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Gender and Migration: The Impact of Aging in OECD Countries on International Nursing Migration

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by

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Abstract

In 2000, the UN Population Division issued a controversial report, Replacement Migration: Is It a Solution to Declining and Ageing Populations? Given the extremely low fertility and increased longevity in many developed countries, replacement migration is "the international migration that would be needed to offset… the overall ageing of a population." Nevertheless, most scholars believe that simply increasing the number of immigrants, even several times more than today's already high levels, cannot effectively offset the trends driving population aging. Yet, these demographic trends clearly will generate demand for certain types of workers with consequences for both receiving countries and the less developed source countries from which most international migrants will come. Because the elderly population will be the most rapidly growing segment of tomorrow's populations, it is likely that the there will be a significant demand for healthcare workers and nurses in long term healthcare.

It seems that as long as nursing remains predominantly a female occupation, and natives' participation in nursing remains stable whilst the number of working-age natives decline, there will be fewer native nurses to provide long term healthcare to the elderly. While it seems evident that such a decreased supply of native nurses would create a latent demand for foreign nurses, just what role immigration will play in addressing demographic changes is debatable. Opposition to immigration remains strong in many countries. Negative public opinion may well restrict any options that require substantial increases in admission. During the past decade, however, even countries with little tradition of immigration have acknowledged that they have sizeable immigrant populations and are likely to continue to admit immigrants.

So it is highly likely that international migration will play an important role in addressing the demographic trends already unfolding in most developed countries. But there is a lack of detailed information about what type of role immigrant will play, particularly if policymakers alter the profile or characteristics of immigrants say favoring one type of occupation like nursing over others. And many receiving countries report nursing shortages and the future holds challenges as nurse retention continues to be a problem, there are too few new recruits, and the nursing workforce ages. For example, pending U.S. legislation would substantially increase the number of foreign-born highly skilled workers and nurses in particular (see S2611).

This report presents initial forecasts of the future number of foreign-born, female nurses from the Developing World resident in North America and Europe in coming decades. The forecast models future nursing stock assuming that current ratios of foreign-born female nurses from Developing Countries hold into the future. These historic ratios combined with UN Population Forecast provide a base case scenario and results for individual countries -US, Canada, UK, France, Germany and Australia- as well as regional aggregates for North America and EU 15 countries. Two variations are then introduced to basic scenario; the first examines the consequence that unexpected longer life expectancy and higher migration will produce on European countries. This first scenario is managed by applying the historic ratios to an alternative stochastic population

forecast. The second variation consists in altering the historic long term health care ratio in order to create two additional scenarios under a higher and lower ratio. The purpose behind this variation is to examine how significant changes in the proportion of nurses working with elderly population due for example to future policies that alter the relation between formal and informal care, healthier older cohorts, labor market conditions or even technological change may affect the forecast's results.

In sum, the findings indicate that assuming current nursing-to-elder population ratios hold into the future for native nurses and all elderly, then the derived demand for foreign-born nurses is such that:

- The number or projected female foreign-born nurses in long term healthcare increases notably sometime in the next decade in North America and all European nations.

- The number of female nurses from less developed countries increases sharply and more rapidly than that for nurses from developed nations.

    - This is especially the case for Europe where nurses from other developed (EU) nations are often the majority of today's foreign nurse workforce; yet the number of native women available to supply tomorrow's nursing labor force is declining.

- The number of nurses admitted at present rates of admission are:

    - Sufficient to meet projected demand of foreign nurses from less developed countries in the case of the United States;

    - Insufficient to meet projected demand of foreign nurses from less developed countries in the case of European nations.

In 2000, the UN Population Division issued a controversial report, *Replacement Migration: Is It a Solution to Declining and Ageing Populations*? Given the extremely low fertility and increased longevity in many developed countries, replacement migration is "the international migration that would be needed to offset declines in the size of population, the declines in the population of working age, as well as to offset the overall ageing of a population." In fact, without significant new numbers many European countries will experience declining populations. Because of the United States' already generous immigration policy, the prospect for growth is more positive, but America too will experience an increasingly large population of elderly dependents. Nevertheless, most scholars believe that simply increasing the number of immigrants, even several times more than today's already high levels, cannot effectively offset the trends driving population aging. Yet, these demographic trends clearly will generate demand for certain types of workers with consequences for both receiving countries and the less developed source countries from which most international migrants will come. Because the elderly population will be the most rapidly growing segment of tomorrow's populations, it is likely that the there will be a significant demand for healthcare workers and nurses in long term healthcare.

To answer the question posed in the title of its report, *Replacement Migration: Is It a Solution to Declining and Ageing Populations*?, the UN Population Division calculated the number of immigrants required to maintain in the coming century the peak projected size of the total population, the working-age population, and the ratio of workers to the elderly. They concluded that maintaining total population size would require about the same current flow of migrants for the United States and most countries of the European Union, but for Italy, Japan, the Republic of Korea and Europe as a whole, offsetting population decline would require a level of immigration much higher than experienced in recent years. Most countries, except the United States, would need a significantly larger number of migrants to offset declines in the working-age population. And, according to the report, "the levels of migration needed to offset population ageing (i.e., maintain potential support ratios) are extremely large, and [for all countries] entail vastly more immigration than occurred in the past." Although it recognized that immigration was not the only solution, the report reinforced for many observers that international migration must be an important part of any strategy to combat population decline and aging.

Further, the demographic models tend to indicate that immigration alone has minimal impacts on the age structure of a population.[1] Immigrants add to the population at different steps of the age pyramid, including dependent children and older persons, but even radically admitting only the youngest immigrants has little immediate impact. Any demographic structure has its own momentum and takes a long time to develop and stabilize. The population age distribution depends primarily on fertility and the age pattern of mortality rather than on other factors. Population projections have been run testing several scenarios with different assumptions about fertility, mortality, and immigration levels.[2] The findings indicate that different fertility assumptions have the largest impact on the projected size of the population ages 0-14,[3] while mortality assumptions impact mostly the size of the population ages 65 and over. Changing the number of assumed immigrants has its greatest impact on the working-age population (ages 15-64). Regardless, the build-in momentum of a population's historical age structure means that it takes time, absent extreme shocks, to change the average age—it is not easy to reverse the aging process.

And much of the concern about population aging focuses on preserving an optimal labor force size or the ratio of workers to the elderly, particularly as policies may have more leverage here. Other than increasing the number of working-age persons, the most effective way of bolstering the number of workers is to have more persons who choose to participate in the labor force. Total participation rates are much lower in Europe than in the United States, but almost everywhere female participation rates, despite historic gains in the past three decades, are lower than those of males. Bringing more women into the labor force, therefore, is one of the most viable ways of maintaining the number of available workers.[4] Of course, there are other options, e.g., decreasing the unemployment rate of the youngest workers, increasing the labor participation of the elderly and, most-

[1] Feld, Serge, 2000. "Active Population Growth and Immigration Hypotheses in Western Europe," *European Journal of Population,* 16 (1): pp. 3-40; Boersch-Supan, Axel, 2001. "Labor Market Effects of Population Aging," Working Paper 8640, Cambridge, MA: National Bureau of Economic Research; Coleman, D. A., 2001. "'Replacement Migration', or Why Everyone's Going to Have to Live in Korea. A Fable for Our Times from the United Nations." Oxford, United Kingdom: Department of Social Policy and Social Work, University of Oxford, http://www.apsoc.ox.ac.uk/Oxpop/wp03.pdf.

[2] Beaujot, Roderic, 2003. "Effect of Immigration on the Canadian Population: Replacement Migration?" Discussion Paper No. 03-03, London, Canada: Population Studies Centre, University of Western Ontario, http://www.ssc.uwo.ca/sociology/popstudies/dp/dp03-03.pdf.

[3] Not surprisingly, therefore, many observers argue that there should be an emphasis on increasing fertility with pronatalist policies. Conversely, in terms of dependency ratios, declining fertility means fewer children to educate, which in turn frees up resources to care for the elderly (Abernethy, Virginia Deane, 2001. "Comment on Bermingham's Summary of the UN's Year 2000 Replacement Migration, Is It a Solution to Declining Population and Aging?" *Population and Environment*, 22 (4): 365-375).

[4] McDonald, Peter and Rebecca Kippen, 2001. "Labor Supply Prospects in 16 Developed Countries, 2000-2050." *Population and Development Review*, Vol. 27 (1), March 2001: pp. 1-32.

talked about, increasing the retirement age of the elderly. Alternatively, the number of full-time hours might be increased or capital investment and new technologies could improve worker productivity, or everyone could simply accept a lower standard of living.[5] A combination of the above factors can expand the size of the current labor force significantly. In many European countries even modest increases in the number of immigrants can play a significant role in offsetting aging effects, if the labor force were first expanded by increasing European's low participation rates and early retirement.[6]

Nevertheless, it seems that as long as nursing remains predominantly a female occupation, and natives' participation in nursing remains stable whilst the number of working-age natives decline, there will be fewer native nurses to provide long term healthcare to the elderly. While it seems evident that such a decreased supply of native nurses would create a latent demand for foreign nurses, just what role immigration will play in addressing demographic changes is debatable. Opposition to immigration remains strong in many countries. Negative public opinion may well restrict any options that require substantial increases in admission. During the past decade, however, even countries with little tradition of immigration have acknowledged that they have sizeable immigrant populations and are likely to continue to admit immigrants. Most often discussed are temporary work programs that would contribute laborers but not permanent residents likely to utilize benefit programs.

But also open to debate is the type of immigrants that will be admitted. When governments select immigrants, they often base admission on level of skills, pre-existing connections to the host country (e.g., colonial ties, trade agreements), family ties, humanitarian interests, and other factors. Governments often cite a preference for highly skilled migrants, who, they believe, will contribute most to the economy and be the easiest to integrate. However, businesses often seek lower skilled labor. It is highly likely that international migration will play an important role in addressing the demographic trends already unfolding in most developed countries. But there is a lack of detailed information about what type of role immigrant will play, particularly if policymakers alter the profile or characteristics of immigrants say favoring one type of occupation like

[5] Cichon, Michael, Florian Léger and Rüdiger Knopp, 2003. "White or Prosperous: How Much Migration Does the Ageing European Union Need to Maintain Its Standard of Living in the Twenty-First Century?" Prepared for the 4th International Research Conference on Social Security "Social Security in a Long Life Society," Antwerp, May 5-7.

[6] Generally speaking, most European nations are, like the United States, unlikely to experience significant declines in the working-age population through about 2020 (Feld 2000 op cit. endnote 2). On the one hand, this makes labor force participation policies even more fundamental and makes it clear that immigration's role becomes more critical in the years beyond 2020.

nursing over others. And many receiving countries report nursing shortages and the future holds challenges as nurse retention continues to be a problem, there are too few new recruits, and the nursing workforce ages. For example, pending U.S. legislation would substantially increase the number of foreign-born highly skilled workers and nurses in particular (see S2611). Yet, the U.S. already admits a goodly number of foreign-born nurses.[7]

This report presents initial forecasts of the future number of foreign-born, female nurses from the Developing World resident in North America and Europe in coming decades. This report starts by presenting the set of assumptions that will be used for the forecast—basically modeling future nursing stock assuming that current ratios of foreign-born female nurses from Developing Countries hold into the future. Following a description of those nursing ratios, the report will briefly elaborate the forecast methodology, data sources and briefly discuss its limitations. These historic ratios combined with UN Population Forecast provide a base case scenario and results for individual countries -US, Canada, UK, France, Germany and Australia- as well as regional aggregates for North America and EU 15 countries. Two variations are then introduced to basic scenario; the first examines the consequence that unexpected longer life expectancy and higher migration will produce on European countries. This first scenario is managed by applying the historic ratios to an alternative stochastic population forecast. The second variation consists in altering the historic Long Term Health Care ratio in order to create two additional scenarios under a higher and lower ratio. The purpose behind this variation is to examine how significant changes in the proportion of nurses working with elderly population due for example to future policies that alter the relation between formal and informal care, healthier older cohorts, labor market conditions or even technological change may affect the forecast's results. Finally, the report will provide a summary of the main findings and conclude by outlining future venues for research.

Assumptions for the forecast

The basic approach for the forecast is to assume that current nurse-to-population ratios reflect an equilibrium of supply and demand. In other words, observed ratios include information about current levels of demand given prevalence rates of care with current technology, as well as current levels of supply given inputs of available workers. Yet, some observers argue that, for example, the US currently experiences a shortage of

[7] B. Lindsay Lowell and Stefka Gerova, 2004. "Immigrants and the Healthcare Workforce: Profiles and Shortages," Work and Occupations, 34- (4): 478-498.

nurses and some forecasts for *all* nurses suggest increasing shortages by 2020. But these assertions of shortages are highly debatable; and today's nursing ratios are at an historic high (Lowell and Gerova 2004).

The actual forecast is made by multiplying the current nurse-to-population ratios by forecasts of the total population by nativity and age. Of course, this implies an assumption that demographic forecasts are reliable which, of the two assumptions, is the more defensible as population inertia tends to generate stable outcomes at least ten to twenty years or more into the future. However, forecasts of immigration are not without uncertainty as policies may change either in terms of the total number of immigrants admitted and/or in terms of the relative number of highly skilled immigrants admitted to various countries (see Howe and Jackson 2003; and Lowell 2004). It is mainly due to this uncertainty that this report will also show the results by applying the present ratios to an alternative population forecast that assumes longer life expectancy and a higher migration rate.

In short, the twin assumptions here are colored by the uncertainty inherent in all forecasts which are best seen as planning tools under "what if" conditions, e.g., what if a growing number of aging persons due to longer life expectancy increases demand given current inputs; and what if immigration remains at current levels with current ratios of nurse immigration?

Before presenting the historic ratios it's important to acknowledge that the countries included in this study have significantly different nurse workforce composition with some exhibiting higher proportion of professional nurses[8] and others relying more in lower skilled auxiliary nurses[9]. Countries also choose different arrangements in terms of the task and facilities (industry) in which each type of nurse works, for example, auxiliary nurses in the US are much more likely to work in nursing homes and home care than their equivalent in France and Germany. The following table illustrates this point by presenting how the proportion of skilled and low skilled nurses working in specific facilities varies across countries.

Table 1: Workplace of Professional and Auxiliary Nurses in selected countries.

	USA	Germany	France	UK

[8] ISCO 88 code 223 includes this category of nurse under the title 'Nursing/Midwifery Professionals'.
[9] ISCO 88 code 323 or 'Nursing/midwifery associated professionals'.

Professional Nurses	**Total # of Professional Nurses**	**2,437,820**	**689,000**	**423,431**	**436,839**
	Hospitals	71.0%	74.6%	76.9%	75.9%
	Nursing Homes	7.8%	7.8%	8.0%	12.3%
	Home Health Care	3.5%	9.4%	0.3%	0.6%
	Office of Physicians	7.8%	4.4%	12.0%	6.7%
	Other facilities	9.9%	3.7%	2.7%	4.5%
Auxiliary Nurses	**Total # of Auxiliary Nurses**	**340,616**	**203,000**	**438,697**	**191,852**
	Hospitals	26.7%	40.9%	62.5%	85.2%
	Nursing Homes	53.1%	16.1%	27.0%	6.3%
	Home Health Care	6.5%	7.3%	3.4%	1.8%
	Office of Physicians	7.2%	22.6%	5.2%	3.3%
	Other facilities	6.5%	13.1%	1.9%	3.4%

Source: Morg 2003 data for the US, LFS September-November 2003 for the UK, Federal Health Monitoring at http://www.gbe-bund.de/ for Germany. Data for France from 'Les professions de santé au 1er janvier 2003-Répertoire ADELI' in Série Statistiquesn° 52, mai 2003 and from www.travail.gouv.fr

The above Table 1 shows that whereas countries tend to exhibit similar proportion of professional nurses working in hospitals, the same is not the case for nurses working in the home care industry, these differences are even more evident for auxiliary nurses with the UK, for instance, having over 85% of auxiliary nurses working in hospitals while Germany and the US that figure is 40.9% and 26.7% respectively. Another interesting fact is that composition between both categories of nurses also varies across countries with auxiliary nurses in the France being as many as professional nurses while in the US they only account for slightly over 10% of total nurse workforce.

The following tables summarize the necessary information require to calculate the basic ratios that will enable us to do the forecast. Table 2 presents detailed information of the nursing workforce in selected countries, particularly in relation to country of birth, female representation and proportion of nurses working with elderly population. The table shows that the proportion of female nurses is higher for the US and Canada than it is for European countries or Australia. On the other hand, the proportion of nurses working with the elderly population varies for this set of countries between 17 and 21 percent of total nurse workforce.

Table 2: Nurse workforce in selected countries

Country	***Total Number of Nurses[h]***	***Number of Native Born Nurses***	***Number of Foreign Born Nurses***	***Number of Nurses from the Developing World***	***% of Nurses working with elderly population***	***% of female in Nurse workforce[i]***
Canada[a]	241,900	199,720	42,180	26,730	21.0	95.2
United States[b]	2,528,525	2,049,360	479,165	257,520	17.7[j]	94.3

Australia[c]	244,422	177,173	67,249	24,961[l]	20.8[j]	89.0
Germany	948,404	890,904[l]	57,500[l]	11,849	18.3	86.4
United Kingdom[d]	475,147	407,231	67,916	51,229	16.5	88.1
France	759,948	740,024[l]	19,924[l]	6,641[l]	19.6[k]	87.2
Rest of EU 15[e]	1,630,135	1,595,663	34,472	3,584	18.3	84.3
North America[f]	2,770,425	2,249,080	521,345	284,250	18.0	94.4
EU 15[g]	3,813,634	3,633,822	179,812	73,304	18.3	94.6

[a] *All for Canada from Canadian Lobour Force Survey*

[b] *All data for the US is from Morg 2000.*

[c] *All data for Australia is from ABS, Census Of Population And Housing, 2001.*

[d] *All data for the UK Labour Force Survey Quaterly, September-November 2003*

[e] *Data mainly from Eurostat Labour Force Surveys. Belgium, Denmark, Spain, Greece, Luxembourg, Ireland, Italy, Netherlands, Portugal, Sweden, Austria and Finland.*

[f] *Aggregated data for Canada and the US.*

[g] *Aggregated data for UK, Germany, France and Rest of EU15.*

[h] *For every individual country "nurses" includes professional and associated nurses. Some of the countries included in "Rest of EU15" also include as part of the nursing workforce ISCO-88 category 322 "Other health associated professionals"*

[i] *These figures were estimated using, the percentage of foreigners and foreigners born abroad and in LDC among ISCO-88 categories 2&3. The data is available in "International Mobility of the Highly Skilled, OECD 2001".*

[j] *Data from Federal Health Monitoring at http://www.gbe-bund.de*

[k] *Data from 'Les services de soins infirmiers à domicile en 2002' Sophie BRESSÉ et Dominique BERTRAND, n° 77 – février 2005 available in http://www.sante.gouv.fr/drees/seriestat/pdf/seriestat77.pdf and from 'Les établissements d'hébergement pour personnes âgées en 2003' François Tugorès in Études et Résultats N° 379, 2005.*

[l] *Data from the OECD Health Data 2005.*

The figures in the table are derived from official international and/or national sources of healthcare statistics (see sources in table). Total nursing ratios are readily available for many countries and are typically based on labor force surveys. Figures on nursing workforce by nativity are a little harder to come by, but the table presents these as well for the countries and regions under study.

However, we are interested in yet more detailed information, particularly *female* nurses from *developing* countries. So the table shows these ratios which are also gleaned from published data and which are available for all nurses. Finally, the percentage of all nurses in long term health care (LTHC) is shown, which data suggests is close to 90 percent driven by eldercare, and this permits us to estimate the unique ratio of nurse-to-elderly population.

Of course, because we have current populations, the figures above can be used to derive the ratios of nurses by nativity. Table 3 presents current populations by nativity allowing us to derive the current ratios of native nurses-to-native-population, and foreign nurses-to-foreign-population (not shown). It also the age composition of each country/region population, break out in two categories. The data on country of birth is primarily from Census data, while the age cohort data is from UN population data for year 2000.

Table 3: Demographic characteristics of Population.

Country	% of Native Born Population[a]	% of Foreign Born Population[a]	Population 65 and over[b]	Population less than 65 years old[b]
Canada	80.7	19.3	3,870,000	26,819,000
United States	87.7	12.3	35,078,000	249,076,000
Australia	78.3	21.7	2,317,000	16,754,000
Germany	87.5	12.5	13,483,000	68,861,000
United Kingdom	91.7	8.3	9,306,000	49,364,000
France	90.0	10.0	9,669,000	49,609,000
Rest of EU 15	93.7	6.3	29,567,000	147,993,000
North America	87.0	13.0	38,960,000	276,008,000
EU 15	91.5	8.5	62,025,000	315,827,000

[a] *Data from ´Counting Immigrants and Expatriates in OECD countries: A New Perspective by Jean-Christophe Dumont and Georges Lemaitre.*

[b] *Data from UN Population Forecast in Year 2000.*

By using the information in the previous tables, the basic ratios could be calculated using the formulas included in Annex 4. Table 4 presents the main ratios that will be employed in the forecast static estimation. Technically, the application of these unconditional ratios is known as a "competing hazards model" and here it primarily assumes little effective change in the hazards (ratios) conditioned on nativity. Given that natives tend to dominate the nursing labor force, total native ratios are relatively unbiased, and the US data at least suggests they are reasonable for immigrants as well (Lowell and Gerova 2004).

By comparing the fourth and fifth column in Table HH is possible to see that the proportion of nurses per elderly inhabitant is greater than that for younger cohorts, Australia exhibits the larger difference where nurses per inhabitant over 65 years old is almost twice that for the younger population. These figures not only depend of the age composition of the population but above all depend on the way the nursing workforce is organized. Germany has one of the larger elderly population (over 16%) but uses 2,5 percentage points less nurses than Australia, who only has 12% of its population over 65 years old (see table 2).

Table 4: Main Historic Ratios for selected countries.

Country	% of Native Born Nurses	% of Foreign Born Nurses	% of Foreign Born Nurses from LDC	Ratio of Nurses to Population 65+	Ratio of Nurses to Population less than 65	Ratio of Nurses to Total Population
Canada	82.6	17.4	63.4	1.314	0.712	0.788
United States	81.0	19.0	53.7	1.277	0.835	0.890
Australia	72.5	27.5	37.1	2.196	1.155	1.282
Germany	93.9	6.1	20.6	1.286	1.125	1.152
United Kingdom	85.7	14.3	75.4	0.841	0.804	0.810
France	97.4	2.6	33.3	1.538	1.232	1.282
Rest of EU 15	97.9	2.1	10.4	1.570	1.321	1.360
North America	81.2	18.8	54.5	1.280	0.823	0.880
EU 15	95.3	4.7	40.8	1.127	0.986	1.009

Because the ratios for each age cohort included in Table 4 are assumed to be fixed in time it is possible to forecast the ratio of nurses to total population by applying those fixed ratios to future population mixed. Due to aging population in developed countries, this ratio is likely to increase over time. Table 5 shows the evolution of nurses to total population in the countries under study.

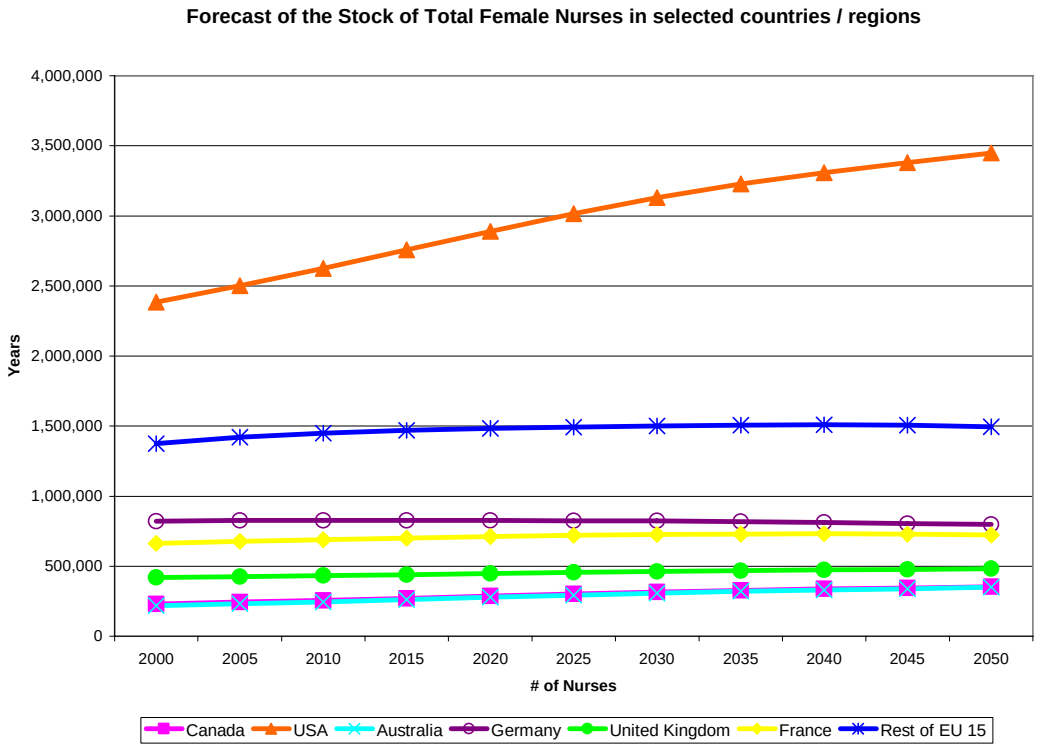
Because most of the ratios used are based in the year 2000. This methodology yields a baseline estimation of the total stock of nurses that would be required in order to keep constant the proportion of nurses serving each age cohort.

Table 5: Nurses to Total Population ratio forecast 2000-2050.

	Canada	USA	Australia	Germany	United Kingdom	France	Rest of EU 15	North America	EU 15
2000	0.788	0.890	1.282	1.152	0.810	1.282	1.360	0.880	1.009
2005	0.791	0.890	1.287	1.156	0.810	1.283	1.361	0.880	1.011
2010	0.798	0.892	1.298	1.158	0.810	1.284	1.363	0.882	1.012
2015	0.810	0.898	1.316	1.159	0.811	1.290	1.367	0.888	1.014
2020	0.823	0.905	1.335	1.161	0.811	1.296	1.370	0.897	1.016
2025	0.838	0.914	1.353	1.164	0.811	1.301	1.374	0.906	1.018
2030	0.852	0.920	1.369	1.168	0.812	1.306	1.380	0.913	1.021
2035	0.859	0.923	1.382	1.172	0.812	1.310	1.385	0.916	1.024
2040	0.862	0.924	1.391	1.172	0.813	1.313	1.390	0.917	1.026
2045	0.864	0.925	1.396	1.171	0.813	1.314	1.393	0.918	1.026
2050	0.867	0.927	1.403	1.171	0.813	1.315	1.394	0.920	1.026

By applying the ratios in table PP to the UN Population Forecasts for the years 2000 to 2050 (see Annex 1[10]) it is possible to estimate a base case scenario. Without breaking up between by Nativity, Figure 1 shows the evolution of the total number of female nurses in the countries and regions under study. This graph gives a first rough sense of future needs of nursing workforce for each of the countries.

Figure 1



The first interesting finding is that for all countries but the US, the number of female nurses to total population will stay close to its 2000 level. This means that for most countries the additional nurses needed due to an aging population are compensated by the decline of the total population driven by low fertility rates. The US is an exception because during the next decades will still experience both significant population growth and an increasing proportion of elderly population cause by baby boom entering retirement age.

However interesting this first finding may be, these numbers hide an interesting story about the future composition of the nurse workforce. The next section will break up these

[10] Annex 1 also shows Replacement Migration Forecast and the Alternative Population Forecast for EU-15 countries use in the first scenario.

figures and show how this story changes when differentiating between native and foreign born populations.

Forecast Results for Individual Countries[11].

Two separate set of forecast are presented in this section. The first is the need of female nurses born in LDC countries to in the total population, the second is the forecast applied to the population 65 and over.

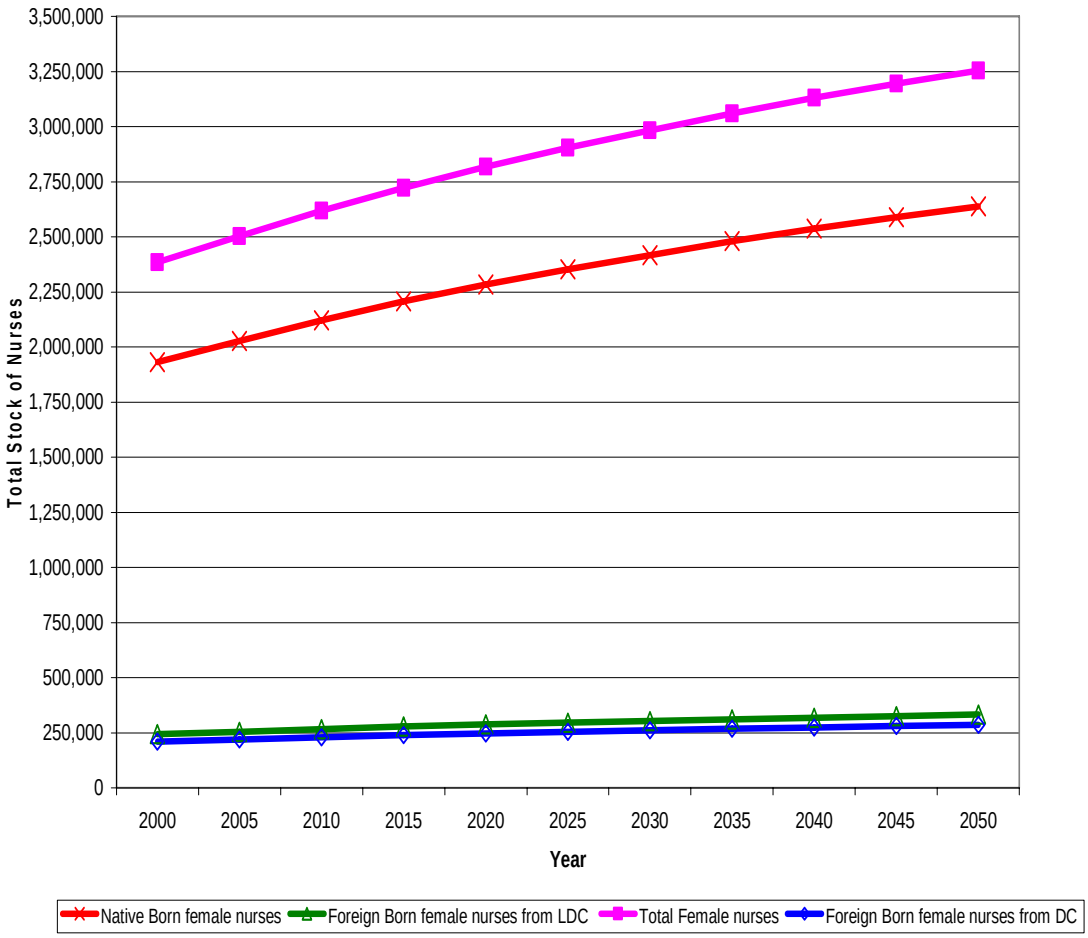
United States:

(1) Forecasts based on total nurse ratios and the total population nuanced by nativity

By multiplying the UN population forecast by the each year estimated total population ratios shown on Table 5 and female proportion in nurse workforce we are able to estimate the future total need of female nurses in each specific country. The □-solid line in figure US1 presents the results for the US. In order to break out that total by nativity, such figure is multiplied by the percentage that each nativity category represents within the nurse workforce. The solid X-line shows the forecast for Natives, while the solid ◊ and Δ lines show the forecast for Foreign Born from Develop Countries and LDC respectively. This methodology assumes that the proportion of native born nurses as well as that of foreign born stays constant in the future. This assumption will be modified later in the report, on the mean time; figure US1 provides a first approach to the results. Under these assumptions the number of native born nurses will increase from nearly 2 million nurses in year 2000 to over 2.75 million by 2050. Meanwhile foreign born female nurses from LDC will increase from nearly 250,000 in year 2000 to 350,000 by 2050. The numbers for female nurses from Develop Countries are slightly lower than those for nurses coming from LDC.

[11] Annex 2 presents detailed tables for each country.

Figure US1: Native and Foreign Born Female Nurse Forecast for the U.S.



However, this number assumes that native population will be able to "fulfill" the current ratio in future year. Lower fertility rate for natives and higher proportion among the elderly population may explain why this assumption is not necessarily truth. In order to examine the consequences of these demographic particularities of native born population, the previously describe ratios are applied to a zero migration population forecast[12]. These results provide additional information regarding the actual number of female nurses that the prevailing native born population will be able to provide in the future. This new forecast and its break out between native and Foreign Born female are shown in Figure US2.

[12] This population forecast are obtained from 'Replacement Migration: Is it a Solution to Declining and Aging Populations' available at http://www.un.org/esa/population/publications/migration/migration.htm

Figure US2: Native and Foreign Born Female Nurse Forecast for the US using replacement migration population forecast.

Figure US2 shows how the consequences of such an alteration are notable. The growing gap between the forecast of all nurses (solid □-line) and native nurses (x-dashed line) demonstrates that the current rate of supply of native nurses would not supply tomorrow's demand for nurses. The forecast figure for a derived demand for foreign nurses from DC and LDC in order to make up the deficit is also shown in the figure US2 (◊-dashed line and Δ-dashed line respectively). This estimation indicates that under this scenario native born nurses will increase and reach a peak of 2,17 million in 2035 and then decline to 2,13 million by 2050. On the other hand, foreign born female nurses from DC (◊-dashed line) and from LDC (Δ-dashed line) sharply increase in order to cover the gap that natives will be unable to provide. This situation causes the number of female nurses from LDC to climb up from 250,000 in year 2000 to over 700,000 in 2050. This forecast is nearly twice that shown in the previous figure.

An immediate policy question that arises from these results is whether actual immigration policy will allow the entrance of such amount of foreign born nurses. To answer such questions an estimate of future immigration caps is provided by projecting the number of female nurses that will eventually be allowed into the country. This projection assumes that proportion of female nurses from LDC over the total foreign population remains constant over time. Future migration caps are obtained by multiplying such fixed ratio to foreign born population forecast[13]. Figure US3 shows the projected migration caps as a ○-dotted line, the forecast results under regular migration (solid lines) and forecast under zero migration population forecasts (dashed lines). In order to simplify this graphic the foreign born from DC data was not included.

Figure US3: Female Nurse Forecast for the U.S.

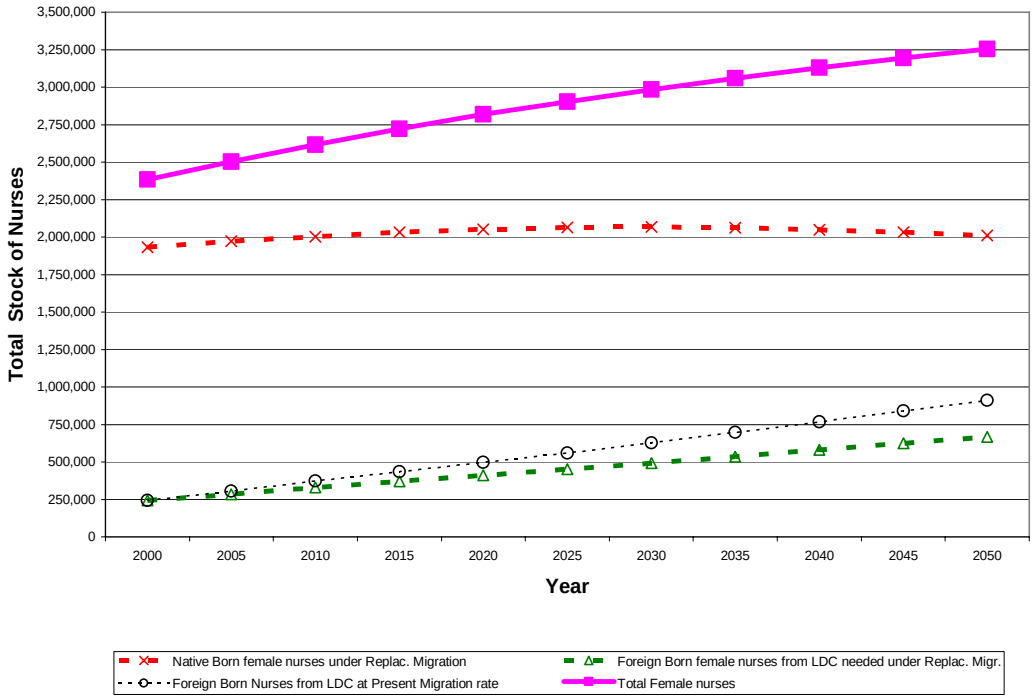


Figure US3 estimate indicates that current migration policy should not be an obstacle for future female nurse immigration from developing countries. The figure also shows how different the forecast looks once the native born nurses to native born population ratio is applied to the zero migration scenario.

In other words, separate nativity-ratio/population forecasts suggest that a declining native-born population will generate a derived demand for increasing numbers of foreign-

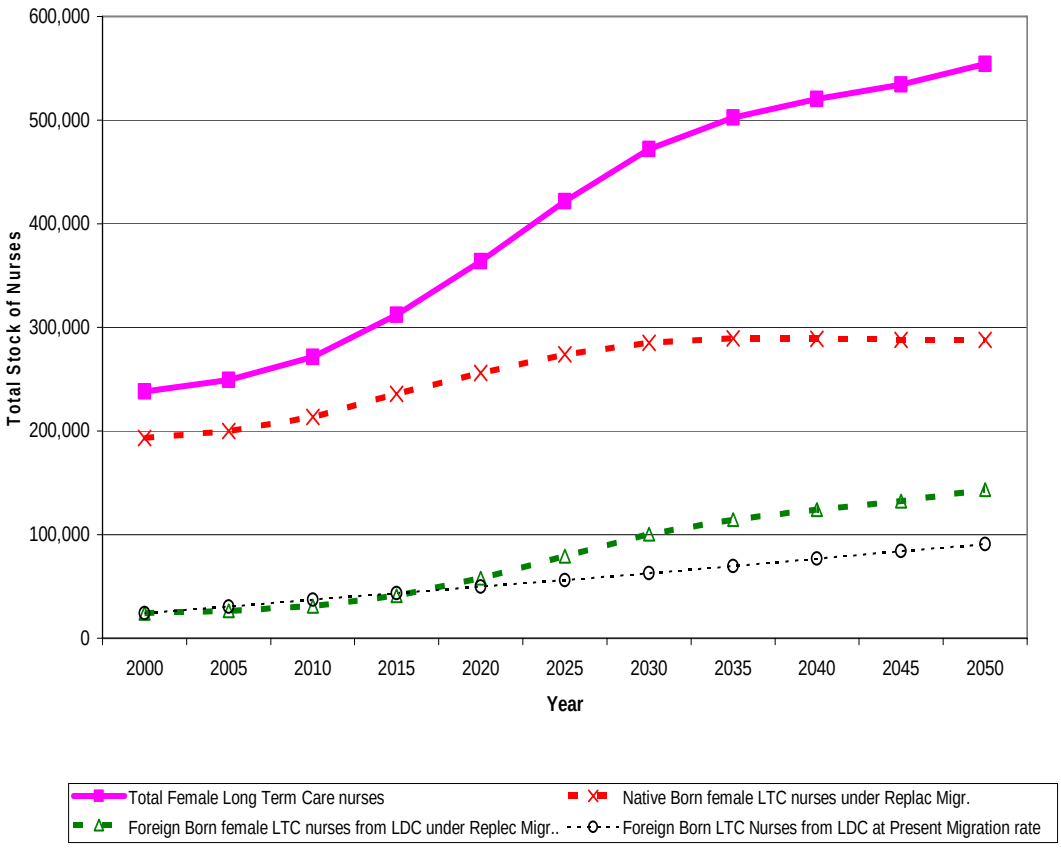
[13] Foreign Born Population forecast are obtained by subtracting from UN population forecast the estimates of the zero migration scenario (Replacement Migration Forecast).

born nurses. But the US immigration policy is forecast to generate enough foreign-born nurses to meet that derived demand.

(2) Forecasts based on eldercare nurses and the elderly population nuanced by nativity.

While the previous estimation allows us to have an idea of the future number of female nurses for the total population, this picture may not be the same if the same analysis is done for the elderly population. In order to estimate the need of female nurses born in developing countries similar steps are taken, but the ratios are adjusted for the LTHC workforce and the projections are made based on the elderly population (ages 65 and over). Figure US4 shows the overall results obtained for the elderly population in the US.

Figure US4: Forecast of LTC Female Nurses working with Elderly Population, United States.



These estimates indicate that female LTC nurses will reach nearly 1 million by 2050, a figure 2,3 times bigger than the year 2000 level. As for the nativity composition of such total, the forecast shows that Native Born population will only provide little over 600,000

female LTC nurses (x-dashed line) while a total of 250,000 female nurses from LDC will be needed in order to keep ratios at their actual level (Δ-dashed line).

Future forecast of foreign born nurse working in LTC suggests that if current ratio of foreign born LTC nurses to total foreign born population is maintain, the US immigration policy will fail to bring in enough nurses to fill the LTC gap. This is an interesting finding since it suggests that the US will, in future years, need to allow a specific type of nurse. One trained to work in Long Term Health Care. This is particularly if considering that in the US the long term health care industry is intensive in low skilled auxiliary nurses (See Table 1).

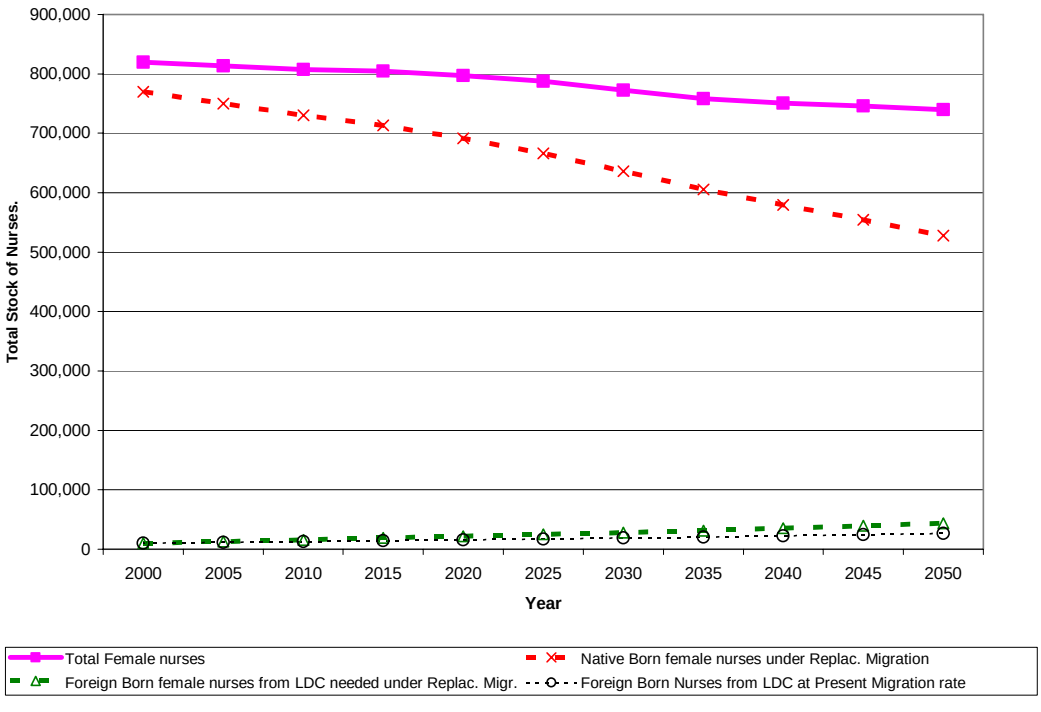
In summary, out of the nearly 460,000 additional foreign born female nurses from LDC that will be needed in the US over the next 45 years, nearly 210,000 of them will be needed to assume Long Term Health Care positions with the elderly population.

Germany:

(1) Forecasts based on total nurse ratios and the total population nuanced by nativity

Figure DE1 shows that despite Germany overall need for nurses doesn't change overtime (□-solid line), its Native population will sharply decline causing the reduction on native nurses from 769,000 in year 2000 to 568,000 by 2050 (x-dashed line) and will therefore face increasing shortage of nurses that will be eventually have to be filled by foreign nurses. Because most of Germany's foreign nurse workforce comes from other EU15 countries the forecast of female nurses from LDC slightly increases from 10,000 in year 2000 to 47,000 in 2050 (Δ-dashed line). It's highly unlikely that over the next 50 years Germany will be able to bring a total of 140,000 nurse form other Develop Countries (not shown in graph), this suggests that individual country figures, particularly for EU countries should be carefully considered because ratios were derived under present conditions that will not necessarily hold in the future. The section presenting regional results will deal with this situation by defining natives as any person born in a EU-15 member state and foreigners as any individual born outside such boundaries.
Figure DE1 also shows that if immigration quotas for nurses remain at their present level, Germany will not be able to bring in the number of foreign nurses it needs in order to keep up with today nurses to total population ratio (○-dotted line vs. to Δ-dashed line).

Figure DE1: Female Nurse Forecast for Germany

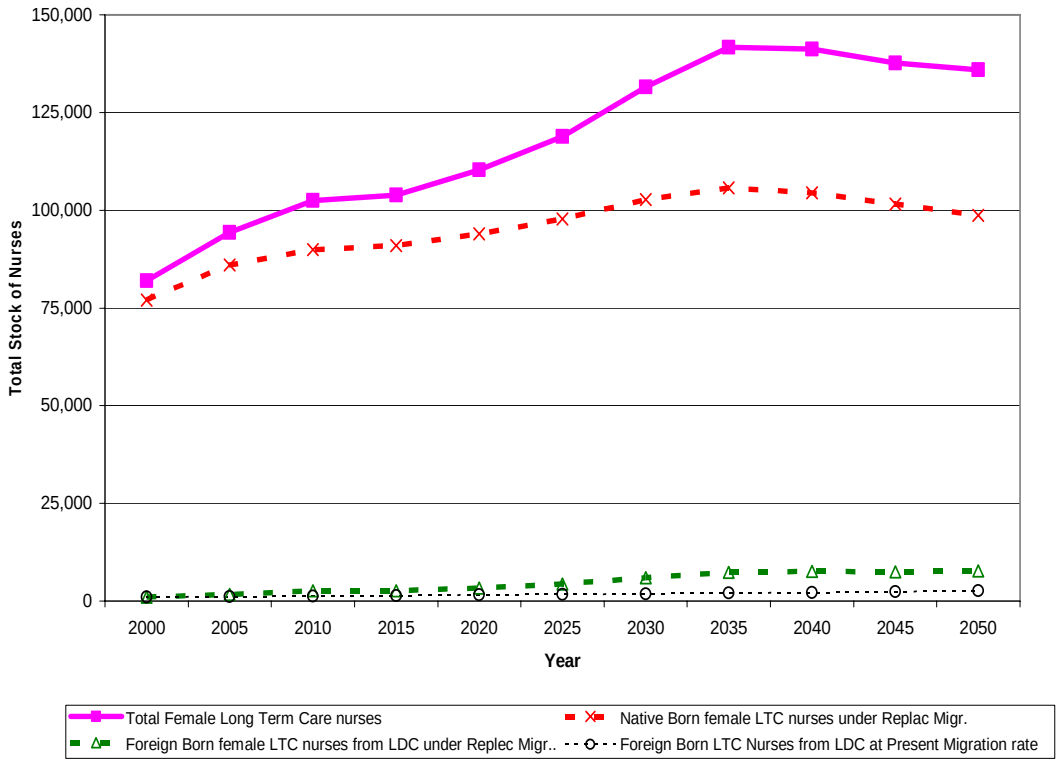


(2) Forecasts based on eldercare nurses and the elderly population nuanced by nativity.

Results for the elderly population suggest that, even though Germany will not need additional nurses for its total population (□-solid line in Figure DE1), the number of nurses needed for the elderly population will sharply increase until 2035, after then the figure will converge in 2050 to a total of 250,000 female nurses. The information in both figures suggests then that Germany will face a strong need to readjust the composition of its nursing workforce in order to fit the future profile of its population.
Regarding the nativity composition of this particular workforce, the story is fairly similar to the one described above. By 2050 Germany will need a total of 68,000 foreign born nurses to take care of its elderly population (not shown in figure), 14,000 of them from LDC (Δ-dashed line). As explained above, it's doubtful that Germany will be able to bring in from other Develop European countries the 54,000 nurses that make up the difference.

As for immigration policy, Figure DE2 also shows that Germany will probably have to modify its current immigration caps if future needs are to be match.

Figure DE2: Forecast of LTC Female Nurses working with Elderly Population, Germany.



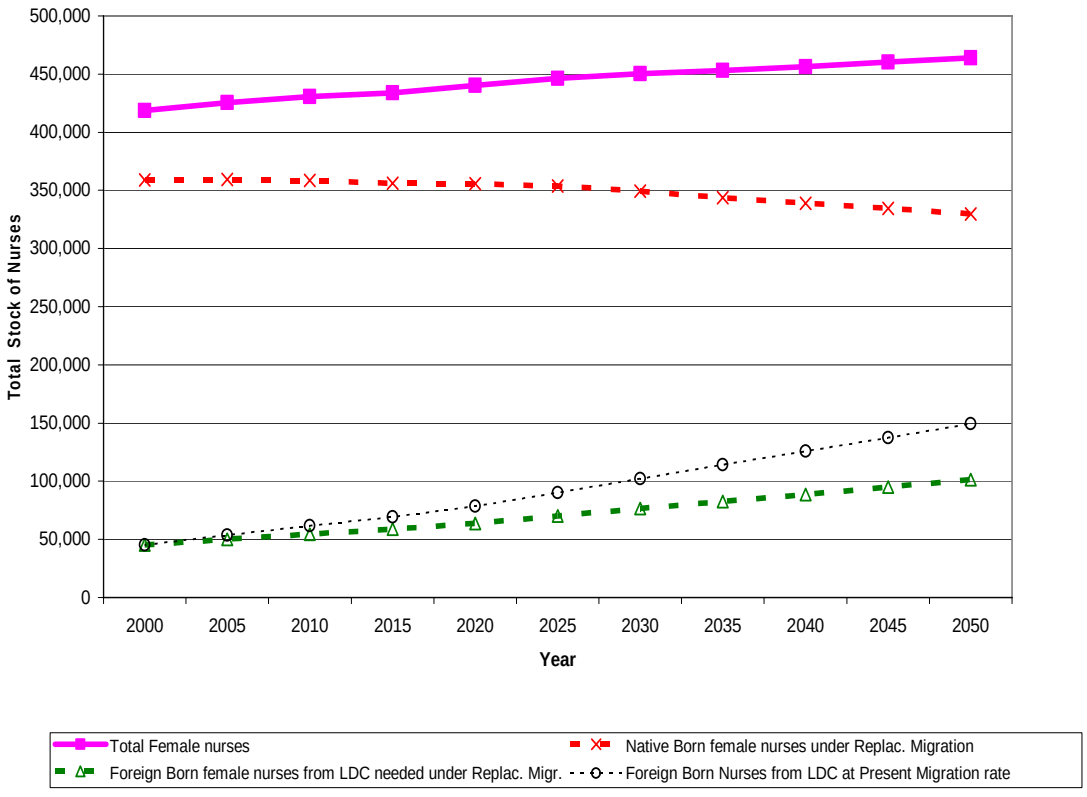
United Kingdom:

(1) Forecasts based on total nurse ratios and the total population nuanced by nativity

Figure UK1 shows that the UK overall need for nurses will slightly increase over the next 50 years, reaching a total of 480,000 in 2050 (□-solid line). During the next 50 years, the UK's native population will be able to provide a fairly stable amount of female nurses which will lay around 350,000 (x-dashed line). This suggest that the over time gap will need to be fulfilled by foreign born nurses. Unlike Germany, nurses from LDC make up a larger proportion of the foreign workforce and so their stock is projected to go from 45,000 in year 2000 to 105,000 in 2050 (Δ-dashed line). Foreign born nurses from other developed countries will have a marginal increase from 14,000 in 2000 to 34,000 in 2050 (not shown on figure).

Figure UK1 also shows that over the total population immigration will not be a restriction to incoming female foreign born nurses (○-dotted line compared to Δ-dashed line).

Figure UK1: Female Nurse Forecast for the U.K.

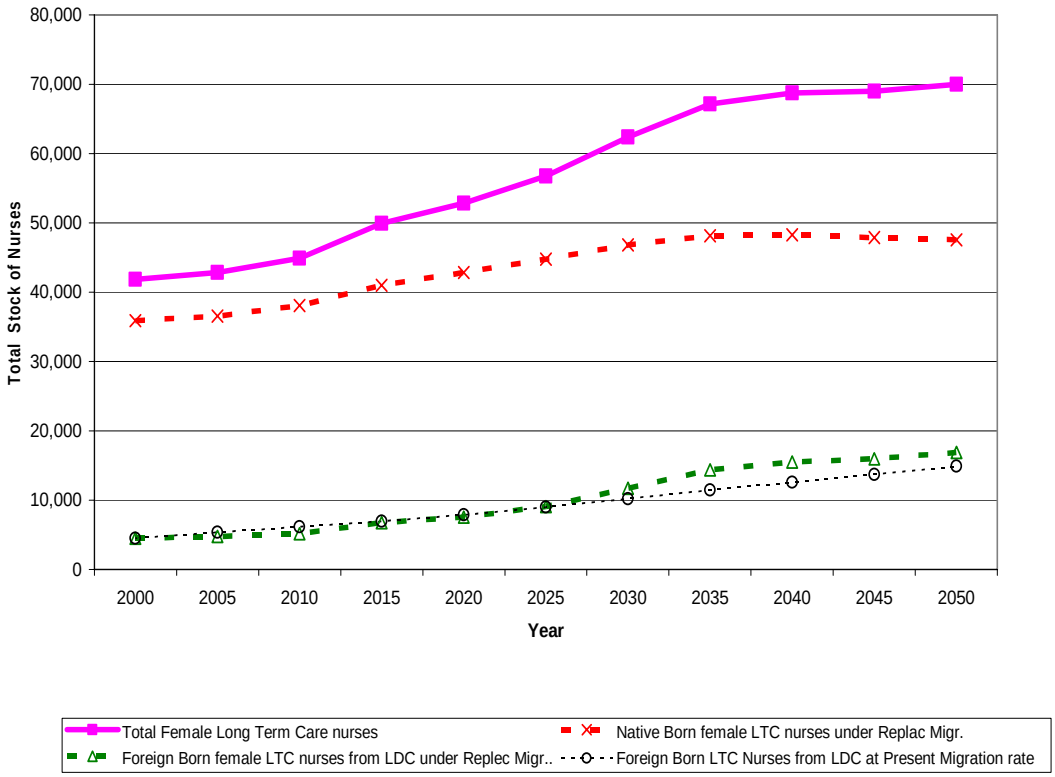


(2) Forecasts based on eldercare nurses and the elderly population nuanced by nativity.

The UK story on nurses for elderly population is similar to that of the US. Figure UK2 shows that the total amount of female nurses working with elderly population should increase until 2040 when it will reach 113,000 (□-solid line). Native population will be able to provide an increasing amount of nurses until it reaches a maximum of 80,000 in 2035 (x-dashed line). On the other hand, female nurse from LDC are expected to go from 5,300 in year 2000 to over 15,000 by 2050, the increase rate will be particularly higher after 2025 (Δ-dashed line).

In the same way as figure US4 suggested for the US, immigration caps will eventually become a restriction for specialized nurses after 2025 when the expected caps will not allow to enough to allow in the required number of nurses for the elderly population. Likewise, this suggests that the UK should pay define its immigration policy in order to allow in a specific type of nurse, trained and willing to work with the elderly population (○-dotted line compared to Δ-dashed line).

Figure UK2: Forecast of LTC Female Nurses working with Elderly Population, United Kingdom.



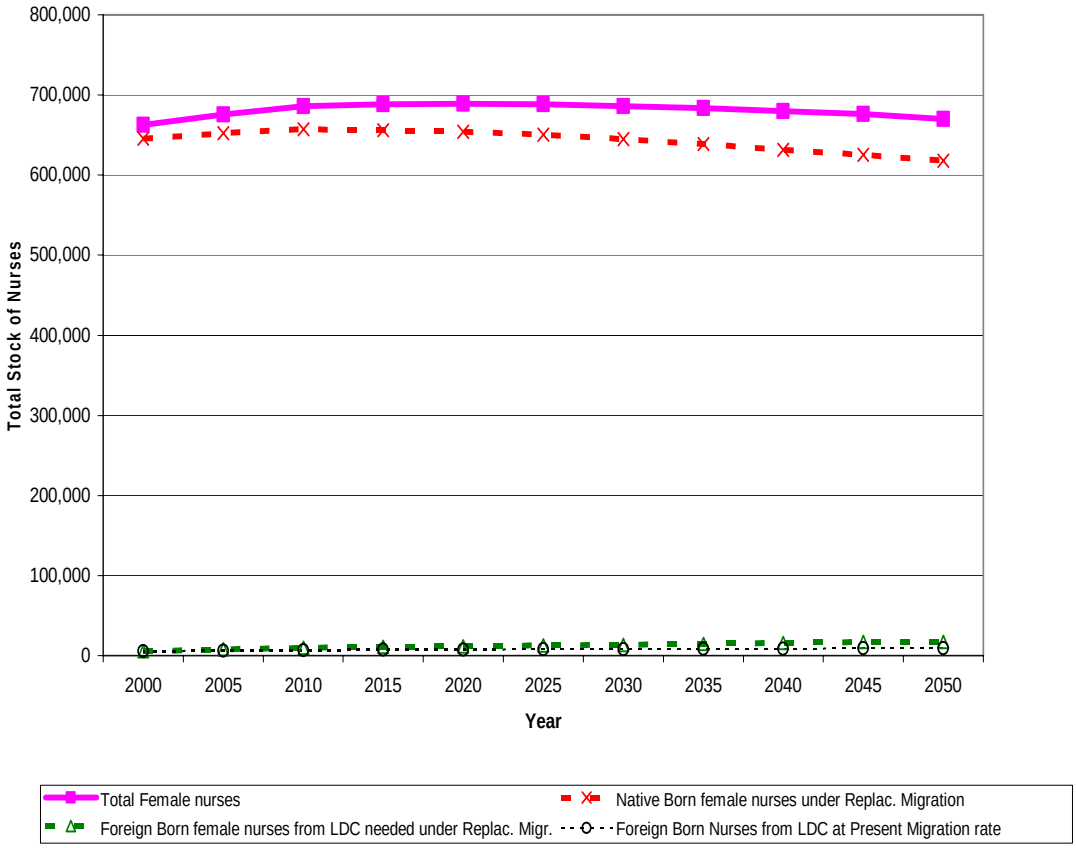
France:

(1) Forecasts based on total nurse ratios and the total population nuanced by nativity

France tells a rather more moderate story. The total number of needed female nurses will slightly increase until 2040 when it will reach over 730,000 (□-solid line). French natives will be able to provide most of this increase reducing pressures for high additional migration (x-dashed line). Despite the increase in native nurses supply, France will need over 56,000 foreign born nurses by 2050, nearly 19,000 of which will be from LDC (Δ-dashed line). This last figure implies nearly 13,000 additional nurses from the available stock in year 2000.

Despite the lower needs for immigrant nurses, France will face restrictive immigration caps during the next 50 years, for instance, if current immigration rates are kept, France will only be able to admit 9,000 of the 19,000 female nurses from LDC that needs by 2050 (○-dotted line compared to Δ-dashed line).

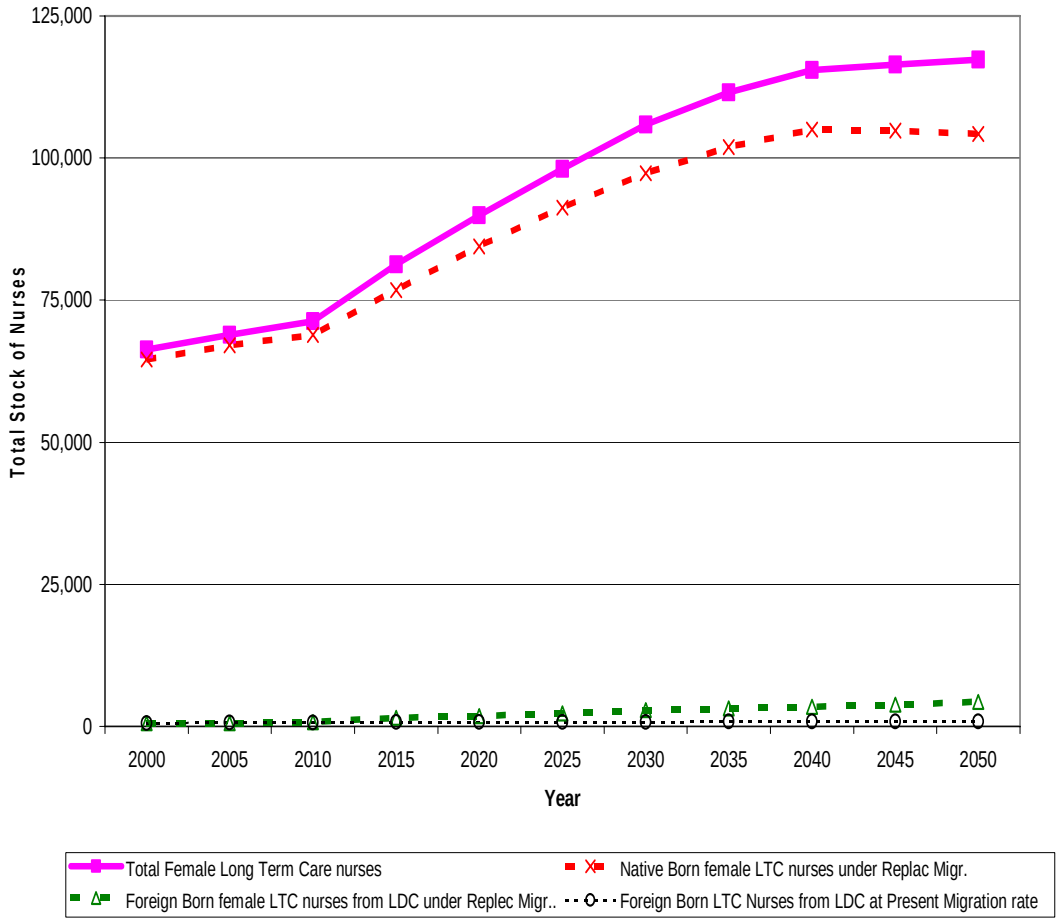
Figure F1: Female Nurse Forecast for France



(2) Forecasts based on eldercare nurses and the elderly population nuanced by nativity.

Regarding nurse care for the elderly, the story is very much similar to that in the previous figure. The total number of female nurses working with elderly population will increase until 2050 when it will apparently settle at nearly 230,000 (□-solid line). Figure F2 also shows a growing gap between total nurses needed and those native born which by 2050 will account for nearly 204,000 female nurses (x-dashed line). Female nurses from LDC will rise from slightly over 1,000 in year 2000 to over 8,500 by 2050 (Δ-dashed line). Similarly to the previous figure, immigration caps will play a restrictive role for incoming foreign born female nurses working with the elderly population (○-dotted line compared to Δ-dashed line).

Figure F2: Forecast of LTC Female Nurses working with Elderly Population, France.



Rest of EU-15 countries.

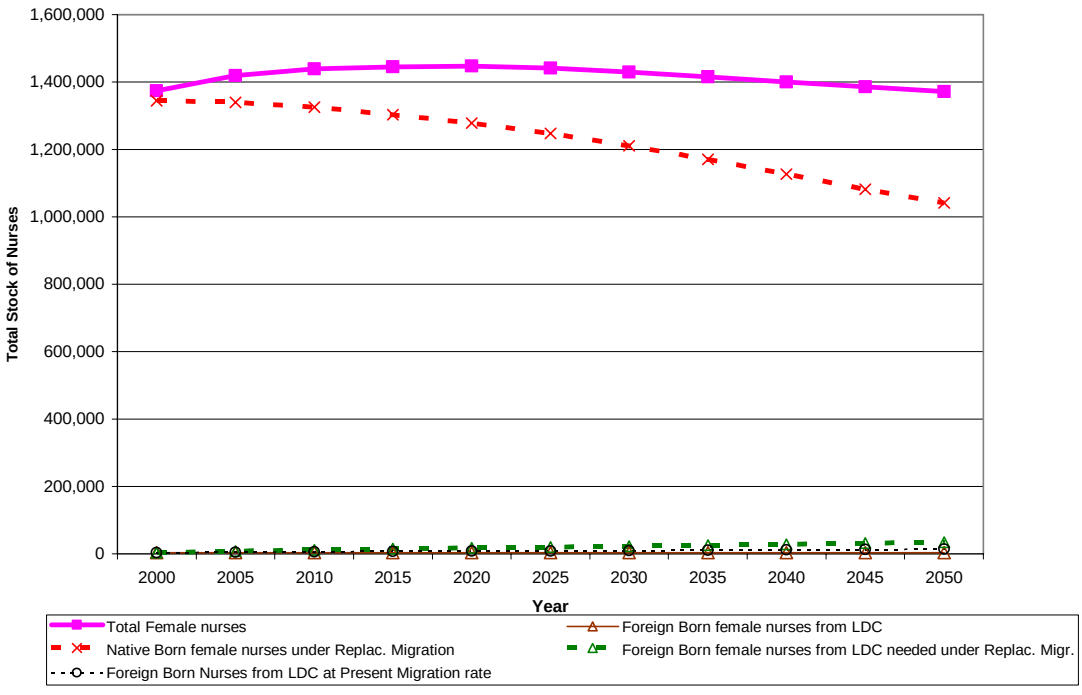
This forecast is for all other EU-15 countries[14]. Information about nurse workforce, particularly by nativity and gender was available for all individual and so the numbers were added up. Regarding the LTC ratio, a weighted average of Germany, France and the UK was assumed for this particular forecast.

(1) Forecasts based on total nurse ratios and the total population nuanced by nativity

Figure REU1 shows how total number of female nurses will slowly increase until 2040, when figure will reach 1,5 million (□-solid line). Native born nurses will steadily decline over time, particularly after 2010. By 2050, the total number of native born female nurses is expected to be 1,1 million (x-dashed line). Just as Germany's figure showed, the gap between natives and foreigners will mostly be assumed by immigrants from other develop countries. As discussed also in the German section, the previous statement is highly unlikely. By 2050, the rest of EU-15 countries will need a total of over 360,000 female foreign born nurses, less than 40,000 from the developing world (Δ-dashed line).

As for immigration policy, the rest of EU-15 countries will need far more foreign born female nurses that the present ratio is allowing (○-dotted line compared to Δ-dashed line).

Figure REU1: Female Nurse Forecast for Rest of EU15 Countries



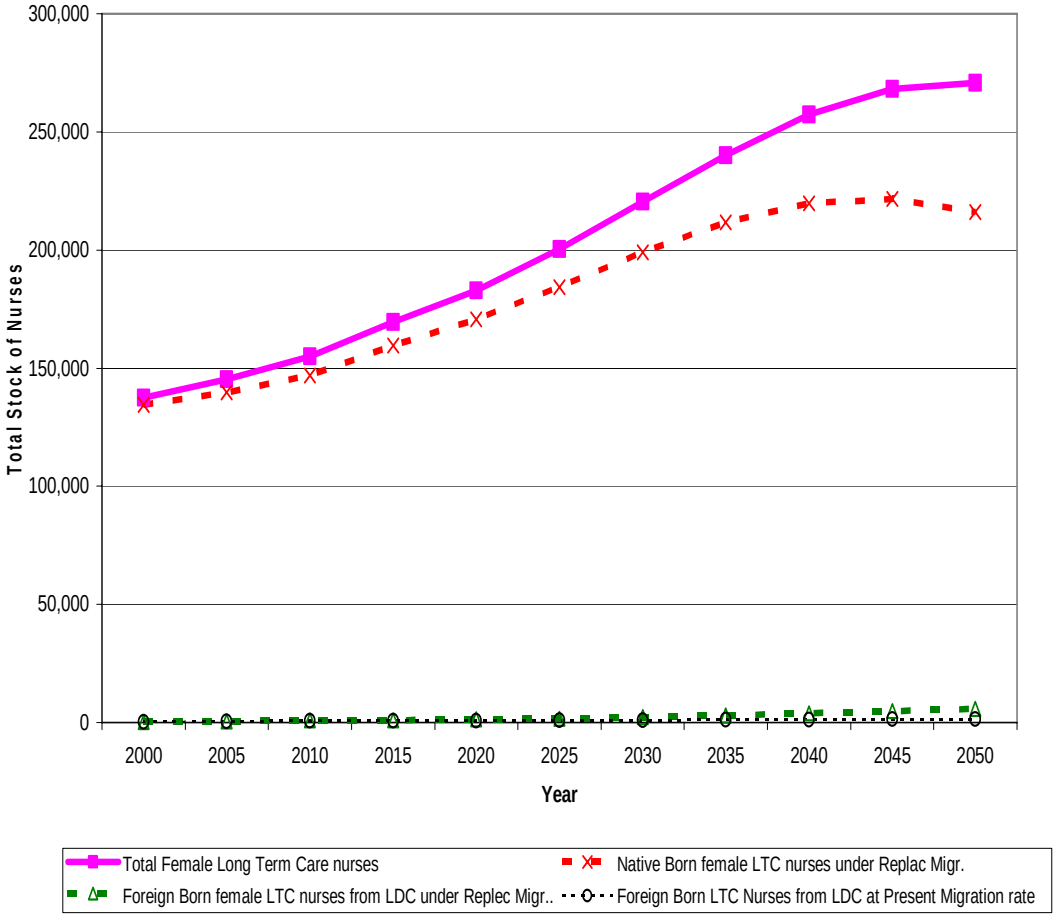
[14] Italy, Spain, Greece, Finland, Sweden, Denmark, Austria, Belgium, Netherlands, Luxembourg and Ireland.

(2) Forecasts based on eldercare nurses and the elderly population nuanced by nativity.

Regarding nurse care for the elderly, the total number of female nurses working with elderly population will increase until 2050 when it will apparently settle at nearly 500,000 (□-solid line). Figure REU2 also shows a growing gap between total nurses needed and those native born which by 2050 will account for nearly 400,000 female nurses (x-dashed line). Female nurses from LDC will rise from 550 in year 2000 to over 10,000 by 2050 (Δ-dashed line).

Similarly to the previous figure, immigration caps will play a restrictive role for incoming foreign born female nurses working with the elderly population (○-dotted line compared to Δ-dashed line).

Figure REU2: Forecast of LTC Female Nurses working with Elderly Population, Rest of EU15 countries.



Canada:

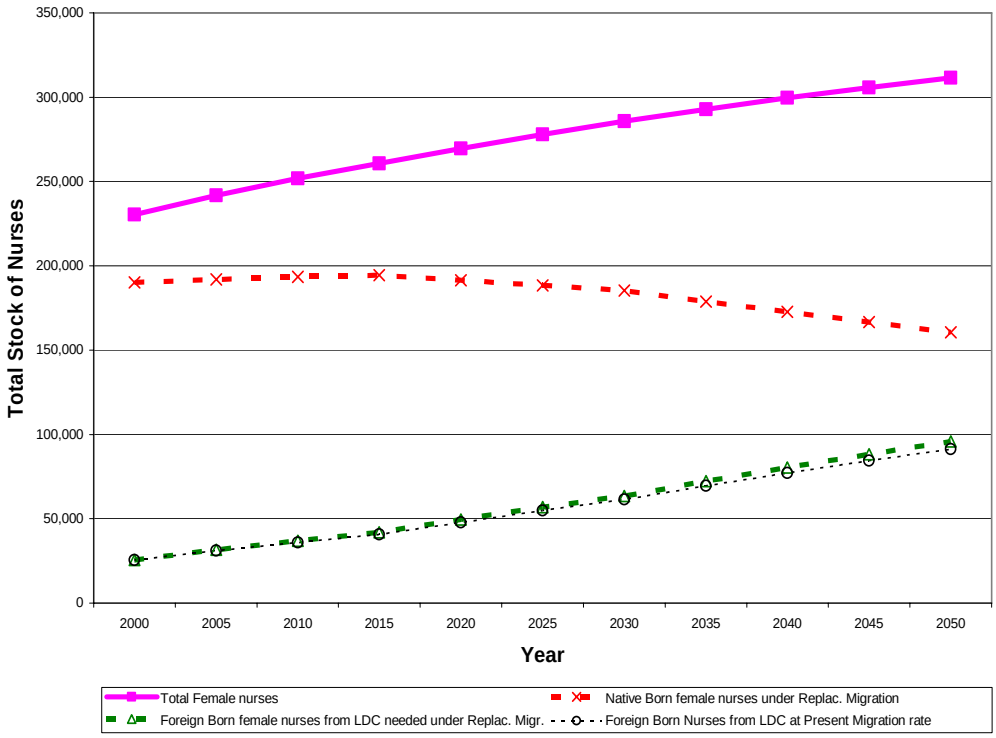
Because the Replacement Migration Report does not provide figures for Canada, neither it does for Australia, only the forecast for the total population is included for this two countries[15].

(1) Forecasts based on total nurse ratios and the total population nuanced by nativity

The total number of female nurses for Canada is expected to constantly grow from 230,000 in year 2000 to over 350,000 by 2050 (□-solid line). However, figures for native female nurses will remain constant at 200,000 for the most part until 2030 and will then decline to reach 182,000 in 2050 (x-dashed line). Foreign born female nurses from LDC needed to fulfill such the gap between total need and native will grow from 25,000 in year 2000 to over 108,000 by 2050 (Δ-dashed line). Meanwhile, the figures for foreigners from other develop countries will shift from nearly 15,000 in 2000 to over 64,000 in 2050 (not shown in graph).

Regarding future role of immigration policy, the results suggest that current immigration policy will play a restrictive role after 2010 (○-dotted line compared to Δ-dashed line).

Figure CA1: Female Nurse Forecast for Canada



[15] The zero migration forecast for the total population were obtained from 'Labor Supply Prospects in 16 OECD Countries' in *Population and Development Review* 27(1) by Peter McDonald & Rebecca Kippen.

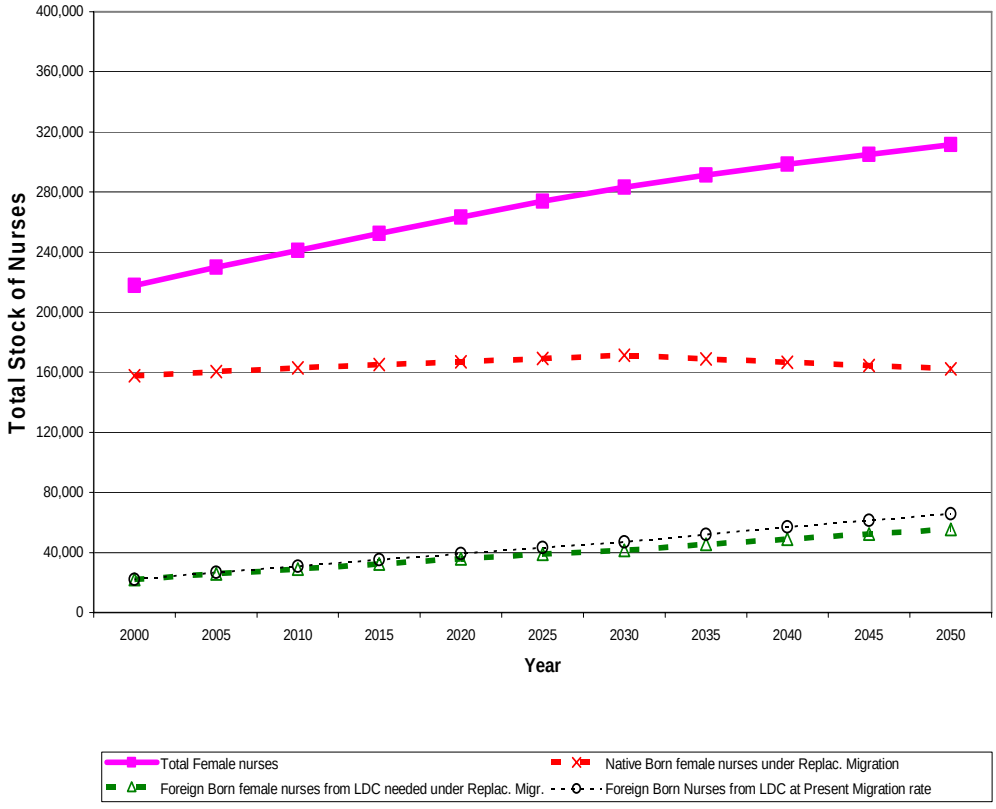
Australia:

(1) Forecasts based on total nurse ratios and the total population nuanced by nativity

Figure AU1 shows that the total number of female nurses in Australia will steadily increase until reaching nearly 350,000 in 2050 (□-solid line). Natives, however, will only be able to grow until 2030 when they reach 186,000, after which such figure will drop to 181,000 in 2050 (x-dashed line). Foreign born female nurses needed for such unfulfilled gap will grow from 45,000 in year 2000 to over 128,000 by 2050; only 15,000 of such figure will come from LDC (Δ-dashed line). As for Germany, it's hard to believe that the remaining 113,000 female nurses will come from other developed countries.

Current immigration policy in Australia will be just enough to accept the required amount of female nurses from LDC (○-dotted line compared to Δ-dashed line).

Figure AU1: Female Nurse Forecast for Australia



Regional Forecast for EU15 and North America[16].

This section will present the aggregated results for two regions; the EU-15 countries and secondly, North America which includes the US and Canada. Two approaches were followed to aggregate the results; the first one simply added up the results for each country within the specific region. This approach although simple presents some shortcomings; mainly it doesn't redefine nativity in order to be consistent with the new geographic boundaries. In order to correct this shortcoming the second approach redefines native born a foreign born and therefore considers all Canadians and Americans as Native Born from North America, as well as any person born in a EU-15 country as a Native Born in the EU-15 Zone.

This correction is particularly important in Europe since most of foreign born nurses working in EU-15 countries were born within the EU-15 Zone and since all of this countries are experiencing difficulties from aging and declining population it seems unreasonable that each individual country will be able to attract nurses from EU-15 member state in the same way that it has been doing in the last decades. In other words, it's very unlikely that if the UK is experiencing a shortage of Nurses, Ireland will be able to bring in UK nurses so as to fulfill the ratio that such nurses represent in the Irish nurse workforce. Therefore it makes sense to explore how the results will change if all EU-15 born nurses are considered as native within the EU-15 Zone.

In order to be consistent with the definitions all previous ratios were corrected so as to fit the new Native and Foreign Born Definition. The results for each geographical region are then presented following both approaches: Individual aggregation and redefinition of boundaries.

[16] Annex 3 presents detailed tables for both regions.

EU-15:

Table 6 presents the results for EU-15 under both approaches. The first pair of columns shows the total amount of female nurses for the total and elderly population. Results following the individual aggregation approach are presented in the middle five columns, where as the results considering native born as anyone born within a EU-15 country are presented in far right five columns.

Table 6

			EU-15 Individually aggregated countries					EU-15 Zone				
	Total Figures		Nurses for Total Populaton			Nurses for Elderly Population		Nurses for Total Populaton			Nurses for Elderly Population	
Year	Total Female nurses	Total Female Long Term Care nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Native Born female LTC nurses	Foreign Born female LTC nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Native Born female LTC nurses	Foreign Born female LTC nurses
2000	3,606,601	661,306	3,436,551	100,726	69,324	630,126	12,711	3,534,337	2,940	69,324	648,056	12,711
2005	3,678,428	712,505	3,428,410	148,094	101,924	669,464	17,546	3,525,964	6,204	146,260	688,514	23,015
2010	3,723,187	757,040	3,406,450	187,614	129,124	700,350	23,111	3,503,379	8,944	210,864	720,278	35,266
2015	3,754,515	819,273	3,377,723	223,186	153,606	749,538	28,429	3,473,835	11,421	269,259	770,866	46,438
2020	3,777,484	877,978	3,342,210	257,827	177,447	796,837	33,079	3,437,312	13,841	326,331	819,511	56,088
2025	3,795,607	949,882	3,299,330	293,961	202,316	853,493	39,295	3,393,211	16,373	386,023	877,779	69,169
2030	3,809,072	1,041,095	3,247,510	332,631	228,931	923,265	48,036	3,339,917	19,090	450,065	949,536	87,833
2035	3,813,108	1,122,413	3,182,041	373,801	257,266	977,538	59,061	3,272,585	21,994	518,530	1,005,353	112,297
2040	3,804,707	1,167,812	3,102,231	416,099	286,377	993,961	70,873	3,190,504	24,992	589,212	1,022,244	139,645
2045	3,785,453	1,181,160	3,012,074	458,097	315,282	977,650	82,964	3,097,782	27,981	659,691	1,005,469	168,542
2050	3,758,514	1,179,838	2,917,001	498,455	343,058	947,412	94,753	3,000,004	30,863	727,647	974,371	197,107

(1) Forecasts based on total nurse ratios and the total population nuanced by nativity

A comparative analysis of both methodologies for the total population estimates suggests that foreign born female nurses from LDC countries under the global approach will more than double the estimates following individual aggregation of each country. In fact, under the global approach native born female nurses are projected to reach 3 million by 2050, over 82,000 more than following the individual aggregation method. These differences are mostly because the new definition of native born increases such ratio in year 2000, allowing a greater percentage of the native population to eventually "become" a female nurse. Foreign born from DC under the global approach basically represent female nurses from the US, Australia and New Zealand.

As already mentioned, the most interesting finding is the path followed by foreign born female nurses from LDC. Under the global approach that figure goes from nearly 70,000 in year 2000 to over 700,000 by 2050. The gap between both estimations grows at an average of 38,500 female nurses each five years.

(2) Forecasts based on eldercare nurses and the elderly population nuanced by nativity.

Regarding the differences in the elderly population nurse workforce, the numbers suggest a similar story. Under the global approach that figure for female nurses from LDC increases from nearly 12,711 in year 2000 to nearly 200,000 by 2050. This is a much larger figure than that suggested by the individual aggregation of each country which by 2050 forecasts a total of nearly 95,000 female nurses from LDC.

North America:

Since there are no replacement migration for Canadians 65 years and older, this section will present the regional results only for the total population and will note discuss the regional results for nurses working with elderly population. Table 7 outlines results for North America.

Table 7

			North America Indiv. agrgegated countries			North America Zone		
	Total Figures		Nurses for Total Populaton			Nurses for Total Populaton		
Year	Total Female nurses	Total Female Long Term Care nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC
2000	2,614,272	470,732	2,122,312	223,731	268,229	2,138,065	207,978	268,229
2005	2,744,372	494,909	2,163,644	264,101	316,627	2,179,704	246,613	318,055
2010	2,880,689	540,533	2,205,902	306,877	367,911	2,222,276	287,555	370,859
2015	3,025,689	623,745	2,257,095	349,538	419,057	2,273,848	328,358	423,483
2020	3,172,485	728,246	2,304,595	394,695	473,195	2,321,701	371,571	479,214
2025	3,315,718	845,881	2,346,587	440,737	528,394	2,364,004	415,650	536,063
2030	3,446,229	949,319	2,372,873	488,136	585,220	2,390,486	461,084	594,659
2035	3,553,258	1,011,592	2,372,466	536,995	643,797	2,390,076	508,007	655,175
2040	3,642,856	1,049,156	2,356,637	584,941	701,279	2,374,129	554,103	714,624
2045	3,721,995	1,077,985	2,332,721	631,808	757,466	2,350,036	599,188	772,771
2050	3,800,740	1,118,388	2,308,356	678,700	813,685	2,325,490	644,300	830,951

(1) Forecasts based on total nurse ratios and the total population nuanced by nativity

Contrary to the results shown for EU-15, the numbers for both methodologies do not vary significantly. This is due to the fact that Canadians represent only a small part of the foreign born female nurses working in the US and the same is true for US nurses working in Canada.

Scenarios:

As discussed in the introduction, two forecast scenarios will complement the results presented in the previous section. The first forecast scenario uses an alternative population forecast made under higher migration and longer life expectancy than the UN Population Forecast used for the Base-case scenario. The results for these scenarios are only presented for European countries.

The second forecast scenario tries to determine how the result will change if the LTC ratio is to vary both upward and downward. The intuition behind this scenario is to provide some rough range of results that may reflect future changes in technology, policies (mix between formal and informal care), environmental health conditions and health state of elderly population, in other words, will future elderly generation be healthier or not?.

A. Longer life expectancy and higher migration Scenario for EU-15 countries.

The forecast results for this scenario are presented in two sections. The first one discusses the findings for LDC female nurses within the total population in each country and both definitions of EU-15 regional results. The second section does similar but for nurses working with the elderly population.

Female Nurses born in LDC countries:

Table 8 shows the comparative results for LDC nurses under both scenarios. The results suggest that higher migration flows and longer life expectancy will increase the number of female LDC nurses in each country. However, because number for individual countries may hide important information, more attention should be given to the regional numbers. Under both approaches to aggregate regional results the numbers significantly increase, however, under the global method of aggregation the alternative scenario forecast falls behind the base-case until 2010 after which figures become larger. By 2050 the figure under the alternative scenario is nearly 200,000 higher than the one provided in the base-case, reaching a total of 920,000 female nurses from LDC.

Table 8

	Germany		UK		France		Rest UE15		EU 15 Countries		EU 15 Zone	
Year	Base-Case	Alternative	Base-Case	Alternative	Base-Case	Alternative	Base-Case	Alternative	Base-Case	Alternative	Base-Case	Alternative
2000	10,238	10,238	45,147	45,147	5,791	5,791	3,021	3,021	69,324	69,324	69,324	69,324
2005	13,273	13,076	50,088	49,541	7,808	6,534	8,256	7,169	101,924	95,589	146,260	131,363
2010	16,316	16,797	54,714	54,778	9,612	8,862	11,885	10,810	129,124	126,584	210,864	204,897
2015	19,287	20,518	59,377	59,978	10,992	11,141	15,050	14,537	153,606	157,447	269,259	278,305
2020	22,536	24,478	64,728	65,656	12,015	13,416	18,032	18,202	177,447	188,662	326,331	352,715
2025	26,073	28,587	71,380	72,501	13,181	16,185	20,879	21,998	202,316	222,022	386,023	432,386
2030	29,904	32,835	78,469	80,694	14,502	19,843	23,878	25,976	228,931	258,525	450,065	519,697
2035	33,969	37,441	85,342	89,653	15,925	24,079	27,193	30,417	257,266	299,116	518,530	616,989
2040	38,147	42,058	91,851	98,560	17,216	28,588	30,736	35,272	286,377	341,793	589,212	719,574
2045	42,566	46,056	98,247	107,892	18,164	32,051	34,237	40,182	315,282	382,605	659,691	818,058
2050	47,105	50,436	104,998	117,382	18,820	35,838	37,442	45,134	343,058	424,990	727,647	920,389

Female Nurses born in LDC countries working in LTC with elderly population:

Results for LDC female nurses working with elderly population suggest a similar story with figures for EU-15, under this alternative scenario, reaching nearly 280,000 in 2050. This result is over 80,000 higher than the one predicted in the base case scenario.

Table 9

	Germany		UK		France		Rest UE15		EU 15 Countries		EU 15 Zone	
Year	Base-Case	Alternative	Base-Case	Alternative	Base-Case	Alternative	Base-Case	Alternative	Base-Case	Alternative	Base-Case	Alternative
2000	1,872	1,872	7,436	7,436	1,133	1,133	554	554	12,711	12,711	12,711	12,711
2005	3,159	2,754	7,842	8,032	1,181	519	1,027	915	17,546	14,821	23,015	16,602
2010	4,748	4,935	8,456	8,445	1,579	967	1,513	1,397	23,111	21,511	35,266	31,502
2015	4,887	5,920	11,103	10,958	2,937	1,694	1,894	2,025	28,429	28,264	46,438	46,049
2020	6,183	7,881	12,420	13,275	3,545	2,834	2,334	2,791	33,079	36,730	56,088	64,680
2025	7,961	10,154	14,946	16,221	4,431	4,159	3,073	3,661	39,295	45,276	69,169	83,243
2030	10,864	13,586	19,335	21,051	5,557	6,018	4,086	4,988	48,036	57,407	87,833	109,885
2035	13,526	17,069	23,650	26,752	6,234	7,924	5,413	6,718	59,061	74,365	112,297	148,310
2040	13,857	18,624	25,480	31,210	6,817	9,996	7,154	8,662	70,873	93,849	139,645	193,710
2045	13,622	19,262	26,233	32,645	7,547	11,454	8,890	10,875	82,964	112,373	168,542	237,746
2050	14,031	20,108	27,863	34,666	8,527	13,387	10,401	13,046	94,753	129,881	197,107	279,771

B. Variations in the Long Term Health Care ratio.

As already mentioned, this forecast scenario consists on modifying the LTC ratios for each country and region. Table 10 presents the ratios used for each forecast. Results in this section are also presented in two sections, for the total and elderly population.

Table 10

	Low LTC Ratio Scenario	Base-Case Scenario	High LTC Ratio Scenario
USA	10.00%	17.72%	30.00%
Germany	10.00%	18.28%	30.00%
France	10.00%	19.57%	30.00%
United Kingdom	10.00%	16.47%	30.00%
Rest of EU-15	10.00%	18.34%	30.00%
EU/15	10.00%	18.34%	30.00%

Female Nurses born in LDC countries:

Table 11 show the forecast results of LDC female nurses for the total population in selected countries and regions. Because of the way the forecast was done a one percentage point change in the LTC ratio changes the results in one times the proportion of 65+ population in year 2000 for each country, or roughly between 0.12 and 0.16 percentage point depending on the country.

Table 11

	USA			Germany			UK			France			Rest UE15			EU 15 Indiv			EU 15 Zone		
Year	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio
2000	242,799	242,799	242,799	10,238	10,238	10,238	45,147	45,147	45,147	5,791	5,791	5,791	3,021	3,021	3,021	69,324	69,324	69,324	69,324	69,324	69,324
2005	285,017	284,905	285,088	13,273	13,545	13,081	50,088	50,140	50,064	7,808	7,825	7,791	8,256	8,282	8,238	101,924	102,745	101,338	146,260	147,438	145,418
2010	330,702	332,367	329,655	16,316	16,874	15,921	54,714	55,064	54,547	9,612	9,655	9,573	11,885	12,002	11,801	129,124	131,132	127,688	210,864	214,144	208,519
2015	376,107	383,530	371,441	19,287	20,001	18,783	59,377	60,706	58,741	10,992	11,218	10,785	15,050	15,382	14,814	153,606	157,776	150,626	269,259	276,569	264,035
2020	421,631	437,972	411,362	22,536	23,625	21,766	64,728	66,645	63,811	12,015	12,427	11,638	18,032	18,633	17,602	177,447	184,229	172,600	326,331	338,803	317,417
2025	468,092	495,951	450,583	26,073	27,727	24,904	71,380	74,242	70,012	13,181	13,802	12,611	20,879	21,898	20,151	202,316	212,859	194,782	386,023	406,139	371,646
2030	516,552	555,678	491,963	29,904	32,472	28,088	78,469	82,892	76,354	14,502	15,365	13,711	23,878	25,473	22,738	228,931	244,973	217,466	450,065	481,603	427,526
2035	565,218	612,183	535,702	33,969	37,524	31,456	85,342	91,322	82,483	15,925	17,018	14,923	27,193	29,495	25,547	257,266	279,510	241,369	518,530	563,363	486,489
2040	613,588	666,085	580,596	38,147	42,195	35,285	91,851	98,600	88,624	17,216	18,513	16,025	30,736	33,830	28,524	286,377	313,944	266,675	589,212	645,930	548,676
2045	661,182	718,458	625,185	42,566	46,916	39,491	98,247	105,359	94,846	18,164	19,576	16,868	34,237	38,062	31,504	315,282	346,881	292,699	659,691	725,808	612,438
2050	708,908	773,056	668,593	47,105	51,876	43,733	104,998	112,753	101,289	18,820	20,335	17,430	37,442	41,779	34,343	343,058	377,944	318,125	727,647	801,644	674,763

Female Nurses born in LDC countries working in LTC with elderly population:

Table 12 presents the results for LDC female nurses working with elderly population. The effects however on the female workforce for the elderly population are direct, meaning that a one percentage point change in the LTC ratio changes the forecast results also in a one percentage point.

Table 12

	USA			Germany			UK			France			Rest UE15			EU 15 Indiv			EU 15 Zone		
Year	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio	Base-Case Scenario	High LTHC Ratio	Low LTHC Ratio
2000	43,020	72,840	24,280	1,872	3,071	1,024	7,436	13,544	4,515	1,133	1,737	579	554	906	302	12,711	20,797	6,932	12,711	20,797	6,932
2005	47,097	79,743	26,581	3,159	5,184	1,728	7,842	14,284	4,761	1,181	1,810	603	1,027	1,680	560	17,546	28,708	9,569	23,015	37,655	12,552
2010	54,995	93,114	31,038	4,748	7,791	2,597	8,456	15,403	5,134	1,579	2,421	807	1,513	2,475	825	23,111	37,812	12,604	35,266	57,700	19,233
2015	72,925	123,473	41,158	4,887	8,020	2,673	11,103	20,225	6,742	2,937	4,503	1,501	1,894	3,099	1,033	28,429	46,513	15,504	46,438	75,978	25,326
2020	102,445	173,455	57,818	6,183	10,145	3,382	12,420	22,623	7,541	3,545	5,434	1,811	2,334	3,819	1,273	33,079	54,121	18,040	56,088	91,767	30,589
2025	140,784	238,367	79,456	7,961	13,063	4,354	14,946	27,225	9,075	4,431	6,793	2,264	3,073	5,027	1,676	39,295	64,291	21,430	69,169	113,170	37,723
2030	177,933	301,267	100,422	10,864	17,827	5,942	19,335	35,219	11,740	5,557	8,519	2,840	4,086	6,685	2,228	48,036	78,592	26,197	87,833	143,706	47,902
2035	203,079	343,841	114,614	13,526	22,196	7,399	23,650	43,079	14,360	6,234	9,557	3,186	5,413	8,856	2,952	59,061	96,632	32,211	112,297	183,732	61,244
2040	220,339	373,065	124,355	13,857	22,739	7,580	25,480	46,413	15,471	6,817	10,451	3,484	7,154	11,705	3,902	70,873	115,958	38,653	139,645	228,476	76,159
2045	234,606	397,222	132,407	13,622	22,353	7,451	26,233	47,785	15,928	7,547	11,568	3,856	8,890	14,546	4,849	82,964	135,740	45,247	168,542	275,757	91,919
2050	253,804	429,726	143,242	14,031	23,025	7,675	27,863	50,753	16,918	8,527	13,072	4,357	10,401	17,017	5,672	94,753	155,027	51,676	197,107	322,493	107,498

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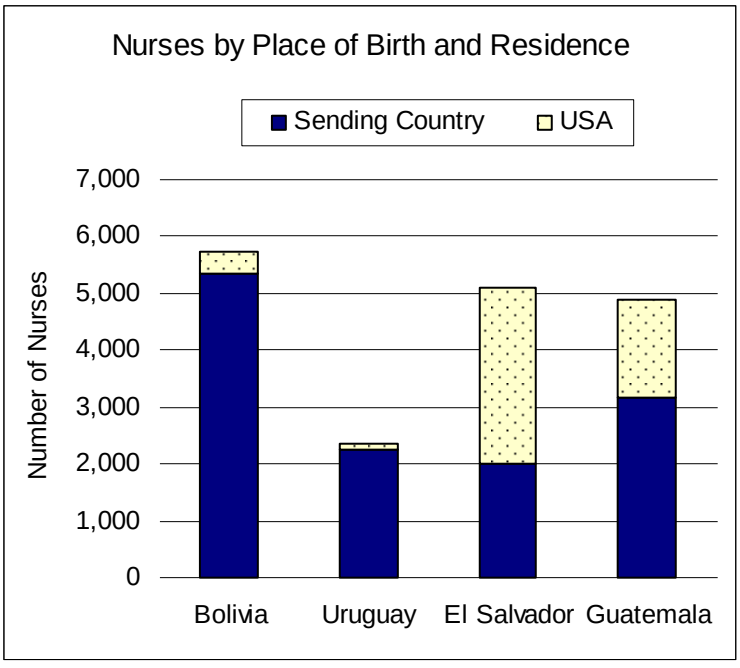
Conclusions

The Gender and Development Unit of the World Bank (PRMGE) has started a substantive work program on international migration and gender. One of the major demand factors for female migrants to OECD economies is population aging. This is exacerbated by a decline in fertility rates and the trend towards early retirement. As a result, a number of European countries and the United States have started to fill positions in nursing and domestic care services through recourse to imports of foreign female labor. This trend is likely to continue as the proportion of the population in these countries of working age declines, particularly in the years after 2010, when the baby boom generation begins to retire.

Consider that the implications for at least some of the nurse-major sending countries in the Western Hemisphere and elsewhere could be significant. Indeed, nurses' organizations from 69 countries and every geographic area reported a nursing shortage in a survey conducted by Penn State. Thirty-three countries – primarily in Oceania, Africa, Central America and the Caribbean – reported that the mobility of nurses to more affluent nations is a serious to an extremely serious problem and that it exacerbates the existing nursing shortage. While there are few estimates of nursing out-migration or "brain loss," a limited set of estimates for the Western Hemisphere's flows to the United States points to some potential problems. Latin American nurses are increasingly mobile participants in the global labor market for healthcare workers.



The accompanying graph shows the percentage of nurses (nursing loss) for two South American and two Central American nations,

but residing and working in the United States in the year 2000.[17] Other data suggest that over 90 percent of internationally mobile Latin Americans with tertiary education choose the United States and this is likely the case for healthcare workers. Clearly, the *numbers* involved in each of individual of the four countries in the figure are rather small, but in the case of the two Central American nations the *percentage* of nurses living in the United States is rather large. About seven percent of Bolivian-born nurses reside in the United States, while 60 percent of Salvadoran and 35 percent of Guatamalan-born nurses are U.S. residents. For a fuller set 14 Latin American nations, for which data are available, about 18 percent of nurses reside in the United States. At the same time, exploratory information suggests that South American-born healthcare workers in particular are moving in increasing numbers to Europe.

[17] The data on the workforce of nurses by sending country is provided by the WHO and PAHO are also available for physicians, while the data from the United States is based on tabulations of the Census 2000 microdata.

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Annex 1: Population Forecasts

UN Population Forecast

Total Population

	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Luxembourg	Netherlands	Austria	Portugal	Finland	Sweden	United Kingdom	Switzerland	Norway	Canada	USA	Australia	Europe	North America	Rest of EU 15	EU 15
2000	10,304	5,340	82,344	10,975	40,717	59,278	3,801	57,715	435	15,898	8,096	10,225	5,177	8,877	58,670	7,167	4,502	30,689	284,154	19,071	728,463	314,968	177,560	377,852
2005	10,419	5,431	82,689	11,120	43,064	60,496	4,148	58,093	465	16,299	8,189	10,495	5,249	9,041	59,668	7,252	4,620	32,268	298,213	20,155	728,389	330,608	182,013	384,866
2010	10,495	5,502	82,701	11,205	43,993	61,535	4,422	58,176	494	16,592	8,248	10,712	5,307	9,168	60,517	7,301	4,730	33,680	312,253	21,201	725,786	346,062	184,314	389,067
2015	10,540	5,560	82,513	11,233	44,372	62,339	4,674	57,818	523	16,812	8,288	10,827	5,359	9,315	61,417	7,334	4,841	35,051	325,723	22,250	721,111	360,905	185,321	391,590
2020	10,573	5,624	82,283	11,217	44,419	62,954	4,893	57,132	552	17,007	8,320	10,902	5,409	9,488	62,491	7,368	4,960	36,441	338,427	23,317	714,959	375,000	185,536	393,264
2025	10,590	5,691	81,967	11,173	44,244	63,407	5,082	56,307	582	17,178	8,339	10,924	5,444	9,650	63,663	7,398	5,080	37,797	350,103	24,329	707,235	388,032	185,204	394,241
2030	10,588	5,752	81,512	11,119	44,008	63,712	5,249	55,423	612	17,303	8,333	10,933	5,453	9,769	64,693	7,410	5,190	39,052	360,894	25,238	698,140	400,079	184,542	394,459
2035	10,555	5,795	80,884	11,055	43,796	63,850	5,406	54,483	642	17,356	8,296	10,930	5,435	9,845	65,471	7,393	5,276	40,154	370,709	26,022	688,041	410,996	183,594	393,799
2040	10,489	5,819	80,159	10,973	43,561	63,787	5,553	53,443	670	17,329	8,237	10,903	5,399	9,906	66,060	7,351	5,339	41,129	379,544	26,706	677,191	420,805	182,282	392,288
2045	10,400	5,834	79,455	10,868	43,185	63,523	5,675	52,256	696	17,243	8,164	10,832	5,360	9,973	66,580	7,300	5,388	42,007	387,531	27,335	665,637	429,669	180,486	390,044
2050	10,302	5,851	78,765	10,742	42,541	63,116	5,762	50,912	721	17,139	8,073	10,723	5,329	10,054	67,143	7,252	5,435	42,844	394,976	27,940	653,323	437,950	178,149	387,173

Total Population 65 +

	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Luxembourg	Netherlands	Austria	Portugal	Finland	Sweden	United Kingdom	Switzerland	Norway	Canada	USA	Australia	Europe	North America	Rest of EU 15	EU 15
2000	1,744	792	13,483	1,843	6,797	9,669	425	10,525	60	2,165	1,260	1,651	772	1,533	9,306	1,074	691	3,870	35,078	2,317	107,418	38,960	29,567	62,025
2005	1,829	816	15,525	2,021	7,093	10,049	453	11,601	64	2,299	1,369	1,793	833	1,557	9,525	1,157	693	4,239	36,710	2,559	115,762	40,961	31,728	66,827
2010	1,878	903	16,866	2,057	7,524	10,399	499	12,289	68	2,511	1,513	1,904	911	1,701	9,981	1,299	742	4,787	39,935	2,904	117,899	44,737	33,758	71,004
2015	2,042	1,021	17,102	2,165	8,004	11,856	588	13,293	75	2,942	1,621	2,046	1,066	1,901	11,099	1,454	848	5,683	45,923	3,442	125,810	51,624	36,784	76,841
2020	2,215	1,098	18,156	2,268	8,518	13,119	676	13,991	83	3,295	1,732	2,211	1,218	2,027	11,740	1,588	943	6,720	53,533	4,020	136,407	60,273	39,332	82,347
2025	2,423	1,169	19,559	2,413	9,444	14,311	780	14,842	95	3,671	1,912	2,401	1,315	2,136	12,620	1,759	1,043	7,916	62,069	4,627	148,521	70,009	42,601	89,091
2030	2,639	1,254	21,644	2,563	10,570	15,445	901	16,150	110	4,076	2,164	2,615	1,390	2,258	13,867	1,952	1,140	9,081	69,461	5,191	160,082	78,570	46,690	97,646
2035	2,782	1,326	23,308	2,784	11,777	16,274	1,056	17,501	126	4,417	2,367	2,811	1,424	2,376	14,924	2,077	1,240	9,769	73,926	5,670	168,321	83,724	50,767	105,273
2040	2,842	1,371	23,241	2,984	13,191	16,849	1,229	18,503	139	4,541	2,474	3,027	1,405	2,453	15,282	2,090	1,307	10,228	76,577	6,044	173,986	86,833	54,159	109,531
2045	2,834	1,370	22,660	3,171	14,281	16,987	1,374	18,626	150	4,461	2,469	3,193	1,406	2,471	15,330	2,047	1,319	10,609	78,583	6,319	177,345	89,219	55,806	110,783
2050	2,807	1,331	22,376	3,248	14,504	17,114	1,493	18,090	156	4,357	2,477	3,243	1,417	2,488	15,558	2,009	1,321	10,989	81,547	6,641	180,134	92,563	55,611	110,659

Higher Migration and Longer Life Expectancy Population Forecast Scenario

Total Population

	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Luxembourg	Netherlands	Austria	Portugal	Finland	Sweden	United Kingdom	Switzerland	Norway	Rest of EU 15	EU 15
2000	10,304	5,340	82,344	10,975	40,717	59,278	3,801	57,715	435	15,898	8,096	10,225	5,177	8,877	58,670	7,167	4,502	177,560	377,852
2005	10,415	5,410	82,595	11,086	42,359	60,155	4,064	57,919	457	16,345	8,124	10,530	5,227	8,991	59,566	7,398	4,599	180,927	383,243
2010	10,487	5,460	82,934	11,283	43,119	61,335	4,271	58,384	477	16,761	8,232	10,801	5,266	9,080	60,529	7,537	4,717	183,621	388,419
2015	10,544	5,494	83,104	11,426	43,663	62,382	4,468	58,490	497	17,122	8,322	11,056	5,303	9,176	61,529	7,659	4,838	185,561	392,576
2020	10,599	5,525	83,212	11,532	43,926	63,329	4,646	58,382	518	17,476	8,411	11,271	5,338	9,297	62,662	7,775	4,968	186,921	396,124
2025	10,661	5,566	83,165	11,607	44,074	64,205	4,797	58,198	541	17,829	8,500	11,443	5,363	9,439	63,869	7,882	5,115	188,018	399,257
2030	10,723	5,611	82,900	11,684	44,081	65,123	4,938	57,997	565	18,169	8,566	11,590	5,367	9,553	65,103	7,961	5,261	188,844	401,970
2035	10,766	5,640	82,516	11,754	44,159	65,995	5,079	57,848	588	18,478	8,581	11,727	5,356	9,631	66,265	8,004	5,383	189,607	404,383
2040	10,787	5,654	81,981	11,837	44,240	66,769	5,221	57,658	609	18,726	8,588	11,877	5,325	9,698	67,293	8,019	5,480	190,220	406,263
2045	10,788	5,662	81,054	11,898	44,222	67,162	5,338	57,325	630	18,932	8,563	11,991	5,283	9,792	68,356	7,993	5,575	190,424	406,996
2050	10,777	5,680	80,271	11,948	44,090	67,572	5,452	56,998	651	19,171	8,517	12,062	5,266	9,916	69,426	7,969	5,676	190,528	407,797

Total Population 65 +

	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Luxembourg	Netherlands	Austria	Portugal	Finland	Sweden	United Kingdom	Switzerland	Norway	Rest of EU 15	EU 15
2000	1,744	792	13,483	1,843	6,797	9,669	425	10,525	60	2,165	1,260	1,651	772	1,533	9,306	1,074	691	29,567	62,025
2005	1,797	813	15,348	1,997	7,161	9,901	459	11,346	65	2,282	1,308	1,782	829	1,553	9,559	1,167	676	31,392	66,200
2010	1,839	900	16,948	2,069	7,570	10,262	515	12,062	71	2,487	1,469	1,885	898	1,682	9,979	1,293	714	33,447	70,636
2015	2,000	1,036	17,553	2,181	8,178	11,578	611	13,013	79	2,902	1,581	2,046	1,081	1,891	11,073	1,453	820	36,599	76,803
2020	2,178	1,129	18,898	2,278	8,829	12,960	717	13,763	90	3,254	1,703	2,234	1,229	2,032	11,893	1,600	920	39,436	83,187
2025	2,399	1,215	20,517	2,409	9,772	14,250	829	14,665	103	3,622	1,894	2,445	1,343	2,156	12,848	1,776	1,027	42,852	90,467
2030	2,645	1,314	22,833	2,568	10,992	15,548	955	16,051	119	4,031	2,155	2,704	1,433	2,280	14,174	1,994	1,129	47,247	99,802
2035	2,832	1,404	24,855	2,803	12,362	16,652	1,077	17,593	135	4,372	2,388	2,950	1,481	2,411	15,479	2,181	1,237	51,808	108,794
2040	2,944	1,459	25,323	3,034	13,735	17,560	1,215	18,875	145	4,539	2,497	3,228	1,463	2,493	16,307	2,279	1,315	55,627	114,817
2045	2,968	1,476	25,123	3,248	14,941	17,861	1,343	19,465	150	4,507	2,517	3,497	1,460	2,516	16,477	2,316	1,339	58,088	117,549
2050	2,978	1,442	25,030	3,406	15,342	18,201	1,437	19,291	153	4,475	2,537	3,680	1,466	2,528	16,775	2,349	1,351	58,735	118,741

Replacement Migration Forecast

Total Population

	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Luxembourg	Netherlands	Austria	Portugal	Finland	Sweden	United Kingdom	Switzerland	Norway	Canada	USA	Australia	EU 15	North America	Rest of EU 15
2000			80,985			58,879		56,950							58,600			31,000	274,355	19,000	372,440	305,355	117,026
2005			79,819			59,571		56,267							58,694			31,333	279,936	19,333	371,065	311,269	116,714
2010			78,302			60,139		55,200							58,685			31,667	284,797	19,667	368,232	316,464	115,906
2015			76,601			60,597		53,840							58,734			32,000	289,513	20,000	364,428	321,513	114,656
2020			74,733			60,960		52,303							58,833			31,667	293,650	20,333	359,936	325,317	113,107
2025			72,643			61,121		50,679							58,768			31,333	296,616	20,667	354,500	327,949	111,289
2030			70,287			61,091		48,962							58,449			31,000	297,970	21,000	347,891	328,970	109,102
2035			67,636			60,862		47,122							57,883			30,000	297,711	20,750	339,947	327,711	106,444
2040			64,785			60,462		45,116							57,168			29,000	296,096	20,500	330,878	325,096	103,347
2045			61,817			59,943		42,959							56,393			28,000	293,589	20,250	321,049	321,589	99,937
2050			58,812			59,357		40,722							55,594			27,000	290,643	20,000	310,839	317,643	96,354

Total Population 65 +

	Belgium	Denmark	Germany	Greece	Spain	France	Ireland	Italy	Luxembourg	Netherlands	Austria	Portugal	Finland	Sweden	United Kingdom	Switzerland	Norway	Canada	USA	Australia	EU 15	North America	Rest of EU 15
2000			13,403			9,381		10,349							9,360				34,736		61,349		18,856
2005			15,176			9,749		11,113							9,535				36,005		65,179		19,606
2010			16,108			10,009		11,487							9,976				38,844		68,186		20,606
2015			16,380			11,158		12,150							10,916				44,472		72,975		22,371
2020			17,190			12,281		12,586							11,604				51,549		77,580		23,919
2025			18,354			13,271		13,218							12,431				59,687		83,096		25,822
2030			20,133			14,150		14,249							13,467				66,306		89,889		27,890
2035			21,405			14,825		15,074							14,197				68,991		95,173		29,672
2040			20,849			15,268		15,566							14,280				68,914		96,772		30,809
2045			19,692			15,243		15,128							14,047				67,972		95,184		31,074
2050			18,689			15,151		14,211							13,881				67,961		92,240		30,308

Annex 2: Country Results

United States

Country: USA **Scenario:** Base

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr.	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	2,383,983	1,932,209	208,975	242,799	422,406	342,359	43,020	1,932,209	208,975	242,799	342,359	43,020	242,799	43,020
2005	2,501,503	2,027,459	219,276	254,768	442,059	358,287	45,022	1,971,174	245,311	285,017	354,425	47,097	305,249	54,086
2010	2,625,511	2,127,966	230,147	267,398	480,894	389,763	48,977	2,010,178	284,631	330,702	378,565	54,995	372,110	65,932
2015	2,756,542	2,234,166	241,632	280,743	553,001	448,205	56,321	2,056,724	323,711	376,107	417,309	72,925	435,926	77,240
2020	2,888,298	2,340,954	253,182	294,162	644,640	522,478	65,654	2,103,773	362,894	421,631	454,021	102,445	498,075	88,251
2025	3,015,817	2,444,308	264,360	307,149	747,430	605,789	76,123	2,144,843	402,882	468,092	485,475	140,784	560,471	99,307
2030	3,131,599	2,538,149	274,509	318,941	836,443	677,934	85,188	2,170,455	444,591	516,552	505,364	177,933	626,891	111,076
2035	3,227,500	2,615,876	282,916	328,708	890,211	721,512	90,664	2,175,804	486,477	565,218	512,345	203,079	696,708	123,446
2040	3,308,124	2,681,222	289,983	336,919	922,134	747,386	93,916	2,166,427	528,109	613,588	512,152	220,339	768,274	136,127
2045	3,379,383	2,738,977	296,229	344,177	946,290	766,964	96,376	2,149,130	569,072	661,182	509,760	234,606	839,578	148,761
2050	3,450,365	2,796,508	302,451	351,406	981,982	795,893	100,011	2,131,307	610,150	708,908	509,732	253,804	909,887	161,218

Country: USA **Scenario:** High LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	2,383,983	1,932,209	208,975	242,799	715,195	579,663	72,840	1,932,209	208,975	242,799	579,663	72,840	242,799	72,840
2005	2,500,517	2,026,659	219,190	254,668	748,469	606,631	76,229	1,970,398	245,215	284,905	600,093	79,743	305,249	91,575
2010	2,630,730	2,130,601	231,305	268,744	814,223	659,924	82,925	2,020,299	286,065	332,367	640,966	93,114	372,110	111,633
2015	2,810,947	2,278,261	246,401	286,284	936,310	758,876	95,360	2,097,317	330,100	383,530	706,565	123,473	435,926	130,778
2020	3,000,234	2,431,678	262,994	305,562	1,091,468	884,631	111,162	2,185,305	376,958	437,972	768,723	173,455	498,075	149,422
2025	3,195,310	2,589,786	280,094	325,430	1,265,506	1,025,688	128,887	2,272,498	426,860	495,951	821,979	238,367	560,471	168,141
2030	3,368,796	2,730,396	295,301	343,099	1,416,220	1,147,840	144,236	2,334,852	478,266	555,678	855,655	301,267	626,891	188,067
2035	3,495,676	2,833,232	306,423	356,021	1,507,255	1,221,624	153,508	2,356,594	526,899	612,183	867,473	343,841	696,708	209,012
2040	3,591,159	2,910,620	314,793	365,745	1,561,306	1,265,432	159,013	2,351,781	573,293	666,085	867,147	373,065	768,274	230,482
2045	3,672,131	2,976,248	321,891	373,992	1,602,205	1,298,581	163,178	2,335,303	618,369	718,458	863,098	397,222	839,578	251,873
2050	3,762,585	3,049,561	329,820	383,204	1,662,637	1,347,561	169,333	2,324,167	665,362	773,056	863,050	429,726	909,887	272,966

Country: USA **Scenario:** Low LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	2,383,983	1,932,209	208,975	242,799	238,398	193,221	24,280	1,932,209	208,975	242,799	193,221	24,280	242,799	24,280
2005	2,502,123	2,027,961	219,331	254,831	249,490	202,210	25,410	1,971,663	245,372	285,088	200,031	26,581	305,249	30,525
2010	2,617,203	2,121,233	229,418	266,552	271,408	219,975	27,642	2,003,817	283,731	329,655	213,655	31,038	372,110	37,211
2015	2,722,350	2,206,454	238,635	277,261	312,103	252,959	31,787	2,031,213	319,696	371,441	235,522	41,158	435,926	43,593
2020	2,817,950	2,283,938	247,015	286,997	363,823	294,877	37,054	2,052,533	354,055	411,362	256,241	57,818	498,075	49,807
2025	2,903,011	2,352,879	254,472	295,660	421,835	341,896	42,962	2,064,616	387,812	450,583	273,993	79,456	560,471	56,047
2030	2,982,528	2,417,328	261,442	303,759	472,073	382,613	48,079	2,067,137	423,428	491,963	285,218	100,422	626,891	62,689
2035	3,058,959	2,479,275	268,142	311,543	502,418	407,208	51,169	2,062,184	461,073	535,702	289,158	114,614	696,708	69,671
2040	3,130,246	2,537,053	274,391	318,803	520,435	421,811	53,004	2,049,938	499,713	580,596	289,049	124,355	768,274	76,827
2045	3,195,401	2,589,860	280,102	325,439	534,068	432,860	54,393	2,032,126	538,090	625,185	287,699	132,407	839,578	83,958
2050	3,254,145	2,637,472	285,251	331,422	554,212	449,187	56,444	2,010,101	575,451	668,593	287,683	143,242	909,887	90,989

United Kingdom

Country: UK **Scenario:** Base

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	418,741	358,887	14,706	45,147	68,965	59,107	7,436	358,887	14,706	45,147	59,107	7,436	45,147	7,436
2005	425,883	365,009	14,957	45,918	70,588	60,498	7,611	359,479	16,315	50,088	60,192	7,842	53,600	8,828
2010	432,047	370,292	15,173	46,582	73,967	63,395	7,975	359,511	17,822	54,714	62,757	8,456	61,548	10,137
2015	438,788	376,069	15,410	47,309	82,253	70,496	8,868	360,070	19,341	59,377	67,533	11,103	69,475	11,442
2020	446,606	382,770	15,685	48,152	87,003	74,567	9,380	360,794	21,084	64,728	70,538	12,420	78,590	12,943
2025	455,197	390,132	15,986	49,078	93,525	80,156	10,084	360,566	23,251	71,380	73,710	14,946	90,009	14,824
2030	462,901	396,735	16,257	49,909	102,766	88,077	11,080	358,871	25,560	78,469	77,133	19,335	102,274	16,844
2035	468,757	401,754	16,463	50,540	110,599	94,790	11,924	355,616	27,799	85,342	79,246	23,650	114,304	18,826
2040	473,047	405,431	16,613	51,003	113,252	97,064	12,211	351,277	29,919	91,851	79,472	25,480	125,851	20,727
2045	476,747	408,602	16,743	51,401	113,608	97,369	12,249	346,498	32,002	98,247	78,830	26,233	137,269	22,608
2050	480,810	412,085	16,886	51,840	115,297	98,817	12,431	341,611	34,201	104,998	78,359	27,863	149,290	24,587

Country: UK **Scenario:** High Migrat.

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	418,741	358,887	14,706	45,147	68,965	59,107	7,436	358,887	14,706	45,147	59,107	7,436	45,147	7,436
2005	425,172	364,399	14,932	45,841	70,840	60,714	7,638	359,493	16,137	49,541	60,192	8,032	52,654	8,672
2010	432,132	370,364	15,176	46,591	73,953	63,382	7,973	359,510	17,843	54,778	62,757	8,445	61,659	10,155
2015	439,573	376,742	15,438	47,394	82,060	70,331	8,847	360,058	19,537	59,978	67,533	10,958	70,513	11,613
2020	447,868	383,851	15,729	48,288	88,137	75,539	9,503	360,826	21,386	65,656	70,538	13,275	80,175	13,205
2025	456,731	391,447	16,040	49,243	95,214	81,605	10,266	360,614	23,616	72,501	73,710	16,221	91,919	15,139
2030	465,905	399,310	16,362	50,233	105,041	90,027	11,325	358,926	26,265	80,694	77,133	21,051	106,075	17,470
2035	474,563	406,731	16,667	51,166	114,712	98,315	12,368	355,707	29,203	89,653	79,246	26,752	121,666	20,038
2040	482,117	413,204	16,932	51,980	120,848	103,575	13,030	351,452	32,104	98,560	79,472	31,210	137,283	22,610
2045	489,704	419,707	17,198	52,798	122,108	104,654	13,165	346,668	35,144	107,892	78,830	32,645	153,735	25,320
2050	497,382	426,288	17,468	53,626	124,316	106,547	13,403	341,765	38,235	117,382	78,359	34,666	170,456	28,073

Country: UK **Scenario:** High LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	418,741	358,887	14,706	45,147	125,622	107,666	13,544	358,887	14,706	45,147	107,666	13,544	45,147	13,544
2005	426,323	365,385	14,972	45,965	128,578	110,200	13,863	359,850	16,332	50,140	109,642	14,284	53,600	16,080
2010	434,812	372,661	15,270	46,880	134,734	115,476	14,527	361,811	17,936	55,064	114,314	15,403	61,548	18,464
2015	448,609	384,486	15,755	48,368	149,826	128,410	16,154	368,129	19,774	60,706	123,013	20,225	69,475	20,842
2020	459,833	394,106	16,149	49,578	158,479	135,826	17,087	371,480	21,708	66,645	128,487	22,623	78,590	23,577
2025	473,446	405,773	16,627	51,046	170,358	146,008	18,368	375,021	24,183	74,242	134,264	27,225	90,009	27,003
2030	488,991	419,096	17,173	52,722	187,191	160,435	20,182	379,098	27,001	82,892	140,501	35,219	102,274	30,682
2035	501,603	429,905	17,616	54,081	201,460	172,664	21,721	380,534	29,747	91,322	144,349	43,079	114,304	34,291
2040	507,807	435,223	17,834	54,750	206,293	176,806	22,242	377,090	32,117	98,600	144,761	46,413	125,851	37,755
2045	511,258	438,180	17,955	55,122	206,940	177,361	22,312	371,580	34,319	105,359	143,591	47,785	137,269	41,181
2050	516,325	442,523	18,133	55,669	210,018	179,999	22,644	366,844	36,728	112,753	142,733	50,753	149,290	44,787

Country: UK **Scenario:** Low LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	418,741	358,887	14,706	45,147	41,874	35,889	4,515	358,887	14,706	45,147	35,889	4,515	45,147	4,515
2005	425,673	364,829	14,949	45,895	42,859	36,733	4,621	359,302	16,307	50,064	36,547	4,761	53,600	5,360
2010	430,725	369,159	15,127	46,440	44,911	38,492	4,842	358,411	17,768	54,547	38,105	5,134	61,548	6,155
2015	434,092	372,044	15,245	46,803	49,942	42,803	5,385	356,216	19,134	58,741	41,004	6,742	69,475	6,947
2020	440,282	377,349	15,463	47,470	52,826	45,275	5,696	355,685	20,785	63,811	42,829	7,541	78,590	7,859
2025	446,471	382,654	15,680	48,137	56,786	48,669	6,123	353,654	22,805	70,012	44,755	9,075	90,009	9,001
2030	450,425	386,043	15,819	48,564	62,397	53,478	6,727	349,200	24,871	76,354	46,834	11,740	102,274	10,227
2035	453,051	388,294	15,911	48,847	67,153	57,555	7,240	343,701	26,867	82,483	48,116	14,360	114,304	11,430
2040	456,426	391,186	16,030	49,211	68,764	58,935	7,414	338,935	28,868	88,624	48,254	15,471	125,851	12,585
2045	460,245	394,459	16,164	49,622	68,980	59,120	7,437	334,505	30,895	94,846	47,864	15,928	137,269	13,727
2050	463,829	397,531	16,290	50,009	70,006	60,000	7,548	329,546	32,993	101,289	47,578	16,918	149,290	14,929

Germany

Country: *Germany* **Scenario:** Base

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	819,421	769,741	39,442	10,238	149,808	140,726	1,872	769,741	39,442	10,238	140,726	1,872	10,238	1,872
2005	825,608	775,553	39,740	10,315	172,497	162,039	2,155	761,197	51,137	13,273	157,167	3,159	11,613	2,123
2010	827,584	777,409	39,835	10,340	187,396	176,035	2,341	748,409	62,859	16,316	164,358	4,748	12,967	2,371
2015	826,083	775,999	39,763	10,321	190,019	178,498	2,374	732,488	74,307	19,287	166,302	4,887	14,285	2,612
2020	825,308	775,271	39,726	10,311	201,730	189,499	2,520	715,951	86,821	22,536	171,728	6,183	15,710	2,872
2025	824,181	774,213	39,671	10,297	217,318	204,142	2,715	697,658	100,450	26,073	178,686	7,961	17,245	3,153
2030	822,648	772,772	39,598	10,278	240,484	225,904	3,005	677,536	115,208	29,904	187,767	10,864	18,877	3,451
2035	818,849	769,204	39,415	10,231	258,973	243,272	3,236	654,009	130,870	33,969	193,334	13,526	20,598	3,766
2040	811,706	762,494	39,071	10,141	258,228	242,573	3,226	626,593	146,966	38,147	190,984	13,857	22,400	4,095
2045	804,055	755,306	38,703	10,046	251,773	236,508	3,146	597,499	163,990	42,566	185,669	13,622	24,326	4,447
2050	796,951	748,633	38,361	9,957	248,618	233,544	3,106	568,367	181,478	47,105	180,529	14,031	26,299	4,808

Country: *Germany* **Scenario:** High Migrat.

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	819,421	769,741	39,442	10,238	149,808	140,726	1,872	769,741	39,442	10,238	140,726	1,872	10,238	1,872
2005	824,448	774,463	39,684	10,301	170,530	160,191	2,131	760,993	50,379	13,076	157,167	2,754	11,519	2,106
2010	829,963	779,644	39,950	10,369	188,308	176,891	2,353	748,452	64,714	16,797	164,358	4,935	13,199	2,413
2015	832,456	781,985	40,070	10,401	195,030	183,205	2,437	732,889	79,048	20,518	166,302	5,920	14,873	2,719
2020	835,371	784,724	40,210	10,437	209,974	197,243	2,623	716,590	94,303	24,478	171,728	7,881	16,634	3,041
2025	837,159	786,404	40,296	10,459	227,962	214,141	2,848	698,435	110,137	28,587	178,686	10,154	18,436	3,371
2030	837,794	787,000	40,327	10,467	253,695	238,314	3,170	678,458	126,501	32,835	187,767	13,586	20,257	3,704
2035	836,864	786,127	40,282	10,456	276,161	259,418	3,450	655,178	144,245	37,441	193,334	17,069	22,221	4,063
2040	832,311	781,849	40,063	10,399	281,361	264,303	3,515	628,220	162,033	42,058	190,984	18,624	24,212	4,427
2045	823,019	773,121	39,615	10,283	279,139	262,215	3,488	599,526	177,437	46,056	185,669	19,262	25,917	4,738
2050	815,276	765,847	39,243	10,186	278,106	261,245	3,475	570,528	194,312	50,436	180,529	20,108	27,797	5,082

Country: *Germany* **Scenario:** High LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	819,421	769,741	39,442	10,238	245,826	230,922	3,071	769,741	39,442	10,238	230,922	3,071	10,238	3,071
2005	842,516	791,436	40,554	10,526	283,057	265,895	3,536	776,786	52,184	13,545	257,901	5,184	11,613	3,484
2010	855,895	804,004	41,198	10,693	307,506	288,863	3,842	774,012	65,009	16,874	269,701	7,791	12,967	3,890
2015	856,666	804,728	41,235	10,703	311,809	292,905	3,896	759,606	77,058	20,001	272,892	8,020	14,285	4,286
2020	865,188	812,733	41,645	10,810	331,026	310,956	4,136	750,546	91,017	23,625	281,795	10,145	15,710	4,713
2025	876,449	823,311	42,187	10,950	366,606	334,986	4,455	741,901	106,821	27,727	293,214	13,063	17,245	5,173
2030	893,306	839,146	42,999	11,161	394,620	370,695	4,930	735,730	125,103	32,472	308,114	17,827	18,877	5,663
2035	904,552	849,711	43,540	11,301	424,959	399,194	5,309	722,460	144,568	37,524	317,250	22,196	20,598	6,179
2040	897,850	843,415	43,217	11,218	423,737	398,047	5,294	693,092	162,563	42,195	313,394	22,739	22,400	6,720
2045	886,232	832,502	42,658	11,072	413,144	388,096	5,162	658,566	180,750	46,916	304,672	22,353	24,326	7,298
2050	877,672	824,461	42,246	10,966	407,966	383,232	5,097	625,936	199,860	51,876	296,236	23,025	26,299	7,890

Country: *Germany* **Scenario:** Low LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	819,421	769,741	39,442	10,238	81,942	76,974	1,024	769,741	39,442	10,238	76,974	1,024	10,238	1,024
2005	813,657	764,326	39,165	10,166	94,352	88,632	1,179	750,179	50,397	13,081	85,967	1,728	11,613	1,161
2010	807,574	758,612	38,872	10,090	102,502	96,288	1,281	730,313	61,339	15,921	89,900	2,597	12,967	1,297
2015	804,467	755,694	38,722	10,051	103,936	97,635	1,299	713,321	72,363	18,783	90,964	2,673	14,285	1,429
2020	797,121	748,793	38,369	9,959	110,342	103,652	1,379	691,499	83,856	21,766	93,932	3,382	15,710	1,571
2025	787,238	739,509	37,893	9,836	118,869	111,662	1,485	666,386	95,948	24,904	97,738	4,354	17,245	1,724
2030	772,707	725,859	37,194	9,654	131,540	123,565	1,643	636,404	108,214	28,088	102,705	5,942	18,877	1,888
2035	758,273	712,300	36,499	9,474	141,653	133,065	1,770	605,628	121,189	31,456	105,750	7,399	20,598	2,060
2040	750,819	705,298	36,140	9,381	141,246	132,682	1,765	579,592	135,942	35,285	104,465	7,580	22,400	2,240
2045	745,971	700,744	35,907	9,320	137,715	129,365	1,721	554,336	152,144	39,491	101,557	7,451	24,326	2,433
2050	739,897	695,038	35,614	9,244	135,989	127,744	1,699	527,678	168,486	43,733	98,745	7,675	26,299	2,630

France

Country: France **Scenario:** Base

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	662,675	645,301	11,583	5,791	129,686	126,286	1,133	645,301	11,583	5,791	126,286	1,133	5,791	1,133
2005	676,775	659,031	11,829	5,915	134,782	131,249	1,178	653,352	15,615	7,808	131,239	1,181	6,369	1,246
2010	688,872	670,811	12,040	6,020	139,477	135,820	1,219	660,035	19,224	9,612	134,740	1,579	6,881	1,347
2015	701,398	683,009	12,259	6,130	159,019	154,850	1,390	668,422	21,984	10,992	150,207	2,937	7,261	1,421
2020	711,376	692,725	12,434	6,217	175,959	171,346	1,538	675,330	24,031	12,015	165,325	3,545	7,540	1,476
2025	719,424	700,562	12,574	6,287	191,946	186,914	1,677	679,881	26,362	13,181	178,652	4,431	7,841	1,534
2030	725,727	706,700	12,685	6,342	207,156	201,725	1,810	682,220	29,005	14,502	190,485	5,557	8,165	1,598
2035	729,422	710,298	12,749	6,375	218,275	212,553	1,908	681,647	31,850	15,925	199,572	6,234	8,503	1,664
2040	730,280	711,133	12,764	6,382	225,987	220,063	1,975	678,632	34,432	17,216	205,535	6,817	8,795	1,721
2045	727,812	708,730	12,721	6,361	227,838	221,865	1,991	673,320	36,328	18,164	205,199	7,547	8,997	1,761
2050	723,778	704,802	12,651	6,325	229,542	223,524	2,006	667,318	37,640	18,820	203,960	8,527	9,118	1,784

Country: France **Scenario:** High Migrat.

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	662,675	645,301	11,583	5,791	129,686	126,286	1,133	645,301	11,583	5,791	126,286	1,133	5,791	1,133
2005	672,716	655,079	11,758	5,879	132,797	129,316	1,161	653,115	13,067	6,534	131,239	519	6,036	1,181
2010	686,357	668,362	11,997	5,998	137,639	134,031	1,203	659,771	17,724	8,862	134,740	967	6,686	1,308
2015	701,118	682,736	12,255	6,127	155,290	151,219	1,357	667,695	22,282	11,141	150,207	1,694	7,303	1,429
2020	714,981	696,235	12,497	6,248	173,826	169,269	1,519	674,732	26,832	13,416	165,325	2,834	7,907	1,547
2025	727,835	708,752	12,722	6,361	191,128	186,117	1,670	679,281	32,369	16,185	178,652	4,159	8,620	1,687
2030	741,162	721,730	12,954	6,477	208,538	203,070	1,822	681,633	39,686	19,843	190,485	6,018	9,544	1,868
2035	753,476	733,722	13,170	6,585	223,345	217,490	1,952	681,239	48,158	24,079	199,572	7,924	10,598	2,074
2040	764,215	744,179	13,357	6,679	235,524	229,349	2,058	678,451	57,176	28,588	205,535	9,996	11,708	2,291
2045	769,241	749,073	13,445	6,723	239,561	233,280	2,094	673,088	64,102	32,051	205,199	11,454	12,552	2,456
2050	774,553	754,246	13,538	6,769	244,121	237,721	2,133	667,039	71,676	35,838	203,960	13,387	13,471	2,636

Country: France **Scenario:** High LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	662,675	645,301	11,583	5,791	198,802	193,590	1,737	645,301	11,583	5,791	193,590	1,737	5,791	1,737
2005	678,324	660,539	11,856	5,928	206,616	201,198	1,806	654,847	15,651	7,825	201,184	1,810	6,369	1,911
2010	691,962	673,821	12,095	6,047	213,812	208,206	1,869	662,997	19,310	9,655	206,550	2,421	6,881	2,064
2015	715,814	697,046	12,511	6,256	243,769	237,378	2,130	682,160	22,436	11,218	230,261	4,503	7,261	2,178
2020	735,723	716,434	12,859	6,430	269,737	262,665	2,357	698,443	24,853	12,427	253,436	5,434	7,540	2,262
2025	753,321	733,571	13,167	6,583	294,246	286,531	2,571	711,915	27,604	13,802	273,866	6,793	7,841	2,352
2030	768,885	748,727	13,439	6,720	317,562	309,236	2,775	722,791	30,730	15,365	292,005	8,519	8,165	2,450
2035	779,469	759,033	13,624	6,812	334,606	325,834	2,924	728,415	34,036	17,018	305,935	9,557	8,503	2,551
2040	785,326	764,736	13,726	6,863	346,429	337,346	3,028	729,785	37,027	18,513	315,077	10,451	8,795	2,639
2045	784,404	763,839	13,710	6,855	349,266	340,109	3,052	725,675	39,153	19,576	314,561	11,568	8,997	2,699
2050	782,022	761,519	13,669	6,834	351,878	342,652	3,075	721,019	40,669	20,335	312,662	13,072	9,118	2,735

Country: France **Scenario:** Low LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	662,675	645,301	11,583	5,791	66,267	64,530	579	645,301	11,583	5,791	64,530	579	5,791	579
2005	675,354	657,647	11,804	5,902	68,872	67,066	602	651,980	15,582	7,791	67,061	603	6,369	637
2010	686,036	668,049	11,991	5,995	71,271	69,402	623	657,318	19,145	9,573	68,850	807	6,881	688
2015	688,171	670,128	12,028	6,014	81,256	79,126	710	655,817	21,569	10,785	76,754	1,501	7,261	726
2020	689,037	670,972	12,043	6,022	89,912	87,555	786	654,122	23,276	11,638	84,479	1,811	7,540	754
2025	688,322	670,275	12,031	6,015	98,082	95,510	857	650,489	25,222	12,611	91,289	2,264	7,841	784
2030	686,127	668,139	11,993	5,996	105,854	103,079	925	644,994	27,422	13,711	97,335	2,840	8,165	817
2035	683,502	665,582	11,947	5,973	111,535	108,611	975	638,734	29,845	14,923	101,978	3,186	8,503	850
2040	679,772	661,950	11,881	5,941	115,476	112,449	1,009	631,697	32,050	16,025	105,026	3,484	8,795	880
2045	675,885	658,165	11,813	5,907	116,422	113,370	1,017	625,281	33,736	16,868	104,854	3,856	8,997	900
2050	670,336	652,761	11,717	5,858	117,293	114,217	1,025	618,045	34,861	17,430	104,221	4,357	9,118	912

Australia

Country: Australia Scenario: Base

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	217,650	157,767	37,656	22,227	45,299	32,836	4,626	157,767	37,656	22,227			22,227	4,626
2005	231,043	167,475	39,973	23,595	50,030	36,265	5,109	161,248	43,889	25,906			26,642	5,545
2010	244,999	177,591	42,388	25,020	56,775	41,155	5,798	165,354	50,083	29,562			30,852	6,421
2015	260,774	189,026	45,117	26,631	67,294	48,779	6,872	170,546	56,738	33,490			35,079	7,301
2020	277,105	200,864	47,943	28,299	78,594	56,970	8,026	175,815	63,693	37,596			39,402	8,201
2025	293,138	212,486	50,717	29,936	90,461	65,572	9,238	181,174	70,406	41,568			43,431	9,039
2030	307,714	223,051	53,238	31,425	101,488	73,565	10,364	186,290	76,355	45,069			46,905	9,762
2035	320,216	232,114	55,401	32,701	110,853	80,353	11,321	185,780	84,537	49,899			52,171	10,858
2040	330,717	239,726	57,218	33,774	118,165	85,654	12,067	184,705	91,816	54,196			56,900	11,842
2045	339,735	246,262	58,778	34,695	123,541	89,551	12,616	183,115	98,487	58,133			61,333	12,765
2050	348,942	252,936	60,371	35,635	129,837	94,114	13,259	181,733	105,146	62,063			65,637	13,661

Canada

Country: Canada Scenario: Base

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	230,289	190,133	14,708	25,447	48,393	39,955	5,347	190,133	14,708	25,447			25,447	5,347
2005	243,110	200,719	15,527	26,864	53,007	43,764	5,857	192,949	18,373	31,787			31,087	6,533
2010	255,822	211,215	16,339	28,268	59,860	49,422	6,615	196,596	21,694	37,532			36,009	7,567
2015	270,248	223,125	17,261	29,862	71,064	58,672	7,853	201,659	25,123	43,465			40,755	8,564
2020	285,609	235,808	18,242	31,560	84,031	69,379	9,285	202,858	30,311	52,441			47,871	10,060
2025	301,660	249,051	19,266	33,332	98,987	81,726	10,938	204,390	35,625	61,635			54,841	11,524
2030	316,828	261,583	20,236	35,010	113,554	93,754	12,548	205,565	40,754	70,509			61,377	12,898
2035	328,239	271,004	20,964	36,271	122,158	100,857	13,498	200,443	46,810	80,987			69,544	14,614
2040	337,479	278,633	21,555	37,291	127,897	105,596	14,133	194,493	52,374	90,612			77,165	16,215
2045	345,614	285,349	22,074	38,190	132,662	109,529	14,659	188,293	57,625	99,696			84,370	17,729
2050	353,465	291,832	22,576	39,058	137,413	113,453	15,184	182,065	62,782	108,618			91,398	19,206

Rest of EU-15

Country: *Rest of EU15* **Scenario:** Base

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	1,373,982	1,344,927	26,034	3,021	251,933	246,606	554	1,344,927	26,034	3,021	246,606	554	3,021	554
2005	1,421,619	1,391,557	26,937	3,126	266,288	260,657	585	1,342,209	71,154	8,256	256,415	1,027	4,779	876
2010	1,449,126	1,418,481	27,458	3,186	284,044	278,037	625	1,334,815	102,426	11,885	269,493	1,513	5,982	1,097
2015	1,468,564	1,437,509	27,827	3,229	310,795	304,223	683	1,323,806	129,707	15,050	292,576	1,894	7,013	1,286
2020	1,482,477	1,451,128	28,090	3,259	335,272	328,182	737	1,309,043	155,402	18,032	312,822	2,334	7,972	1,462
2025	1,493,041	1,461,468	28,290	3,283	367,263	359,496	807	1,292,219	179,942	20,879	337,710	3,073	8,871	1,627
2030	1,501,350	1,469,601	28,448	3,301	404,056	395,512	888	1,271,685	205,787	23,878	364,756	4,086	9,804	1,798
2035	1,506,984	1,475,116	28,555	3,313	440,123	430,815	968	1,245,437	234,354	27,193	388,061	5,413	10,826	1,985
2040	1,508,973	1,477,063	28,592	3,318	471,743	461,767	1,037	1,213,353	264,885	30,736	402,932	7,154	11,912	2,184
2045	1,505,394	1,473,560	28,524	3,310	491,906	481,504	1,082	1,176,094	295,063	34,237	406,397	8,890	12,982	2,380
2050	1,495,056	1,463,441	28,329	3,287	496,418	485,920	1,091	1,134,930	322,684	37,442	396,379	10,401	13,965	2,561

Country: *Rest of EU15* **Scenario:** High Migrat.

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	1,373,982	1,344,927	26,034	3,021	251,933	246,606	554	1,344,927	26,034	3,021	246,606	554	3,021	554
2005	1,411,298	1,381,453	26,741	3,103	265,217	259,608	583	1,342,343	61,786	7,169	256,415	915	4,412	809
2010	1,438,920	1,408,492	27,265	3,164	282,932	276,949	622	1,334,950	93,160	10,810	269,493	1,397	5,620	1,030
2015	1,463,955	1,432,997	27,739	3,219	312,052	305,453	686	1,324,138	125,280	14,537	292,576	2,025	6,839	1,254
2020	1,484,677	1,453,281	28,132	3,264	339,664	332,481	747	1,309,609	156,866	18,202	312,822	2,791	8,026	1,472
2025	1,504,213	1,472,404	28,502	3,307	372,925	365,039	820	1,292,633	189,582	21,998	337,710	3,661	9,242	1,695
2030	1,521,962	1,489,777	28,838	3,346	412,736	404,008	907	1,272,119	223,866	25,976	364,756	4,988	10,499	1,925
2035	1,538,451	1,505,918	29,151	3,382	452,678	443,106	995	1,245,890	262,144	30,417	388,061	6,718	11,890	2,180
2040	1,552,715	1,519,880	29,421	3,414	486,244	475,961	1,069	1,213,461	303,982	35,272	402,932	8,662	13,408	2,458
2045	1,562,620	1,529,576	29,609	3,436	510,998	500,192	1,123	1,176,143	346,295	40,182	406,397	10,875	14,939	2,739
2050	1,569,141	1,535,959	29,732	3,450	521,860	510,824	1,147	1,135,032	388,975	45,134	396,379	13,046	16,494	3,024

Country: *Rest of EU15* **Scenario:** High LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	1,373,982	1,344,927	26,034	3,021	412,195	403,478	906	1,344,927	26,034	3,021	403,478	906	3,021	906
2005	1,425,997	1,395,842	27,020	3,135	435,681	426,468	958	1,346,342	71,374	8,282	419,527	1,680	4,779	1,434
2010	1,463,405	1,432,459	27,729	3,217	464,731	454,904	1,022	1,347,969	103,435	12,002	440,924	2,475	5,982	1,795
2015	1,500,906	1,469,167	28,439	3,300	508,501	497,747	1,118	1,352,960	132,564	15,382	478,692	3,099	7,013	2,104
2020	1,531,898	1,499,503	29,027	3,368	548,547	536,947	1,206	1,352,682	160,582	18,633	511,816	3,819	7,972	2,392
2025	1,565,872	1,532,759	29,670	3,443	600,888	588,181	1,321	1,355,255	188,720	21,898	552,536	5,027	8,871	2,661
2030	1,601,655	1,567,786	30,348	3,521	661,087	647,108	1,453	1,356,647	219,535	25,473	596,786	6,685	9,804	2,941
2035	1,634,578	1,600,012	30,972	3,594	720,096	704,868	1,583	1,350,886	254,197	29,495	634,917	8,856	10,826	3,248
2040	1,660,915	1,625,792	31,471	3,652	771,832	755,510	1,697	1,335,528	291,556	33,830	659,247	11,705	11,912	3,573
2045	1,673,553	1,638,163	31,711	3,680	804,821	787,802	1,769	1,307,468	328,023	38,062	664,917	14,546	12,982	3,895
2050	1,668,206	1,632,929	31,609	3,668	812,202	795,027	1,786	1,266,372	360,056	41,779	648,527	17,017	13,965	4,190

Country: *Rest of EU15* **Scenario:** Low LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	1,373,982	1,344,927	26,034	3,021	137,398	134,493	302	1,344,927	26,034	3,021	134,493	302	3,021	302
2005	1,418,491	1,388,494	26,878	3,119	145,227	142,156	319	1,339,255	70,998	8,238	139,842	560	4,779	478
2010	1,438,920	1,408,492	27,265	3,164	154,910	151,635	341	1,325,415	101,704	11,801	146,975	825	5,982	598
2015	1,445,450	1,414,884	27,389	3,178	169,500	165,916	373	1,302,971	127,666	14,814	159,564	1,033	7,013	701
2020	1,447,157	1,416,555	27,421	3,182	182,849	178,982	402	1,277,856	151,699	17,602	170,605	1,273	7,972	797
2025	1,440,990	1,410,518	27,304	3,168	200,296	196,060	440	1,247,170	173,669	20,151	184,179	1,676	8,871	887
2030	1,429,664	1,399,431	27,089	3,143	220,362	215,703	484	1,210,965	195,961	22,738	198,929	2,228	9,804	980
2035	1,415,795	1,385,855	26,827	3,113	240,032	234,956	528	1,170,074	220,173	25,547	211,639	2,952	10,826	1,083
2040	1,400,384	1,370,771	26,535	3,079	257,277	251,837	566	1,126,038	245,823	28,524	219,749	3,902	11,912	1,191
2045	1,385,215	1,355,922	26,247	3,046	268,274	262,601	590	1,082,203	271,507	31,504	221,639	4,849	12,982	1,298
2050	1,371,310	1,342,312	25,984	3,015	270,734	265,009	595	1,040,992	295,976	34,343	216,176	5,672	13,965	1,397

Annex 3: Regional Results

North America

Region: North America Indiv. Scenario: Base

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	2,614,272	2,122,312	223,731	268,229	470,732	382,149	48,298	2,122,312	223,731	268,229			268,229	48,298
2005	2,744,372	2,227,930	234,865	281,577	494,909	401,776	50,779	2,163,644	264,101	316,627			336,049	60,510
2010	2,880,689	2,338,594	246,531	295,564	540,533	438,814	55,460	2,205,902	306,877	367,911			406,891	73,266
2015	3,025,689	2,456,308	258,941	310,441	623,745	506,367	63,997	2,257,095	349,538	419,057			474,576	85,453
2020	3,172,485	2,575,479	271,504	325,502	728,246	591,203	74,719	2,304,595	394,695	473,195			544,691	98,079
2025	3,315,718	2,691,758	283,762	340,198	845,881	686,701	86,789	2,346,587	440,737	528,394			614,730	110,690
2030	3,446,229	2,797,709	294,931	353,589	949,319	770,674	97,402	2,372,873	488,136	585,220			687,801	123,847
2035	3,553,258	2,884,598	304,090	364,570	1,011,592	821,228	103,791	2,372,466	536,995	643,797			766,888	138,088
2040	3,642,856	2,957,335	311,758	373,763	1,049,156	851,723	107,645	2,356,637	584,941	701,279			846,692	152,458
2045	3,721,995	3,021,581	318,531	381,883	1,077,985	875,127	110,603	2,332,721	631,808	757,466			925,550	166,657
2050	3,800,740	3,085,508	325,270	389,962	1,118,388	907,927	114,749	2,308,356	678,700	813,685			1,003,167	180,633

Region: North America Combined Scenario: Base

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	2,614,272	2,138,065	207,978	268,229	470,732	384,985	48,298	2,138,065	207,978	268,229			268,229	48,298
2005	2,744,372	2,244,467	218,328	281,577	494,909	404,758	50,779	2,179,704	246,613	318,055			338,055	60,871
2010	2,880,689	2,355,953	229,173	295,564	540,533	442,071	55,460	2,222,276	287,555	370,859			411,021	74,010
2015	3,025,689	2,474,540	240,709	310,441	623,745	510,125	63,997	2,273,848	328,358	423,483			480,734	86,562
2020	3,172,485	2,594,596	252,387	325,502	728,246	595,591	74,719	2,321,701	371,571	479,214			552,989	99,573
2025	3,315,718	2,711,738	263,782	340,198	845,881	691,798	86,789	2,364,004	415,650	536,063			625,197	112,575
2030	3,446,229	2,818,475	274,164	353,589	949,319	776,394	97,402	2,390,486	461,084	594,659			700,582	126,149
2035	3,553,258	2,906,009	282,679	364,570	1,011,592	827,323	103,791	2,390,076	508,007	655,175			782,239	140,852
2040	3,642,856	2,979,286	289,807	373,763	1,049,156	858,045	107,645	2,374,129	554,103	714,624			864,674	155,695
2045	3,721,995	3,044,009	296,103	381,883	1,077,985	881,623	110,603	2,350,036	599,188	772,771			946,157	170,367
2050	3,800,740	3,108,410	302,368	389,962	1,118,388	914,667	114,749	2,325,490	644,300	830,951			1,026,373	184,811

EU-15 Individually aggregated

Region: EU15 Indiv. **Scenario:** Base

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	3,606,601	3,436,551	100,726	69,324	661,306	630,126	12,711	3,436,551	100,726	69,324	630,126	12,711	69,324	12,711
2005	3,678,428	3,504,991	102,732	70,705	712,505	678,910	13,695	3,428,410	148,094	101,924	669,464	17,546	87,183	15,986
2010	3,723,187	3,547,639	103,983	71,565	757,040	721,345	14,551	3,406,450	187,614	129,124	700,350	23,111	101,896	18,684
2015	3,754,515	3,577,490	104,857	72,167	819,273	780,645	15,748	3,377,723	223,186	153,606	749,538	28,429	114,937	21,075
2020	3,777,484	3,599,376	105,499	72,609	877,978	836,581	16,876	3,342,210	257,827	177,447	796,837	33,079	127,524	23,383
2025	3,795,607	3,616,645	106,005	72,957	949,882	905,095	18,258	3,299,330	293,961	202,316	853,493	39,295	140,497	25,761
2030	3,809,072	3,629,475	106,381	73,216	1,041,095	992,007	20,011	3,247,510	332,631	228,931	923,265	48,036	154,180	28,270
2035	3,813,108	3,633,321	106,494	73,294	1,122,413	1,069,492	21,574	3,182,041	373,801	257,266	977,538	59,061	168,641	30,922
2040	3,804,707	3,625,316	106,259	73,132	1,167,812	1,112,750	22,447	3,102,231	416,099	286,377	993,961	70,873	183,518	33,650
2045	3,785,453	3,606,970	105,722	72,762	1,181,160	1,125,469	22,704	3,012,074	458,097	315,282	977,650	82,964	198,335	36,367
2050	3,758,514	3,581,300	104,969	72,244	1,179,838	1,124,209	22,678	2,917,001	498,455	343,058	947,412	94,753	212,564	38,976

Region: EU15 Indiv. **Scenario:** High Migrat.

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	3,606,601	3,436,551	100,726	69,324	661,306	630,126	12,711	3,436,551	100,726	69,324	630,126	12,711	69,324	12,711
2005	3,662,455	3,489,771	102,286	70,398	705,820	672,540	13,567	3,427,978	138,888	95,589	669,464	14,821	83,686	15,345
2010	3,716,652	3,541,413	103,800	71,440	753,116	717,607	14,476	3,406,144	183,924	126,584	700,350	21,511	100,500	18,428
2015	3,763,660	3,586,204	105,113	72,343	818,868	780,259	15,740	3,377,445	228,767	157,447	749,538	28,264	117,061	21,464
2020	3,805,278	3,625,860	106,275	73,143	886,934	845,115	17,048	3,342,493	274,122	188,662	796,837	36,730	133,685	24,512
2025	3,844,223	3,662,969	107,363	73,892	964,553	919,074	18,540	3,299,608	322,593	222,022	853,493	45,276	151,302	27,743
2030	3,881,998	3,698,962	108,418	74,618	1,064,082	1,013,911	20,453	3,247,842	375,631	258,525	923,265	57,407	170,360	31,237
2035	3,916,516	3,731,853	109,382	75,281	1,159,954	1,105,262	22,296	3,182,792	434,608	299,116	977,538	74,365	191,440	35,102
2040	3,942,097	3,756,228	110,096	75,773	1,224,171	1,166,451	23,530	3,103,687	496,617	341,793	993,961	93,849	213,622	39,170
2045	3,952,583	3,766,220	110,389	75,974	1,253,299	1,194,206	24,090	3,014,062	555,916	382,605	977,650	112,373	234,852	43,062
2050	3,961,646	3,774,855	110,642	76,149	1,266,008	1,206,316	24,335	2,919,155	617,501	424,990	947,412	129,881	256,991	47,122

Region: EU15 Individually **Scenario:** High LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	3,606,601	3,436,551	100,726	69,324	1,081,980	1,030,965	20,797	3,436,551	100,726	69,324	1,030,965	20,797	69,324	20,797
2005	3,708,051	3,533,217	103,560	71,274	1,165,748	1,110,783	22,407	3,456,019	149,286	102,745	1,095,328	28,708	87,183	26,155
2010	3,781,107	3,602,829	105,600	72,678	1,238,612	1,180,212	23,808	3,459,443	190,532	131,132	1,145,860	37,812	101,896	30,569
2015	3,856,438	3,674,608	107,704	74,126	1,340,435	1,277,233	25,765	3,469,417	229,245	157,776	1,226,339	46,513	114,937	34,481
2020	3,921,855	3,736,940	109,531	75,384	1,436,483	1,368,753	27,611	3,469,945	267,681	184,229	1,303,726	54,121	127,524	38,257
2025	3,993,399	3,805,111	111,529	76,759	1,554,127	1,480,850	29,873	3,471,260	309,280	212,859	1,396,422	64,291	140,497	42,149
2030	4,075,991	3,883,809	113,836	78,347	1,703,362	1,623,049	32,741	3,475,078	355,940	244,973	1,510,578	78,592	154,180	46,254
2035	4,142,795	3,947,463	115,701	79,631	1,836,410	1,749,823	35,299	3,457,165	406,121	279,510	1,599,375	96,632	168,641	50,592
2040	4,170,957	3,974,297	116,488	80,172	1,910,687	1,820,599	36,726	3,400,859	456,154	313,944	1,626,246	115,958	183,518	55,055
2045	4,164,852	3,968,479	116,317	80,055	1,932,528	1,841,409	37,146	3,313,960	504,010	346,881	1,599,560	135,740	198,335	59,500
2050	4,140,730	3,945,495	115,644	79,591	1,930,365	1,839,348	37,104	3,213,641	549,144	377,944	1,550,086	155,027	212,564	63,769

Region: EU15 Indiv. **Scenario:** Low LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	3,606,601	3,436,551	100,726	69,324	360,660	343,655	6,932	3,436,551	100,726	69,324	343,655	6,932	69,324	6,932
2005	3,657,258	3,484,819	102,141	70,298	388,583	370,261	7,469	3,408,678	147,242	101,338	365,109	9,569	87,183	8,718
2010	3,681,793	3,508,197	102,826	70,769	412,871	393,404	7,936	3,368,577	185,528	127,688	381,953	12,604	101,896	10,190
2015	3,681,673	3,508,083	102,823	70,767	446,812	425,744	8,588	3,312,191	218,856	150,626	408,780	15,504	114,937	11,494
2020	3,674,306	3,501,063	102,617	70,626	478,828	456,251	9,204	3,250,921	250,784	172,600	434,575	18,040	127,524	12,752
2025	3,654,249	3,481,952	102,057	70,240	518,042	493,617	9,958	3,176,455	283,013	194,782	465,474	21,430	140,497	14,050
2030	3,618,310	3,447,708	101,053	69,549	567,787	541,016	10,914	3,084,872	315,973	217,466	503,526	26,197	154,180	15,418
2035	3,577,489	3,408,811	99,913	68,765	612,137	583,274	11,766	2,985,417	350,704	241,369	533,125	32,211	168,641	16,864
2040	3,542,957	3,375,907	98,949	68,101	636,896	606,866	12,242	2,888,809	387,473	266,675	542,082	38,653	183,518	18,352
2045	3,514,307	3,348,608	98,149	67,550	644,176	613,803	12,382	2,796,323	425,285	292,699	533,187	45,247	198,335	19,833
2050	3,485,353	3,321,019	97,340	66,994	643,455	613,116	12,368	2,705,000	462,228	318,125	516,895	51,676	212,564	21,256

EU-15 Zone

Region: EU15 Zone **Scenario:** Base

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	3,606,601	3,534,337	2,940	69,324	661,306	648,056	12,711	3,534,337	2,940	69,324	648,056	12,711	69,324	12,711
2005	3,678,428	3,604,724	2,999	70,705	712,505	698,228	13,695	3,525,964	6,204	146,260	688,514	23,015	95,702	17,548
2010	3,723,187	3,648,586	3,035	71,565	757,040	741,871	14,551	3,503,379	8,944	210,864	720,278	35,266	117,584	21,560
2015	3,754,515	3,679,287	3,061	72,167	819,273	802,858	15,748	3,473,835	11,421	269,259	770,866	46,438	137,091	25,137
2020	3,777,484	3,701,795	3,080	72,609	877,978	860,386	16,876	3,437,312	13,841	326,331	819,511	56,088	155,991	28,602
2025	3,795,607	3,719,555	3,095	72,957	949,882	930,849	18,258	3,393,211	16,373	386,023	877,779	69,169	175,541	32,187
2030	3,809,072	3,732,750	3,105	73,216	1,041,095	1,020,235	20,011	3,339,917	19,090	450,065	949,536	87,833	196,238	35,982
2035	3,813,108	3,736,706	3,109	73,294	1,122,413	1,099,924	21,574	3,272,585	21,994	518,530	1,005,353	112,297	218,196	40,008
2040	3,804,707	3,728,473	3,102	73,132	1,167,812	1,144,413	22,447	3,190,504	24,992	589,212	1,022,244	139,645	240,864	44,165
2045	3,785,453	3,709,605	3,086	72,762	1,181,160	1,157,494	22,704	3,097,782	27,981	659,691	1,005,469	168,542	263,511	48,317
2050	3,758,514	3,683,205	3,064	72,244	1,179,838	1,156,198	22,678	3,000,004	30,863	727,647	974,371	197,107	285,325	52,317

Region: EU15 Zone **Scenario:** High Migrat.

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	3,606,601	3,534,337	2,940	69,324	661,306	648,056	12,711	3,534,337	2,940	69,324	648,056	12,711	69,324	12,711
2005	3,662,455	3,589,071	2,986	70,398	705,820	691,677	13,567	3,525,520	5,572	131,363	688,514	16,602	90,562	16,605
2010	3,716,652	3,642,182	3,030	71,440	753,116	738,026	14,476	3,503,065	8,691	204,897	720,278	31,502	115,532	21,184
2015	3,763,660	3,688,248	3,068	72,343	818,868	802,461	15,740	3,473,550	11,804	278,305	770,866	46,049	140,214	25,710
2020	3,805,278	3,729,032	3,102	73,143	886,934	869,163	17,048	3,437,603	14,961	352,715	819,511	64,680	165,049	30,263
2025	3,844,223	3,767,197	3,134	73,892	964,553	945,226	18,540	3,393,497	18,340	432,386	877,779	83,243	191,428	35,100
2030	3,881,998	3,804,215	3,165	74,618	1,064,082	1,042,761	20,453	3,340,258	22,043	519,697	949,536	109,885	220,028	40,344
2035	3,916,516	3,838,042	3,193	75,281	1,159,954	1,136,712	22,296	3,273,358	26,170	616,989	1,005,353	148,310	251,719	46,155
2040	3,942,097	3,863,110	3,214	75,773	1,224,171	1,199,642	23,530	3,192,002	30,521	719,574	1,022,244	193,710	285,127	52,281
2045	3,952,583	3,873,386	3,222	75,974	1,253,299	1,228,187	24,090	3,099,827	34,698	818,058	1,005,469	237,746	317,203	58,162
2050	3,961,646	3,882,267	3,230	76,149	1,266,008	1,240,641	24,335	3,002,219	39,039	920,389	974,371	279,771	350,648	64,295

Region: EU15 Zone **Scenario:** High LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	3,606,601	3,534,337	2,940	69,324	1,081,980	1,060,301	20,797	3,534,337	2,940	69,324	1,060,301	20,797	69,324	20,797
2005	3,708,051	3,633,753	3,023	71,274	1,165,748	1,142,390	22,407	3,554,359	6,254	147,438	1,126,495	37,655	95,702	28,711
2010	3,781,107	3,705,346	3,083	72,678	1,238,612	1,213,795	23,808	3,557,880	9,083	214,144	1,178,466	57,700	117,584	35,275
2015	3,856,438	3,779,168	3,144	74,126	1,340,435	1,313,577	25,765	3,568,139	11,731	276,569	1,261,234	75,978	137,091	41,127
2020	3,921,855	3,843,273	3,197	75,384	1,436,483	1,407,700	27,611	3,568,681	14,370	338,803	1,340,823	91,767	155,991	46,797
2025	3,993,399	3,913,384	3,256	76,759	1,554,127	1,522,987	29,873	3,570,034	17,227	406,139	1,436,157	113,170	175,541	52,662
2030	4,075,991	3,994,322	3,323	78,347	1,703,362	1,669,233	32,741	3,573,961	20,427	481,603	1,553,561	143,706	196,238	58,872
2035	4,142,795	4,059,787	3,378	79,631	1,836,410	1,799,614	35,299	3,555,537	23,895	563,363	1,644,885	183,732	218,196	65,459
2040	4,170,957	4,087,385	3,401	80,172	1,910,687	1,872,403	36,726	3,497,629	27,397	645,930	1,672,520	228,476	240,864	72,259
2045	4,164,852	4,081,401	3,396	80,055	1,932,528	1,893,806	37,146	3,408,258	30,785	725,808	1,645,075	275,757	263,511	79,053
2050	4,140,730	4,057,763	3,376	79,591	1,930,365	1,891,686	37,104	3,305,084	34,002	801,644	1,594,193	322,493	285,325	85,598

Region: EU15 Zone **Scenario:** Low LTC Ratio

Year	Total Female nurses	Native Born female nurses	Foreign Born female nurses from DC	Foreign Born female nurses from LDC	Total Female Long Term Care nurses	Native Born female long term care nurses	Foreign Born female Long Term Care nurses from LDC	Native Born female nurses under Replac. Migration	Foreign Born female nurses from DC needed under Replac. Migr.	Foreign Born female nurses from LDC needed under Replac. Migr.	Native Born female LTC nurses under Replac Migr.	Foreign Born female LTC nurses from LDC under Replec Migr..	Foreign Born Nurses from LDC at Present Migration rate	Foreign Born LTC Nurses from LDC at Present Migration rate
2000	3,606,601	3,534,337	2,940	69,324	360,660	353,434	6,932	3,534,337	2,940	69,324	353,434	6,932	69,324	6,932
2005	3,657,258	3,583,978	2,982	70,298	388,583	380,797	7,469	3,505,671	6,168	145,418	375,498	12,552	95,702	9,570
2010	3,681,793	3,608,021	3,002	70,769	412,871	404,598	7,936	3,464,429	8,844	208,519	392,822	19,233	117,584	11,758
2015	3,681,673	3,607,905	3,002	70,767	446,812	437,859	8,588	3,406,439	11,199	264,035	420,411	25,326	137,091	13,709
2020	3,674,306	3,600,684	2,996	70,626	478,828	469,233	9,204	3,343,425	13,463	317,417	446,941	30,589	155,991	15,599
2025	3,654,249	3,581,030	2,979	70,240	518,042	507,662	9,958	3,266,840	15,764	371,646	478,719	37,723	175,541	17,554
2030	3,618,310	3,545,811	2,950	69,549	567,787	556,411	10,914	3,172,651	18,134	427,526	517,854	47,902	196,238	19,624
2035	3,577,489	3,505,808	2,917	68,765	612,137	599,871	11,766	3,070,366	20,635	486,489	548,295	61,244	218,196	21,820
2040	3,542,957	3,471,968	2,889	68,101	636,896	624,134	12,242	2,971,009	23,272	548,676	557,507	76,159	240,864	24,086
2045	3,514,307	3,443,891	2,865	67,550	644,176	631,269	12,382	2,875,892	25,977	612,438	548,358	91,919	263,511	26,351
2050	3,485,353	3,415,518	2,842	66,994	643,455	630,562	12,368	2,781,970	28,620	674,763	531,398	107,498	285,325	28,533

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Annex 4: Formulas

A. Basic Definitions

$$\text{♀}\mathbf{Nurses} = \mathbf{Total\ \#\ Nurses} * \textit{\% female nursing workforce}$$

$$\textit{NB-Nurses} = \frac{\#\ \mathbf{Native\ Born\ Nurses}}{\mathbf{Total\ \#\ Nurses}}$$

$$\textit{FB-Nurses} = \frac{\#\ \mathbf{Foreign\ Born\ Nurses}}{\mathbf{Total\ \#\ Nurses}}$$

$$\textit{LDC-Nurses} = \frac{\mathbf{Nurses\ from\ LDC}}{\mathbf{\#\ Foreign\ Born\ Nurses}}$$

$$\textit{LTHC-Nurses} = \frac{\mathbf{\#\ Nurses\ in\ LTHC}}{\mathbf{Total\ \#\ Nurses}}$$

B. Ratios to Population.

$$^{65+}\text{♀}\textit{Nurses} = \frac{\text{♀}\mathbf{Nurses} * \textit{LTHC-Nurses}}{\mathbf{Population\ 65+}}$$

$$^{<65}\text{♀}\textit{Nurses} = \frac{\text{♀}\mathbf{Nurses} * (1 - \textit{LTHC-Nurses})}{\mathbf{Population\ <65}}$$

$$^{TotPop}\text{♀}\textit{Nurses}_i = {}^{<65}\text{♀}\textit{Nurses} * \frac{\mathbf{Population{<}65_i}}{\mathbf{Tot\ Population_i}} + {}^{65+}\text{♀}\textit{Nurses} * \frac{\mathbf{Population{<}65_i}}{\mathbf{Tot\ Population_i}}$$

C. Formulas for Total Population Forecast.

$$\mathbf{Total\ \#\ {}^{All}\text{♀}Nurses_i^{TotPot}} = {}^{TotPop}\text{♀}\textit{Nurses}_i * \mathbf{Total\ Population\ Forecast_i}$$

$$\mathbf{Total\ \#\ {}^{NB}\text{♀}Nurses_i^{TotPot}} = \mathbf{Total\ \#\ {}^{All}\text{♀}Nurses_i^{TotPot}} * \textit{NB-Nurses}$$

$$\mathbf{Total\ \#\ {}^{FB}\text{♀}Nurses_i^{TotPot}} = \mathbf{Total\ \#\ {}^{All}\text{♀}Nurses_i^{TotPot}} * \textit{FB-Nurses}$$

$$\mathbf{Total\ \#\ {}^{LDC}\text{♀}Nurses_i^{TotPot}} = \mathbf{Total\ \#\ {}^{FB}\text{♀}Nurses_i^{TotPot}} * \textit{LDC-Nurses}$$

D. Formulas for Elderly Population Forecast.

$$\mathbf{Total\ \#\ {}^{All}\text{♀}Nurses_i^{65+}} = {}^{65+}\text{♀}\textit{Nurses} * \mathbf{Population\ 65+\ Forecast_i}$$

$$\mathbf{Total\ \#\ {}^{NB}\text{♀}Nurses_i^{65+}} = \mathbf{Total\ \#\ {}^{All}\text{♀}Nurses_i^{65+}} * \textit{NB-Nurses}$$

$$\mathbf{Total\ \#\ {}^{FB}\text{♀}Nurses_i^{65+}} = \mathbf{Total\ \#\ {}^{All}\text{♀}Nurses_i^{65+}} * \textit{FB-Nurses}$$

$$\mathbf{Total\ \#\ {}^{LDC}\text{♀}Nurses_i^{65+}} = \mathbf{Total\ \#\ {}^{FB}\text{♀}Nurses_i^{65+}} * \textit{LDC-Nurses}$$

E. Formulas for Total Population Forecast at Zero Migration.

$$\textbf{Total \# } {}^{\textbf{NB}}\text{♀}\textbf{Nurses}_{\textbf{i}}^{\textbf{Zero}} \textbf{ for Total Pop} = {}^{TotPop}\text{♀}Nurses_i * \textbf{Zero Migration Forecast}_{\textbf{i}}^{\textbf{TotPop}}$$

$$\textbf{Zero Migration Forecast}_{\textbf{i}}^{\textbf{TotPop}} = \frac{\textbf{Native-Born Population}_{\textbf{2000}}}{\textbf{Total Population}_{\textbf{2000}}} * Replacement\ Migration\ Index_i^{TotPot}$$

$$Replacement\ Migration\ Index_i^{TotPot} = \frac{\textbf{Total Population at Zero Migration}_{\textbf{i}}}{\textbf{Total Population at Zero Migration}_{\textbf{2000}}}$$

F. Formulas for Elderly Population Forecast at Zero Migration.

$$\textbf{Total \# } {}^{\textbf{NB}}\text{♀}\textbf{Nurses}_{\textbf{i}}^{\textbf{Zero}} \textbf{ for Popul 65+} = {}^{TotPop}\text{♀}Nurses_i * \textbf{Zero Migration Forecast}_{\textbf{i}}^{\textbf{65+}}$$

$$\textbf{Zero Migration Forecast}_{\textbf{i}}^{\textbf{65+}} = \frac{\textbf{Native-Born Population 65+}_{\textbf{2000}}}{\textbf{Total Population 65+}_{\textbf{2000}}} * Replacement\ Migration\ Index_i^{65+}$$

$$Replacement\ Migration\ Index_i^{65+} = \frac{\textbf{Population 65+ at Zero Migration}_{\textbf{i}}}{\textbf{Population 65+ at Zero Migration}_{\textbf{2000}}}$$

G. Formulas for Determing need of Female nurses from LDC for Total Population.

$$\textbf{Needed Stock of } {}^{\textbf{FB}}\text{♀}\textbf{Nurses}_{\textbf{i}} = \textbf{Total \# } {}^{\textbf{All}}\text{♀}\textbf{Nurses}_{\textbf{i}}^{\textbf{TotPot}} \textbf{ - Total \# } {}^{\textbf{NB}}\text{♀}\textbf{Nurses}_{\textbf{i}}^{\textbf{Zero}} \textbf{ for Total Pop}$$

$$\textbf{Needed Stock of } {}^{\textbf{LDC}}\text{♀}\textbf{Nurses}_{\textbf{i}} = \textbf{Needed Stock of } {}^{\textbf{FB}}\text{♀}\textbf{Nurses}_{\textbf{i}} * LDC\text{-}Nurses$$

H. Formulas for Determing need of Female nurses from LDC for Elderly Population.

$$\textbf{Needed Stock of } {}^{\textbf{FB}}\text{♀}\textbf{Nurses}_{\textbf{i}} = \textbf{Total \# } {}^{\textbf{All}}\text{♀}\textbf{Nurses}_{\textbf{i}}^{\textbf{TotPot}} \textbf{ - Total \# } {}^{\textbf{NB}}\text{♀}\textbf{Nurses}_{\textbf{i}}^{\textbf{Zero}} \textbf{ for Popul 65+}$$

$$\textbf{Needed Stock of } {}^{\textbf{LDC}}\text{♀}\textbf{Nurses}_{\textbf{i}} = \textbf{Needed Stock of } {}^{\textbf{FB}}\text{♀}\textbf{Nurses}_{\textbf{i}} * LDC\text{-}Nurses$$