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## Developments in Labour Supply, Employment, and Labour Shortfalls in Non-Physician Healthcare Professions

Study for the Federal Ministry for Economic Affairs and Energy (BMWi)

– Short Version –

**IEGUS**  
for better health and care

 **WifOR**  
Wirtschaftsforschung

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## **Imprint**

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## **1 Management Summary**

The present study provides the first comprehensive assessment of trends in labour supply, employment and labour shortfalls in non-physician healthcare professions. Its findings are based on a macroeconomic analysis, an analysis of microdata sources and an examination of framing conditions. It offers policy recommendations for decision makers seeking to steer developments (demand and supply) on the labour market. Included in the study are non-physician healthcare professions that offer services to patients, including nursing, midwifery, geriatric care, physical therapy, speech-language pathology, orthopaedics technology and audiology. Its findings affirm the expectation of future labour shortfalls in all these professions.

### **Key Findings**

The microeconomic analysis shows that women continue to dominate the nursing profession despite a recent increase in the share of male employees. In addition, the average age of skilled nurses has increased. Exceptional working hours and stressful duties are widespread. Yearly salaries for experienced nurses increase only marginally with age. Employment stability among nurses is high compared to the national average. Career termination is especially common during training or during the first years on the job.

A labour market model, based on macroeconomic analysis, shows how potential labour capacity varies with changes in career longevity, career-switching and the number of new graduates entering the job market. The model predicts a decline in the potential labour supply in all occupational groups examined by 2030. In light of projected labour demand, a shortfall of skilled workers is to be expected in all occupational groups and across all scenarios. The predicted severity of labour shortfall varies across scenarios depending on the respective influence of each specific factor included in the model.

### **Potential Areas for Intervention**

The study makes recommendations regarding potential labour market interventions in the areas of career longevity, career-switching and education. The greatest potential for reducing future skilled labour shortfalls lies in preserving employees' career longevity in their current job situation. The labour situation can also be affected by increasing the number of career-switchers entering non-physician healthcare professions, by decreasing the number of career-switchers leaving and by increasing the number of professionals trained annually. The limited data available on these developments do not allow to draw firm conclusions about what is driving these developments or about which interventions are likely to be most effective. Further research is needed, especially in the exploration of variation among the individual professions.

Developments in labour supply, employment and labour shortfalls in non-physician healthcare professions will continue to be a closely monitored aspect of the healthcare economy in the future. Expected labour shortfalls in the healthcare professions make action imperative. Proven interventions for alleviating shortfalls of skilled healthcare workers exist. The authors of this study show additional options. Whether these are sustainably effective should be the subject of future investigation.

## 2 Introduction

Germany faces an increasing risk of labour shortfalls due to demographic change and other factors. Companies must act now to ensure that their future needs for qualified employees can be met, and relevant regulatory framing conditions should be adjusted accordingly.

From 2000 to 2016, the number of persons employed in the healthcare sector increased by 1.4 percent per year on average, as compared to an average annual increase of only 0.6 percent in all sectors of the German economy. This strong employment growth was the result of a consistently high demand for healthcare services – relatively unaffected by economic cycles – and correspondingly high employer demand for skilled employees. Healthcare continues to be a job motor, as nearly one-third of all healthcare companies are planning to expand employment (Deutscher Industrie- und Handelskammertag 2015). In some areas, employer demand for labour already outstrips supply. Because healthcare is manpower-intensive, labour shortfalls and labour costs are very often at the centre of economic risk assessments (see for example: DIHK-Report Gesundheitswirtschaft).

The Federal Employment Agency's list of so-called bottleneck professions in healthcare (i. e., those characterised by labour shortfalls) affirms this pattern (Bundesagentur für Arbeit 2016: 13). The present study's supply and demand projections<sup>1</sup> also indicate significant future labour shortfalls in the healthcare economy. Prospectively, the healthcare sector will lack about 634,000 non-physician professionals by 2030 (2016: 245,000), meaning that employers will be able to fill only three of every four jobs in these professions.

For this reason, the goals of expanding the potential supply of additional labour, prolonging job retention and promoting professional healthcare education (for all employee groups) have high operational, economic and social relevance. For aiding the development of interventions appropriate to these goals, this study undertakes detailed economic analyses of the structures underling the labour supply, employment and current as well as future labour shortfalls. These analyses also take institutional and legal frameworks into consideration, as these strongly influence the healthcare labour market.

On the basis of these findings, the present study offers statistical projections of future developments in skilled labour and labour shortfalls. For addressing the challenges these projections imply, recommendations are formulated regarding a variety of policies that have good chances of reducing labour shortfalls in the non-physician professions. In focus are non-physician healthcare professions that offer services to patients.

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<sup>1</sup> Projections are based on underlying assumptions (cf. chapter 6.1 of the long version of this report) and are thus subject to uncertainty. A review of related studies is provided in chapter 6.3.2 (long version).

### 3 Supply and Demand: Microeconomic Labour Market Analysis of the Status Quo in the Healthcare Economy

In a microdata-based approach, the present study investigates several different facets of non-physician employment in the healthcare economy. ‘Microdata’ is data at the individual, company or company-site level. These allow for differentiated analysis of structures, processes and person groups in the context of the study’s objectives.

The study draws on multiple datasets (cf. the Infobox below). These data are based on official statistics (e. g. the German Federal Employment Agency’s employment registries) and on surveys (e. g. BIBB/BAuA Labour Force Survey).

#### Infobox: Microdata Sources

**Sample of Integrated Labour Market Biographies (SIAB):** This dataset of the German Labour Office encompasses individual career histories for a 2 percent random sample of all employees and benefit recipients for the years 1975 to 2014. These include periods of employment whilst contributing to national social insurance, employment without making social insurance contributions and periods of unemployment whilst receiving unemployment or other social benefits. The analysis of the Sample of Integrated Labour Market Biographies focuses on employee characteristics (e. g. age, gender) and on questions of job retention and developments over time in personal compensation.

**BIBB/BAuA Labour Force Survey:** This representative survey of circa 20,000 employees in Germany was last undertaken in the years 2006 and 2012. The present study draws on the wealth of information it provides on employee characteristics, their training and professional life, as well as the characteristics of their activities and jobs (quality of work).

**Establishment History Panel (BHP):** The Establishment History Panel is a 50 percent sample of all business establishments in Germany with at least one employee contributing to national social insurance. The data are based on administrative information (employment reports) of the German Labour Office. Data are available for the years 1975 to 2014 and are used for analysis of establishment dynamics (start-ups, failures, survival) and for employment structure within the establishment.

#### 3.1 Employee Characteristics by Profession

The proportion of self-employed workers differs markedly among the occupations included in the study, underscoring their heterogeneity (Table 3–1). Whereas the share of self-employed workers is extremely low in both nursing professions and in the reference occupation of childcare, circa one-fourth to one-third of workers in the therapeutic professions are self-employed. Self-employment among midwives is also typically high, although this cannot be shown using the data used in the study. Supplementary data from the German Midwifery Association show that only 4 percent of all midwives in Germany were exclusively dependently employed in 2011.

Women make up a very high proportion of the workforce in all healthcare professions included in the study, ranging up to 88 percent and, in the reference occupation of childcare, even higher (Table 3–1). The proportion of German citizens and German native speakers in the healthcare workforce is similar to the average for all economic sectors. Significantly higher proportions can be observed only in the reference occupation of childcare.

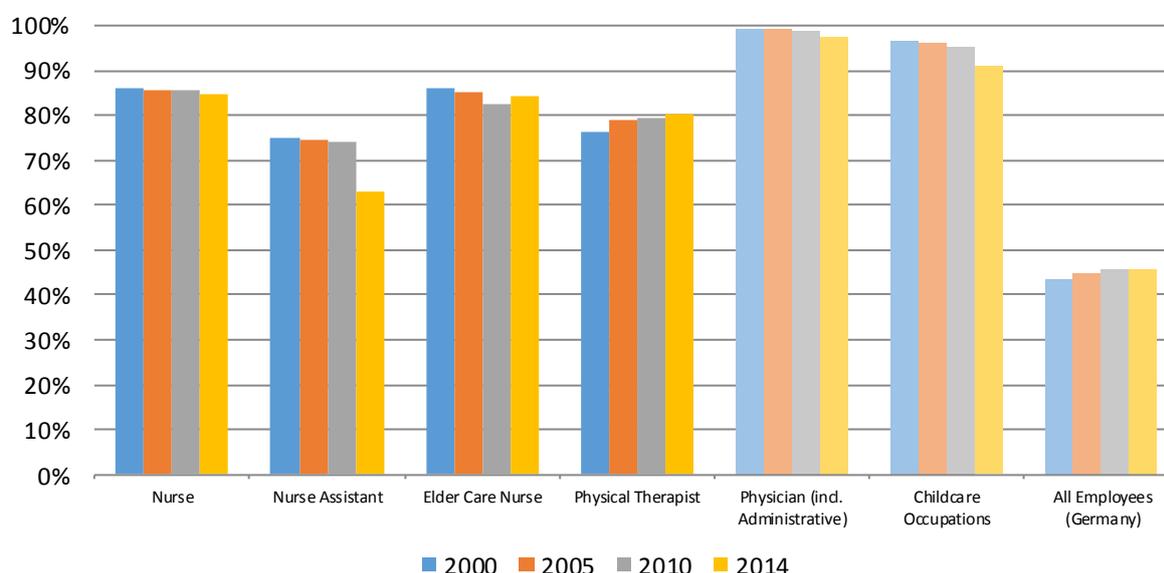
**Table 3–1: Characteristics of Employment and of Employees in Selected Healthcare Professions, 2012 (Share in percent)**

Occupation	Self-Employed	Female	German Citizen	German Native Speaker	N
Nurse	1.6***	83.2***	87.5	85.7	693
Elder Care Nurse	1.0***	87.6***	92.7	86.6	327
Physical Therapist	34.4***	77.8***	86.2	84.6	82
Other Therapist	26.4***	82.0***	100.0***	94.3	42
Childcare	3.5***	91.9***	97.9***	94.4***	395
Physician and Pharmacist	46.2***	48.1	89.7	84.7	236
<b>All Employees (Germany)</b>	<b>11.1</b>	<b>45.1</b>	<b>91.1</b>	<b>89.1</b>	<b>19,748</b>

Notes: N = sample size; \*/\*\*/\*\* = difference in comparison to overall employee population is statistically significant at the .1/.05/.01-level; Source: BIBB/BAuA Labour Force Survey 2012, IAW 2016, own calculations.

Figure 3–1 shows that among all occupations observed (except physical therapist), the proportion of women among all employees holding social-insurance mandated jobs fell between 2000 and 2014. This development runs contrary to the overall employment trend in Germany. It can be interpreted as a positive signal that these traditionally female-dominated professions are becoming increasingly successful in winning over skilled male workers.

**Figure 3–1: Proportion of Women to All Employees in Social-Insurance Mandated Jobs, 2000–2014**



Source: Integrated Labour Market Biographies Sample, IAW 2016, own calculations.

Employee age has also increased significantly since the beginning of the century in all occupations. This can be interpreted as an indicator of increased labour-market participation of older individuals but also as a deficit of newly trained young professionals. Among employees with social-insurance mandated jobs, the median age of nurses increased from 36 to 42.5 years between 2000 and 2014, and among physical therapists the increase was from 35 to 38 years.

### 3.2 Characteristics of Employment Relationships

An important and much discussed issue related to labour shortfalls in healthcare is the career longevity among nurses. On the whole, this study finds that employment stability for nurses is high in comparison to the national average. Only among the lower-skilled ‘assistant’ occupations is the share of incoming and outgoing career-switchers significant or above-average. In all higher-skilled occupations observed, the rate of career-switching is consistently below average.

Among all forms of termination, early-career employment termination is thought to be an especially significant factor contributing to labour shortfalls (Hackmann 2010). This is affirmed by the results of the micro econometric job retention analysis performed for this study. In the nursing professions, employment termination risk correlates with fewer years of job experience in nursing. In addition, the results show that premature termination of employment in nursing depends mainly on whether employees have a job-leaving certificate in nursing. If not (yet) obtained, the employment period is significantly lower.

Finally, young people and men stay employed in nursing care for significantly shorter time periods than older employees and women, which likely is related at least in part to the structure of career advancement opportunities in nursing in Germany. Working conditions also play a role. Low daily pay is associated with shorter employment duration. And for employment requiring skilled activities, employed persons working in jobs not incorporated in the social insurance system are quicker to quit their jobs than employees who have social-insurance mandated jobs.

**Table 3–2: Characteristics of Working Hours (Share in percent), 2012**

Occupation	Temporary Employees <sup>a</sup>	Part-time Employees, <sup>2</sup> Total <sup>a</sup>	Part-time Employees, Female <sup>a</sup>	Shift Workers	On-call Duty	Weekend Work <sup>b</sup>	N
Nurse	7.1***	34.8***	39.9	51.9***	29.1***	89.4***	693
Elder Care Nurse	16.8	44.0***	44.6	45.9***	22.8	95.4***	327
Physical Therapist	11.8	51.8***	61.1*	6.1***	5.6***	46.9***	82
Other Therapist	12.7	41.4*	41.3	4.7***	3.7***	68.2	42
Childcare	15.4	42.9***	44.1	9.5***	10.3***	54.6***	395
Physician and Pharmacist	31.1***	24.8	37.8	4.2***	72.9***	87.8***	236
<b>All Employees (Germany)</b>	<b>12.1</b>	<b>23.3</b>	<b>43.7</b>	<b>18.3</b>	<b>18.2</b>	<b>68.6</b>	<b>19,748</b>

Notes: N = sample size; a) not including self-employed; b) regular or occasional work Saturdays or Sundays; \*/\*\*/\*\* = difference in comparison to overall employee population is statistically significant at the .1/.05/.01-level; Source: BIBB/BAuA Labour Force Survey 2012, IAW 2016, own calculations.

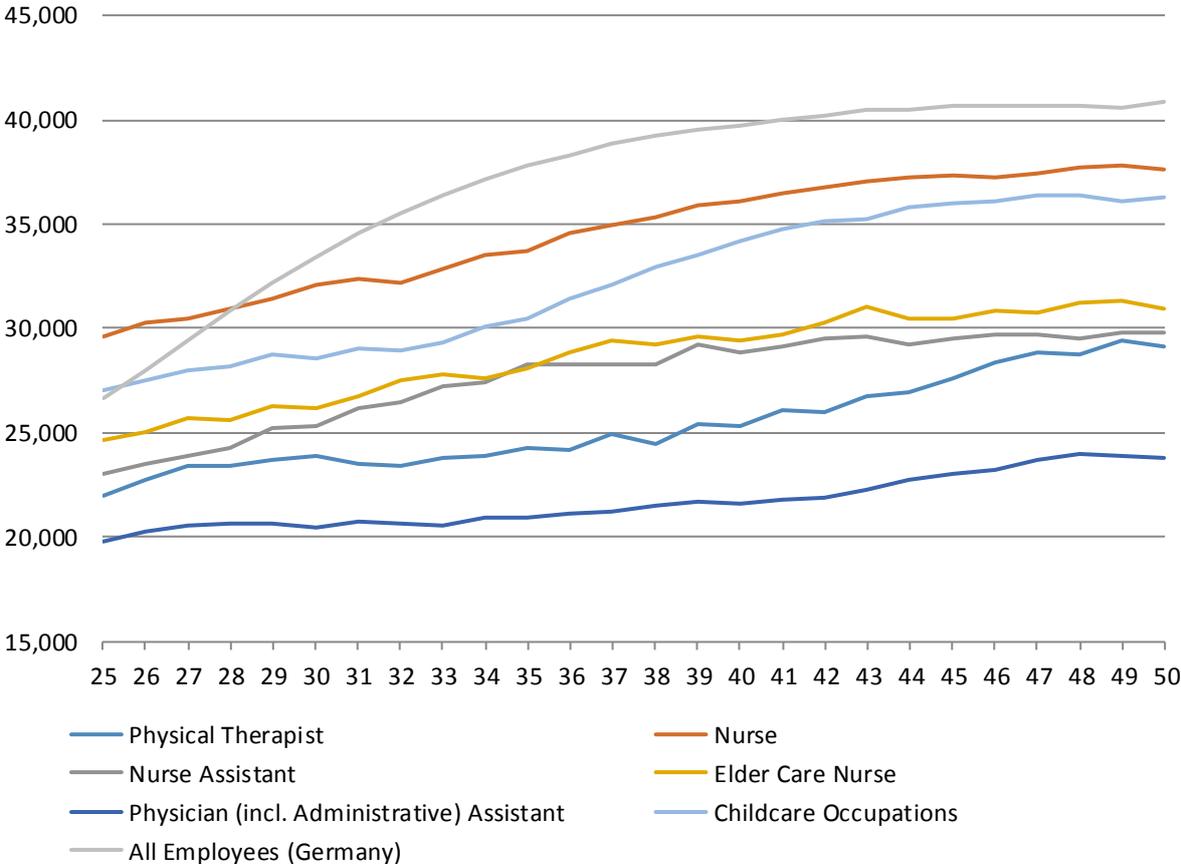
Regarding the characteristics of working hours, Table 3–2 shows, among other things, that temporary contracts are not especially widespread in the observed occupations. Part-time work, however, is of fundamental significance in all healthcare professions and has increased in past years, as in all sectors of the German economy. The above-average share of part-time employment in the occupations

<sup>2</sup> Strictly speaking, employees are regarded as part-time if their regular weekly working hours are shorter than those of the full-time employees of the same enterprise. However, as the data used contain no information regarding the average hours of full-time workers at the enterprise level, a limit of 35 hours per week was set such that employees who work fewer than 35 hours per week are considered to be employed part-time.

observed is due in particular to the high proportion of female employees, despite the fact that women are not disproportionately employed part-time in comparison to other occupations. With regard to the significance of forms of irregular working hours including shift work, on-call duty and weekend work, clear differences exist between nursing (higher than average prevalence) and therapeutic professions (lower than average).

An additional factor associated with work quality or the attractiveness of an occupation is employee pay. Not only does absolute remuneration play a role here, but also the correlation of pay with increasing age (cf. Figure 3–2) or employment duration.

**Figure 3–2: Average Gross Annual Pay of Full-Time Employees by Occupation and Age, 2000–2014, in Euros (Inflation Adjusted to 2010)**



Source: Sample of Integrated Labour Market Biographies, IAW 2016, own calculations.

Average annual pay for all occupations shown in Figure 3–2, especially for nursing professions falls below the national average. In the figure, this gap is especially clear in the lag of early-career pay growth compared to the national average.<sup>3</sup> Although it is commonly emphasized that pay alone does not determine the attractiveness of a profession but rather that other conditions of employment and its broader socio-political context (e. g. the compatibility of work and family, ‘work-life balance’) must also be factored in, the role of remuneration should not be underestimated. Above all, the comparatively low pay growth over time and the fact that near-peak pay levels are reached in the early career years is likely to work to the great disadvantage of these professions. However, structur-

<sup>3</sup> This is explained in part by the fact that few college graduates are employed in the nursing professions. These account in a large part for the fast increase in gross yearly pay between the 25th and 35th years (see also Koch et al. 2016: 39 ff.).

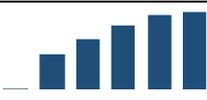
al characteristics of the healthcare system (e. g. pervasive public regulation, collective bargaining) limit employers’ influence over wages and salaries.

**3.3 Skilled Craft Professions in Healthcare**

The two skilled craft professions of audiologist and orthopaedics technician cannot be analysed on the basis of the data used above because they are not clearly identifiable in these data. However, insight into these professions is possible using statistics provided by the German Confederation of Skilled Crafts (Zentralverband des Deutschen Handwerks) and the skilled crafts statistics (Handwerkstatistik) of the Federal Statistical Office. Among other things, these data show that the number of enterprises in audiology nearly doubled between the years 2000 and 2015, whereas the number of enterprises in orthopaedics technology increased by 10 percent.

Employment, too, has grown strongly in both crafts. As seen in Table 3–3, audiology employment has grown by 32 percent, orthopaedics technology by 23 percent.

**Table 3–3: Employment in Skilled Craft Professions, 2008–2013**

	2008	2009	2010	2011	2012	2013	Index: 2008=100
<b>Audiologist</b>	11,007	12,633	13,333	13,956	14,439	14,562	
<b>Orthopaedics Technician</b>	29,782	31,259	33,284	33,470	35,485	36,661	
<b>Skilled Crafts in Healthcare</b>	175,984	180,028	184,963	186,515	191,204	190,012	
<b>Licensed Skilled Crafts</b>	4,021,013	4,008,641	4,040,309	4,093,354	4,100,552	4,070,752	

Source: Skilled crafts statistics of the Federal Statistical Office (Statistisches Bundesamt, Handwerksstatistik), IAW 2016, own calculations.

These two trades represent high-growth areas of the economy in which a large number of skilled workers are needed and training is essential for the exercise of the profession. For meeting future demand for skilled workers, it is of critical importance that a sufficient number of newly trained professionals enter the labour market to generate productive output as employees. The number of trainees is keeping pace with growth in audiology, where the number of trainees increased by 120 percent between 2000 and 2015). Orthopaedics technology, however, saw a decline in the number of trainees through 2011 and a slight increase thereafter to its current 80 percent of the 2000 level. This trend mirrors the overall average for skilled crafts in healthcare.

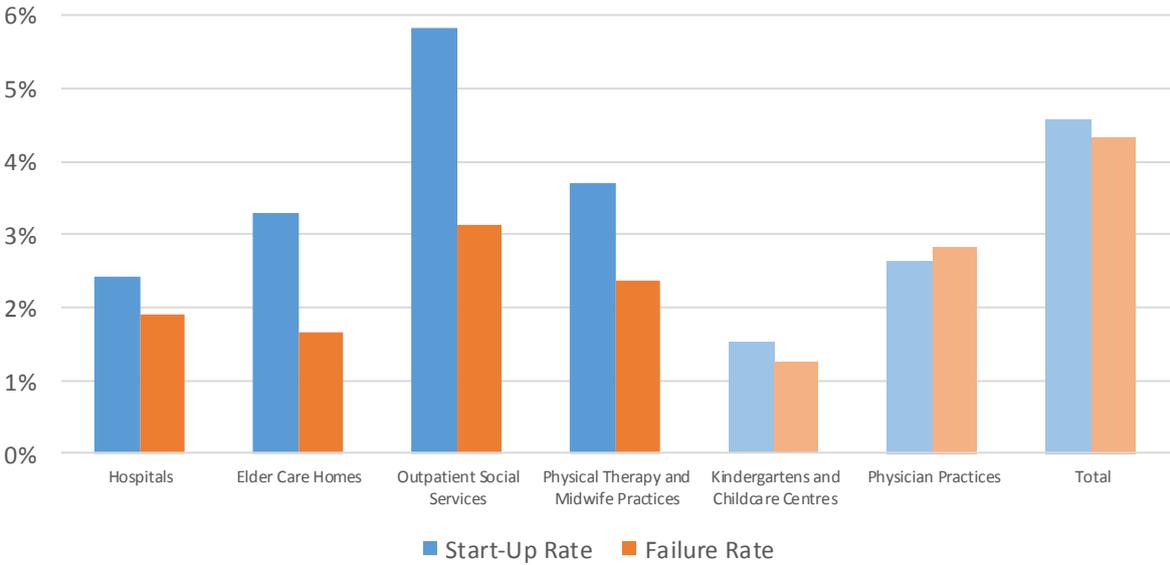
Altogether, current trainee trends indicate that audiology should be well positioned to meet an increased need for skilled workers in the future. There has been a slight recovery in the number of orthopaedic technician trainees, but it is questionable as to whether this will suffice to meet future demand, which is only likely to go up as the population continues to age.

**3.4 Characteristics of Enterprises**

Recent years have seen an increase in the number of enterprises and employees as well as the size of most enterprises in non-physician healthcare. This reflects increased demand for services in this sector of the healthcare economy. Above all, the sharp increase in outpatient social services clearly reflect demographic and social change. At the same time, the increased size of enterprises is indicative of the increased pressure they face to increase efficiency and productivity. Larger enterprises have advantages in this environment.

These changes are also reflected in the fact that in all branches observed, start-up rates for new enterprises as a percentage of all enterprises easily outstrips failure rates (cf. Figure 3–3), although not the overall start-up rate across all sectors nationally. This growth is being driven by increased demand for the services these firms provide and explains also a part of the increase in the number of enterprises. At the same time, the surplus of start-ups indicates that the market is not yet saturated. Moreover, the positive effects on employment generated by new businesses far outweigh the negative effects of enterprise failures.

**Figure 3–3: Start-Up and Failure Rates (Average), 2003–2013**



Source: Establishment History Panel, IAW 2016, own calculations.

In sum, all areas of non-physician healthcare are growing despite ubiquitous labour shortfalls. This indicates rising demand for the goods and services they offer and, in turn, increased competition for skilled workers. Labour force shortfalls could therefore become even more severe.

## 4 Macroeconomic Projections for Envisioning the Future Healthcare Labour Market

### 4.1 Labour Supply, Demand and Shortfalls in the Healthcare Economy through 2030

In recent years, the healthcare economy has become a motor of growth and employment of great significance for the national economy. The gross domestic product (GDP) of the healthcare sector grew from € 197.3 billion in 2000 to € 336.4 billion in 2016. This increase of over € 139.1 billion corresponds to an average growth rate of 3.4 percent per year. Compare this to the average national GDP growth rate of 2.2 percent annually. Employment trends reveal a similar picture. The number of persons employed in the healthcare sector increased from 5.6 million in 2000 to almost 7.0 million in 2016. This increase of approximately 1.4 million persons corresponds to an average growth rate of 1.4 percent per year as compared to 0.6 percent per year for all economic sectors. In consequence, the share of the workforce employed in the healthcare sector relative to the economy as a whole has risen from 14.1 percent to 16.1 percent since 2000 (BMWi 2017: 9, 14).

Past studies of the healthcare sector using the National Health Account for Germany (Gesundheitswirtschaftliche Gesamtrechnungen, GGR) analyse the macroeconomic contribution of healthcare to the economy as a whole, focusing on gross value added, the number of employees as well as the positive effects that emerge when healthcare production interlaces with the overall economy. Specific analyses of the healthcare labour market have been neglected in past work.

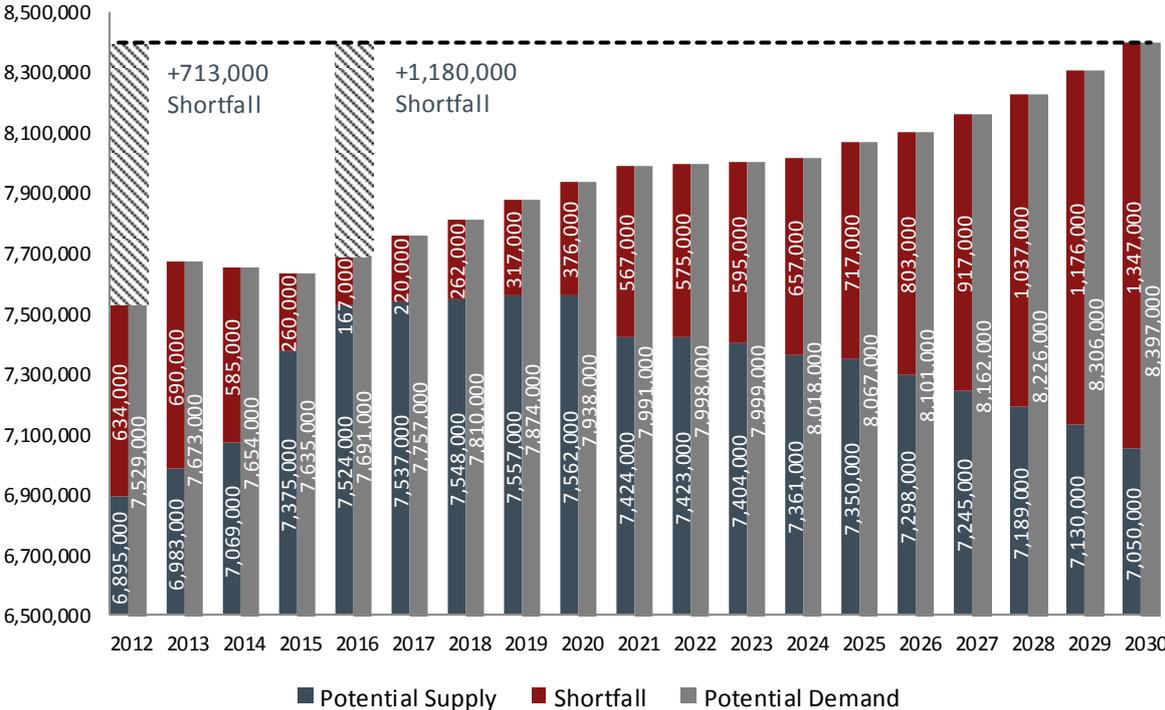
A macroeconomic labour-market model<sup>4</sup> is used in this study to anticipate developments in the structure of labour supply and the potential demand for labour on the healthcare market. It focuses on non-physician healthcare professions that offer services to patients. Below, potential developments in labour supply, labour demand and potential labour shortfalls in the healthcare economy are presented before exploring further conditions framing non-physician healthcare occupations.

Figure 4–1 shows the development of potential labour supply and demand and the resulting expected labour shortfalls in the years 2012 to 2030.

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<sup>4</sup> In order to assess the future labor market potential in healthcare more closely, a macroeconomic labor market model is needed. Based on the delimitations of economic branches used in the National Health Account for Germany (GGR), this model also takes sectoral and occupational group-specific determinants into account (Ostwald et al. 2013: 113–115). The model allows projections of the potential structure of labour supply, potential labour demand and labour shortfalls through 2030, both for the healthcare economy overall and specifically for non-physician healthcare occupations that offer services to patients. A detailed description of this model is provided in section six of the long version of this report.

**Figure 4–1: Potential Labour Supply, Demand and Shortfalls in the Healthcare Economy, 2012–2030**



Source: WifOR 2016, own calculations.

The macroeconomic labour market model projects the potential labour supply in healthcare to increase through the year 2020. At this juncture, the potential labour supply will exceed 7.5 million skilled workers, more than the labour supply of nearly 6.9 million skilled workers in 2012. The number of new graduates entering the labour market will exceed the rate of retirement during these years, thus the predicted rise in the potential labour supply.

This trend will end by 2021, however, when demographic factors will attenuate the potential labour supply in healthcare. According to the prognosis of the Standing Conference of the Ministers of Education, at this point the rate of retirement, increasing due to baby-boomers reaching retirement age, will no longer be offset by the declining rate of entry of new graduates (Statistisches Bundesamt 2014, Internet). Thus, the potential labour supply in 2030 is projected to lie at just over 7.0 million workers, 6.3 percent less than in 2016.

Potential public and private sector labour demand is projected to increase steadily between 2012 and 2030, in contrast to the potential labour supply. The double demographic shift will depress the potential labour supply whilst simultaneously stimulating potential labour demand, as the demand for health services is expected to increase with the age of the population (e.g. Fetzer 2005: 5–6; Bowles und Greiner 2012: 8–9). Also, demand for healthcare services and healthcare personnel are expected to increase as a result of worsening health behaviours (Gesundheitsberichterstattung des Bundes 2016, Internet). Thus, the demand for workers in healthcare, according to the projections of the macroeconomic labour market model, will increase from almost 7.5 million persons in 2012 to approximately 8.4 million workers in 2030.

Juxtaposing the potential labour supply and the potential labour demand leads to the expectation of an increase in the labour deficit by 713,000 persons from 2012 to 2030 (shortfall in 2012: 634,000; shortfall in 2030: 1,347,000). This means that in 2012, a deficit of about 8.4 percent of the total

workforce (relative shortfall<sup>5</sup>) would have had to be compensated for in order to satisfy demand. In 2030, this shortfall will increase such that one in six jobs in the healthcare economy will remain unfilled (relative shortfall of 16 percent).

#### **4.2 Labour Supply, Demand and Shortfalls for Selected Health Occupations that Offer Services to Patients (Not Physicians) through 2030**

This study focuses on non-physician areas of the healthcare economy. These are delimited by four occupational groups as defined by the 3-digit occupational classification categories<sup>6</sup> of the Federal Employment Agency:

- 813 Occupations in nursing, emergency medical services and obstetrics
- 817 Occupations in non-medical therapy and alternative medicine
- 821 Occupations in geriatric care
- 825 Technical occupations in medicine, orthopaedic and rehabilitation

In 2017, these four occupational groups account for about 27.1 percent of potential supply in healthcare. In the following, the central results for these professional groups are presented, showing the potential development of supply and demand together with expected shortfalls.

##### **813 | Occupations in nursing, emergency medical services and obstetrics**

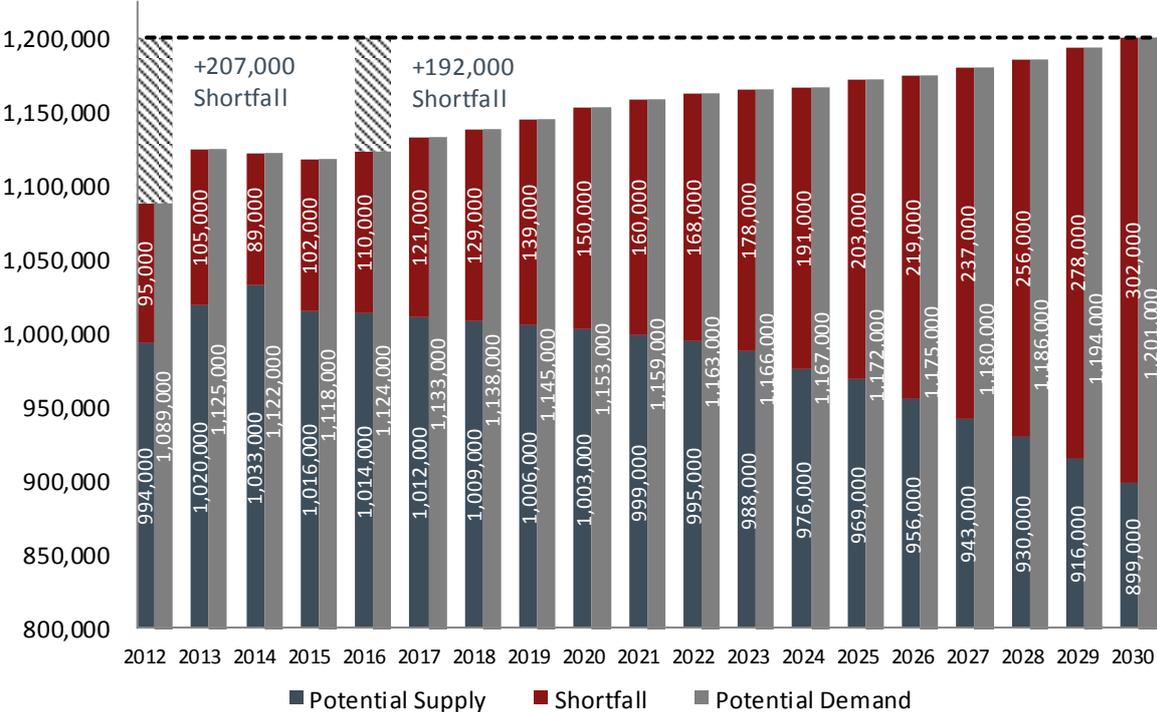
Figure 4–2 shows expected developments in the potential labour supply, demand and shortfall for occupational group 813 (nursing, emergency medical services and obstetrics) between 2012 and 2030.

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<sup>5</sup> Labour supply and demand in combination results in either a surplus or shortfall of labour. A shortfall prevails when labor demand exceeds labour supply. Relative shortfall is the quotient of shortfall to labor demand.

<sup>6</sup> The classification of occupations uses codes to specify different levels of detail in the occupations. Whereas the most general, 1-digit level encompasses ten occupational areas, the five-digit level encompasses 1,286 specific occupations (Bundesagentur für Arbeit 2011: 8). This study uses the 3-digit level plus information regarding the level of qualification; projections within the macroeconomic labour market model cannot be performed at a greater level of specificity.

**Figure 4–2: Potential Labour Supply, Demand and Shortfall for Occupational Group 813 (Nursing, Emergency Medical Services and Obstetrics), 2012–2030**



Source: WifOR 2016, own calculations.

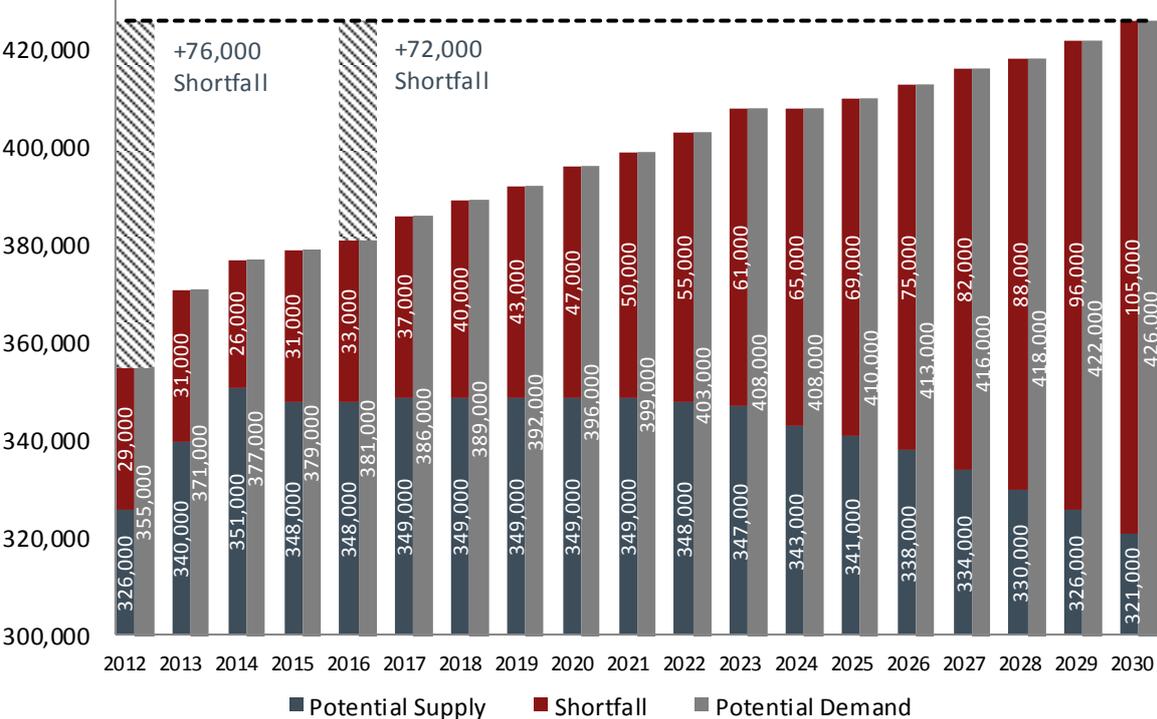
A potential labour supply of more than 1.0 million workers can be observed for the occupational group ‘nursing, emergency medical services and obstetrics’ in 2016. This compares to a potential public and private sector labour demand of more than 1.1 million workers, resulting in a shortfall of 110,000 workers (relative shortfall of 9.8 percent). The macroeconomic labour market model indicates a potential labour demand of 1.2 million workers by 2030, an increase of 6.9 percent. Over the same time period, however, the potential labour supply declines by 11.3 percent to about 0.9 million workers, yielding an increase in the labour shortfall from 192,000 workers in 2016 to 302,000 in 2030. This corresponds to a relative shortfall of 25.2 percent. Based on current data, the shortfall in this occupational group will triple.

The average age of workers in occupational group 813 (nursing, emergency medical services and obstetrics) increases from 39.8 years in 2012 to 46.9 years in 2030 (healthcare economy: 41.6 years in 2016; 46.4 years in 2030). The share of women in this occupational group is 78.8 percent. The macroeconomic labour market model indicates that their share will sink to 71 percent by 2030 (healthcare economy: 47.0 percent in 2016; 42.0 percent in 2030).

**817 | Occupations in non-medical therapy and alternative medicine**

Figure 4–3 summarizes expected developments in the potential labour supply, demand and shortfall for occupational group 817 (non-medical therapy and alternative medicine) between 2012 and 2030.

**Figure 4–3: Potential Labour Supply, Demand and Shortfall for Occupational Group 817 (Non-medical Therapy and Alternative Medicine), 2012–2030**



Source: WifOR 2016, own calculations.

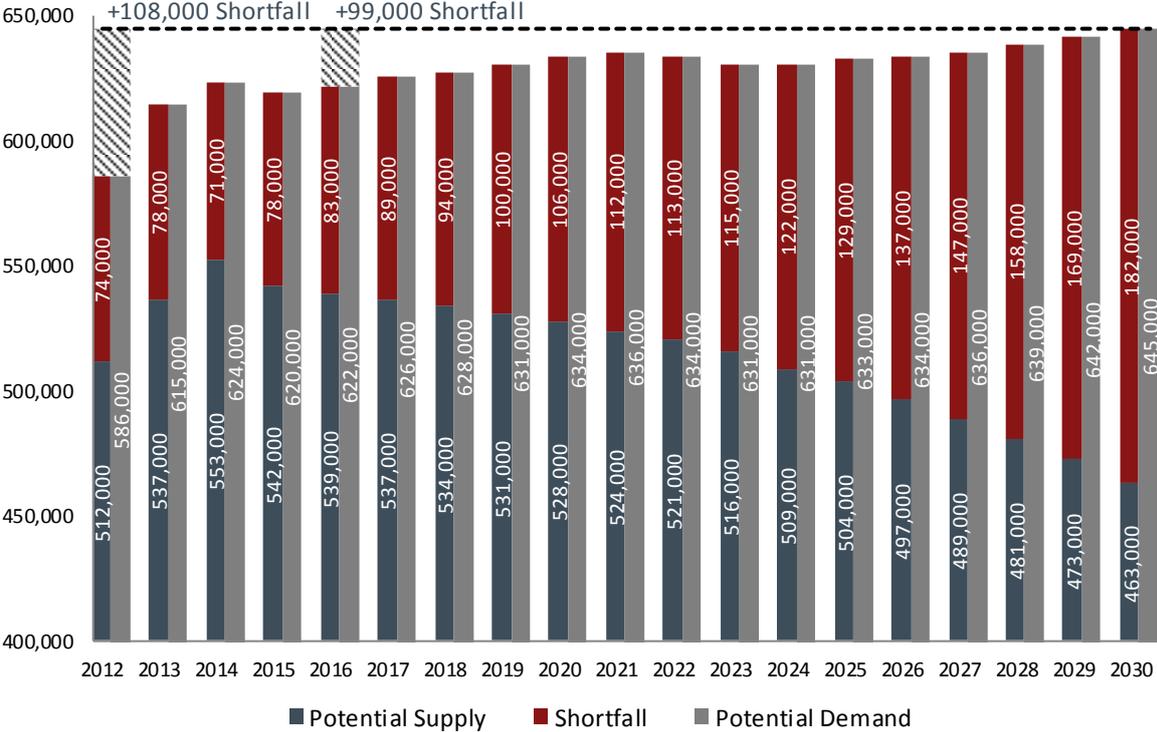
A potential labour supply of 348,000 workers can be observed for the occupational group ‘non-medical therapy and alternative medicine’ in 2016, as compared to a potential labour demand of 381,000 persons. This corresponds to a shortfall of 33,000 persons in this occupational group (relative shortfall of 8.7 percent). By 2030 the potential labour demand increases by 11.8 percent to 426,000 workers. However, the potential labour supply declines by 7.8 percent to about 321,000 persons, yielding a three-fold increase in the labour shortfall by 2030 (absolute shortfall of 105,000 persons). This is 72,000 more workers than in 2016 and corresponds to a relative shortfall of 24.6 percent.

With an average age of 38.8 years in 2012, the occupational group ‘non-medical therapy and alternative medicine’ was the second youngest among the non-physician occupations in healthcare. By 2030, however, it will be the oldest with an average age of 47.8 years (healthcare economy: 41.6 years in 2016; 46.4 years in 2030). The share of women in this occupational group is 79.4 percent. This will fall to 71.4 percent by 2030 (healthcare economy: 47.0 percent in 2016; 42.0 percent in 2030).

**821 | Occupations in geriatric care**

Expected developments in the potential labour supply, demand and shortfall for occupational group 821 (geriatric care) between 2012 and 2030 are shown in Figure 4–4.

**Figure 4–4: Potential Labour Supply, Demand and Shortfall for Occupational Group 821 (Geriatric Care), 2012–2030**



Source: WifOR 2016, own calculations.

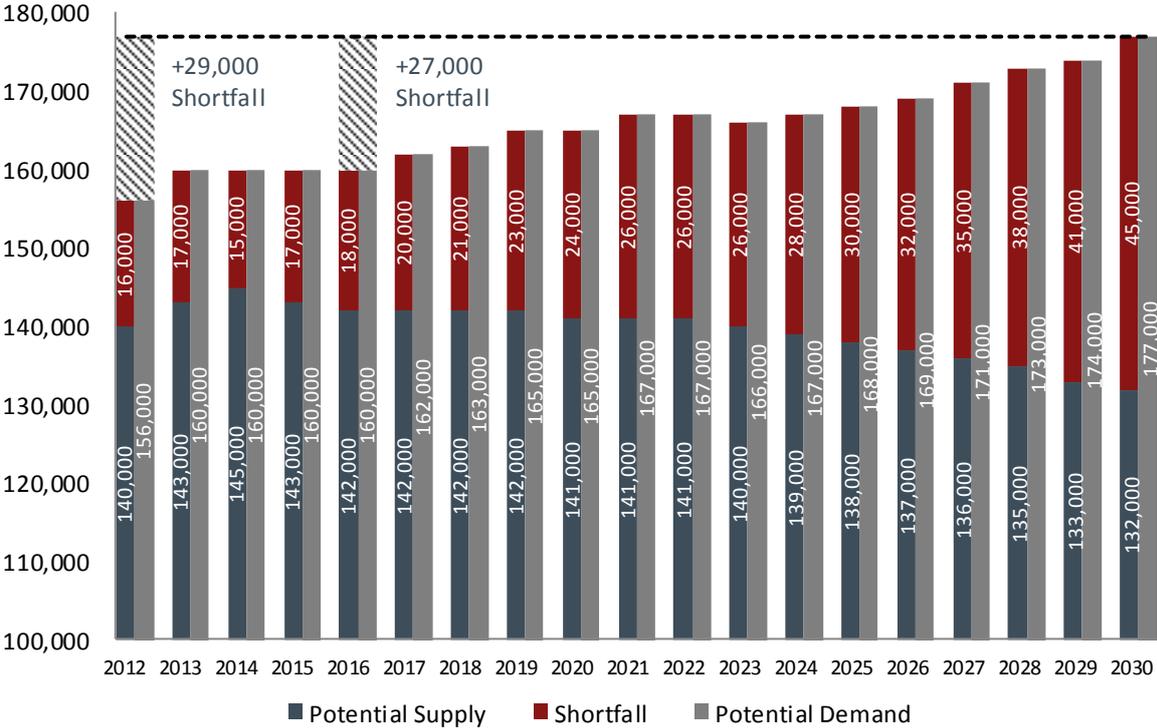
The labour shortfall in the occupational group ‘geriatric care’ increases from 83,000 workers (relative shortfall of 13.4 percent) in 2016 to 182,000 persons (relative shortfall of 28.2 percent) in 2030. In contrast to potential labour demand, which increases from 622,000 (2016) to 645,000 persons (2030), potential labour supply decreases by 14.1 percent from 539,000 in 2016 to 463,000 workers by 2030. The double demographic shift, which manifests itself by depressing potential labour supply whilst simultaneously stimulating demand for health services and healthcare workers, means that more than one-fourth of all jobs will not be filled in 2030.

The macroeconomic labour market model projects an increase in the average age of workers in geriatric care from 40.5 years in 2012 to 47.1 years in 2030 (healthcare economy: 41.6 years in 2016; 46.4 years in 2030). Among all four non-physician occupations in healthcare, geriatric care workers show the most moderate increase in average age. The share of women in geriatric care falls from 82.9 percent (2016) to 74.6 percent by 2030 (healthcare economy: 47.0 percent in 2016; 42.0 percent in 2030).

**825 | Technical occupations in medicine, orthopaedic and rehabilitation**

As for the occupational groups discussed above, expected developments in the potential labour supply, demand and shortfall for occupational group 825 (medical, orthopaedic and rehabilitation technology) between 2012 and 2030 are summarized in Figure 4–5.

**Figure 4–5: Potential Labour Supply, Demand and Shortfall for Occupational Group 825 (Medical, Orthopaedic and Rehabilitation Technology), 2012–2030**



Source: WifOR 2016, own calculations.

A potential labour supply in occupational group 825 (medical, orthopaedic and rehabilitation technology) of 142,000 workers in 2016 is contrasted to a potential labour demand of 160,000 persons, yielding a shortfall of 18,000 workers (relative shortfall of 11.4 percent). The macroeconomic labour market model shows potential labour demand increasing to more than 177,000 persons by 2030, an increase of 10.6 percent. At the same time, potential labour supply falls by 7.0 percent between 2016 and 2030 such that the shortfall grows to 45,000 workers by 2030 (relative shortfall of 25.3 percent). Based on current data, demand for healthcare services in this area will increase such that one-fourth of all jobs will not be filled in 2030. The labour shortfall increases by 27,000 (2016) up to 45,000 persons by 2030.

The occupational group 825 (medical, orthopaedic and rehabilitation technology) shows an increase in average workforce age from 38.4 years in 2012 to 46.3 years in 2030 (healthcare economy: 41.6 years in 2016; 46.4 years in 2030). This group had the lowest average age of all non-physician occupational groups in healthcare in 2016. The share of women in this occupational group – 44.5 percent in 2016 and 41.0 percent in 2030 – is similar to the share of female employees in the overall healthcare economy.

**4.3 Shortfall Developments in the Healthcare Economy: Policy Choices and Scenarios**

The present study modelled worst-case, base-case and best-case scenarios for the purpose of identifying a variety of policies with good chances of reducing labour shortfalls in each of the non-physician professions. The scenarios turn on career longevity, career-switching and the number of new graduates entering the job market. The design of scenarios was coordinated in workshops with professional associations representing the various groups involved in non-physician healthcare and also draws on the current healthcare economics literature.

Figure 4–6 provides an overview of the absolute and relative labour shortfalls in the four relevant occupational groups in the years 2016 and 2030 under simultaneous consideration of all three scenarios: longevity, career-switching and the number of new graduates entering the job market.

**Figure 4–6: Absolute and Relative Shortfalls in Non-Physician Occupational Groups under Simultaneous Consideration of Scenarios**

Occupational Classification: 3-Digit Code	2016	2030		
		Worst-Case	Base-Case	Best-Case
<b>813   Nursing, Emergency Medical Services and Obstetrics</b>	110,000 (9.8 %)	440,000 (35.9 %)	302,000 (25.2 %)	212,000 (18.1 %)
<b>817   Non-medical Therapy and Alternative Medicine</b>	33,000 (8.7 %)	156,000 (35.3 %)	105,000 (24.6 %)	73,000 (17.6 %)
<b>821   Geriatric Care</b>	83,000 (13.4 %)	250,000 (38.6 %)	182,000 (28.2 %)	135,000 (21.4 %)
<b>825   Medical, Orthopaedic and Rehabilitation Technology</b>	18,000 (11.4 %)	66,000 (35.7 %)	45,000 (25.3 %)	31,000 (18.3 %)

Source: WifOR 2016, own calculations.

Relative shortfalls could grow ‘explosively’ if the assumptions underlying the worst-case scenarios hold in 2030. The shortfall in ‘nursing, emergency medical services and obstetrics’ would come to 440,000 persons; with the consequence that 35.9 percent of jobs would remain unfilled. The occupational group ‘non-medical therapy and alternative medicine’ would have a relative shortfall of 35.3 percent with an absolute shortfall of 156,000 persons, the lowest among all non-physician healthcare occupations. In geriatric care, the relative shortfall in 2030 would come to 38.6 percent, corresponding to an absolute gap of 250,000 persons. This is 68,000 more than the base-case projection. Finally, the absolute labour shortfall in the group of employees in ‘medical, orthopaedic and rehabilitation technology’ is estimated at 66,000 persons in the worst-case, which corresponds to a relative shortfall of 35.7 percent.

On the other hand, should the assumptions of the best-case scenarios hold, labour shortfalls in non-physician healthcare professions would be much less severe. Accordingly, relative shortfalls for the occupational groups 813 (nursing, emergency medical services and obstetrics), 817 (non-medical therapy and alternative medicine) and 825 (medical, orthopaedic and rehabilitation technology) would amount to less than 20 percent. The occupational group of ‘geriatric care’ would see a gap of 135,000 workers, meaning that one-fifth of all jobs would go unfilled.

## 5 Study Findings and Future Perspectives

The study's findings reveal areas of potential policy action for mitigating current and possible future labour shortfalls in the healthcare professions. All projections indicate the emergence of labour shortfalls in the event that adequate preventive steps are not taken. The study did not encompass an evaluation of the likely effectiveness of the identified policies, and even with additional sources this would not be completely feasible.

### Policies to Improve Career Longevity

The study's findings indicate that the current conditions framing career longevity would lead to a stark increase in labour shortfalls. Projections show a clear shortfall of more than 30 percent for the year 2030. Thus, **the extension of actual career longevity by maintaining employability has an ameliorating effect** on relative labour shortfall. A base-case to best-case reduction of up to 2.5 percentage points through 2030 is projected. Among all parameters considered in this projection model, this factor has the strongest effect on labour shortfalls.

Recommendations:

- On the basis of study findings, interventions are recommended that enable and support greater career longevity. Concrete measures should be based on knowledge of job-specific barriers to career longevity.
- Working conditions should be modified with a view toward improving employability and health such that employees can continue in their profession even in advanced age. Contributions can be made through, for example, the use of assistive technology, the widespread implementation of occupation-specific measures of corporate health management or the broader differentiation of job profiles in the sense of skill-mix diversification.
- The Health Prevention Law obliges social funds to strengthen their cooperation and could also make a contribution to improved career longevity.

### Policies Affecting Career-Switching

The scenarios involving career-switching indicate that a net emigration of nearly 3 percent (worst case) would lead to an increase in the relative shortfall across all occupational groups of 2.2 to 2.3 percentage points. In contrast, the best case, which assumes a net immigration of 3 percent, would lead to a reduction in the relative shortfall of up to 2.3 percentage points. Consequently, **the scenarios involving career-switching represent the second most important area for policy action**. The largest groups of career-switchers are men and younger healthcare professionals. The likelihood of changing careers falls with increasing career experience and career-relevant qualification level and in the presence of monetary incentives.

Recommendations:

- Pay structures and opportunities for remuneration in the healthcare professions, especially in nursing, should be revised.
- The improvement of the vertical permeability of career paths as well as the promotion of autonomy can be additional building blocks for preventing occupational emigration. The implementation and scientific evaluation of pilot projects in these areas should be encouraged and project results should be integrated into standard care when appropriate.
- Training programmes (over several months) and subsequent mentoring (over several years) can increase the level of career attachment, especially for younger employees.

- Facilitating flexible working hours to support family and nursing care, as well as monitoring return to work, could also increase the labour market participation of healthcare professionals.
- The Federal Employment Agency's success in promoting worker retraining to enter the geriatric care labour market should be extended to other healthcare professions as an option for increasing occupational immigration.

### **Policies Affecting Education**

Adjusting the number of new trainees and students across the educational scenarios has the weakest effects on labour shortfalls (in comparison to career longevity and career-switching). Even in the best case, the relative labour shortfall in the non-physician healthcare occupations can be reduced by 0.5 percentage points at most. This is due to the relatively small number of new graduates entering the labour market relative to the entire labour force. Therefore, **policies in the area of education can make only a comparatively small overall contribution** to the reduction of labour shortfalls. Nevertheless, they remain relevant in the light of the fact that healthcare companies are already having to compete for qualified workers.

Recommendations:

- In the field of education, the focus should lie on the acquisition of trainees, framing conditions and the superordinate structures.
- In light of changing career profiles, the sustainable employment opportunities in these professions should be clearly communicated to the public.
- Promoting networks of companies, nursing schools and general education schools for the generation of young talent is another building block.
- The maintenance and expansion of possibilities for low-threshold career entry is recommended. The federal states need to develop a common regulatory framework for healthcare assistant occupations.
- Upskilling to higher levels of qualification should be promoted, for example with measures similar to the promotion of retraining to geriatric care. This has proven successful, and its continuation and, if appropriate, its transfer to other occupations such as general nursing is recommended.
- Deficits exist in many healthcare occupations in opportunities for university education, professional tasks requiring university-level skills and, more generally, in the overall quotient of university-trained professionals. The lack of attractive employment opportunities for university trained health professionals is countering the recruitment of specialist workers from abroad, especially in Germany's nursing market.

### **Policies Related to Data Collection**

In the course of the study it became clear that the **available data are insufficient** for answering specific questions related to the individual healthcare professions in Germany. Underlying causes of this problem include (1) non-existent data, (2) inconsistencies between data of different origins and between different time points (e. g. classifications of professions or sectors) and (3) obstacles to data access.

## Recommendations:

- Healthcare economics research supported by the German Federal Ministry for Economic Affairs and Energy has served in past years to underscore the sectors' significance and to improve knowledge of causal relationships (Henke et al. 2010; Henke et al. 2011; Ostwald et al. 2013; Schneider et al. 2014; Schneider et al. 2015). These studies should be resolutely continued, and their underlying methods and models should be further refined with the goal of showing repercussions on health expenditures, economic growth and employment.
- Studies using the national health economy accounts as depicted in this study should be expanded upon from a detailed labour market perspective.
- Data for scientific analyses of potential labour supply and demand at the level of specific occupations should be made more widely accessible.
- In the healthcare professions there are developments that are not primarily intended to expand data generation but which would have this effect potentially and which, for this reason, should be promoted. For example, the establishment of 'Nursing Chambers' (Pflegekammer) or the introduction of the electronic registry of healthcare professions.

## Additional Policy Areas

In addition to the fields of action described above, further potential areas for action became apparent during the course of the study, some of which are the topic of continuing social and political discussion. Deriving specific relevant policy measures from the results of the present analysis is not possible. Yet the recommendations, below, reflect opinions or interpretations which are relevant from the perspective of the project partners because they revolve around workforce development in healthcare. These issues should also be taken into account in cooperation with the respective, responsible ministries for the purpose of developing sustainable strategies to mitigate labour shortfalls.

- **Attractiveness of Healthcare Occupations:** Politicians, professional associations and others routinely presume an attractiveness deficit, which in turn is attributed to those characteristics of the professions analysed in the study that have been identified by other studies and employee surveys as stressful. Healthcare professions could be made more attractive with measures in the areas of working conditions, autonomy and career paths.
- **Digitalisation in the Healthcare Economy:** Changing processes and structures of cooperation through digitalisation raises a multitude of questions, which so far have not been adequately addressed. In particular, its impact on the employment market, changes in occupational profiles, career longevity and ways to activate personnel reserves should be the subject of further research.
- **Career Migration into the Healthcare Occupations:** Career migration can be a further building block for ameliorating expected labour shortfalls. In various evaluation studies (Peters et al., 2016; Braeseke et al., 2013; Merda et al., 2012), factors favouring career migration into healthcare training programmes and occupations have already been identified. However, there is a need for further research also in this area, in particular with regard to current considerations of how to reduce labour shortfalls by increasing the number of immigrants and refugees entering nursing professions.

On the basis of study findings, the further research in the following areas is recommended.

- **An exhaustive survey of the current data stock**, including existing deficits, towards building a comprehensive and unitary data base for making prognoses regarding developments at the level of the individual healthcare professions and for making direct comparisons at the microeconomic level.
- **Studies differentiated by occupation on the causes of premature career termination** for the identification of measures to improve long term career longevity.
- **Analysis of existing best practice for improving staff loyalty among younger employees** with a focus on promoting career advancement.
- **Intensification and networking of existing education initiatives.**

Developments in labour supply, employment and labour shortfalls in non-physician healthcare professions will continue to be closely monitored. The labour shortfalls predicted by this and other studies make action imperative. Measures that have already proven effective can be supplemented by further options for ameliorating labour shortfalls. In the future, more effort should be invested in verifying the effectiveness of these measures.

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