Health workforce remuneration: Comparing wage levels, ranking and dispersion of 16 occupational groups in 20 countries

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Citation for published version (APA):
Tijdens, K., & de Vries, D. H. (2011). Health workforce remuneration: Comparing wage levels, ranking and dispersion of 16 occupational groups in 20 countries. (AIAS working paper; No. 11-111). Amsterdam Institute for Advanced Labour Studies. http://www.uva-aias.net/publications/show/1498

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Health workforce remuneration
Comparing wage levels, ranking and dispersion of 16 occupational groups in 20 countries

Kea Tijdens and Daniel H. de Vries

Working Paper 11-111
August 2011
Acknowledgement

This paper builds on research work done using the WageIndicator web-survey on work and wages (www.wageindicator.org). A previous analysis has been presented at the International Conference on Research in Human Resources for Health, Rio de Janeiro, June 09-11 2010 and at the 2nd ILO conference on Regulating Decent Work, Geneva, July 6-8 2011.

August 2011

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Bibliographic Information
Tijdens, K.G., Vries, D.H. de (2011). Health workforce remuneration: Comparing wage levels, ranking and dispersion of 16 occupational groups in 20 countries. Amsterdam, University of Amsterdam, AIAS Working Paper 11-111

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Health workforce remuneration

Comparing wage levels, ranking and dispersion of 16 occupational groups in 20 countries

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Abstract

This article focuses on remuneration in the Human Resources for Health (HRH), comparing wage levels, ranking and dispersion of 16 HRH occupations in 20 countries (Argentina, Belarus, Belgium, Brazil, Chile, Colombia, Czech Republic, Finland, Germany, India, Mexico, Netherlands, Poland, Russian Federation, South-Africa, Spain, Sweden, Ukraine, United Kingdom, United States). Research questions asked are to what extent are the wage rankings, wage dispersion, and standardized wage levels are similar between the 16 occupational groups in the HRH workforce across countries. The pooled data from the continuous, worldwide, multilingual WageIndicator web-survey between 2008 and 2011Q1 have been analysed (N=38,799). Hourly wages expressed in standardized USD, all controlled for PPP and then indexed to 2011 levels. The findings show that the Medical Doctors have overall the highest median wages and they have so in 11 of 20 countries, while the Personal Care Workers have overall lowest wages and they have so in 9 of 20 countries. Health Care Managers lower earnings than Medical Doctors, but in 5 of 20 countries they have higher earnings (BLR, CZE, POL, RUS, UKR). The wage levels of Nursing & Midwifery Professionals vary largely across countries. The correlation of the overall ranking to the national ranking is more than .7 in 7 of 20 countries. The wage dispersion is defined as the ratio of the highest to the lowest median earnings in an occupation in a country. It is highest in Brazil (7.0), and lowest in Sweden, Germany, Poland, and Argentina. When comparing wage levels in occupations across countries, the largest wage differences for the Medical Doctors: the Ukraine doctor earns 19 times less compared to the US doctor. A correlation between country-level earnings and wage differentials across countries reveals that the higher the median wages in an occupation, the higher the wage difference across countries (r=.9). In conclusion, this article breaks new ground by investigating for the first time the wage levels, ranking and dispersion of occupational groups in the HRH workforce across countries. Findings illustrate that the assumption of similarity in cross-country wage ranking, wage dispersion, and purchasing power adjusted wage levels does not hold. These findings help to explain the complexity of migratory paths seen.

Keywords: health workforce composition; remuneration; wages; survey data; occupational groups; ranking; dispersion
Health workforce remuneration

1. Background

Wages are commonly perceived as a key factor affecting job satisfaction, retention, and attrition or migration of health care professionals within and across countries (Ferrinho et al, 1998; Dovlo, 2002; Smigel-askas and Padaiga, 2007; Nguyen et al, 2008). A major problem preventing progress on insight into the relative importance of wage information in health workforce strengthening is the lack of detailed information about the wide range of health workers’ occupations (De Vries and Tijdens, 2010). Typically, international databases employ high levels of occupational aggregation and are insufficiently standardized in their classifications to allow for cross-country comparability (Dräger et al, 2006). For example, while the October Inquiry and the Occupational Wages (OWW) database of the International Labour Organisation (ILO) is an important resource, for the health sector only seven occupations are included: general physician, dentist, professional nurse, auxiliary nurse, physiotherapist, medical x-ray technician and ambulance driver. Another major source, the Luxembourg Income and Employment Study, has surveyed 30 countries over the past decades, yet lacks sufficient specificity as most labour force surveys do not provide further detail than a 2-digit coding of ILO’s International Standard Classification of Occupations (ISCO). An investigation for a number of European countries concludes that no cross-country comparable data is available for the occupational groups in the HRH workforce, and that one has to rely on a few national studies with incomparable wage data and incomparable occupational groups (Pillinger, 2010). At the country level, a small diversity of HRH sources is available and includes population censuses and surveys, facility assessments, and routine administrative records. However, most available data sources have shortcomings (Dal Poz et al, 2009; McQuide et al, 2009).

As a result of this absence of comparable wage data, few studies have investigated wage levels and wage distribution across countries (Dräger et al, 2006; Vujicic, 2004). Preliminary analysis has suggested that salary differentials between source and destination countries are too high to curb migration (Vujicic, 2004). Using data on 42 countries from both the OECD Health Data 2005 and OWW database for a comparison of wages of general physicians and professional nurses only, Dräger et al. found that there is an enormous gap in wages for health workers between rich and poor countries (Dräger et al, 2006). Moreover, health workers tend to be paid less than equivalent professionals – or at least teachers and engineers – in low-income countries. Wages, they suggest, are great incentives for health workers to migrate, posing challenges for the development of strategies to retain them in poor countries. At the same time, an increasingly complex
remuneration landscape in destination countries is showing the development of different task profiles and related certifications requirements—a proxy for relative wage ranking for distinct occupations across countries—across counties (Grimshaw and Carroll, 2008; Jaehrling, 2008).

This article introduces a non-probability dataset that can be used for comparing wage information across countries—the WageIndicator web-survey—with the aim of contributing to an improved understanding of global wage differentials, thereby illustrating the usefulness of online data collection for cross-country comparative research. The paper focuses on the validity of three wage cross-country wage assumptions: the similarity of ranking of wage levels, the similarity of wage dispersion and the comparability of cost-of-living adjusted (PPP) wage levels across 20 countries in 16 occupational groups in the Human Resources for Health (HRH) workforce. Using detailed occupational wage information available from the international, multilingual WageIndicator web-survey in these countries, the following three research questions will be answered:

1) To what extent are the rankings between the 16 occupational groups in the HRH workforce similar across countries, based on their median wage levels?

2) To what extent are countries similar with respect to the wage dispersion across the national HRH occupations?

3) To what extent are the standardized wage levels within the same HRH occupations comparable across countries?

Answers to these questions are important. Differences between the complexity of wage structures between various countries are of potential key influence to workforce migratory patterns, while allowing insight in possible strategies to increase country level job satisfaction and retention, and national settings of health care provision, wage setting processes, and credentialism.
2. Methods

2.1. Data

The data used in this paper stem from the WageIndicator web-survey (www.wageindicator.org). This is a multi-country, continuous surveys, posted at the WageIndicator websites in an increasing number of countries. In 2000, the WageIndicator project started as a paper-and pencil survey for establishing a website with salary information for women’s occupations in the Netherlands, but quickly developed into an online, multilingual data collection tool which on an ongoing basis pulls occupational information for hundreds of occupations through more than 60 national websites as of early 2011. A national website hosting the survey tool consists of job related content, labour law and minimum wage information, an anonymous questionnaire with a prize incentive, and a free and crowd-pulling Salary Check presenting average wages for occupations based on data from the questionnaire. Additionally, the project includes search engine optimization, web-marketing, publicity, and answering visitors’ email. Most countries have their own web-manager. Coalitions with media groups and publishing houses with a strong Internet presence contribute to the large numbers of visitors to the websites. The websites are consulted by employees, students, job seekers, individuals with a job on the side, and alike for their job mobility decisions, annual performance talks, occupational choice or other reasons. All web-visitors are asked to complete voluntarily the web-survey, in return to the free information provided. Importantly, approximately 1.5% of the visitors start completing the questionnaire. The web-survey is comparable across countries, it is in the national language(s) and it has questions about wages, education, occupation, industry, socio-demographics, and alike (Tijdens et al, 2010). The survey has a prize incentive and it takes approximately 10 minutes to complete part 1 and 10 minutes for part 2.

From a scientific perspective, concerns have been raised in relation to the quality and reliability of web-survey data (Couper, 2000). The problem of sample bias arises when those not covered, not recruited, and/or not surveyed are different from those who are covered, are recruited and have responded (Groves, 2004). To minimize such bias, researchers have traditionally attempted to create samples that provide a reliable cross-section of a given population allowing the drawing of probability-based samples which produce representative results for the entire population. In the case of the WageIndicator web-survey, which is a non-probability or volunteer survey, the most serious problem is related to the self-selection recruitment method of respondents, and the related question of to what extent the results are representative for the
general population. To deal with this problem, different weighting techniques have been proposed to adjust a “biased” web sample to the population under consideration (Lee and Vaillant, 2009; Schonlau et al, 2009). The efficiency of different weights in adjusting biases has also been considered in the case of the WageIndicator data (Steinmetz and Tijdens, 2009). Specifically, un-weighted and weighted results of these data from the year 2006 for selected countries (Germany, the Netherlands, Spain, the US, Argentina and Brazil) have been compared using representative reference surveys for the same year. Similar to findings from previous studies (Lee, 2006; Loosveldt and Sonck, 2006), the results showed that all web samples deviated from the reference samples with regard to the common variables age, gender and education. However, the impact of the applied weights seems to be very limited and does not make web-survey data more comparable to the general population. This argument can also be supported by a detailed comparison of the WageIndicator data to other so-called representative surveys (such as the Labor Force Survey or the World Values Survey) using the distributions over 36 categories (2genders*2workinghours*3agegroups*3educationgroups). As shown in their analysis (Steinmetz and Tijdens, 2009), for most of these categories it would be exaggerated to speak of a fundamental selection bias in the case of the volunteer data set. It seems worthwhile to emphasize the argument made by Couper and Miller (2008) that it is better not to treat survey quality as an absolute, but to evaluate quality relative to other features of the research design and the stated goals of the survey.

2.2. Defining health sector occupations

The WageIndicator web-survey asks in detail about the occupation of the respondent, offering a search tree with some 1,700 occupations, coded according to ILO’s recently updated occupational classification ISCO-08, adding further digits to its 433 four-digit occupational units (Tijdens, 2010). These 1,700 occupational titles have been translated into all languages of the web-survey. Based on this list, health sector occupations were selected and subsequently clustered following the occupational classifications in the Communicable Disease Global Atlas for Human Resources for Health of the World Health Organisation (2009) and ILO’s definition of health sector occupational units (International Labour Organisation, 2009), but keeping a number of more detailed occupational categories to allow for additional insight in the usage of the WageIndicator dataset. The initial list of occupations allows for a selection of 20 health sector occupational groups. In this article we will refer to these occupations as the Human Resources for Health occupations, abbreviated as HRH occupations. Excluded are occupations related to pharmaceutical production and jobholders in sectors Health Care Administration & Operations occupations not working in the human health
activities, residential care activities, and social work activities without accommodation (NACE2.0 codes 86, 87, and 88). The mapping of the selected occupations into the HRH occupations, including the related ISCO-08 codes, can be found in Appendix 1.

Given the list of 20 HRH occupations, the WageIndicator data did not provide sufficient observations for four groups of these occupations (<250 obs.), namely Traditional & Complementary Medicine (Associate) Professionals, Paramedical Practitioners, Veterinary Professionals, and Optometrists and Ophthalmic Opticians. The remaining 16 groups are included in the analysis. The number of observations in the HRH occupations is shown in Table 1, given the selection of countries discussed in the next section.

### Table 1 Number of observations of 16 HRH occupations

| HRH Occupation                               | Freq. | Percent | HRH Occupation                               | Freq. | Percent |
|----------------------------------------------|-------|---------|----------------------------------------------|-------|---------|
| Medical Doctors                              | 1988  | 5.1     | Community Health Workers                      | 596   | 1.5     |
| Nursing & Midwifery Professionals            | 3239  | 8.3     | Other Health Associate Professionals          | 4787  | 12.3    |
| Dentists                                     | 309   | 0.8     | Personal Care Workers in Health Services      | 1794  | 4.6     |
| Pharmacists                                  | 407   | 1.0     | Health Researchers & Educators                | 1653  | 4.3     |
| Envr. and Occ. Health and Hygiene Prof.      | 417   | 1.1     | Health Care Managers                          | 1465  | 3.8     |
| Physiotherapists                             | 741   | 1.9     | Health Care Administration & Operations       | 6851  | 17.7    |
| Other Health Professionals                   | 4279  | 11.0    | Health Informatics Technicians                | 5431  | 14.0    |
| Medical and Pharmaceutical Technicians       | 2373  | 6.1     |                                               |       |         |
| Nurses & Midwifery Associate Prof.           | 2469  | 6.4     | Total                                        | 38799 | 100.0   |

*Source: WageIndicator data 2008, 2009, 2010, 2011Q, selection 16 health sector occupations in 20 countries. The data are not weighted across or within countries or occupations.*

### 2.3. Selecting the countries

For this study the WageIndicator data from 2008, 2009, 2010 and 2011 until April have been used. This dataset includes observations from 56 countries. Yet, only countries with at least 250 observations with valid wage information for the HRH occupations have been included in the analyses. Quite a number of countries did not start the web-survey until 2010 or 2011 and therefore have insufficient observations for the current analyses. The study is limited to 20 countries from four continents, namely one country from Africa (South Africa), six from the Americas (Argentina, Brazil, Chile, Colombia, Mexico, United States), one from Asia (India) and twelve from Europe (Belarus, Belgium, Czech Republic, Finland, Germany, Netherlands, Poland, Russian Federation, Spain, Sweden, Ukraine, United Kingdom). In total, 38,799 observations from 20 countries have been used in the analyses. Table 2 provides a breakdown of the number of observations by country. The number of observations by country and occupation can be found in Appendix 1.
Table 2  Number of observations in the WageIndicator web-survey for the HRH remunerations study, break down by country

| Country             | Frequency | Percent | Country            | Frequency | Percent |
|---------------------|-----------|---------|--------------------|-----------|---------|
| Argentina           | 1554      |  4.0    | Netherlands        | 7375      | 19.0    |
| Belgium             | 2168      |  5.6    | Poland             | 272       |  0.7    |
| Brazil              | 4072      | 10.5    | Russian Federation | 487       |  1.3    |
| Belarus             |  719      |  1.9    | South Africa       | 1007      |  2.6    |
| Chile               |  591      |  1.5    | Spain              |  934      |  2.4    |
| Colombia            |  599      |  1.5    | Sweden             |  297      |  0.8    |
| Czech Republic      |  2091     |  5.4    | Ukraine            |  388      |  1.0    |
| Finland             |  1646     |  4.2    | United Kingdom     | 1558      |  4.0    |
| Germany             | 10325     | 26.6    | United States      |  551      |  1.4    |
| India               |   612     |  1.6    |                    |           |         |
| Mexico              |  1553     |  4.0    | Total              | 38799     | 100%    |

Source: WageIndicator data 2008, 2009, 2010, 2011Q, selection 16 health sector occupations in 20 countries. The data are not weighted across or within countries or occupations.

2.4. Defining wages

The WageIndicator web-survey asks respondents about their earnings (Tijdens et al, 2010). In the survey, the employees and the self-employed are routed differently through the pages with questions on wages. The employees are asked if they are paid per month or per week, whichever is most common in the country of survey. If the answer is ‘no’, the next question asks them to tick the pay period. In countries where it is deemed necessary, a question asks about the currency in which the wage is paid. Then, the employees are asked ‘Do you know your gross and your net wage?’. Depending on the answer, questions follow for the last gross and/or net wage. Here, a hint suggests to include bonuses, if these were received in the last wage. The next page presents a list of bonuses and benefits that may have been included in the last wage, ranging from shift and commuting allowances to tips and performance bonuses. These questions are default set to ‘no’. If ‘yes’ is selected, a question pops up asking for the amount of the bonus. The self-employed receive a question about their gross annual income, followed by a question whether this income was earned in 12 months or less, and if less, in how many months. For the computation of the hourly wages, either the contractual hours for workers in dependent employment with agreed working hours in their employment contract are used or the usual working hours for all other categories. The wage variable is taken from the survey question about gross wage or net wage, which have been tested against the minimum and maximum values, applicable for the country and for the reported pay period. Then the total of reported bonuses is deducted from the reported wages. Next, the hourly wages are computed from the weekly hours, the wage period and the gross wages minus the bonuses. For the cases with information about net hourly wages only, the gross hourly
wages are computed based on the annual country average between gross and net wages.

We then converted the hourly wages into a standardized hourly wage in US dollars, using purchasing power parities (PPP) from the World Bank Database with their projections for the years up to 2011. The purchasing power parity theory uses the long-term equilibrium exchange rate of two currencies to equalize their purchasing power for a given basket of goods. Using a PPP basis is arguably more useful when comparing differences in living standards on the whole between nations because PPP takes into account the relative cost of living and the inflation rates of different countries, rather than just a nominal Gross Domestic Product (GDP) comparison. In the data cleaning, the standardized hourly wages are tested for their reliability. Indexed hourly wages lower than 1 standardized PPP US dollar or over 400 standardized PPP US dollars are considered outliers. Odd values in the reported gross and/or net wages are set to missing. Similarly, this is done if the sum of bonuses is larger than 2/3 of the reported gross wage, or if the reported gross wages are larger than 100 times the reported net wage.

For this study, to compare the hourly wages over the survey years, the 2008 wages have been augmented with the ratio of the national PPP-2011/PPP-2008, and similarly for 2009 and 2010. Thus all wages have been indexed to the 2011 level. In case an HRH occupation in a country had less than 5 observations over these years, the wages in this occupation were set to missing. In the remaining, the words standardized USD wages will be used to refer to the PPP standardized wages in US dollars, indexed to the 2011 level.
3. Results

3.1. Wage rankings of occupations across countries

The first research objective addressed to what extent the wage rankings for the 16 occupational groups in the HRH workforce are similar across countries. For this purpose, the median wages of the 16 occupations in each of the 20 countries have been computed and ranked. Ranking runs from 1, indicating the occupation with the lowest median wage in the country, to 16, indicating the occupation with the highest median wage in the country. In a few countries, wage information for some occupations had insufficient observations (<5), for example for the Dentists (insufficient in 7 countries), the Physiotherapists (in 6 countries), and the Personal Care Workers in Health Services (in 6 countries). In these countries, the ranking of these less than 16 occupations was scaled between 1 and 16. The ranking of 16 occupations in each of the 20 countries can be found in Appendix 1. Based on the median standardized wages of each occupation in each country, the 20-country mean standardized wages were calculated and subsequently ranked (Table 3, column 2 and 3). Note that this ranking does neither control for the relative sizes of the national HRH workforces nor for the relative sizes of the HRH occupations within the country. Thus, the ranking is based on occupations, not on jobholders in occupations. The results are shown in Table 3.

Table 3  Mean rank order in the 16 HRH occupations across the 20 countries (1=lowest rank, 16 = highest rank), mean wages of the median wages in each occupation across 20 countries in standard USD, minimum rank in the occupation, maximum rank in the occupation, standard deviation of ranks, mean rank order, and number of countries with sufficient observations

| Occupation                                    | 20-country rank order | mean wage | min rank order | max rank order | sd | mean rank order | #cntr obs |
|-----------------------------------------------|-----------------------|-----------|----------------|----------------|----|----------------|-----------|
| Medical Doctors                               | 16                    | 25.05     | 5              | 16             | 2.8 | 14             | 19        |
| Dentists                                      | 15                    | 22.48     | 1              | 16             | 4.7 | 13             | 13        |
| Pharmacists                                   | 14                    | 18.42     | 2              | 16             | 4.2 | 12             | 17        |
| Health Researchers & Educators               | 13                    | 16.15     | 3              | 16             | 3.3 | 12             | 19        |
| Other Health Associate Professionals          | 12                    | 14.36     | 1              | 10             | 2.4 | 6.9            | 14        |
| Physiotherapists                              | 11                    | 14.08     | 1              | 13             | 3.8 | 8.3            | 14        |
| Health Care Managers                          | 10                    | 13.46     | 7              | 16             | 2.4 | 12             | 20        |
| Envir. and Occ. Health and Hygiene Prof.      | 9                     | 12.99     | 4              | 15             | 3.3 | 11             | 17        |
| Nursing & Midwifery Professionals             | 8                     | 12.60     | 1              | 14             | 3.9 | 8.4            | 20        |
| Medical and Pharmaceutical Technicians        | 7                     | 12.27     | 2              | 13             | 2.5 | 8.2            | 18        |
| Other Health Professionals                    | 6                     | 12.08     | 4              | 15             | 2.8 | 8              | 20        |
| Community Health Workers                      | 5                     | 10.82     | 1              | 13             | 3.5 | 5.7            | 20        |
| Health Informatics Technicians                | 4                     | 10.43     | 2              | 16             | 4.1 | 7.3            | 20        |
| Health Care Administration & Operations       | 3                     | 10.20     | 1              | 14             | 3.4 | 5.1            | 19        |
| Nurses & Midwifery Associate Professionals    | 2                     | 9.90      | 1              | 12             | 3.6 | 4.3            | 20        |
| Personal Care Workers in Health Services      | 1                     | 5.89      | 1              | 15             | 4.8 | 2.6            | 20        |

Source: WageIndicator data 2008, 2009, 2010, 2011Q, selection 16 health sector occupations in 20 countries.
The data are not weighted across or within countries or occupations.
Table 3 shows, not surprisingly, that the occupational group Medical Doctors rank the highest number 16, indicating that this occupational group has the highest mean across the 20 countries of the country-specific median standardized USD wages. It has the highest median wage in 11 of the 20 countries and the one-highest in another three countries (see Appendix 1). The Medical Doctors group ranks relatively low in the Ukraine. The Dentists group is ranked 15 across the 20 countries, but this occupation has the highest median wage in three countries (Belgium, Netherlands, United Kingdom).

In contrast to the Medical Doctors group, the Personal Care Workers group is ranked 1, indicating that in the 20 countries this group has the lowest wage ranking, when averaging the median wages in this occupation across the 20 countries. In 9 of the 20 countries this occupation indeed ranks lowest, and in the other countries it is ranked among the lowest earning occupations, apart from the Czech Republic (rank 15), Colombia and Ukraine (both rank 10).

In most countries, the Health Care Managers group has a relative high ranking, though in three countries this occupation ranks in the middle, namely in Spain, Germany, and India. In almost all countries, the Health Care Managers group has lower median earnings than the Medical Doctors group. In five countries, they have however higher earnings, namely in Belarus, Czech Republic, Poland, Russian Federation and Ukraine.

The Nursing & Midwifery Professionals group is ranked 9 out of 16, thus its ranking is in the higher half of the earnings distribution. In four countries, this occupation is ranked at the bottom, namely in Belarus, India, Russian Federation, and Ukraine. In contrast, this occupational group has relatively higher rankings in Brazil, Chile, Netherlands, Spain, and United States. According to the ISCO occupational classification, the Nurses & Midwifery Associate Professionals have a job-level below that of the Nursing & Midwifery Professionals. Yet, in two countries the latter occupation has higher median earnings than the former, namely in South Africa and United Kingdom. The distinction between the two occupational groups is probably not understood the same way in these countries. This certainly calls for further investigations of the work activities associated with these occupational groups.

Research objective 1 aimed to investigate to what extent the rankings of the median wage levels of the 16 occupational groups in the HRH workforce are similar across countries. For this purpose, the ranking in each country has been correlated to the overall 20-country ranking, thereby indicating how much the country’s ranking fits into the overall ranking. The one-last column in Table 4 shows the results. It depicts that the correlations are pretty high for most countries. In seven countries (Argentina, Belgium, Brazil, Chile, Finland, Netherlands, United States) the correlation is more than .7. In another four countries it is between
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.5 and .7 (Germany, Spain, South Africa, United Kingdom). In seven countries it is between .3 and .5 (Belarus, Colombia, Czech Republic, Mexico, Poland, Russian Federation, and Sweden). Finally, two countries exhibit a ranking that is extremely different from the overall 20-country ranking, namely India, and Ukraine.

In conclusion, for the majority of countries in this study, the ranking is pretty similar. These countries are seemingly a group of higher income countries, somewhat contrasting with the medium or lower level income countries showing a lower ranking of median wage level. Considering health workforce migratory patterns from low to higher level countries, this is difference may be of further interest.

Table 4 Standardized USD wages in 16 occupations in the HRH workforce in 20 countries (minimum, maximum, ratio maximum/minimum, standard deviation, average wage across occupations (not controlled for number of jobholders in the occupations), rank correlations of the 16 occupations within the country to the average ranking, and number of occupations with sufficient observations

| Country            | Min   | Max   | Ratio max-min | SD   | Mean wage | Rank corr | # of occ's |
|--------------------|-------|-------|---------------|------|-----------|-----------|------------|
| Argentina          | 5.88  | 14.11 | 2.40          | 2.61 | 8.78      | 0.86      | 16         |
| Belgium            | 11.62 | 51.53 | 4.43          | 10.04| 18.46     | 0.71      | 16         |
| Brazil             | 2.50  | 17.54 | 7.02          | 3.70 | 5.35      | 0.78      | 16         |
| Belarus            | 4.27  | 14.04 | 3.29          | 2.61 | 7.83      | 0.34      | 14         |
| Chile              | 7.20  | 34.80 | 4.83          | 7.31 | 14.14     | 0.77      | 14         |
| Colombia           | 5.69  | 25.16 | 4.42          | 5.05 | 11.22     | 0.48      | 15         |
| Czech Republic     | 2.28  | 14.37 | 6.30          | 3.12 | 9.60      | 0.40      | 15         |
| Finland            | 10.97 | 27.54 | 2.51          | 4.50 | 13.65     | 0.77      | 14         |
| Germany            | 13.83 | 27.55 | 1.99          | 4.48 | 18.34     | 0.64      | 14         |
| India              | 3.00  | 14.81 | 4.93          | 3.70 | 8.11      | 0.27      | 12         |
| Mexico             | 4.67  | 16.79 | 3.60          | 3.32 | 9.68      | 0.30      | 16         |
| Netherlands        | 16.68 | 66.96 | 4.02          | 13.35| 24.79     | 0.81      | 16         |
| Poland             | 3.35  | 7.68  | 2.29          | 1.33 | 4.79      | 0.36      | 14         |
| Russian Federation | 1.37  | 6.86  | 5.01          | 1.59 | 4.24      | 0.34      | 14         |
| South Africa       | 13.20 | 56.23 | 4.26          | 11.78| 23.60     | 0.66      | 15         |
| Spain              | 9.42  | 29.35 | 3.11          | 5.12 | 15.20     | 0.55      | 15         |
| Sweden             | 14.81 | 23.45 | 1.58          | 2.61 | 17.99     | 0.45      | 11         |
| Ukraine            | 2.12  | 7.13  | 3.36          | 1.73 | 4.83      | 0.13      | 15         |
| United Kingdom     | 16.65 | 57.67 | 3.46          | 10.89| 25.94     | 0.68      | 14         |
| United States      | 11.38 | 71.01 | 6.24          | 16.82| 24.66     | 0.78      | 14         |

Source: WageIndicator data 2008, 2009, 2010, 2011Q, selection 16 health sector occupations in 20 countries.
The data are not weighted across or within countries or occupations.

3.2. Wage dispersion within countries

Research objective 2 aimed to investigate to what extent countries differ with respect to the gap between the highest and the lowest earning occupation in the national HRH workforce. The results are shown in Table 4. Per country, columns 2 and 3 reveal the lowest and highest median standardized hourly wages of the 16 occupations. Column 4 shows the ratio between the highest and lowest wages. This column reveals that the wage gap is largest in Brazil where the median wage of the highest paid HRH occupation is 7.0 times
the median of the lowest paid HRH occupation, followed by Czech Republic, United States and Russian Federation (ratios between 5.0 and 6.3). In contrast, Sweden, Germany, Poland, and Argentina are egalitarian countries as far as the median wages in the HRH workforce is concerned (ratios between 1.6 and 2.5). In another five countries, the ratios are between 3.0 and 3.5 (Spain, Belarus, Ukraine, United Kingdom, and Mexico). In the remaining six countries, the wage differentials are between 4.0 and 4.9 (Netherlands, South Africa, Colombia, Belgium, Chile, and India). One can conclude tentatively that wage dispersion is higher in the larger economies, such as Brazil, United States and Russia, compared to smaller economies, but that in general a diverse pattern is seen.

### 3.3. Wage levels across countries

Research objective 3 aimed to investigate to what extent the PPP standardized wages within the same HRH occupational groups are comparable across countries. Thus, within an occupational group, how do the wage levels compare international?

Before turning to the overall picture, the median standardized wages for three occupations are shown, namely for the groups of Medical Doctors, the Nursing & Midwifery Professionals and the Personal Care Workers in Health Services (Graph 1). The largest wage differences for the group of Medical Doctors are between the Ukraine on the one hand and the United States on the other hand. The Ukraine doctor earns 19 times less compared to the US doctor, using PPP standardized wages. The Nursing & Midwifery Professionals occupational group exhibits the same pattern, though the differences are smaller. The Ukraine nurses and midwives earn 9 times less compared to the US nurse, using PPP standardized wages. When it comes to the care worker, the pattern is different. Here, the care worker in Brazil has the lowest earnings and they earn 6 time less compared to the care worker in Mexico, having the highest earnings.
Graph 1  Standardized USD hourly wages in 3 occupations in the HRH workforce in 20 countries

Source: WageIndicator data 2008, 2009, 2010, 2011Q, selection 2 health sector occupations in 20 countries. The data are not weighted across or within countries or occupations.

Table 3 in the Appendix presents the findings with respect to the standardized wages earned in the 16 HRH occupations in each of the 20 countries. It shows that the maximum median earnings are highest in Belgium, South Africa, the United Kingdom, the Netherlands, and United States. The maximum median earnings are lowest in Poland, the Russian Federation and Ukraine. When focusing on the minimum median wages paid in the 20 countries, Table 3 shows that these are lowest in the Russian Federation, Ukraine, Czech Republic, Brazil, India, and Poland. They are highest in Germany, Sweden, the United Kingdom, and the Netherlands. Across countries, the wage differentials within occupations are highest for the group of Medical Doctors and lowest for the group of Personal Care Workers (Graph 2). Across countries, the mean wages within-occupations – thus the sum of the median wages in this occupational group divided by the number of countries with valid wage data for this group - are highest for the group of Medical Doctors and lowest for the group of Personal Care Workers (Graph 2). The correlation between the within-occupation wage differentials and the within-occupation mean wages is high (r=.9), indicating that the wage distributions in the health workforce reveal similar patterns across countries.
Graph 2  Within-occupation wage differences in 16 occupational groups across 20 countries

Source: WageIndicator data 2008, 2009, 2010, 2011Q, selection 2 health sector occupations in 20 countries. The data are not weighted across or within countries or occupations.

Assuming that workforce mobility across countries is driven by wage differentials, provided that these wage differentials are perceived to be controlled for PPP, one can expect the groups of Medical Doctors and Dentists to migrate from the former Eastern European countries to the UK, US, South-Africa and the Netherlands. Based on the wage differentials in Graph 2, lower workforce mobility though still substantial can be expected for the remaining occupational groups. The lowest mobility can be expected for the occupational group of the Personal Care Workers.
4. Discussion

This study certainly has limitations. The first one relates to the definition of wages. *WageIndicator* applies a standard definition to all countries and occupations, as explained in section 3. However, wage structures may vary across countries. It may include non-financial remunerations such as housing or food, may include financial remunerations probably not reported as wage such as transportation cost reimbursement, may include social benefit or pension contributions, or may include in part cash rewards not reported. Thus, whereas the web-survey has a standardized approach of calculating hourly wages, there may be variation across countries which are not taken into account. Possibly this would explain the finding that median wages for Associate Nurses and Midwives wages are higher than Nurses and Midwives in the United Kingdom and South Africa.

A second limitation relates to the occupational titles. In this study, it is assumed that the same occupational titles to refer to the same job content across countries. Thus, the occupational group of Nursing & Midwifery Professionals is assumed to have the same set of tasks across the world, otherwise the wages of apples and pears would be compared. However, the job content of the HRH occupational groups is not empirically tested on a worldwide scale. The *WageIndicator* web-survey does allow for a worldwide testing of job content, but this would require a separate project for developing such testing.

A third limitation relates to the diploma credentials in the HRH occupations. In most countries for most HRH occupations credentials are required. Depending on the supply and demand ratio in the local labor market, these credentials will or will not be required for entry into the job. In most workplaces credentials will lead to higher earnings. However, the current dataset does not allow controlling for credentials. Thus, the dataset does not control for wages of accredited versus not-accredited jobholders in the same occupational group.

Finally, this study does not take into account the public or private provision of health care, which is assumed to affect wage setting. It also does not take into account regional wage differentials in large countries. Nevertheless these limitations, being the first study on wages in a wide range of HRH occupations and a wide range of countries in four continents, it certainly increases the understanding of wage levels and wage dispersion in the HRH field.
5. Conclusions

This paper breaks new ground by investigating for the first time the wage levels and the wage distribution of 16 occupational groups in the Human Resources for Health (HRH) workforce for 20 countries. Cross-country worldwide wage comparisons have not been undertaken for such a great detail in occupational breakdown. This data is needed for understanding cross-country mobility in the HRH workforce, for understanding the national settings of health care provision, and for understanding wage setting processes and credentialism within countries.

For the investigations, the data of the worldwide, continuous WageIndicator web-survey for 2008, 2009, 2010, and 2011 until April was pooled. The web-survey has detailed information about wages and about occupations, allowing for a break down into the 16 occupational groups in the HRH workforce in 20 countries.

For the analyses, the wages were first controlled for purchasing power parity in the respective years, and then these wages were set to the 2011 level. In total, the analyses included 38,799 observations.

Research question 1 assumed that the ranking of median wages in the 16 occupational groups was similar across the 20 countries. The study reveals that in the majority of the countries the wage ranking is indeed fairly similar across countries, particularly for higher income countries. In 7 of the 20 countries, the national ranking correlates at least .7 with the overall 20-country ranking. The findings show that the Medical Doctors have overall the highest median wages and they have so in 11 of 20 countries, while the Personal Care Workers have overall median lowest wages and they have so in 9 of 20 countries. Health Care Managers lower earnings than Medical Doctors, but in 5 of 20 countries they have higher earnings (BLR, CZE, POL, RUS, UKR). The wage levels of Nursing & Midwifery Professionals vary largely across countries.

Research question 2 assumed that the wage distribution among the 16 occupations was similar cross countries. This assumption did not hold. The wage dispersion is defined as the ratio of the highest to the lowest median earnings in an occupation in a country. It is highest in Brazil (7.0), whereas Sweden, Germany, Poland, and Argentina are egalitarian countries as far as the median wages in the HRH workforce is concerned.

Research question 3 assumed that the wage levels within the same occupational groups in the HRH workforce were comparable across countries, using standardized PPP wages. The largest wage differences are found for the Medical Doctors: the Ukraine doctor earns 19 times less compared to the US doctor. Correlation between country-level earnings and wage differentials across countries, the data reveal that the
higher the median wages in an occupation, the higher the wage difference across countries ($r=0.9$).

In conclusion, the data of the WageIndicator web-survey allows for the mapping and comparison of wage structures between countries, making visible a complex and diverse landscape of wage rankings, dispersions, and standardized wages. The findings illustrate that the assumption of similarity in cross-country wage ranking, wage dispersion, and purchasing power adjusted wage levels does not hold. These findings may help to explain the complexity of migratory paths observed.
Abbreviations

HRH = Human Resources for Health
ILO = International Labour Organisation
ISCO = International Standard Classification of Occupations
OWW = October Inquiry and the Occupational Wages
PPP = Purchasing Power Parity
WHO = World Health Organisation
USD = US dollars
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### Table 1  Crossover table WageIndicator occupations into HRH health occupations

| code | HRH occupations label | ISCO-08 code | ISCO-08 label | WageIndicator label |
|------|-----------------------|--------------|--------------|--------------------|
| 1    | Medical Doctors       | 2211         | Generalist medical practitioners | Company doctor |
| 1    | Medical Doctors       | 2211         | Generalist medical practitioners | General Practitioner |
| 1    | Medical Doctors       | 2211         | Generalist medical practitioners | Toxicologist |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Anaesthetist |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Cardiologist |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Gastroenterologist |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Geneticist |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Gynaecologist |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Medical practitioner, all other specialists |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Optical specialist |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Pathologist |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Plastic surgeon |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Psychiatrist |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Radiologist |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Skin specialist |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Surgeon |
| 1    | Medical Doctors       | 2212         | Specialist medical practitioners | Urologist |
| 2    | Nursing & Midwifery Professionals | 2211 | Nursing professionals | Charge nurse |
| 2    | Nursing & Midwifery Professionals | 2211 | Nursing professionals | Children's nurse |
| 2    | Nursing & Midwifery Professionals | 2211 | Nursing professionals | District nurse |
| 2    | Nursing & Midwifery Professionals | 2211 | Nursing professionals | Hospital nurse |
| 2    | Nursing & Midwifery Professionals | 2211 | Nursing professionals | Intensive care, recovery nurse |
| 2    | Nursing & Midwifery Professionals | 2211 | Nursing professionals | Nurse, all other |
| 2    | Nursing & Midwifery Professionals | 2211 | Nursing professionals | Psychiatric nurse |
| 2    | Nursing & Midwifery Professionals | 2211 | Nursing professionals | Surgical nurse |
| 2    | Nursing & Midwifery Professionals | 2222 | Midwifery professionals | Professional midwife |
| 3    | Traditional & Complementary Medicine (Associate) Professionals | 2230 | Traditional and complementary medicine professionals | Homeopathic practitioner |
| 3    | Traditional & Complementary Medicine (Associate) Professionals | 3230 | Traditional and complementary medicine associate professionals | Faith healer |
| 3    | Traditional & Complementary Medicine (Associate) Professionals | 3230 | Traditional and complementary medicine associate professionals | Traditional or complementary medicine associate professional |
| 4    | Paramedical Practitioners | 2240 | Paramedical Practitioners | Paramedical practitioner, all other |
| 6    | Dentists              | 2261         | Dentists      | Dentist            |
| 6    | Dentists              | 2261         | Dentists      | Dentist, dentist surgeon |
| 7    | Pharmacists           | 2262         | Pharmacists   | Pharmacist in hospital or factory |
| 7    | Pharmacists           | 2262         | Pharmacists   | Retail pharmacist |
| Code | Occupation Category                                      | Code | Code | Occupation Category                                      | Code |
|------|--------------------------------------------------------|------|------|--------------------------------------------------------|------|
| 8    | Environmental and Occupational Health and Hygiene Professionals | 2263 | Environmental and Occupational Health and Hygiene Professionals | Hygienist, health officer | 2263 |
| 8    | Environmental and Occupational Health and Hygiene Professionals | 2263 | Environmental and Occupational Health and Hygiene Professionals | Occupational health or safety inspector | 2263 |
| 8    | Environmental and Occupational Health and Hygiene Professionals | 2263 | Environmental and Occupational Health and Hygiene Professionals | Occupational health or safety officer | 2263 |
| 8    | Environmental and Occupational Health and Hygiene Professionals | 2263 | Environmental and Occupational Health and Hygiene Professionals | Sanitary inspector | 2263 |
| 9    | Physiotherapists                                       | 2264 | Physiotherapists                                       | Occupational therapist | 2264 |
| 9    | Physiotherapists                                       | 2264 | Physiotherapists                                       | Physiotherapist | 2264 |
| 9    | Physiotherapists                                       | 2264 | Physiotherapists                                       | Psychomotor therapist | 2264 |
| 9    | Physiotherapists                                       | 2264 | Physiotherapists                                       | Remedial gymnast | 2264 |
| 10   | Optometrists and Ophthalmic Opticians                  | 2267 | Optometrists and Ophthalmic Opticians                   | Contact lens specialist | 2267 |
| 10   | Optometrists and Ophthalmic Opticians                  | 2267 | Optometrists and Ophthalmic Opticians                   | Ophthalmic optician | 2267 |
| 10   | Optometrists and Ophthalmic Opticians                  | 2267 | Optometrists and Ophthalmic Opticians                   | Optometrist | 2267 |
| 11   | Other Health Professionals                             | 2131 | Pharmacologist                                         | Pharmaceutical chemist | 2131 |
| 11   | Other Health Professionals                             | 2265 | Dieticians and nutritionists                            | Dietician | 2265 |
| 11   | Other Health Professionals                             | 2266 | Audiologists and speech therapists                      | Audiologist | 2266 |
| 11   | Other Health Professionals                             | 2269 | Health professionals not elsewhere classified           | Foot therapist, podiatrist | 2269 |
| 11   | Other Health Professionals                             | 2269 | Health professionals not elsewhere classified           | Recreational therapist | 2269 |
| 11   | Other Health Professionals                             | 3211 | Medical imaging and therapeutic equipment technicians   | Therapy or health professional, all other | 3211 |
| 11   | Other Health Professionals                             | N.A. | Clinical counsellor                                    | Addictions counsellor | N.A. |
| 11   | Other Health Professionals                             | N.A. | Clinical counsellor                                    | Psychologist | N.A. |
| 12   | Medical and Pharmaceutical Technicians                 | 3211 | Medical imaging and therapeutic equipment technicians   | Electrocardiograph equipment operator | 3211 |
| 12   | Medical and Pharmaceutical Technicians                 | 3211 | Medical imaging and therapeutic equipment technicians   | Electroencephalograph equipment operator | 3211 |
| 12   | Medical and Pharmaceutical Technicians                 | 3211 | Medical imaging and therapeutic equipment technicians   | Medical radiation therapist | 3211 |
| 12   | Medical and Pharmaceutical Technicians                 | 3211 | Medical imaging and therapeutic equipment technicians   | Nuclear medicine technologist | 3211 |
| 12   | Medical and Pharmaceutical Technicians                 | 3211 | Medical imaging and therapeutic equipment technicians   | Sonographer | 3211 |
| Code | Occupation                          | Industry                                      | Description                                      |
|------|------------------------------------|----------------------------------------------|-------------------------------------------------|
| 12   | Medical and Pharmaceutical Technicians | 3211                                         | Medical imaging and therapeutic equipment technicians X-ray assistant |
| 12   | Medical and Pharmaceutical Technicians | 3212                                         | Medical and pathology laboratory technicians Laboratory technician biology, biotechnology |
| 12   | Medical and Pharmaceutical Technicians | 3212                                         | Medical and pathology laboratory technicians Medical laboratory technician |
| 12   | Medical and Pharmaceutical Technicians | 3212                                         | Medical and pathology laboratory technicians Ophthalmic laboratory technician |
| 12   | Medical and Pharmaceutical Technicians | 3212                                         | Medical and pathology laboratory technicians Pathology laboratory technician |
| 12   | Medical and Pharmaceutical Technicians | 3213                                         | Medical and pathology laboratory technicians First line supervisor process controllers industrial production, manufacture, metal |
| 12   | Medical and Pharmaceutical Technicians | 3213                                         | Medical and pathology laboratory technicians Pharmaceutical process controller |
| 12   | Medical and Pharmaceutical Technicians | 3213                                         | Medical and pathology laboratory technicians Pharmaceutical technician |
| 12   | Medical and Pharmaceutical Technicians | 3213                                         | Medical and pathology laboratory technicians Pharmacology laboratory technician |
| 12   | Medical and Pharmaceutical Technicians | 3213                                         | Medical and pathology laboratory technicians Pharmacy assistant (skilled) |
| 12   | Medical and Pharmaceutical Technicians | 3213                                         | Medical and pathology laboratory technicians Quality inspector pharmaceutical products |
| 12   | Medical and Pharmaceutical Technicians | 3214                                         | Medical and dental prosthetic technicians Dental prosthesis technician |
| 12   | Medical and Pharmaceutical Technicians | 3214                                         | Medical and dental prosthetic technicians Medical prosthetic technician |
| 13   | Nurses & Midwifery Associate Professionals | 3221                                         | Nursing associate professionals Company nurse |
| 13   | Nurses & Midwifery Associate Professionals | 3221                                         | Nursing associate professionals Nursing aide (clinic or hospital) |
| 13   | Nurses & Midwifery Associate Professionals | 3221                                         | Nursing associate professionals Nursing associate professional |
| 13   | Nurses & Midwifery Associate Professionals | 3221                                         | Nursing associate professionals Private nurse |
| 13   | Nurses & Midwifery Associate Professionals | 3221                                         | Nursing associate professionals School nurse |
| 13   | Nurses & Midwifery Associate Professionals | 3222                                         | Midwifery associate professionals Assistant midwife |
| 14   | Community Health Workers | 3253                                         | Community Health Workers Community health worker |
| 14   | Community Health Workers | 3253                                         | Community Health Workers Community service worker |
| 15   | Other Health Associate Professionals | 3251                                         | Dental assistants and therapists Dental assistant |
| 15   | Other Health Associate Professionals | 3251                                         | Dental assistants and therapists Dental hygienist |
| 15 | Other Health Associate Professionals | 3254 | Dispensing opticians | Dispensing optician |
| --- | --- | --- | --- | --- |
| 15 | Other Health Associate Professionals | 3255 | Physiotherapy technicians and assistants | Massage therapist |
| 15 | Other Health Associate Professionals | 3255 | Physiotherapy technicians and assistants | Masseur |
| 15 | Other Health Associate Professionals | 3255 | Physiotherapy technicians and assistants | Physiotherapy assistant |
| 15 | Other Health Associate Professionals | 3256 | Medical assistants | Anaesthetist assistant |
| 15 | Other Health Associate Professionals | 3256 | Medical assistants | Medical assistant |
| 15 | Other Health Associate Professionals | 3256 | Medical assistants | Physician assistant |
| 15 | Other Health Associate Professionals | 3256 | Medical assistants | Surgery assistant |
| 15 | Other Health Associate Professionals | 3258 | Ambulance workers | Ambulance driver (non paramedic) |
| 15 | Other Health Associate Professionals | 3258 | Ambulance workers | Ambulance paramedic |
| 15 | Other Health Associate Professionals | 3258 | Ambulance workers | Emergency medical technician |
| 15 | Other Health Associate Professionals | 3259 | Health associate professionals not elsewhere classified | Chiropractor |
| 15 | Other Health Associate Professionals | 3259 | Health associate professionals not elsewhere classified | Creative therapist |
| 15 | Other Health Associate Professionals | 3259 | Health associate professionals not elsewhere classified | Health associate professional, all other |
| 15 | Other Health Associate Professionals | 3259 | Health associate professionals not elsewhere classified | Osteopath |
| 16 | Personal Care Workers in Health Services | 5321 | Health care assistants | First-aid attendant |
| 16 | Personal Care Workers in Health Services | 5321 | Health care assistants | Hospital orderly |
| 16 | Personal Care Workers in Health Services | 5322 | Home-based personal care workers | Elderly aide |
| 16 | Personal Care Workers in Health Services | 5322 | Home-based personal care workers | First line supervisor personal care workers |
| 16 | Personal Care Workers in Health Services | 5322 | Home-based personal care workers | Handicapped aide |
| 16 | Personal Care Workers in Health Services | 5322 | Home-based personal care workers | Home care aide |
| 16 | Personal Care Workers in Health Services | 5322 | Home-based personal care workers | Maternity carer |
| 16 | Personal Care Workers in Health Services | 5322 | Home-based personal care workers | Psychiatric aide |
| 16 | Personal Care Workers in Health Services | 5329 | Personal care workers in health services not elsewhere classified | Pharmacy aide |
| 16 | Personal Care Workers in Health Services | 5329 | Personal care workers in health services not elsewhere classified | Residential warden |
| 17 | Health Researchers & Educators | N.A. | Health Researcher Natural Sciences | Bacteriologist |
| 17 | Health Researchers & Educators | N.A. | Health Researcher Natural Sciences | Biologist |
| Code | Group                                      | Description                              | Sector                          |
|------|-------------------------------------------|------------------------------------------|--------------------------------|
| 17   | Health Researchers & Educators            | Health Researcher Natural Sciences       | Biotechnologist                 |
| 17   | Health Researchers & Educators            | Health Researcher Natural Sciences       | Clinical research associate     |
| 17   | Health Researchers & Educators            | Health Researcher Social Sciences        | Demographer                     |
| 17   | Health Researchers & Educators            | Health Researcher Natural Sciences       | Epidemiologist                  |
| 17   | Health Researchers & Educators            | Health Education Professionals           | PhD student health sciences     |
| 17   | Health Researchers & Educators            | Health Researcher Natural Sciences       | Physical scientists, all other  |
| 17   | Health Researchers & Educators            | Health Education Professionals           | Post-secondary education teacher health sciences |
| 17   | Health Researchers & Educators            | Health Education Professionals           | Researcher health sciences      |
| 17   | Health Researchers & Educators            | Health Researcher Social Sciences        | Researcher psychology, pedagogic subjects |
| 17   | Health Researchers & Educators            | Health Researcher Social Sciences        | Researcher social work, other social sciences |
| 17   | Health Researchers & Educators            | Health Education Professionals           | Secondary education teacher health and welfare subjects |
| 17   | Health Researchers & Educators            | Health Researcher Social Sciences        | Social scientist, all other     |
| 17   | Health Researchers & Educators            | Health Researcher Social Sciences        | Sociologist, anthropologist or related professional |
| 17   | Health Researchers & Educators            | Health Education Professionals           | University lecturer health sciences |
| 17   | Health Researchers & Educators            | Health Education Professionals           | University professor health sciences |
| 17   | Health Researchers & Educators            | Health Education Professionals           | Vocational education teacher health and welfare subjects |
| 18   | Health Care Managers                      | Health Services Manager                  | Handicapped care services manager |
| 18   | Health Care Managers                      | Health Services Manager                  | Hospital manager                |
| 18   | Health Care Managers                      | Health Services Manager                  | Laboratory department manager  |
| 18   | Health Care Managers                      | Health Services Manager                  | Manager, all other health services |
| 18   | Health Care Managers                      | Health Services Manager                  | Psychiatric care services manager |
| 18   | Health Care Managers                      | Aged care services manager               | Aged care services manager      |
| 18   | Health Care Managers                      | Social welfare service managers          | Child care services manager     |
| 18   | Health Care Managers                      | Social welfare service managers          | Social welfare centre manager   |
| 19   | Health Care/Administration & Operations   | Health Care Support Staff                | Bookkeeper                      |
| 19   | Health Care/Administration & Operations   | Health Care Support Staff                | Buyer                           |
| 19   | Health Care/Administration & Operations   | Health Care Support Staff                | Catering worker                 |
| 19   | Health Care/Administration & Operations   | Health Care Support Staff                | Cleaner in offices, schools or other establishments |
| 19   | Health Care/Administration & Operations   | Health Care Support Staff                | Cleaner laboratory equipment    |
| Year | Field                      | N.A. | Position                                      | Description                               |
|------|----------------------------|------|-----------------------------------------------|--------------------------------------------|
| 19   | Health Care Administration & Operations | N.A. | Health Care Support Staff | Logistics worker                           |
| 19   | Health Care Administration & Operations | N.A. | Health Marketing Professional | Marketing professional                      |
| 19   | Health Care Administration & Operations | N.A. | Health Care Support Staff | Medical secretary or receptionist           |
| 19   | Health Care Administration & Operations | N.A. | Health Care Support Staff | Office clerk                                |
| 19   | Health Care Administration & Operations | N.A. | Human Resources for Health Officer | Personnel department manager                  |
| 19   | Health Care Administration & Operations | N.A. | Human Resources for Health Officer | Personnel officer                            |
| 19   | Health Care Administration & Operations | N.A. | Health Care Public Relations Professional | Public relations department manager         |
| 19   | Health Care Administration & Operations | N.A. | Health Care Public Relations Professional | Public relations officer                     |
| 19   | Health Care Administration & Operations | N.A. | Health Care Support Staff | Receptionist, telephonist                    |
| 19   | Health Care Administration & Operations | N.A. | Health Marketing Professional | Sales representative                         |
| 19   | Health Care Administration & Operations | N.A. | Health Care Support Staff | Secretary                                    |
| 19   | Health Care Administration & Operations | N.A. | Health Care Support Staff | Staff scheduling clerk                       |
| 20   | Health Informatics Technicians | 3252 | Medical records and health information technicians | Medical records or health information technician |
| 20   | Health Informatics Technicians | N.A. | IT support technician | IT user support technician                    |
Table 2  Number of observations by occupational group and country

| Country              | Medical Doctors | Nursing & Midwifery Prof. | Pharmacists | Environm. and Occ. Health and Hygiene Prof. | Physiotherapists | Other Health Prof. | Medical and Pharmaceutical Technicians |
|----------------------|-----------------|---------------------------|-------------|---------------------------------------------|------------------|--------------------|----------------------------------------|
| Argentina            | 114             | 106                       | 7           | 20                                          | 21               | 11                 | 55                                     | 144                                    |
| Belgium              | 50              | 288                       | 8           | 44                                          | 32               | 41                 | 214                                    | 182                                    |
| Brazil               | 188             | 154                       | 101         | 100                                         | 59               | 58                 | 152                                    | 343                                    |
| Belarus              | 164             | 19                        | 24          | 9                                           | 20               | 2                  | 19                                     | 45                                     |
| Chile                | 47              | 42                        | 14          | 4                                           | 13               | 20                 | 51                                     | 25                                     |
| Colombia             | 69              | 27                        | 15          | 4                                           | 5                | 5                  | 46                                     | 43                                     |
| Czech Republic       | 46              | 253                       | 6           | 25                                          | 32               | 4                  | 54                                     | 112                                    |
| Finland              | 36              | 279                       | 2           | 4                                           | 19               | 41                 | 117                                    | 74                                     |
| Germany              | 393             | 1072                      | 36          | 59                                          | 0                | 277                | 2418                                   | 452                                    |
| India                | 42              | 13                        | 1           | 7                                           | 7                | 3                  | 21                                     | 27                                     |
| Mexico               | 216             | 34                        | 20          | 11                                          | 7                | 10                 | 57                                     | 72                                     |
| Netherlands          | 164             | 472                       | 21          | 24                                          | 109              | 185                | 667                                    | 538                                    |
| Poland               | 55              | 23                        | 0           | 8                                           | 12               | 7                  | 18                                     | 14                                     |
| Russian Federation   | 123             | 18                        | 15          | 7                                           | 8                | 0                  | 9                                      | 19                                     |
| South Africa         | 33              | 65                        | 3           | 10                                          | 21               | 2                  | 80                                     | 85                                     |
| Spain                | 69              | 84                        | 3           | 13                                          | 16               | 23                 | 82                                     | 81                                     |
| Sweden               | 3               | 41                        | 0           | 5                                           | 2                | 3                  | 19                                     | 23                                     |
| Ukraine              | 73              | 26                        | 15          | 12                                          | 11               | 1                  | 22                                     | 15                                     |
| United Kingdom       | 66              | 144                       | 15          | 35                                          | 22               | 17                 | 139                                    | 71                                     |
| United States        | 37              | 79                        | 3           | 6                                           | 1                | 13                 | 39                                     | 28                                     |
| Total                | 1988            | 3239                      | 309         | 407                                         | 417              | 741                | 4279                                   | 2373                                   |

| Country              | Community Health Workers | Other Health Associate Professionals | Personal Care Workers & Educators in Health Services | Health Researchers | Health Care Managers | Health Care Administration & Operations | Health Care Informatics Technicians | total |
|----------------------|---------------------------|--------------------------------------|-----------------------------------------------------|---------------------|----------------------|----------------------------------------|--------------------------------------|-------|
| Argentina            | 8                         | 165                                  | 32                                                  | 30                  | 54                   | 195                                    | 549                                  | 1554  |
| Belgium              | 59                        | 164                                  | 143                                                 | 127                 | 207                  | 304                                    | 210                                  | 2168  |
| Brazil               | 36                        | 478                                  | 66                                                  | 77                  | 123                  | 926                                    | 1094                                 | 4072  |
| Belarus              | 22                        | 87                                   | 1                                                   | 47                  | 21                   | 47                                     | 181                                  | 719   |
| Chile                | 20                        | 85                                   | 4                                                   | 18                  | 24                   | 32                                     | 183                                  | 591   |
| Colombia             | 8                         | 42                                   | 22                                                  | 12                  | 23                   | 66                                     | 159                                  | 599   |
| Czech Republic       | 29                        | 205                                  | 25                                                  | 85                  | 305                  | 501                                    | 324                                  | 2091  |
| Finland              | 21                        | 206                                  | 214                                                 | 103                 | 76                   | 166                                    | 183                                  | 1646  |
| Germany              | 192                       | 1312                                 | 233                                                 | 583                 | 37                   | 2633                                   | 2                                   | 10325 |
| India                | 5                         | 25                                   | 2                                                   | 82                  | 35                   | 136                                    | 205                                  | 612   |
| Mexico               | 14                        | 56                                   | 13                                                  | 32                  | 63                   | 75                                     | 849                                  | 1553  |
| Netherlands          | 61                        | 1262                                 | 827                                                 | 135                 | 117                  | 1140                                   | 465                                  | 7375  |
| Poland               | 10                        | 26                                   | 5                                                   | 30                  | 16                   | 13                                     | 33                                   | 272   |
| Russian Federation   | 13                        | 71                                   | 4                                                   | 19                  | 20                   | 42                                     | 102                                  | 487   |
| South Africa         | 5                         | 74                                   | 5                                                   | 60                  | 78                   | 203                                    | 263                                  | 1007  |
| Spain                | 16                        | 148                                  | 30                                                  | 41                  | 39                   | 52                                     | 212                                  | 934   |
| Sweden               | 10                        | 49                                   | 3                                                   | 15                  | 20                   | 32                                     | 63                                   | 297   |
| Ukraine              | 15                        | 54                                   | 2                                                   | 25                  | 3                    | 27                                     | 78                                   | 388   |
| United Kingdom       | 44                        | 185                                  | 148                                                 | 90                  | 152                  | 202                                    | 214                                  | 1558  |
| United States        | 8                         | 93                                   | 15                                                  | 42                  | 52                   | 59                                     | 62                                   | 551   |
| Total                | 596                       | 4787                                 | 1794                                                 | 1653                | 1465                 | 6851                                   | 5431                                 | 38799 |
### Table 3  Ranking of occupations in 20 countries

| Medical Doctors | Argentina | Belgium | Brazil | Belarus | Chile | Colombia | Czech Republic | Finland | Germany | India |
|-----------------|-----------|---------|--------|---------|-------|----------|----------------|---------|---------|-------|
| 16.0            | 15.0      | 16.0    | 11.4   | 16.0    | 16.0  | 12.8     | 16.0           | 16.0    | 13.7    | 16.0  |
| Nursing & Midwifery Professionals | 10.0 | 10.0 | 14.0 | 2.3 | 13.7 | 9.6 | 7.5 | 9.1 | 8.0 | 1.3 |
| Dentists        | 14.0      | 16.0    | 15.0   | 8.0     | 14.9  | 13.9     | 1.1            | 14.9    |         |       |
| Pharmacists     | 13.0      | 13.0    | 11.0   | 16.0    |       | 16.0     | 16.0           | 16.0    | 16.0    | 5.3   |
| Env. and Occupational Health Professionals | 8.0 | 11.0 | 9.0 | 12.6 | 11.4 | 14.9 | 9.6 | 14.9 | 4.0 |       |
| Physiotherapists| 11.0      | 9.0     | 12.0   | 9.1     | 8.5   | 5.7      | 2.3            |         |         |       |
| Other Health Professionals | 5.0 | 4.0 | 8.0 | 9.1 | 8.0 | 6.4 | 10.7 | 6.9 | 10.3 | 12.0 |
| Medical and Pharmaceutical Technicians | 9.0 | 8.0 | 5.0 | 10.3 | 5.7 | 7.5 | 4.3 | 8.0 | 5.7 | 13.3 |
| Nurses & Midwifery Associate Professionals | 3.0 | 6.0 | 6.0 | 1.1 | 1.1 | 2.1 | 2.1 | 4.6 | 3.4 |       |
| Community Health Workers | 6.0 | 3.0 | 3.0 | 5.7 | 6.9 | 12.8 | 5.3 | 3.4 | 11.4 | 2.7 |
| Other Health Associate Professionals | 4.0 | 1.0 | 4.0 | 6.9 | 3.4 | 5.3 | 6.4 | 10.3 | 4.6 | 6.7 |
| Personal Care Workers in Health Services | 1.0 | 2.0 | 1.0 | 10.7 | 3.2 | 1.1 | 1.1 |     |     |     |
| Health Researchers & Educators | 15.0 | 12.0 | 13.0 | 3.4 | 12.6 | 4.3 | 13.9 | 13.7 | 12.6 | 14.7 |
| Health Care Managers | 12.0 | 14.0 | 10.0 | 14.9 | 10.3 | 11.7 | 14.9 | 12.6 | 9.1 | 9.3 |
| Health Care Administration & Operations | 2.0 | 7.0 | 2.0 | 4.6 | 2.3 | 1.1 | 8.5 | 2.3 | 6.9 | 8.0 |
| Health Informatics Technicians | 7.0 | 5.0 | 7.0 | 13.7 | 4.6 | 3.2 | 11.7 | 11.4 | 10.7 |       |

| Mexico | Netherlands | Poland | Russia Federation | South Africa | Spain | Sweden | Ukraine | United Kingdom | United States |
|--------|-------------|--------|------------------|--------------|-------|--------|---------|----------------|--------------|
| Medical Doctors | 16.0 | 15.0 | 12.6 | 10.3 | 16.0 | 16.0 | 5.3 | 14.9 | 16.0 |
| Nursing & Midwifery Professionals | 9.0 | 12.0 | 5.7 | 3.4 | 9.6 | 12.8 | 10.2 | 2.1 | 6.9 | 11.4 |
| Dentists | 12.0 | 16.0 | 6.9 | 12.6 | 14.9 | 11.7 | 16.0 | 12.8 | 13.7 | 14.9 |
| Pharmacists | 2.0 | 14.0 | 6.9 | 12.6 | 14.9 | 11.7 | 16.0 | 12.8 | 13.7 | 14.9 |
| Env. and Occupational Health Professionals | 11.0 | 10.0 | 8.0 | 13.7 | 13.9 | 14.9 | 6.4 | 8.0 |     |     |
| Physiotherapists | 1.0 | 8.0 | 11.4 | 8.5 | 4.3 | 12.6 | 12.6 |     |     |     |
| Other Health Professionals | 7.0 | 9.0 | 4.6 | 14.9 | 7.5 | 5.3 | 5.8 | 11.7 | 5.7 | 8.0 |
| Medical and Pharmaceutical Technicians | 8.0 | 6.0 | 10.3 | 8.0 | 5.3 | 9.6 | 8.7 | 7.5 | 2.3 | 5.7 |
| Nurses & Midwifery Associate Professionals | 3.0 | 3.0 |     | 1.1 | 11.7 | 8.5 | 11.6 | 1.1 | 9.1 | 6.9 |
| Community Health Workers | 6.0 | 7.0 | 3.4 | 2.3 | 6.4 | 10.7 | 1.5 | 3.2 | 10.3 | 2.3 |
| Other Health Associate Professionals | 10.0 | 4.0 | 2.3 | 5.7 | 4.3 | 3.2 | 2.9 | 4.3 | 3.4 | 4.6 |
| Personal Care Workers in Health Services | 15.0 | 1.0 | 1.1 | 1.1 | 1.1 | 10.7 | 1.1 |     |     |     |
| Health Researchers & Educators | 14.0 | 11.0 | 16.0 | 9.1 | 10.7 | 13.9 | 13.1 | 8.5 | 11.4 | 13.7 |
| Health Care Managers | 13.0 | 13.0 | 14.9 | 16.0 | 12.8 | 7.5 | 14.5 | 13.9 | 10.3 |     |
| Health Care Administration & Operations | 4.0 | 5.0 | 13.7 | 4.6 | 2.1 | 2.1 | 7.3 | 9.6 | 1.1 | 3.4 |
| Health Informatics Technicians | 5.0 | 2.0 | 9.1 | 11.4 | 3.2 | 6.4 | 4.4 | 16.0 | 4.6 | 9.1 |
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- Economics
- Sociology
- Psychology
- Health and safety studies

AIAS provides both teaching and research. On the teaching side it offers a Masters in Comparative Labour and Organisation Studies and one in Human Resource Management. In addition, it organizes special courses in co-operation with other organisations such as the Netherlands Centre for Social Innovation (NCSI), the Netherlands Institute for Small and Medium-sized Companies (MKB-Nederland), the National Centre for Industrial Relations ‘De Burecht’, the National Institute for Co-determination (GBIO), and the Netherlands Institute of International Relations ‘Clingendael’. AIAS has an extensive research program (2004-2008) on Institutions, Inequalities and Internationalisation, building on the research performed by its member scholars. Current research themes effectively include:

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