Palabras clave: Educación en Farmacia. Servicios farmacéuticos. Unión Europea. Europa.

INTRODUCTION

In 1994 the EAFP, under the direction of P. Bourlioux, University Paris XI, France, brought out a document surveying the state of pharmacy education in the EU of that time (document available at: http://enzu.pharmine.org/media/filebook/files/Bourlioux_full_report.pdf). In 2006 the EAFP decided to repeat this study and enlarge it to European pharmacy practice. To this end the PHARMINE consortium was created amongst EAFP members.

The PHARMINE consortium, created in 2008, consists of 50 universities from EU member states or other European countries that are members of the European Association of Faculties of Pharmacy (EAFP). EU partner associations representing

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community (PGEU), hospital (EAHP) and industrial pharmacy (EIPG), together with the European Pharmacy Students' Association (EPSA) are also part of the consortium.

The consortium surveyed pharmacies and pharmacists in different settings: community, hospital, industry and other sectors. The consortium also looked at how EU higher education institutions, courses and traineeship were organised. An empirical – based on statistical analysis of data – rather than an intuitive approach was used to avoid anecdotal conceptualisation. The fundamental question asked was: is pharmacy education adapted to needs?

This is the 2011 report for the EU. Further reports will be edited in the future as the data for EU member states are completed, data from other European countries are obtained, situations in individual countries change, etc.

METHODS.

The survey ran between the spring of 2009 and the summer of 2011. An electronic version was sent out to at least 2 faculties per country (excepting countries with only 1 faculty e.g. Estonia). We planned for a balanced design and obtained data from at least 1 faculty per country; in some cases we did not obtain data from 2 faculties.

In some cases, data were expressed per population (in millions, M). The population of the different member states used in the analysis was that as of 1st January 2009 given in the European Commission Eurostat demography report for 2011 <http://epp.eurostat.ec.europa.eu/portal/page/portal/population/documents/Tab/report.pdf>.

Statistical analysis.

Data (n=25) were obtained from the 27 EU member states excepting Cyprus and Luxembourg that do not have full pharmacy degree courses. When data were obtained from 2 faculties in the same country, the data from the larger faculty was used.

Results are expressed as medians with 10 and 90% percentiles. The Kolmogorov–Smirnov (KS) test for deviations of distribution from normality was significant with positive skewness – a bunching of values below the mean with a long tail above: one-tailed percentage points for skewness =0.711 (n=25 and $\alpha=0.05$). Skewness was due to the uneven distribution of population in the EU. Twenty % of the population of the EU live in 17 smaller countries: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Latvia, Lithuania, Malta, Portugal, Slovakia, Slovenia and Sweden, and 80% in 8 larger countries: France, Germany, Italy, The Netherlands, Poland, Romania, Spain and United Kingdom. Kurtosis (an excess of values near the mean and far from it with a corresponding depletion of the flanks of the normal distribution curve) was rarely significant (percentage point for distribution =3.99, for n=50 and $\alpha=0.05$).

In order to compare data for an individual country with an EU “average”, several possibilities were envisaged. Comparing the data for a given country with the EU mean was judged invalid as distributions were often not normal (see previous paragraph). Comparisons with medians were also invalid as medians were equal to zero in some cases. It was decided to use an EU linear regression estimation. This was calculated as follows: estimations of numbers of pharmacies, etc. as the dependent variable were calculated from the linear regression equation with population as the independent variable with the condition that when $X=0$, $Y=0$. The reported number for the country was then expressed as a ratio of the estimated number. Taking community pharmacies in France as an example: with $X=\text{population}$ and $Y=\text{community pharmacies}$, forcing the linear regression through $Y=0$ when $X=0$, gives a slope of 298 ± 18 (test of slope $\neq 0$: $P<0.0001$; $n=25$ countries). Thus the EU linear regression estimation of the number of pharmacies in France = $64.7 \text{ million} \times 298 = 19,280$. The reported number of pharmacies is 23,133, thus giving a ratio compared to the estimate of $23,133/19,280 = 1.20$ (see table 6). France therefore has 1.2 times more pharmacies than to be expected from the EU linear regression estimation or EU “average”.

Statview® (<http://statview.com/>), GraphPad® (www.graphpad.com) and nQuery® (www.statistical-solutions-software.com) programs were used.

Complete data for each country can be obtained on the PHARMINE website at: http://www.pharmine.org/losse_paginas/Country_Profiles/. These profiles were written by the various members of the PHARMINE consortium (see below). Data were checked by JA with that available on the internet, where possible.

RESULTS

EU population and number of pharmacists.

The population of the 25 EU member states under consideration is 501 million. A total of 419,353 pharmacists work in these 25 countries, with 81% in community pharmacy, 5% in hospital pharmacy, 7% in industrial pharmacy and 10% in other occupations (tables 1 and 2). Tasks carried out in each of the 4 sectors, as reported, are given in table 3. The median values for population, number of pharmacists and population per pharmacist are 10 million, 6,278 and 1,593 (tables 1, 2, 4 and 5).

When the data (population versus pharmacists) are plotted separating into larger (n=8) and smaller (n=17) EU member states with a cut-off after The Netherlands (16.6 M), results are similar with slopes of 758 ± 202 and 728 ± 155 (t-test for difference between slopes: $P>0.05$) for larger and smaller countries; medians are 1545 (percentiles 879, 3,282) and 1628 (percentiles 977 and 6,097), respectively.

Thus in the above and almost all of the following cases there are no significant differences in results

from larger and smaller EU countries (data not shown).

Community pharmacies, pharmacists and assistants

Reported numbers of community pharmacists expressed as a ratio of the EU linear regression estimation, gives a median value (0.92, percentiles 0.25 and 1.49) not significantly different from 1 ($P>0.05$) (tables 6, 7). Belgium (1.64) and Sweden (0.22) are outside the limits. Thus Belgium has more and Sweden less community pharmacists than the EU linear regression estimation.

The median number of pharmacies is 2380. Ratios compared to the EU linear regression estimation (tables 6, 7) showed 4 countries outside the percentile limits (0.32, 1.86): Greece (3.23), Bulgaria (1.99), Denmark (0.19) and Slovenia (0.18). Thus Greece has more than 3-fold, Bulgaria twice, and Denmark and Sweden one-fifth, the number of pharmacies. There are 3585 persons per pharmacy.

There are 2.10 (percentile limits 1.27, 3.02) pharmacists per pharmacy in Europe. Most countries show values grouped within a narrow range from 1.0 (Greece) to 2.4 (France). Three northern/central European countries have larger values: Denmark: 3.0, Slovenia: 3.1, and Austria: 4.1.

There are 4,598 assistants per country (percentiles 481, 30,516). Ratios compared to the EU linear regression estimation (table 6, 7) show 4 countries outside percentile limits: The Netherlands (2.21), Sweden (1.58), Ireland (0.26) and Slovenia (0.18). The median number of assistants per pharmacy is 1.63 (percentiles 0.43, 9.59, table 5) with a minimum of 0.3 (Ireland) and a maximum of 10.1 (Denmark) (table 4).

The education of assistants is carried out at a university faculty in three cases (Finland, Romania and Sweden); in all other cases education is given in a technical college or high school.

Hospital pharmacies and pharmacists

There are 115 hospital pharmacies per country (percentiles: 18, 662, $n=23$) and 375 hospital pharmacists (97, 4,159, $n=24$; table 2). There are 92,174 persons per hospital pharmacy and 28,669 per hospital pharmacist (tables 8, 9).

Ratios compared to the EU linear regression estimation show 4 countries outside percentiles limits (0.36, 2.50) for hospital pharmacies: Denmark (0.19), Italy (0.35), Finland (2.96) and France (2.86), and 4 for hospital pharmacists: Slovenia (0.28), Bulgaria (0.29), Ireland (2.03) and Malta (5.77), (tables 10, 11).

Industrial pharmacists

The median number of industrial pharmacists is 737 (percentiles 35, 5,276) with 13,831 (percentiles of 7,188 and 53,338) persons per industrial pharmacist (table 2).

Other activities and occupations

The median number of pharmacists in other occupations is 400 (percentiles 75, 6,877) (table 2).

Higher education institutions (HEIs).

There are 195 public HEIs in the EU with 144 (74%) in the 8 larger countries (tables 12, 13). There are 12 private HEIs: 1 each in Ireland and Romania, 4 in Portugal and 6 in Spain. Ratios compared to the EU linear regression estimation show 3 countries outside percentile limits (0.55, 2.36): Czech Republic (0.51), The Netherlands (0.33) and Malta (6.76) (tables 14, 15). It should be noted that the actual numbers of HEIs in these 3 countries are low.

In 12 countries (Czech Republic, Denmark, Finland, France, Hungary, Italy, Latvia, Poland, Slovakia, Slovenia, Spain and Sweden) HEIs are independent faculties. In 5 countries (Austria, Germany, The Netherlands, Portugal and United Kingdom) HEIs are part of a science department. In 7 countries (Belgium, Bulgaria, Estonia, Ireland, Lithuania, Malta and Romania) HEIs are part of a medical department. In Greece Athens has an independent faculty, Thessaloniki and Patras have faculties within the school of Health Sciences.

Staff

An EU country has 185 staff teaching pharmacy (percentiles: 18.4, 1,437) with 62 staff per HEI (percentiles: 14.5, 141) (table 13). Ratios compared to the EU linear regression estimation show 2 countries outside percentile limits (0.31, 2.10): Austria (0.26) and Portugal (3.44) (table 14).

Students

An EU country has 400 pharmacy students (percentiles: 48, 3,337) with 8 students per staff member (percentiles: 3.0, 24) (table 13). Ratios compared to the EU linear regression estimation show no countries outside percentile limits (tables 14, 15). There are 0.068 students per working pharmacist (percentiles: 0.031, 0.174) (table 13).

Courses

In opposition to the data above, data relating to percentage of the 7 subject areas in the course were almost all of normal distribution (tables 16, 17). Medical sciences (MEDSCI) represent the main subject area (28%) followed by chemical sciences (CHEMSCI: 24%), pharmaceutical technology (PHARMTECH: 15%), biological sciences (BIOLSCI: 11%), physics/mathematics (PHYSMATH: 6.4%), generic subjects (GENERIC: 6.4%) and law/society/ethics (LAWSOC: 6.2%).

When subject area percentages were tested for correlations amongst them, the only significant correlation (negative) emerging was that between medical and chemical sciences (figure 1). Some countries had a more "medical" course: MEDSCI % / CHEMSCI % = 2.38 for France, 1.85 for Estonia and 1.79 for Poland. Others had more "chemical" courses: MEDSCI % / CHEMSCI % = 0.71 for Germany, 0.40 for Greece, 0.38 for Denmark, 0.36 for Austria.

Traineeship

Traineeship was mainly in community pharmacy (58%) with 26% in hospital and 16% in industrial settings (details see tables 18 through 23 and figure 2). Traineeship was mainly in the fifth year (74%) but some countries such as Finland, France, Germany, Hungary and Malta started significant traineeship early - in the first or second year.

Analysis revealed medians that were often equal to zero given the large number of zeros in a given category.

DISCUSSION

A total of 419,353 pharmacists work in the 25 EU countries surveyed. This gives a mean value of 16,774 pharmacists per country with a median of 6,278. The mean and median are very different as the distribution of the data is highly skewed. This is due to the fact that the population of the EU ($n=25$) - 501 million - is roughly distributed into larger and smaller countries. Twenty % of the population of the EU lives in 17 smaller countries: Austria, Belgium, Bulgaria, Czech Republic, Denmark, Estonia, Finland, Greece, Hungary, Ireland, Latvia, Lithuania, Malta, Portugal, Slovakia, Slovenia and Sweden, and 80% lives in 8 larger countries: France, Germany, Italy, The Netherlands, Poland, Romania, Spain and United Kingdom. As a consequence of this, many of the analyses are presented using medians. Furthermore, data were also analysed by separating countries into two groups - larger and smaller countries - but no significant differences were observed between the two groups.

Community pharmacies and community, hospital and industrial pharmacists are unevenly distributed in the EU (table 24), some countries having ratios of reported number / EU linear regression estimation of >0.5 (i.e. less than half the number to be expected from the population of the country), and some with ratios of >1.5 (i.e. 1.5x or more the number expected).

Most (70%) of pharmacists work as community pharmacists with the tasks reported in table 3. In order to evaluate whether pharmacy education and training is adapted to needs, correlations were calculated between the numbers of community pharmacists and the number of HEIs and pharmacy students. These were highly significant in both cases: $r^2=0.77$ ($P<0.0001$) and 0.75 ($P<0.0001$), respectively. Thus in terms of numbers of future pharmacists, EU HEIs appear to be connected to the needs.

Pharmacists working in hospitals and industry have clearly identified roles and competences (table 3). In order to evaluate whether pharmacy education and training is adapted to such needs, correlations were calculated between the ratios of hospital and industrial pharmacists (reported number / EU linear regression estimation) and the ratio CHEMSCI+PHARMTECH / MEDSCI. It was argued that countries with higher numbers of hospital pharmacists would have courses more oriented

towards medical sciences: MEDSCI (human anatomy and physiology, medical terminology, pharmacology, pharmacognosy, pharmacotherapy / therapeutics, toxicology, pathology, histology, microbiology, nutrition, non-pharmacological treatment, haematology, immunology, parasitology, hygiene, emergency therapy, clinical chemistry / bio-analysis (of body fluids), radiochemistry, dispensing process, drug prescription, prescription analysis (detection of adverse effects and drug interactions), generic drugs, planning, running and interpretation of the data of clinical trials, medical devices, orthopaedics, OTC medicines, complementary therapy, at-home support and care, skin illness and treatment, homeopathy, phytotherapy, drugs in veterinary medicine, pharmaceutical care, pharmaceutical therapy of illness and disease). Likewise those with higher numbers of industrial pharmacists would have courses more oriented toward chemical sciences: CHEMSCI (general, organic & inorganic chemistry, analytical chemistry, pharmaceutical chemistry / pharmacopeia analysis, medicinal physico-chemistry / SAR / drug design) and pharmaceutical technology: PHARMTECH (galenic formulation / pharmaceuticals, drug disposition and metabolism (ADME) / pharmacokinetics, novel drug delivery systems, drug design, pharmaceutical R&D, drug production, quality assurance in production, drug / new chemical entity registration and regulation, common technical document (quality (pharmaceutical), safety (safety pharmacology and toxicology), efficacy (preclinical and clinical studies)), ophthalmic preparations, medical gases, cosmetics, management strategy in industry, economics of the pharmaceutical industry and R&D). In neither case were correlations significant: hospital pharmacists $r^2=0.15$, $P=0.069$, industrial pharmacists $r^2=0.12$, $P=0.115$. At the extremes, however, courses were oriented. Thus Ireland with a ratio for hospital pharmacists of 2.03 (twice as many hospital pharmacists as to be expected from the EU linear regression estimation) had a CHEMSCI+PHARMTECH / MEDSCI ratio of 0.38. Denmark with a ratio for industrial pharmacists of 4.47 (4.5 times as many industrial pharmacists as to be expected from the EU linear regression estimation) had a CHEMSCI+PHARMTECH / MEDSCI ratio of 3.63.

A couple of provisos have to be added, however. Firstly, whilst community pharmacists are registered by their national chamber and thus their numbers are accurately known, this is often not the case for hospital or industrial pharmacists and thus their numbers may be less accurate. Secondly, whilst the content of the degree course for community pharmacists is fixed by the annex of the EU directive 2005/36 (see above), this is not the case for hospital and industrial pharmacists. A large variety in the course proposed is observed. In France future hospital pharmacists have extensive pre-graduate training in hospital pharmacy and also undergo a 4-year hospital internship. In other countries there is little specific pre- or post-graduate training for either hospital or industrial pharmacists. The latter are simply defined by their place of work and their roles and responsibilities (table 3).

The PHARMINE survey revealed that there is a median of 4598 assistants per country and 1.63 assistants / community pharmacist. Three countries were unable to reply to questions on assistants as the status of such persons is not clearly established in these countries. In most EU countries the main task of assistants is to take care of medicine storage, logistics, invoicing and management of pharmacy IT systems and other such tasks. Their training, which is performed at a high school or college, includes basic modules in chemistry and in physics, healthcare, hygiene, management, economics, bookkeeping, etc.

The education of assistants is carried out at university in three cases (Finland, Romania and Sweden). Taking the case of Finland (http://www.pharmine.org/losse_paginas/Country_Profiles/Finland/) following the Bologna declaration (<http://enzu.pharmine.org/media/filebook/files/Bologna%20declaration.pdf>), pharmacy education is divided into two parts. All the students follow the same curriculum the first three years and graduate with a bachelor degree. Approximately one third of the students continue additional two years to graduate with the master degree, devoted mainly to chemical and medical sciences, generic subjects and pharmaceutical technology, and medical sciences. Those graduating with a bachelor degree have tasks similar to those of pharmacists, but these do not include pharmacy ownership, management or in-depth scientific issues. The main focus is in customer service and patient counselling. In summary, in Finland, both B.Sc. and M.Sc. graduates are involved in dispensation and counselling. Ownership of a pharmacy and/or a position of responsible pharmacist are restricted to M.Sc. graduates.

Traineeship is mainly in a community / hospital setting (84%) and mainly in the fifth and final year, although several countries introduce traineeship earlier – some in the first year of the degree. In most countries the length of the course is 5 years. There is thus integration of traineeship into the degree course. In some countries (Austria, UK) the course is shorter. Following graduation pharmacists undergo a pre-registration training period that is validated by the national chamber or agency.

In conclusion, the PHARMINE survey of pharmacy and pharmacy education in Europe produced country profiles with extensive information for each country in the EU and several other European countries. These data are available at: http://www.pharmine.org/losse_paginas/Country_Profiles/. This 2011 PHARMINE report represents a presentation of the project and the data and some preliminary analysis on the basic question of how pharmacy education is adapted to pharmacy practice in the EU.

This is the 2011 report for the EU. Further reports will be edited in the future as the data is completed, data from other European countries are obtained, situations in individual countries change, etc. Further reports will also deal with other subjects such as the impact of the Bologna declaration and of the EC directives on organisation of university

studies, and quality assurance in European pharmacy education.

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Table 1. EU pharmacists: reported data (NA: data not available).

	Population (million)	Community pharmacists	% total	Hospital pharmacists	% total	Industrial pharmacists	% total	Other occupations	% total	Total number of pharmacists
Austria	8.4	5160	94.6	292	5.4	NA	-	NA	-	5,452
Belgium	10.8	12,000	90.2	500	3.8	800	6	NA	-	13,300
Bulgaria	7.6	6,000	84.3	114	1.6	1000	14.1	NA	-	7,114
Czech Rep.	10.5	6,000	95.6	220	3.5	15	0.2	43	0.7	6,278
Denmark	5.5	952	25.9	270	7.4	1900	51.7	550	15	3,672
Estonia	1.3	1,165	75.9	100	6.5	20	1.3	250	16.3	1,535
Finland	5.4	1,406	45.8	545	17.7	800	26.1	320	10.4	3,071
France	64.7	55,455	72.9	5,574	7.3	4752	6.2	10,309	13.5	76,090
Germany	81.8	57,353	81.1	1,890	2.7	5500	7.8	6,019	8.5	70,762
Greece	11.3	11,342	87	302	2.3	144	1.1	1,250	9.6	13,038
Hungary	10	4,900	62.4	350	4.5	1200	15.3	1,400	17.8	7,850
Ireland	4.5	3,400	84.1	474	11.7	85	2.1	83	2.1	4,042
Italy	60.4	40,346	85.1	2745	5.8	4300	9.1	NA	-	47,391
Latvia	2.2	1,624	80.5	94	4.7	300	14.9	NA	-	2,018
Lithuania	3.3	2,947	93.5	NA	-	85	2.7	120	3.8	3,152
Malta	0.4	281	45	120	19.2	71	11.4	152	24.4	624
Netherlands	16.6	3,100	62	400	8	NA	-	1,500	30	5,000
Poland	38.1	21,534	95.1	1,100	4.9	NA	-	NA	-	22,634
Portugal	10.6	6,108	56.4	738	6.8	674	6.2	3,313	30.6	10,833
Rumania	21.5	13,500	93.8	692	4.8	100	0.7	100	0.7	14,392
Slovakia	5.4	2,900	89	159	4.9	200	6.1	NA	-	3,259
Slovenia	5.4	906	56.5	78	4.9	470	29.3	150	9.4	1,604
Spain	47.2	48,000	77.9	1,612	2.6	11996	19.5	NA	-	61,608
Sweden	9.3	1,400	43.8	200	6.3	1200	37.5	400	12.5	3,200
United Kingdom	62	21,712	69.1	6,213	19.8	1137	3.6	2,372	7.5	31,434

Table 2. EU pharmacists: statistical analysis.

	Community pharmacists	% total	Hospital pharmacists	% total	Industrial pharmacists	% total	Other occupations	% total	Total number of pharmacists
Number	25	25	24	24	22	22	17	17	25
Median	5,160	81	375	5.2	737	7	400	10	6,278
10% Percentile	934	45	97	2.5	35	0.82	75	0.7	1576
90% Percentile	50,982	95	4,159	18	5,276	35	6,877	30	65,270
Mean	13,180	74	1,033	7	1,670	12	1,667	13	16,774
Standard deviation	17,739	19	1,635	5.1	2801	13	2,720	9.2	22,603
Standard error	3,548	3.9	334	1	597	2.8	660	2.2	4521
KS normality test									
KS distance	0.29	0.15	0.32	0.26	0.34	0.19	0.29	0.12	0.3
P value	<0.0001	>0.10	<0.0001	0.0002	<0.0001	0.04	0.0005	>0.10	<0.0001
Passed normality test (alpha=0.05)?	No	Yes	No	No	No	No	No	Yes	No
Skewness	1.7	-0.87	2.5	1.7	2.8	1.6	2.5	0.71	1.8
Kurtosis	1.6	-0.07	5.7	2.1	8.7	2.6	6.3	-0.09	2
Sum	329,491	1,848	24,782	167	36,749	273	28,331	213	419,353

Table 3. Activities and occupations of pharmacists in the EU.

Community	Hospital	Industrial	Other
<ul style="list-style-type: none"> • preparation of medicines • dispensing of medicines • substitution by generic drugs • customer counselling on <ul style="list-style-type: none"> • medicinal prescriptions • use of self-medication medicines • dietetic products for adults and babies • programs on addictive drug substitution • nicotine replacement drugs and strategies • blood pressure, glycaemia, cholesterol monitoring/screening • reporting of adverse drug reactions 	<ul style="list-style-type: none"> • purchasing, stocking, distribution of drugs • management of drug budget • preparation of drugs for specific pathologies. e.g. anticancer drugs • specialised medical devices and material • sterile preparations • radio-chemicals • quality assurance • Interaction and communication with others: doctors, nurses, hospital board • prescription of drugs under certain circumstances • participation in clinical trials • teaching of hospital staff, pharmacy students • personalised medicine service 	<ul style="list-style-type: none"> • research and development of drugs • synthesis and production • preclinical and clinical drug evaluation • marketing authorisation • quality assurance • marketing • management of complaints, recalls • food industry • cosmetology • biotechnology 	<ul style="list-style-type: none"> • clinical biology / chemistry • academia • wholesale and distribution of medicines • armed forces, fire service, police • communication, marketing • state and local governments • insurance companies • IT database and technology • family planning clinics • labile blood products, transfusion services • humanitarian aid

Table based on replies from 25 member states. Not all activities and / or occupations may be present in a given country.

Table 4. Community pharmacists. Pharmacies and assistants: reported data.

	Population (millions)	Community pharmacists	Population /pharmacist	Community pharmacies	Population /pharmacy	Pharmacists /pharmacy	Assistants	Assistants /pharmacy
Austria	8.4	5,160	1,628	1,270	6,614	4.06	5,278	4.16
Belgium	10.8	12,000	900	5,729	1,885	2.09	6,500	1.13
Bulgaria	7.6	6,000	1,267	4,500	1,689	1.33	NA	NA
Czech Republic	10.5	6,000	1,750	2,420	4,339	2.48	4,600	1.9
Denmark	5.5	952	5,777	318	17,296	2.99	3,200	10.06
Estonia	1.3	1,165	1,116	496	2,621	2.35	748	1.51
Finland	5.4	1,406	3,841	805	6,708	1.75	3,839	4.77
France	64.7	55,455	1,167	23,133	2,797	2.4	35,000	1.51
Germany	81.8	57,353	1,426	21,390	3,824	2.68	12,192	0.57
Greece	11.3	11,342	996	10,890	1,038	1.04	4,032	0.37
Hungary	10.0	4,900	2,041	2,380	4,202	2.06	5,400	2.27
Ireland	4.5	3,400	1,324	1,616	2,785	2.1	539	0.33
Italy	60.4	40,346	1,497	17,617	3,429	2.29	NA	NA
Latvia	2.2	1,624	1,355	810	2,716	2.00	1,481	1.83
Lithuania	3.3	2,947	1,120	1,320	2,500	2.23	1,890	1.43
Malta	0.4	281	1,423	204	1,961	1.38	184	0.9
Netherlands	16.6	3,100	5,355	2,000	8,300	1.55	17,000	8.5
Poland	38.1	21,534	1,769	10,628	3,585	2.03	20,052	1.89
Portugal	10.6	6,108	1,735	2,667	3,975	2.29	4,596	1.72
Rumania	21.5	13,500	1,593	5,796	3,709	2.33	120,000	20.7
Slovakia	5.4	2,900	1,862	1,848	2,922	1.57	2,080	1.13
Slovenia	2.0	906	2,208	296	6,757	3.06	456	1.54
Spain	47.2	48,000	983	21,057	2,242	2.28	NA	NA
Sweden	9.3	1,400	6,643	1,200	7,750	1.17	6,800	5.67
United Kingdom	62.0	21,712	2,856	13,693	4,528	1.59	14,838	1.08

NA: data not available

Table 5. Community pharmacists, pharmacies and assistants: statistical analysis.

	Community pharmacists	Population /pharmacist	Community pharmacies	Population /pharmacy	Pharmacists /pharmacy	Assistants	Assistants /pharmacy
Number	25	25	25	25	25	22	22
Median	5,160	1,593	2,380	3,585	2.10	4,598	1.63
10% Percentile	933.6	991.1	309.2	1,807	1.266	480.9	0.43
90% Percentile	50,982	5,524	21,190	7,970	3.018	30516	9.592
Mean	13,180	2,145	6,163	4,407	2.124	12305	3.408
Standard deviation	17,739	1,569	7,466	3,315	0.6593	25,443	4.636
Standard error	3548	313.7	1493	663	0.1319	5424	0.9885
KS normality test							
KS distance	0.2949	0.2916	0.2802	0.2454	0.1377	0.3169	0.3242
P value	<0.0001	<0.0001	<0.0001	0.0004	>0.10	<0.0001	<0.0001
Passed normality test (alpha=0.05)?	No	No	No	No	Yes	No	No
Skewness	1.676	1.946	1.305	2.664	0.8499	3.967	2.857
Kurtosis	1.577	2.856	0.3212	9.159	1.889	16.94	9.215
Sum	329,491	53,631	154,083	110169	53.1	270,705	74.97

Table 6. Community pharmacies. pharmacists and assistants: reported data as a ratio of the EU linear regression estimation (NA: data not available).

	Community pharmacies	Community pharmacists	Assistants
Austria	0.51	0.9	1.35
Belgium	1.78	1.64	1.3
Bulgaria	1.99	1.16	NA
Czech Republic	0.77	0.84	0.94
Denmark	0.19	0.25	1.25
Estonia	1.28	1.32	1.24
Finland	0.5	0.38	1.53
France	1.2	1.26	1.17
Germany	0.88	1.03	0.32
Greece	3.23	1.48	0.77
Hungary	0.8	0.72	1.16
Ireland	1.21	1.11	0.26
Italy	0.98	0.98	NA
Latvia	1.24	1.09	1.45
Lithuania	1.34	1.32	1.23
Malta	1.71	1.03	0.99
The Netherlands	0.4	0.28	2.21
Poland	0.94	0.83	1.13
Portugal	0.84	0.85	0.93
Rumania	0.9	0.92	NA
Slovakia	1.15	0.79	0.83
Slovenia	0.18	0.25	0.18
Spain	1.5	1.5	NA
Sweden	0.43	0.22	1.58
United Kingdom	0.74	0.52	0.52
NA: data not available			

Table 7. Community pharmacies. pharmacists and assistants: reported data as a ratio of the EU linear regression estimation: statistical analysis.

	Community pharmacies	Community pharmacists	Assistants
Number of values	25	25	21
Median	0.94	0.92	1.16
10% Percentile	0.316	0.25	0.272
90% Percentile	1.864	1.488	1.57
Mean	1.068	0.9068	1.064
Standard deviation	0.6544	0.4121	0.4826
Standard error	0.1309	0.08242	0.1053
KS normality test			
KS distance	0.1386	0.1084	0.126
P value	>0.10	>0.10	>0.10
Passed normality test (alpha=0.05)?	Yes	Yes	Yes
P value summary	ns	ns	ns
Skewness	1.495	-0.2192	0.01617
Kurtosis	3.844	-0.7203	0.614
Sum	26.69	22.67	22.34
ns: not significant			

Table 8. Hospital pharmacies and hospital pharmacists (NA: data not available).				
	Hospital pharmacies	Population / hospital pharmacy	Hospital pharmacists	Population / hospital pharmacist
Austria	NA		292	28,767
Belgium	267	40,449	500	21,600
Bulgaria	NA		114	66,667
Czech Republic	86	122,093	220	47,727
Denmark	15	366,667	270	20,370
Estonia	23	56,522	100	13,000
Finland	224	24,107	545	9908
France	2,594	24,942	5,574	11,607
Germany	438	186,758	1,890	43,280
Greece	115	98,261	302	37,417
Hungary	115	86,957	350	28,571
Ireland	76	59,211	474	9,494
Italy	297	203,367	2,745	22,004
Latvia	38	57,895	94	23,404
Lithuania	54	61,111	NA	
Malta	8	50,000	120	3,333
Netherlands	100	166,000	400	41,500
Poland	708	53,814	1,100	34,636
Portugal	115	92,174	738	14,363
Rumania	594	36,195	692	31,069
Slovakia	50	108,000	159	33,962
Slovenia	29	186,207	78	69,231
Spain	288	163,889	1,612	29,280
Sweden	73	127,397	200	46,500
United Kingdom	505	122,772	6,213	9,979
NA: data not available				

Table 9. Hospital pharmacies and hospital pharmacists: statistical analysis				
	Hospital pharmacies	Population / hospital pharmacy	Hospital pharmacists	Population / hospital pharmacist
Number of values	23	23	24	24
Median	115	92,174	375	28,669
10% Percentile	18	29,443	97	9,701
90% Percentile	662	196,723	4,159	57,197
Mean	296	108,469	1,033	29,070
Standard deviation	539	78,648	1,635	17,363
Standard error	112	16399	334	3544
KS normality test				
KS distance	0,3	0,2	0,3	0,09
P value	<0,0001	>0,10	<0,0001	>0,10
Passed normality test (alpha=0.05)?	No	Yes	No	Yes
P value summary	***	ns	***	ns
Skewness	4	2	2	0,7
Kurtosis	16	4	6	0,3
Sum	6,812	2,000,000	24,782	697,669
ns: not significant. ***: P<0.001				

Table 10. Hospital pharmacies and hospital pharmacists: actual data as a ratio of the EU linear regression estimation (NA: data not available).

	Hospital pharmacies	Hospital pharmacists
Austria	NA	0.67
Belgium	1.77	0.89
Bulgaria	NA	0.29
Czech Republic	0.59	0.4
Denmark	0.19	0.94
Estonia	1.26	1.48
Finland	2.96	1.94
France	2.86	1.66
Germany	0.38	0.44
Greece	0.73	0.51
Hungary	0.82	0.67
Ireland	1.21	2.03
Italy	0.35	0.87
Latvia	1.23	0.82
Lithuania	1.17	NA
Malta	1.43	5.77
Netherlands	0.43	0.46
Poland	1.33	0.56
Portugal	0.77	1.34
Rumania	1.97	0.62
Slovakia	0.66	0.57
Slovenia	0.38	0.28
Spain	0.44	0.66
Sweden	0.56	0.41
United Kingdom	0.58	1.93
NA: data not available		

Table 11. Hospital pharmacies and hospital pharmacists: actual data as a ratio of the EU linear regression estimation: statistical analysis.

	Hospital pharmacies	Hospital pharmacists
Number of values	23	24
Median	0.77	0.67
10% Percentile	0.362	0.345
90% Percentile	2.504	1.985
Mean	1.047	1.092
Standard deviation	0.7559	1.135
Standard error	0.1576	0.2317
Lower 95% CI of mean	0.7196	0.6128
Upper 95% CI of mean	1.373	1.571
KS normality test		
KS distance	0.183	0.2616
P value	0.0443	0.0002
Passed normality test (alpha=0.05)?	No	No
P value summary	*	***
Skewness	1.359	3.293
Kurtosis	1.463	12.98
Sum	24.07	26.21
*: P<0.05		
***: P<0.001		

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Table 12. Higher education institutions, staff and students: data (NA: data not available).

	Number HEIs	Staff	Staff / HEI	Students	Students / staff	Students / pharmacist
Austria	3	58	19	NA		
Belgium	9	185	21	1,000	27	0.075
Bulgaria	3	200	67	334	8	0.047
Czech Republic	2	190	95	430	11	0.068
Denmark	2	90	45	230	13	0.063
Estonia	1	14	14	48	17	0.031
Finland	3	300	100	475	8	0.155
France	24	NA		3,337		0.044
Germany	22	NA		NA		
Greece	3	90	30	400	22	0.031
Hungary	4	NA		NA		
Ireland	3	91	30	150	8	0.037
Italy	32	1,354	42	NA	0	
Latvia	2	115	58	86	4	0.043
Lithuania	1	185	185	96	3	0.030
Malta	1	10	10	48	24	0.077
Netherlands	2	NA		NA		
Poland	10	1,446	145	1,658	6	0.073
Portugal	9	952	106	1,021	5	0.094
Rumania	10	1,000	100	2,500	13	0.174
Slovakia	2	NA		NA		
Slovenia	1	65	65	180	14	0.112
Spain	19	1,865	98	3,168	8	0.051
Sweden	2	170	85	270	8	0.084
United Kingdom	25	902	36	3,500	19	0.111

NA: data not available

Table 13. Higher education institutions, staff and students: statistical analysis.

	Number HEIs	Staff	Staff / HEI	Students	Students / staff	Students / pharmacist
Number	25	20	20	19	19	19
Median	3.0	185	61.5	400	8	0.06849
10% Percentile	1.0	18.4	14.5	48	3	0.03068
90% Percentile	24.4	1437	141.1	3337	24	0.1547
Mean	7.8	464.1	67.55	996.4	11.47	0.07376
Standard deviation	9.129	567.7	46.53	1213	7.449	0.04088
Standard error	1.826	126.9	10.41	278.3	1.709	0.009379
KS normality test						
KS distance	0.3014	0.3291	0.136	0.2979	0.2058	0.1534
P value	< 0.0001	< 0.0001	> 0.10	0.0001	0.0333	> 0.10
Passed normality test (alpha=0.05)?	No	No	Yes	No	No	Yes
P value summary	***	***	ns	***	*	ns
Skewness	1.475	1.319	0.8929	1.268	0.6478	1.156
Kurtosis	1.009	0.5114	0.5792	0.07911	-0.3417	0.9153
Sum	195	9282	1351	18931	218	1.401

ns: not significant
*: P<0.05
***: P<0.001

Table 14. Higher education institutions. staff and students: actual data as a ratio of the EU linear regression estimation.

	Number HEIs	Staff	Students
Austria	0.97	0.26	NA
Belgium	2.25	0.66	1.61
Bulgaria	1.07	1.01	0.76
Czech Republic	0.51	0.69	0.71
Denmark	0.98	0.63	0.73
Estonia	2.08	0.41	0.64
Finland	1.5	2.13	1.53
France	1.00	NA	0.9
Germany	0.73	NA	NA
Greece	0.72	0.3	0.62
Hungary	1.08	NA	NA
Ireland	1.8	0.77	0.58
Italy	1.43	0.86	NA
Latvia	2.46	2.00	0.68
Lithuania	0.82	2.14	0.51
Malta	6.76	0.96	2.09
Netherlands	0.33	NA	NA
Poland	0.71	1.45	0.76
Portugal	2.29	3.44	1.68
Rumania	1.26	1.78	2.02
Slovakia	1.00	NA	NA
Slovenia	1.35	1.24	1.57
Spain	1.09	1.51	1.17
Sweden	0.58	0.7	0.51
United Kingdom	1.09	0.56	0.98
NA: data not available			

Table 15. Higher education institutions. staff and students: actual data as a ratio of the EU linear regression estimation: statistical analysis.

	Number HEIs	Staff	Students
Number of values	25	20	19
Median	1.08	0.91	0.76
10% Percentile	0.552	0.311	0.51
90% Percentile	2.358	2.139	2.02
Mean	1.434	1.175	1.055
Standard deviation	1.249	0.7993	0.5247
Standard error	0.2497	0.1787	0.1204
KS normality test			
KS distance	0.239	0.1818	0.2395
P value	0.0007	0.0822	0.0054
Passed normality test (alpha=0.05)?	No	Yes	No
P value summary	***	ns	**
Skewness	3.467	1.315	0.8148
Kurtosis	14.44	1.897	-0.7723
Sum	35.86	23.5	20.05
ns: not significant			
**: P<0.01			
***: P<0.001			

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Table 16. Subject areas in %: reported data.

	CHEMSCI	PHYSMATH	BIOLSCI	PHARMTECH	MEDISCI	LAWSOC	GENERIC
Austria	44.0	2.0	22.0	14.0	16.0	0.60	1.00
Belgium	24.0	9.0	11.0	18.0	27.0	2.00	8.00
Bulgaria	31.0	7.0	11.0	13.0	24.0	7.00	7.00
Czech Republic	17.0	5.0	8.0	22.0	19.0	13.00	16.00
Denmark	42.0	7.0	7.0	16.0	16.0	9.00	3.00
Estonia	21.0	4.0	2.0	21.0	39.0	10.00	3.00
Finland	20.0	5.6	2.5	21.9	28.8	15.60	5.60
France	17.6	9.5	17.9	5.9	42.0	2.20	5.00
Germany	39.8	4.5	10.9	13.4	28.3	2.10	3.80
Greece	39.3	5.8	14.2	8.2	15.9	2.70	14.00
Hungary	27.2	5.2	5.2	16.0	28.5	3.88	14.22
Ireland	13.6	11.1	7.1	18.3	35.5	7.30	7.10
Italy	32.4	7.2	10.4	9.1	31.5	4.80	2.20
Latvia	27.7	6.4	6.4	20.2	26.6	8.50	6.40
Lithuania	28.0	2.6	11.7	11.7	36.4	9.80	9.80
Malta	15.4	7.2	12.7	15.4	30.8	3.60	15.00
Netherlands	20.1	3.9	10.6	14.2	31.1	8.30	11.80
Poland	21.3	4.1	8.0	15.9	38.2	6.20	6.20
Portugal	19.6	6.8	14.6	14.9	32.2	12.00	1.20
Rumania	26.1	8.7	15.8	14.1	24.9	3.70	6.60
Slovakia	28.8	8.8	10.9	14.4	27.6	3.40	6.00
Slovenia	27.0	8.5	8.5	22.0	21.0	8.50	4.70
Spain	23.5	5.5	19.9	11.0	27.6	5.50	7.00
Sweden	18.3	11.3	12.8	19.5	21.5	11.80	5.00
United Kingdom	13.6	5.7	23.9	22.7	23.9	3.40	6.80

CHEMSCI: chemical sciences
 PHYSMATH: physics, mathematics
 BIOLSCI: biological sciences
 PHARMTECH: pharmaceutical technology
 MEDISCI: medical sciences
 LAWSOC: law, society, ethics
 GENERIC: generic subjects, traineeship

Table 17. Subject areas in %: statistical analysis.

	CHEMSCI	PHYSMATH	BIOLSCI	PHARMTECH	MEDISCI	LAWSOC	GENERIC
Number	25	25	25	25	25	25	25
Median	24	6.4	11	15	28	6.2	6.4
10% Percentile	15	3.4	4.1	8.7	16	2.1	1.8
90% Percentile	41	10	21	22	39	12	15
Mean	26	6.5	11	16	28	6.6	7.1
Standard deviation	8.7	2.4	5.5	4.6	7.2	4	4.2
Standard error	1.7	0.48	1.1	0.91	1.4	0.79	0.85
KS normality test							
KS distance	0.13	0.11	0.13	0.11	0.081	0.15	0.22
P value	>0.10	>0.10	>0.10	>0.10	>0.10	>0.10	0.004
Passed normality test (alpha=0.05)?	Yes	Yes	Yes	Yes	Yes	Yes	No
P value summary	ns	ns	ns	ns	ns	ns	**
Skewness	0.7	0.23	0.55	-0.23	0.071	0.51	0.78
Kurtosis	-0.29	-0.35	0.19	-0.48	-0.5	-0.54	-0.13
Sum	638	162	285	393	693	165	176

ns: not significant

** : P<0.01

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Table 18. Traineeship – community (hours): reported data.

	Year 1	Year 2	Year 3	Year 4	Year 5
Austria	0	0	0	0	0
Belgium	0	0	0	0	1,000
Bulgaria	0	0	0	0	800
Czech Republic	40	0	0	0	960
Denmark	0	0	0	1,040	0
Estonia	0	48	0	0	410
Finland	0	520	520	0	0
France	0	320	80	80	0
Germany	160	160	0	0	800
Greece	0	0	0	0	960
Hungary	0	140	140	140	560
Ireland	0	0	0	0	960
Italy	0	0	0	250	500
Latvia	0	0	0	0	648
Lithuania	0	0	0	0	935
Malta	84	84	84	42	1,000
Netherlands	0	0	0	160	0
Poland	0	0	160	0	0
Portugal	0	0	0	39	640
Rumania	60	60	60	60	780
Spain	0	0	0	0	450
Slovakia	0	0	0	160	800
Slovenia	0	0	0	0	720
Sweden	0	0	0	0	1,040
United Kingdom	12	80	0	0	0

Table 19. Traineeship – community (hours): statistical analysis.

	Year 1	Year 2	Year 3	Year 4	Year 5
Number of values	25	25	25	25	25
Median	0	0	0	0	648
10% Percentile	0	0	0	0	0
90% Percentile	69.6	224	148	196	1000
Mean	14.24	56.48	41.76	78.84	558.5
Standard deviation	37.04	122.1	109.7	211.4	394.4
Standard error	7.408	24.41	21.95	42.28	78.87
KS normality test					
KS distance	0.4497	0.3582	0.4082	0.3546	0.2016
P value	<0.0001	<0.0001	<0.0001	<0.0001	0.0101
Passed normality test (alpha=0.05)?	No	No	No	No	No
P value summary	***	***	***	***	*
Skewness	3.111	2.902	3.794	4.247	-0.4686
Kurtosis	10.25	8.957	16.02	19.49	-1.373
Sum	356	1,412	1,044	1,971	13,963

*: P<0.05

***: P<0.001

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Table 20. Traineeship – hospital (hours): reported data.					
	Year 1	Year 2	Year 3	Year 4	Year 5
Austria	0	0	0	0	0
Belgium	0	0	0	0	0
Bulgaria	0	0	0	0	800
Czech Republic	0	80	0	0	0
Denmark	0	0	0	0	0
Estonia	0	0	0	0	90
Finland	0	0	0	0	0
France	0	0	0	0	960
Germany	160	160	0	0	800
Greece	0	0	0	0	960
Hungary	0	0	140	140	140
Ireland	0	0	0	0	960
Italy	0	0	0	250	500
Latvia	0	0	0	0	648
Lithuania	0	0	0	0	40
Malta	0	0	80	500	0
Netherlands	0	0	0	0	0
Poland	0	0	0	160	0
Portugal	0	0	0	0	320
Rumania	0	0	0	0	0
Spain	0	0	0	0	450
Slovakia	0	0	0	0	0
Slovenia	0	0	0	0	0
Sweden	0	0	0	0	0
United Kingdom	6	12	12	0	0

Table 21. Traineeship – hospital (hours): statistical analysis.					
	Year 1	Year 2	Year 3	Year 4	Year 5
Number of values	25	25	25	25	25
Median	0	0	0	0	0
10% Percentile	0	0	0	0	0
90% Percentile	2.4	39.2	39.2	196	960
Mean	6.64	10.08	9.28	42	266.7
Standard deviation	31.97	35.12	31.62	114.3	369.1
Standard error	6.394	7.024	6.323	22.86	73.83
KS normality test					
KS distance	0.5023	0.4929	0.4954	0.4833	0.2904
P value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Passed normality test (alpha=0.05)?	No	No	No	No	No
P value summary	***	***	***	***	***
Skewness	4.989	3.856	3.683	3.217	1.001
Kurtosis	24.92	15.2	13.57	11.08	-0.6776
Sum	166	252	232	1,050	6,668
***: P<0.001					

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Table 22. Traineeship – industry (hours): reported data.

	Year 1	Year 2	Year 3	Year 4	Year 5
Austria	0	0	0	0	0
Belgium	0	0	0	0	1,000
Bulgaria	0	0	0	0	0
Czech Republic	0	0	0	0	0
Denmark	0	0	0	0	0
Estonia	0	0	0	0	0
Finland	0	0	0	0	0
France	0	0	320	0	0
Germany	160	160	0	0	800
Greece	0	0	0	0	0
Hungary	0	0	140	140	0
Ireland	0	0	0	0	960
Italy	0	0	0	250	500
Latvia	0	0	0	0	0
Lithuania	0	0	0	0	0
Malta	0	0	80	500	0
Netherlands	0	0	0	0	0
Poland	0	0	0	0	0
Portugal	0	0	0	0	0
Rumania	0	0	0	0	0
Spain	0	0	100	100	100
Slovakia	0	0	0	0	0
Slovenia	0	0	0	0	0
Sweden	0	0	0	0	0
United Kingdom	0	0	0	0	0

Table 23. Traineeship – industry (hours): statistical analysis.

	Year 1	Year 2	Year 3	Year 4	Year 5
Number of values	25	25	25	25	25
Median	0	0	0	0	0
10% Percentile	0	0	0	0	0
90% Percentile	0	0	116	184	864
Mean	6.4	6.4	25.6	39.6	134.4
Standard deviation	32	32	71.3	112.3	314.2
Standard error	6.4	6.4	14.26	22.47	62.85
KS normality test					
KS distance	0.5393	0.5393	0.4802	0.4778	0.4656
P value	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
Passed normality test (alpha=0.05)?	No	No	No	No	No
P value summary	***	***	***	***	***
Skewness	5	5	3.403	3.413	2.199
Kurtosis	25	25	12.6	12.4	3.428
Sum	160	160	640	990	3360

***: P<0.001

Table 24. Countries with extremes of ratios of reported data / EU linear regression estimation.				
Ratios of reported data / EU linear regression estimation	Community pharmacies	Community pharmacists	Hospital pharmacists	Industrial pharmacists
0.5 and lower	Sweden, Slovenia, Denmark, The Netherlands, Finland	Sweden, Slovenia, Denmark, The Netherlands, Finland	Slovenia, Bulgaria, Czech Republic, Sweden, Germany, The Netherlands	Czech Republic, Romania, Greece, Estonia, UK, Ireland, Lithuania, Slovakia
1.5 and greater	Spain, Belgium	Spain, Malta, Belgium, Bulgaria, Greece	France, UK, Finland, Ireland, Malta	Hungary, Sweden, Bulgaria, Latvia, Finland, Malta, Spain, Denmark

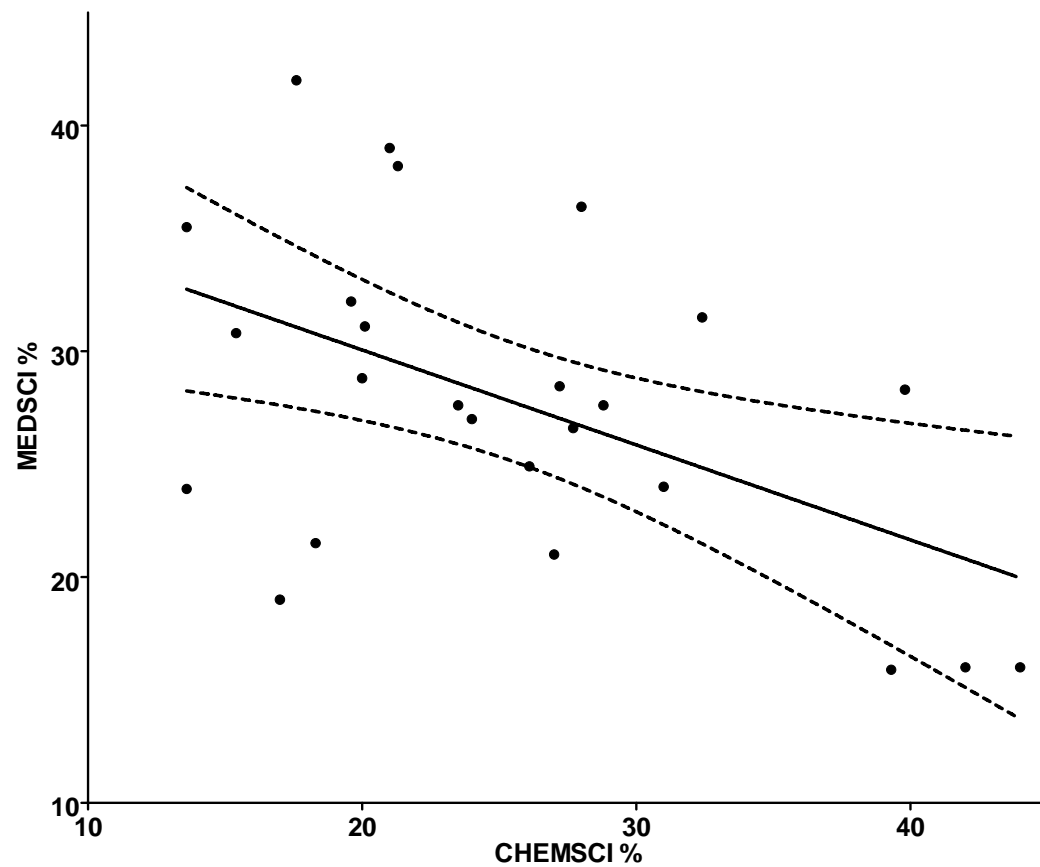


Figure 1. Relationship between MEDSCI and CHEMSCI.
(CHEMSCI: chemical sciences; MEDSCI: medical sciences)

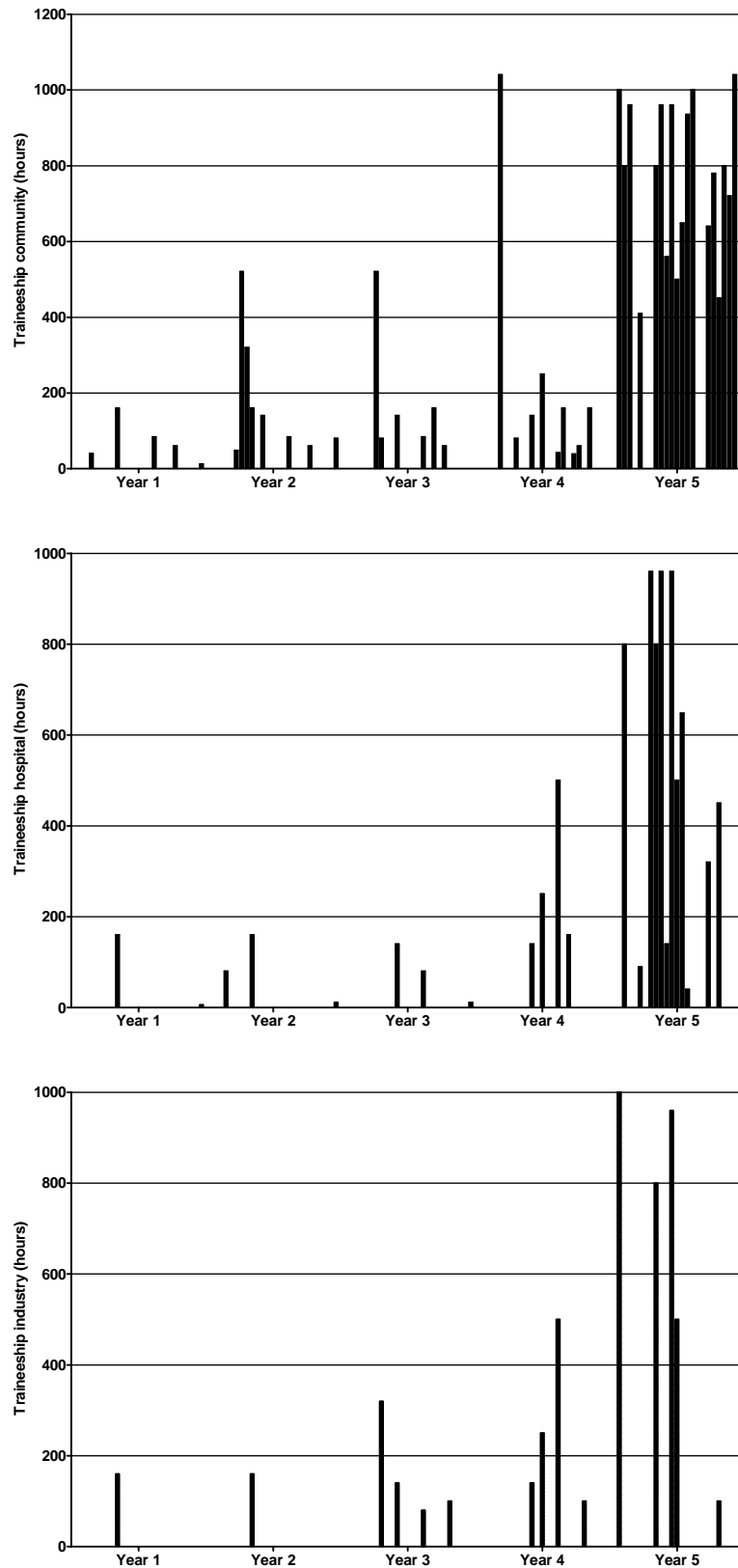


Figure 2. Traineeship : hours per year for individual countries (each bar represents a country).